

Advanced Stellar Propulsion Systems

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by Brian Fraser (Scottsdale, Arizona, USA)
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Addendum TOC

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Introduction

I was wandering in a bookstore one day and saw one of those StarTrek engineering manuals. I leafed through it and saw all kinds of detailed and interesting drawings. I wondered if the book explained how the "warp drive" worked. I found intriguing terms like "dilithium crystals," "phase inducers," and "inertial dampers." But the book did not explain how this interstellar propulsion system operated, except that it was based on the warping of space. I was disappointed and did not buy the book. But the idea of such a propulsion system fired my imagination. Was it possible? Could I design one?

But I never gave the problem much thought after that. I enjoyed StarTrek because it had good psychological themes, not because it was high-tech. And I really had not the slightest idea how I would design a warp drive.

Eventually though, my mind came back around to confront this problem. I seem to like solving "impossible" problems. I also am intrigued about learning how the human mind solves such problems and creates new concepts and insights seemingly from nothing. I tend to solve problems intuitively, and so the process is not obvious to me.

And so this article is about gravitation and a possible basis for an advanced propulsion system. If you are a regular reader of science magazines you will find the ideas presented here reasonably clear. They are not inherently hard to understand, but they are very *different* and will require quite a bit of patient reflection. Some background in physics would help you with the terminology.

Also, this article is more concerned with finding the right *questions*, and the right *principles*, than with finding the right answers per se. I also think you will find it to be a good example of a useful problem solving attitude I call "creative arrogance" —a viewpoint that is quite in contrast to that of our Pavlovian educational system. (For more about creativity see: "Creativity in Science and Engineering", Ronald B. Standler, 1998, <http://www.rbs0.com/create.htm> ; "The Creativity Crisis", Po Bronson, Ashley Merryman, <http://www.newsweek.com/2010/07/10/the-creativity-crisis.html> ; <http://www.newsweek.com/2010/07/12/forget-brainstorming.html> ; "Opinion: Academia Suppresses Creativity", Fred Southwick (2012) <http://www.the-scientist.com/?articles.view/articleNo/32077/title/Opinion--Academia-Suppresses-Creativity/>)

The Key Premise

A previous article, [An Atom or a Nucleus?](#) refuted the commonly held belief that atomic matter is made up of fundamental particles. Instead, the evidence from physics points to the idea that matter

is actually some sort of relationship between space and time. Matter gravitates, and in order to design an advanced propulsion system, an understanding of gravity is very necessary. It follows that we need to know a lot more about how these space-time relationships operate.

Two lines of evidence suggest that matter is comprised of *ratios* of space and time. The first is the requirement of consistency in the units of measurement in the mathematical equations describing physical phenomena. In common terms this means that if an equation has the units of measurement of apples, oranges, and pineapple on one side of the "=" sign, then it must have fruit, or fruit cocktail units of measurements on the other side; it cannot equate to typewriters or airplanes.

Certain equations in physics are descriptive of *fundamental* phenomena and space/time ratios appear in these equations. $E = cB$ and $E = mc^2$ are two well-known examples. The "c" term stands for a constant that appeared in Maxwell's equations pertaining to electromagnetic phenomena. That constant turned out to be the speed of light and so physicists have continued to use the letter "c" to denote that speed. It is quite high—about 186,000 miles *per second*. It is clearly a space/time ratio. But note that it is used with E (energy), M (mass) and B (magnetic flux density). In order for these equations to be consistent in their units of measurement, E, M, and B must also be space/time ratios. If mass and energy are space time ratios, then *every* entity in the physical universe must be ultimately reducible to a space/time relationship.

The second line of evidence is that certain physical entities can be inherently described in terms of space/time ratios. The most prominent feature of the photon (light), for example, is a property called "frequency", which has the units of "cycles per second." Frequency is a special sort of speed and can be treated as a space/time ratio.

This is also true of particles having mass. Electrons have a property called "intrinsic spin." This is not the ordinary type of spin you could visualize on a spinning toy. In fact it can be demonstrated in one-dimensional systems where ordinary angular momentum cannot even be defined. Atoms also possess this kind of spin ("intrinsic angular momentum") as the Stern-Gerlach experiment demonstrated in 1924. Intrinsic spin and angular momentum are also akin to speed, but imply *rotational* space/time relationships instead of linear or oscillatory ones.

In other words, photons (light), atoms, and subatomic particles all seem to possess inherent space/time ratios of various sorts. As far as we know the entire universe is made up of these three classes of entities and so this again amounts to saying that everything in the universe is a space/time ratio.

This would actually resolve the fundamental particle dilemma. As was pointed out in *An Atom or a Nucleus?* there can be no such thing as a fundamental particle. Particles can be converted into radiation and radiation into particles, but that which is truly fundamental cannot change into some other thing. If radiation and matter are comprised of space/time ratios, then their interconvertability is understandable. When an electron annihilates a positron, for example, a rotational space/time relationship simply converts into the form represented by radiation. Both are still fundamentally space/time ratios.

We cannot explain *what* space and time really are. Such an explanation could only occur from a viewpoint that is outside of the physical universe, and therefore outside of the scope of science. We

humans have an intuitive feel for space and time, but they are both inherently unanalyzable. The *function* of space and time, on the other hand, seems to clearly involve the concept of *separation*. It is as though God created them so he could say, "I am here, and you are there. I am me, and you are you." This "separability" is fundamental to concepts like "locality," "identity," and "existence." These are all very important to the physicist and to our understanding of the universe.

Apparent Properties of Space and Time

While we cannot explain *what* space and time are, it will be fruitful to note their key properties. These seem to be as follows:

1. **Space is three-dimensional.** Space has a property we could call "extensionality" and it manifests this property in three independent ways, and is typically described by three independent numbers. This is just a technical way of saying space is "three-dimensional."

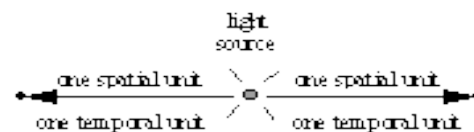
2. **Time progresses.** The most obvious effect of time is to order events in time and to separate such events in time. Time seems to progress only in one direction.

Note that the ordering of events in time seems to be independent of their ordering in space. I can lay out cards on a table, but their spatial order says nothing about which card was laid down first or last.

3. **Time is three-dimensional in the same sense that space is three-dimensional.**

This peculiar conclusion is forced upon us when we try to account for the observed properties of light. The Michelson-Morley experiment, Bradley's telescopic stellar aberration, and de Sitter's problem, all suggest that the speed of light is constant in all unaccelerated reference systems in a vacuum. The measured speed does not depend on the speed of the emitter, or upon the physical reference system used for measurement. This actually facilitates our understanding of the universe, but is also counterintuitive. An illustration will help clarify the meaning of these statements.

Suppose two automobiles are moving directly away from each other, one traveling north and the other, south. Suppose that their speedometers each show 50 miles per hour as the rate of travel over the ground. Simple intuition tell us that the separation rate of these two automobiles *relative to each other* is 100 miles per hour.



Two photons are emitted from a source of light. Each photon moves away from the source at speed c . Common sense would lead us to expect that they move away from *each other* at a speed of $2c$. But experimental evidence indicates the separation rate is only c , rather than $2c$.

Speed is a ratio of space and time (s/t). For the speed to remain constant in this manner, the photon must move through one unit of time just as it moves through one unit of space. In this example, the total spatial separation between photons is 2 units and the total temporal separation must also be 2 units. The ratio of $2/2$ c produces the same speed as $1/1$ c .

In other words time must be 3-dimensional and photons must move in both space and time. The speed of light is thus constant in all reference systems in a vacuum.

But now suppose we repeated this experiment using two photons instead of automobiles. Photons move at speed "c" the speed of light. The rate at which the two photons separate—the total spatial separation divided by the total time separation—is expected to be $2c$. Simple experiments do in fact show a speed of $2c$, but the more fundamental evidence mentioned above suggests that this speed is only an artifact of the reference system. The photons physically separate at the actual rate of c , not $2c$.

The simplest way around this uncomfortable conclusion is to claim that *time* is three-dimensional like space, and that photons travel simultaneously in both space and time. As the accompanying illustration shows, the two photons have moved one spatial unit away from the source and are separated from each other by two spatial units. But if light travels through time, the total temporal separation would also be two units. This keeps the ratio constant and so the speed of the photon, whether relative to the source, or relative to the other photon, would always be c . In other words it is both constant and independent of the reference system.

This seems like a good explanation except that temporal positions cannot be depicted in a spatial reference system. So how do we know this is really happening? Is there any evidence that photons have a physical position in three-dimensional (or "coordinate") time? Yes, there is.

Modify the above illustration by requiring that the two photons be emitted *in the same event*. For example, there is a device that can convert a single violet photon into two red photons; the total energy remains the same and the requirement that they originate in the same event is satisfied. These photons can then separate as shown in the illustration. It can be shown that if something alters the polarization of the photon moving to the right, something will also happen to the polarization of the one moving to the left. The two photons could be widely separated, even miles from each other, and this will still happen. How can one photon "know" what has happened to the other? Could some effect be propagated across space at twice the speed of light? Or is this what Einstein called "spooky action at a distance"—a concept that makes physicists very uncomfortable?

The underlying explanation seems to be simple. The photons are moving in both space and time. In space they are separating, but *because they originated in the same event*, they remain in the same *temporal* location, and that location moves away from the source and carries the two photons. It follows that if I disturb one photon, the other one becomes disturbed because they are both in the same *temporal* location, even though they are not in the same *spatial* location. Our spatial reference system is incapable of depicting temporal locations, and so the effect looks like the incomprehensible "action at a distance."

This effect, though not the explanation, is actually well known to physicists. It was first described in a scientific paper written by Einstein, Podolsky, and Rosen in 1935 and which later came to be known as the "EPR paradox." It was originally a "thought experiment" with no experimental basis. But in the 1960s a mathematical theorem by John S. Bell allowed this paradox to be tested experimentally. Several experiments of widely differing designs were performed since then and the physical reality of the EPR paradox has been thoroughly confirmed. Physicists still have not found a plausible explanation for this effect and articles about it continue to appear regularly in the scientific and engineering journals. It is a fascinating and classical problem in quantum physics. (For further discussion see: [The Problem of Quantum Locality](#))

4. Space progresses in the same sense that time progresses.

We readily sense the progression of time, but space seems to "stay put" and not progress. If space did progress, it would manifest itself as an expansion. Everything in our environment would be moving away from everything else. I know of only two instances where this seems to be the case: photons always move outward and away from the source of emission, and galaxies are moving away from us as well as each other (the "expanding universe"). Both effects involve what could be called "free space." But if both space and time are three-dimensional, and if both progress, why do we sense the progression of time but not space?

To humans, one second of time is a readily comprehensible quantity. But physically a natural quantity of time is more likely on the order of the Rydberg fundamental frequency, or about 10^{-16} seconds. That means that we humans apprehend an enormous amount of time at one glance. What if our view of space could be similarly enlarged? What would we see if our desktop unit of space were 10^{16} light-seconds? That is roughly 300 million light years. Our galaxy is about 100,000 light years in diameter. On this scale we would need a microscope just to see a galaxy! If our desktop were large enough to hold say, 100 of these units of measurement, we would be looking at 30 billion light years of space in one glance. The evidence from astronomy indicates that under these circumstances we would definitely sense the expansion (progression) of space. But we would not have any obvious clue that it is three-dimensional.

This idea, incidentally, is consistent with statements in the Bible about the "stretching out of the heavens." (Job 26:7, 9:8, 37:18, Psalm 104:2, Isaiah 40:22, 42:5, 44:24, 45:12, 48:13, 51:13, Jeremiah 10:12, 51:15, Zechariah 12:1) It is also consistent with recent discoveries in astronomy pertaining to Einstein's cosmological constant, dark energy, etc: "REPULSIVE FORCE IN THE UNIVERSE", Physics News Update, March 4, 1998, <http://www.aip.org/pnu/1998/split/pnu361-1.htm> ; <http://www.wired.com/wiredscience/2008/12/dark-energy-ein/>

Summary of Key Space/Time Concepts

- Both space and time progress in three dimensions. This means that space expands and time expands. We cannot see the expansion of time in our reference system but we can see the effects of the expansion of space ("clock space") with appropriate combinations of telescopes and spectrographs.
- Both space and time depict separation and the depiction of separation makes use of both extensionality and expansion.
- Space and time have identical properties and are fundamentally indistinguishable. There is no way to tell which is which. For now, we might simply think of them as two "realms of separation."
- Evidence from quantum physics suggests that space and time exist in very small but discrete, indivisible units.

Space and time are apparently always coupled into ratios. The master ratio is apparently the speed of light, c , which must represent the basic speed of space/time itself. This appears to be the

"nothing datum" for the *physical* universe. (Other ratios are "not nothings," in other words, particles or radiation.) The temporal portion of this ratio is the "time" that we humans perceive as progressing. The progression of the spatial portion explains why the universe expands (the "expansion of the universe"). This expansion is not due to the "Big Bang" that scientists claim blew the stars and galaxies apart during the birth of the universe; it is due to the progression of space itself.

Space and time are *not* the backgrounds or settings in which events take place. They are the events themselves. I know that readers will have a great deal of difficulty with this and I have had to sacrifice some technical accuracy to keep things understandable. For now, the reader should try to work with both viewpoints.

"Nothing happens until something moves." —Albert Einstein

Gravitation and Space/Time ratios

If matter reduces to a space/time ratio, then *matter is on the move*. But where is it going? We know matter gravitates towards other matter and so the obvious answer is "towards all other matter." Gravitation would be a nice property to incorporate into a stellar propulsion system because it inherently causes motion towards other things. If we want to visit another star system, we must move towards it, not away from it! ☺

The summary section above left us with a completely empty universe that was expanding at the speed of light in both time and space. If we could mentally stand outside of this universe and throw some things into it, what would happen? There are three major cases:

Let's say I throw in a handful of special fluff powder. This special powder has no mass and when it engages the physical universe, all of its component particles are swept outward and away from the original location at the speed of light. The original locations of each of the particles are swept along in the expansion of space. If we called these particles "photons," we would realize that photons are actually stationary; they have no motion relative to space or to time.

That nicely solves a major dilemma in physics: the need for a medium in which to propagate the wave motion of light. In this scenario, light is stationary; it is not propagated, does not go anywhere, and has no need for a medium. It would be swept outward and away from its source at the speed of light, and that is exactly what is observed experimentally!

Now suppose I create some stuff that has a property I will call "antimotion." This antimotion, in effect, figures out which way space and time are expanding and moves in the opposite direction. We will suppose that the speed of the antimotion is equal to the speed of light. What happens if I place a handful of this stuff into the physical universe? From my viewpoint it will remain stationary, because the antimotion exactly opposes the outward expansion of space/time. Note carefully that it appears to be stationary because it is actually moving at the speed of light relative to the space and time in which it is located!

This nicely solves a major dilemma in astrophysics: the need for an explanation of the stability of globular clusters. A globular cluster is a roughly spherical blob of tens of thousands of stars. The

cluster does not rotate and so astronomers would expect gravitation to draw the stars together, causing the whole cluster to collapse. But they are manifestly very stable structures. What apparently happens is that the inward gravitational motion of an individual star is exactly balanced out by the outward expansion of space/time. Gravitation moves things "towards" and the expansion moves things "away." The result is an equilibrium and the structure is stable.

(<http://arxiv.org/abs/0707.2459>)

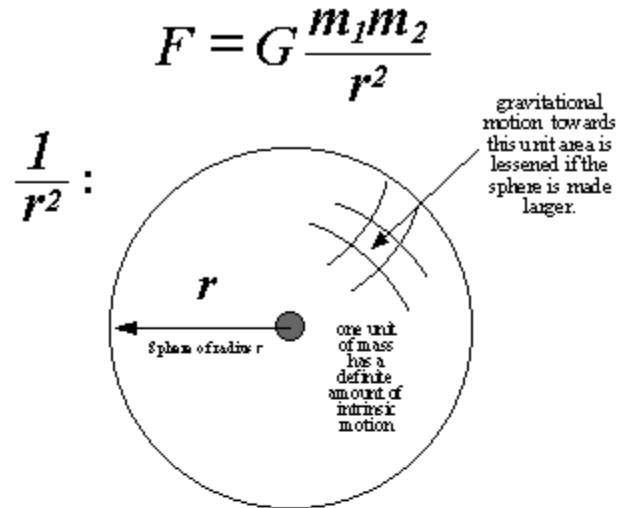
Now suppose I create some more of this antimotion stuff but this time make it so it moves anti to the expansion of space/time at *twice* the speed of light. When I throw a handful of this stuff into the universe, the space/time expansion tries to move it apart, but the antimotion has twice the intensity and causes it to move together. We would say the particles "gravitate" together. Note carefully that they come together, *not* because they are exerting "gravitational forces" on each other, but because they are on their own independent course, and that course is "anti to outward" in every case for each individual particle.

But how would matter acquire this antimotion? You have already read the answer. Matter *is* an intrinsic space/time ratio. It is already in motion (or "*is* motion"). The motion only needs to be opposite that of the space/time expansion.

A deeper analysis shows that this motion can be completely described by one number (like +1 for the expansion or -2 for the antimotion). In other words, its sole distinguishing characteristic is just a magnitude. This is unusual because we usually think of "motion" as having both a magnitude and a direction. So this motion literally has no direction except to say that it is "towards " or "away." To oppose the outward expansion, the intrinsic antimotion does not need a direction, just a magnitude with the correct + or - sign.

It can now be seen that gravitation is not a force. It is more properly treated as a motion. Picture an apple dropping to the earth. The earth has far more mass than the apple, and therefore far more "intrinsic motion." So it is the *earth* that rushes to meet the apple. The apple itself is relatively stationary in space because it has the least mass and

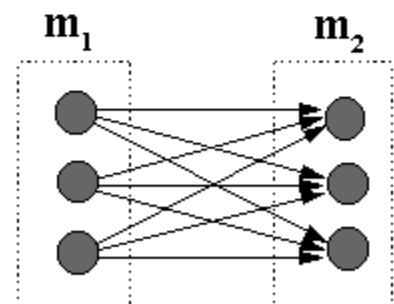
Derivation of the gravitational force equation:



A unit of mass has a definite quantity of intrinsic motion, and its effects are distributed in 3D space much like light is distributed in space when radiated from a light bulb. The light would spread itself on the inner surface of a sphere of radius r . If the sphere were made larger, this same quantity of light would be spread out over a larger area in proportion to r^2 . (The formula for the surface area of a sphere is $S=4\pi r^2$). The flux of light through a unit area on this surface is therefore proportional to $1/r^2$. Likewise, the gravitational motion is proportional to the inverse square of the radius.

Also, if there were two units of mass instead of one, the motion as measured at the surface would be twice as intense.

$m_1 m_2$:



In this example, a body containing 3 units of mass appears to act on another body also containing 3 units of mass. In reality, the intrinsic motion, $m_1 \rightarrow m_2$, is indistinguishable from $m_2 \rightarrow m_1$. But in practice, one mass is viewed as stationary and its intrinsic motion is attributed entirely to the other mass. The "force" of interaction therefore appears to be proportional to the *product* of the masses (9 units).

therefore the least intrinsic motion. (See [Principle of Equivalence](#) below; this is also consistent with the current view of gravitation. See *Spacetime Physics*, E. F. Taylor, J.A. Wheeler, 2nd ed., p.26-29. For an explanation of the fundamental origin of gravitation, see [Origin of Intrinsic Spin](#))

The expansion is centerless and is everywhere the same. Gravitation, however, is bound to a center and has a distinct spatial distribution of its intensity. A unit of mass has a definite quantity of motion and this motion is distributed equally in all directions. If this mass were surrounded by a spherical surface, all points on the surface would receive an equal amount of motion. The same would be true if the sphere were made larger, except that this same definite quantity of motion would now be spread out over a larger surface and would therefore be less intense. The surface area of a sphere is directly proportional to the square of its radius. Hence, the intensity of the motion towards a unit area on the surface of the sphere will be proportional to the inverse of the radius squared. If we think of the gravitational motion as being caused by forces, then this type of (motional) gravitation would have an inverse square force distribution just as expressed in Newton's law of (conventional) gravitation. (See also Feynman *Lectures on Physics* Vol 2, p 1-5,4-7)

It can be seen that if there were *two* units of mass instead of one, this unit area would receive *twice* the motion. Hence, the total gravitational motion will be directly proportional to the total amount of mass. Note, however, that this will be the case only if the gravitational force is measured by its effects on a *one unit* test mass. If the masses have more than one unit of mass, they will give the appearance of attracting each other in direct proportion to the *product* of their masses, as the accompanying illustration shows.

The only other item in Newton's equation that needs an explanation is the proportionality constant, G. This constant presents us with two perplexing questions. G does not represent a "thing" and therefore cannot legitimately have units of measurement. So why isn't it just a pure number? And why is a proportionality constant needed in such a fundamental equation as that for gravitation? Its presence suggests that the units of length and mass do not match the physical reality.

The explanation is that Newton's equation is a good *mathematical* description of gravitation but it tells us nothing of the concepts underlying the phenomena. It says "this is what is happening" instead of "this is why and how it is happening." Another of Newton's own equations, $F=ma$, states that force is proportional to mass times acceleration. But his gravitational equation, in contrast, states that force is proportional to the *product of two masses*, divided by the square of the distance between the two masses. This creates problems with the consistency of the units of measurement and so in conventional physics, G is arbitrarily assigned units of measurement such that the units on both sides of the "=" sign are the same.

This is an unnecessary contrivance however. The r^2 term in the denominator does *not* have the units of "length squared," for example. In reality the r^2 term represents the ratio of two areas: the ratio of the total spherical surface to a single unit of area (as shown in the illustration). The term is therefore just a pure number—unitless. Similarly, for reasons explained above, the units of m_1, m_2 are just "mass", not "mass squared". These are the only insights needed for the "intrinsic motion" explanation of gravitation, but most of us still like to think of motion as being caused by an external force. If so, an acceleration term must be introduced into the gravitational equation. It has a magnitude of one unit and its sole effect is to convert the equation from the motional

representation into a force representation. The gravitational equation reduces to $F=ma$ and G becomes unitless just as it should be.

The development here is thus consistent with Newton's equation for gravitation.

Because gravitation based on intrinsic motion is not a force, it will seem to act instantly, and not have a finite propagation delay like light. This would apparently also be true for magnetic and electric "force field" phenomena because their equations take the same form as that for gravitation. This conclusion is consistent both with Newton's equation itself (which says that the force is not dependent on time) and with the modern technical use of Newton's equation in orbital mechanics. Although this conclusion is in disagreement with the prevailing views of the scientific community, it could be tested experimentally. (See also [The Speed of Gravity](#) in the Addendum below)

Other misconceptions about gravitation have to do with how the intrinsic gravitational motion appears in the commonly used three-dimensional "spatial reference system." Gravitation is a net inward motion at the speed of light in all three spatial dimensions simultaneously (however, see "[Beyond Einstein: non-local physics](#)" for a clarification). It seems paradoxical that gravitational motion is inherently three-dimensional, yet it can be completely described by one number (a signed magnitude); this property seems to make it, in some sense, *one-dimensional* ("scalar"). Just as peculiar, our "three dimensional" spatial reference system is inherently capable of portraying only *onedimension* of the gravitational motion. This means that the full gravitational effect *cannot* be seen in the reference system—only that portion of the motion parallel to the (arbitrary) alignment of the reference system can be measured by our instruments. And, although the gravitating material also has a three-dimensional time coordinate, our instruments can only see the motion that takes place in space.

Scientists have good factual reasons to believe that the gravitational force is weaker than the electrostatic force by a factor of 4×10^{42} . I would not expect the gravitational force to be that weak however; the low value may actually be an artifact of the reference system.

Also, the above discussion of antimotion supposed that the intrinsic motion of the atom is an integral multiple (two in this case) of the speed of light and that this causes a net "towards" motion of the atoms. We recognize this effect as that of gravitation. What is not so obvious is that, according to this viewpoint, what we commonly call the speed of light is actually the *speed of the gravitational system*. My own belief is that c itself is a constant. But the c we *measure* while in our position in this galaxy will not necessarily have the same numerical value as the c that represents the speed of space/time. This will have all sorts of implications for physical systems that move at high speeds and for equations like $E=cB$ and $E= mc^2$. (See also [Shapiro Time Delay](#) ; Other links: "Experimental evidence that the gravitational constant varies with orientation" , <http://arxiv.org/pdf/physics/0202058.pdf> , <http://www.hindu.com/thehindu/seta/2002/05/16/stories/2002051600120200.htm> ; http://en.wikipedia.org/wiki/Gravitational_constant , <http://cip.physik.uni-wuerzburg.de/~rkritzer/grav.pdf> ; **Update 8-30-2010:** In retrospect the arguments about the speed of light actually seem to be more applicable to the Hubble "constant". Refs: http://en.wikipedia.org/wiki/Cosmological_constant ; http://www.astro.ucla.edu/~wright/cosmo_constant.html; <http://phys.org/news/2015-04-gravitational-constant-vary.html> http://transpower.files.wordpress.com/2008/07/mathcad-hubble_local_group.pdf ;)

An Advanced Interstellar Propulsion System

A spacecraft and everything in it is made of atoms. The atoms move "towards" all other atoms in three-dimensions. Suppose this inward intrinsic motion could be canceled in all three dimensions simultaneously. If this could actually be done, every atom would become locked into a space/time location that would move outward and away from its original location in a direction that is entirely arbitrary. From our viewpoint the spacecraft would simply explode outward at the speed of light (the motion that each atom would acquire would be exactly like that of the photon)

This example shows that the principle of "antigravity," strictly speaking, is not what is desired in an advanced propulsion system for spacecraft. It would have two obvious problems: it blows things apart, and the motion it produces is not steerable in any manner.

However, my impression from the Periodic table is that mass somehow involves a spin that is intrinsically two-dimensional, not three-dimensional. If this is the case, then an "extra spin" is required to distribute the intrinsic two-dimensional spin such that it opposes all three apparent dimensions of the expansion of space. In other words, it is the *distribution* of the effects of intrinsic spin that we recognize as gravitational mass. The mass of our everyday encounter has the full distribution and "stays put" in our reference system. But suppose, by technical means, we were able to alter or "align" the "superficial" spin of a group of atoms. This would leave the intrinsic spins of the atoms unchanged (no "cancellation of atoms" to worry about). But such atoms would now "stay put" in only two dimensions, and take off at the speed of light in the remaining one. I believe this could be the foundational principle of an advanced, interstellar propulsion system. I hope to pursue the details in future articles. (See [Spin Polarization](#) and ["Motion Cancellers"](#) in the Addendum below for some related information.)

For now, let's suppose that the technical means employed could produce an effect that is only one-tenth of one percent of the theoretical value. What sort of capabilities would a spacecraft have which utilized this system?

1. Such a spacecraft would be capable of moving at 186 miles per second.
2. This rapid acceleration/speed capability would make such a spacecraft hard to detect. In less time than it takes to blink an eye, such a craft could go from stationary to a position 18 miles away*. If we were looking right at it, it would just seem to disappear. If we got a glimpse of it while in flight it would be gone before we could focus our eyes on it. It would undoubtedly be atomic powered, use a "field propulsion technology" (the NASA term is "propellantless propulsion") and would therefore leave no contrail in the sky. Motion at this speed in the atmosphere would create a powerful sonic boom. However, electroaerodynamic technology can, even today, prevent the development of sonic shock waves on "conventional" aircraft. Hence, such a craft might *not* produce a sonic boom. (See "Northrop Studying Sonic Boom Remedy"; AW&ST, Scott, W. B., 1/22/68, pg 21.; "Experiments Indicate Electric Charge Could Quiet Sonic Boom"; Product Engineering magazine 3/11/68, pgs 35-36; "Electroaerodynamics in Supersonic Flow"; Cahn, Andrew; AIAA 68-24; "Recent Experiments In Supersonic Regime With Electrostatic Charges" Cahn, Andrew, Anderson; AIAA 70-759; " 'Air Spike' Could Ease Flight Problems", AW&ST, May 15, 1995, pages 66-67; "Black world engineers, scientists, encourage using highly classified technology for civil applications", AW&ST, March 9, 1992, p. 66-67, <http://members.nbci.com/082499/aviation/nws001/ai014.htm> , <http://home.swipnet.se/~w-34966/propuls/propulse.htm> ; "Air flow control with electrohydrodynamic actuators", Guillermo Artana, Juan D' Adamo, Gastón Desimone, Guillermo DiPrimio, May 2000, <http://laboratorios.fi.uba.ar/1fd/web%20publi/electroaero/Paper2.pdf> ; "An Experimental Study Of An Electroaerodynamic Actuator", R. Mestiri1 , R. Hadaji1 and S. Ben Nasrallah1, 2010, <http://www.techscience.com/doi/10.3970/fdmp.2010.006.409.pdf>) ; Bluff-Body Wake Control, <http://mae.osu.edu/labs/afcad/research/bluff-body-wake-control> See [Addendum](#) below for related

information. (* possible example at

2:06 http://www.youtube.com/watch?v=KKuYNtg7M0s&feature=player_embedded)

Such a craft would have a destabilizing effect on world security. It would, however, be a great boon to business. It could fly from New York to Tokyo in less time than it takes for passengers to get on board.

3. If this technology could operate on the atoms of the occupants just as effectively as the spacecraft, then the occupants would experience the same motion as the spacecraft and would move right with it, experiencing no acceleration. From their viewpoint the spacecraft would seem stationary. (In other words they would not be smashed against the walls when the spacecraft takes off at 186 miles per second). From the viewpoint of the occupants, commanding the spacecraft to move away from the earth would only seem to make the earth recede rather than make the spacecraft move.

4. Such a spacecraft would be independent of the medium in which it operates. It does not operate by "antigravity" or by repulsion, so it needs nothing to push against. It would work in interstellar space, in the atmosphere, even in the ocean.

Is it possible? Are there indications that such an effect can be produced? And are there related effects that could give us some insights on this subject? I hope to write more about these topics in the future.

The Social Realizations

Articles like this one are intended to appeal to technically-minded people who enjoy scientific topics. But they are not intended to merely publish interesting insights about physics. Instead they are intended to be a subtle type of "value practice" which should have socially positive effects. I try to comment on a few of these "social realizations" in each article:

1. A factual, but unexpected and radically different viewpoint can be powerfully productive.

This article has given simple, logical answers to such questions as: What causes gravitation? How could the EPR paradox be explained? Is there such a thing as a fundamental particle? What is matter made of? What accounts for the constancy of the speed of light? How can light move from one place to another without an interconnecting medium? These and other "incomprehensible problems" were suddenly solved by a simple insight that had several unexpected consequences.

That is not to say that these ideas will be readily understood or quickly adopted by the scientific community. Radically new ideas still tend to be pictured in terms of old familiar ones and a lot of time and effort is required to break free from these conceptual restraints. Another problem is that the scientific

community frequently confuses fact with theory (and even uses theory to "correct" the facts more frequently than it cares to admit). A *radical* departure from what is commonly accepted is viewed with a sense of betrayal—as though unclean and unwashed infidels were trespassing on the holy turf of the experts—as though someone were making a bomb threat instead of offering a new window into the universe.

Radically new ideas also have qualities that engineers and scientists don't like: they are vague, imprecise, incomplete, sloppy, have a non-rigorous development, and "raise more questions than answers." They produce the usual false leads, misconceptions and dead ends, as well as attract attention from fringe groups and mass media who invariably spread inaccuracies and get everything blown out of proportion. (In this case follow the *science*, and ignore the psychological and social pollution.) New ideas are also very fragile and vulnerable to criticism by those who say "it can't be done" and who can easily point out all kinds of "reasons" the new idea can fail and make everyone look stupid. And not everybody wants an antidote for arrogance either.

I cannot even guess whether the propulsion system described above will ultimately be developed. But I am *sure* there will be immense and varied benefits from efforts to learn more about the properties of space/time ratios.

2. Finding the right question is more important than finding the right answer.

Solving a problem is often just a matter of straight-forward time and effort. But how do you find the *right* problem to solve? One principle that I must emphasize very emphatically is to think in terms of what *needs* to be done rather than what *can* be done. Think with the final result in view, *not the tools you will use to get there*.

Suppose you want a better understanding of the structure of the atom. If you thought in terms of tools—using experts in nuclear physics and particle accelerators costing billions of dollars—would you have come up with the idea that the atom does not "have" a nucleus or that matter is not fundamentally made of particles? Probably not. And what if you tried to do something for which there were no tools at all, such as design some kind of "antigravity" propulsion system? If you were accustomed to thinking in terms of tools, you would not have a clue where to start.

You would actually make faster progress if you were able to cast aside your preconceived ideas, your "safe, proven truth," and depend on ordinary fact-centered perception. The problem will speak to you with a weak little voice, calmly telling you it does not want to be a problem, and even telling you how it can be solved. But its solution demands that you take the plunge into *terra incognita*—the land of the unknown. This land will not mistreat you, but it is a

land of strange and bewildering things, where few people feel comfortable. Yet it is a land where many can be productive in spite of their fears.

Besides avoiding this key fallacy, an approach I find helpful in getting to the root cause of the problem is to keep asking questions until no further question of the same sort can be asked: "Why is the software so hard to maintain?" It is because we wrote it without standards. "Why didn't the management support the use of standards?" They did not realize how important standards were. "Why didn't they realize how important standards were?" Probably because they saw their task as that of managing projects instead of people. (etc.)

I make a mental graph of this that looks like a "Λ" (an upside-down Vee). The left side represents the questions and goes upwards and ends at the point where no further question of the same sort can be asked. In this example, I would eventually get to the CEO (Chief Executive Officer) and have to ask a question like "Why did the CEO do that?" This is outside the scope of the company, and is not a question of the same sort. So at this point I start looking for answers, and list them down the right side of the "Λ", generally corresponding one-to-one with the questions. I often end up with most of the questions, most of the answers, and many very useful insights.

Unfortunately, corporate management is usually not interested in insights of this depth. When they ask "What went wrong? Why did this fail?" they are all too often looking for someone to blame. They brag about "management *for* results" but this usually turns into "management *of* the results." Results managers can only assign blame, limit the damage, and try to clean up the mess. It is simply too late to do anything else. Real management has to manage the *process* that leads to the result, and must be based on finding the right thing to do, and on supporting the people who do it. Demanding results without supplying the tools and support to get those results will be ineffectual.

Once you find the questions and the answers, it is important to *do* something with them. I worked for an engineering firm that believed that 90% of its "technical problems" actually had their origins in the company culture. But even with this realization—which was a pretty good one for socially dense engineers—they *still* did not do anything to fix their culture. The company missed out on the great benefits this could have produced within just a few years.

3. The historical response to discovery now has another opportunity to repeat itself.

The script goes like this: First they say "You are crazy and we can prove it!" Then they say, "Well, you are not crazy, but it is unimportant." Finally they say: "Well, it *is* important, and we knew it all along!"

"All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed.
Third, it is accepted as being self-evident." Arthur Schopenhauer, German philosopher
(1788 - 1860)

<http://www.quotationspage.com/quote/25832.html>

I hope this article will better empower you to imagine things that were formerly inconceivable. You now have real insights into perplexing problems that scientists have not been able to solve after *centuries* of research and *lifetimes* of studies. Hopefully you can now muster the courage to punch through similar conceptual barriers and 'boldly go where you have never gone before.' And, again, all it took was an *example*, in this case a simple article to point the way. (And not a cent of taxpayer's money was spent producing it!)

See also Addendum below.

[Return to Home Page](#)

8/95c
html 11/98g

Addendum:

[Mitigation/Elimination of Sonic Shock Waves](#)

[The Speed of Gravity : not less than \$2 \times 10^{10}c\$](#)

[The Speed of Electric Fields](#)

[Variations in Speed of Light](#)

[How to Construct a Sensitive Gravity Meter](#)

[Renewed Interest in the Eötvös Experiments](#)

[What the Neutron Interferometer Reveals about Gravitational and Inertial Mass](#)

[Spin Polarization of Atoms and Photons](#)

[Some Related Links about "Gravity Modification Experiments"](#)

[Gravitational Lensing and Deflection of Photons by Gravity](#)

[The Gravitational Redshift and the Principle of Equivalence](#)

[The Shapiro Time Delay](#)

[Lack of Recoil in Railguns](#)

[The Relativistic Correction Factor, Gamma \(\$\gamma\$ \)](#)

[In Search of the Geometry of Space, Time and Motion](#)

[Why is gravitation an accelerated motion? What powers gravity?](#)

[The Kinematic Time Shift, Gravitational Time Shift](#) (2-22-03, edited 7-17-07)

["Motion Cancellers"](#)

[Podkletnov Effect](#)

[Morton Effect](#)
[The Biefeld-Brown effect](#)
[StrangeFlying Machines](#)

[Motion Couplers and Momentum Converters](#)

[Space/time dimensions for some electromagnetic quantities](#)

[Various electrogravity, magnetogravity, and gravomechanical effects](#)

[PiggottLinks](#)

[FarrowLinks](#)

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[HutchisonEffect](#)

[SearlEffectList](#)

[Poynting vector insights \(electromagnetic momentum\)](#)

[Speculation on Potential Uses of Antigravity](#)

[What is a UFO?](#)

[UFO Physics](#)

[How can UFOs make right-angle turns at high speed?](#)

[What did those guys know back then?](#)

Mitigation/Elimination of Sonic Shock Waves

An article in Aviation Week & Space Technology (AW&ST, May 15, 1995, "Air Spike' Could Ease Flight Problems," pages 66-67), shows that research in electroaerodynamic technology is alive and well.

The article says that the aerospike technology "could reduce the drag and heat transfer problems associated with hypersonic flight." It mentions that vehicles so designed could travel at Mach 25 (orbital velocity) but be subject to Mach 3 conditions in the region behind the shock wave. The ultimate goal is to build earth-to-orbit vehicles that reduce transportation costs by a factor of 100 to 1000. Such a vehicle might be "blunt bodied, lens-shaped or saucer-shaped" and would fly blunt face forward (like an Apollo heat shield). The electric energy drives the air radially away from the craft and transforms the traditional conical shock wave into a weaker parabolic one. The air behind the shock is very low in density and this reduces the heat transfer effects. The article also mentions a magnetohydrodynamic fan engine and how it could eliminate sonic booms so that a lens shaped craft "is silent but very bright in hypersonic operation." One photo and a drawing are shown.

An article from Meridian International Research has this note (in part) about electroaerodynamic technology:

Tests were further carried out in a supersonic windtunnel of 1.5 by 3 inch test section using Schlieren photography.

In one test at Mach 1.5, an 8 degree double wedge airfoil model 1.5 inches in span and 0.375 inches in chord was used. When a charge of 70kV at 0.01milliamperes was applied to the leading edge, the shock wave disappeared. The power used was 0.7 watts.

For a 20 metre span straight wing, this would equate to less than 400W of electrical power. (Electroaerodynamic Sonic Boom Elimination, Meridian International Research, <http://www.meridian-int-res.com/Aeronautics/SSonic.htm>)

This technology could probably also be used with the railgun method of launching vehicles into orbit. In this scheme the vehicle is accelerated on earth and shot through the atmosphere into a highly eccentric orbit. But atmospheric drag and heating effects on the vehicle during launch are serious problems. The use of an electroaerodynamic shield may circumvent these effects. Such a relatively inexpensive launch method could be used for supplies and fuel.

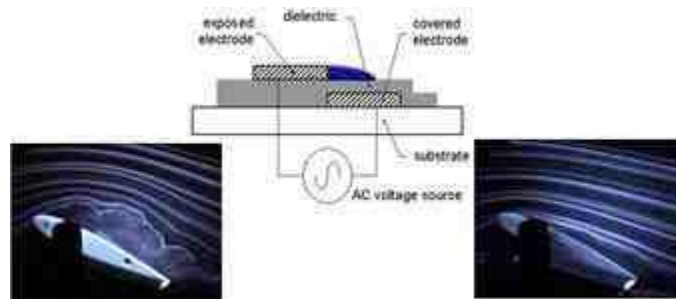
A suborbital option might be to use a cleverly designed combination of an electroaerodynamic shield with an atmospheric ramjet. The shield would be used on the main airframe to reduce drag, and the ramjet, outside the shield, could produce efficient thrust up to about Mach 3 to Mach 6.

Elimination of sonic shock waves is normally difficult to do in open atmosphere. However, the waves can be suppressed in closed containers by clever techniques. This leaves me with the impression that the techniques used in open atmosphere have just not gotten clever enough (at least not on civilian aircraft). <http://www.aip.org/physnews/graphics/html/macroson.htm> , <http://www.macrosonix.com/pdf files/Physics Today.pdf> , www.aiaa.org/events/aners/Presentations/ANERS-Henne.pdf

All these studies have had an aerospace focus. But if electroaerodynamics can reduce *drag*, why not apply the technology to the automobile to increase gas mileage? The drag reduction would not be as dramatic as in aerospace applications, but even an improvement of a few percent would be worth looking at. And what about its use for reducing aerodynamic drag in long-distance trucking? This might be a way to cut fuel costs with only relatively minor modifications. (For some ideas, see <http://www.amazing1.com/hv-dc-power-supplies.htm>)

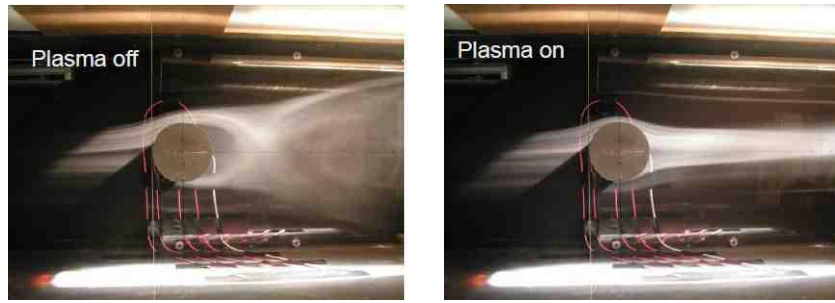
See also:

Plasma actuators:

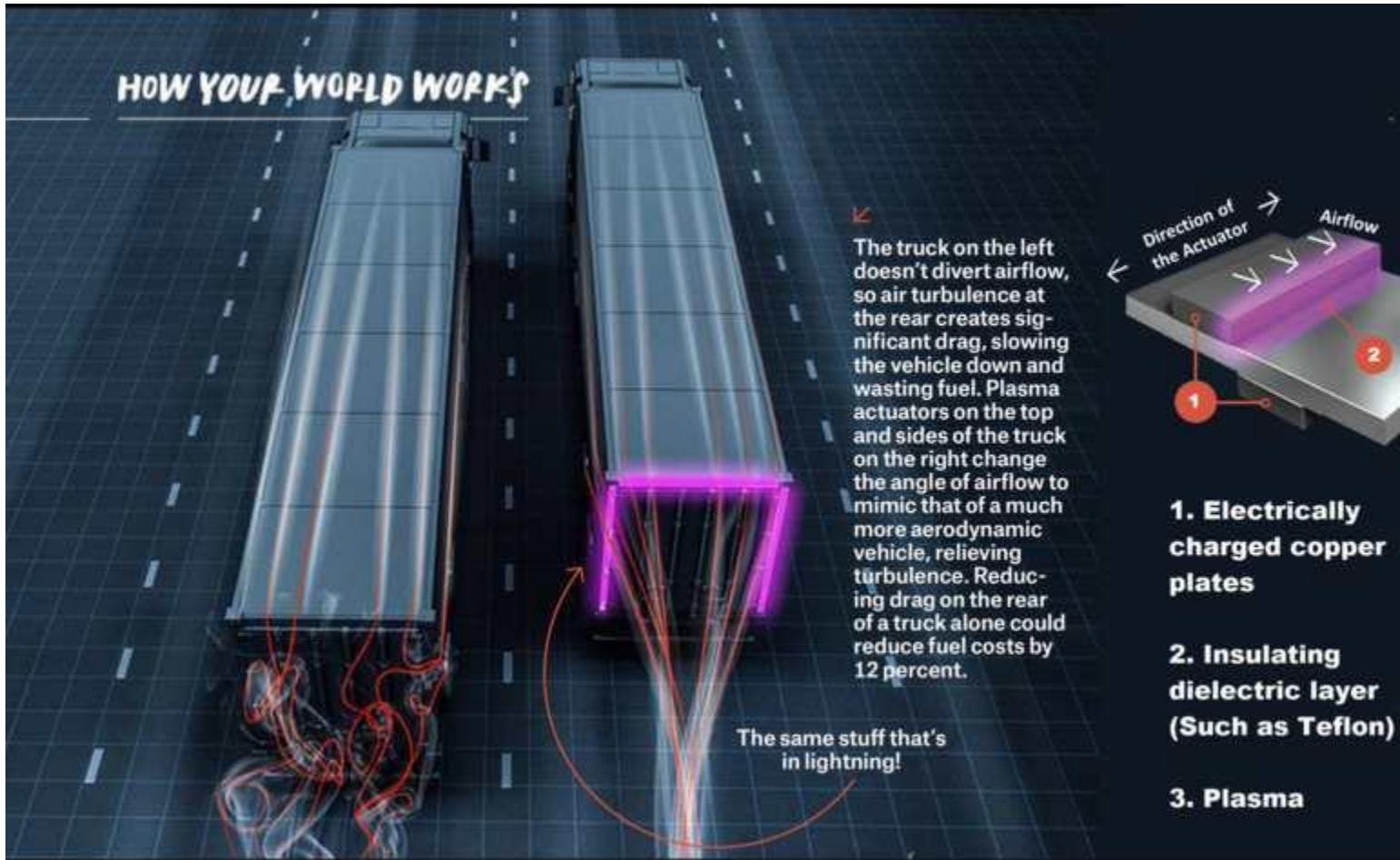


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AirForce Print News Today, May 1, 2006,

http://www.wpafb.af.mil/news/story_print.asp?id=123033847
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"Plasma Actuators for Bluff Body Flow Control", Alexey V. Kozlov
 (2007) http://www.nd.edu/~akozlov/Publications/Kozlov_A_candidacy.pdf



<http://plasmastreamtech.com/technology/>

"Drag-resistant aerospike", http://en.wikipedia.org/wiki/Drag-resistant_aerospike

"The Northrop shock wave reduction experiment", <http://jnaudin.free.fr/html/ehdaero.htm>

"Electro-aerodynamics" <http://www.youtube.com/watch?v=KvR9XtmxwLg&feature=fvwrel>

"Sliding discharge in air at atmospheric pressure: electrical properties", Christophe Loustea, ,
 Guillermo Artanab, Eric Moreaua,
 Ge´rard Toucharda (2005) <http://laboratorios.fi.uba.ar/lfd/web%20publi/electroaero/sliding.pdf>

"Electric wind induced by sliding discharge in air at atmospheric pressure" E. Moreau, , C. Louste, G. Touchard, <http://www.sciencedirect.com/science/article/pii/S0304388607001131>

"Electrical modeling of a trielectrode sliding discharge", F.O.Minottia, D. Grondonaa, P.Allen, and H.Kellya (2009)
<http://www.icpig2009.unam.mx/pdf/PA10-15.pdf>

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<http://www.fi.tartu.ee/labs/ltl/CLEO.pdf>

"Validation of Plasma Injection for Hypersonic Blunt-Body Drag Reduction", J.S. Shang (2002) <http://ftp.rta.nato.int/public//PubFullText/RTO/MP/RTO-MP-089///MP-089-38.pdf>

"Airfoil fluid flow control system", John R. Boyd (1960) <http://www.freepatentsonline.com/2946541.pdf>

"Air resistance reducer", Everett M. Hadley (1937) <http://www.freepatentsonline.com/210257.pdf>

"Apparatus for the promotion and control of vehicular flight", H.C. Dudley (1963) <http://www.freepatentsonline/3095167.pdf>

"Let Caesar's things belong to Caesar"

html 4/99b

The Speed of Gravity : not less than $2 \times 10^{10}c$

"The most amazing thing I was taught as a graduate student of celestial mechanics at Yale in the 1960s was that all gravitational interactions between bodies in all dynamical systems had to be taken as instantaneous. . . . Indeed, as astronomers we were taught to calculate orbits using instantaneous forces; then extract the position of some body along its orbit at a time of interest, and calculate where that position would appear as seen from Earth by allowing for the finite propagation speed of light from there to here. . . . That was the required procedure to get the correct answers." And thus begins an article by astronomer Dr. Tom Van Flandern about the speed of gravity. ("The Speed of Gravity - What the Experiments Say" , Tom Van Flandern, *Physics Letters A*, 250 (1-3) (1998) pp. 1-11; (http://www.usc.edu/isd/elecreources/gateways/physlet_A.html) . The article was reprinted in *Infinite Energy*, Issue 27, 1999, pages 50-58.

My own article about the nature of gravity shows that it can be treated as an intrinsic motion that is not propagated. Thus, the gravitational effect of a change in the position of a celestial body is felt instantaneously—everywhere in the Universe. This is in accord with Newton's Universal Law of Gravitation, where the speed of gravity is unconditionally infinite. Although Van Flandern does not believe that the speed of gravity is infinite, he does discuss experimental evidence that sets a lower limit on the speed. "Standard experimental techniques exist to determine the propagation speed of forces. When we apply these techniques to gravity, they all yield propagation speeds too great to measure, substantially faster than light speed." The speed of gravity, "if it is a force of nature propagating in flat space-time [is] not less than $2 \times 10^{10}c$." (That is, not less than 20 billion times the speed of light).

The most obvious and incontrovertible experimental evidence for an extremely high speed of gravity is that gravity has no aberration.

To understand this effect imagine that you are standing out in a light rain storm and that the raindrops are falling straight down. You have a straight piece of plastic pipe in your hand that is about four inches in diameter and about four feet long. You want to align the pipe so that the raindrops fall down the pipe without touching its inside wall. Not surprisingly you find that the pipe has to be aligned straight up and down, exactly parallel to the falling rain drops. But now suppose you begin walking. You still want the raindrops to fall down the pipe without touching the sides. You find that you now have to tilt the pipe in the direction of your motion, otherwise the raindrops will collide with the inside walls of the pipe. If you were moving very fast (compared to the speed of the falling raindrop) you would have to point the pipe almost horizontally in the direction of your motion in order for the raindrops to "fall" straight down the center line of the pipe.

An effect like this was found for starlight and telescopes. It was discovered by an astronomer named Bradley in 1728. It arises because the Earth is moving around the Sun at a speed that is significant (i.e., not ignorable) compared to the speed of light. The effect is well-known and is called "stellar aberration". It requires that telescopes be "misaimed" slightly so that the light will travel directly down the center-line of the telescope. The magnitude of the effect is dependent on the Earth's motion around the Sun relative to the starlight. It can displace the apparent position of the stars by up to 20 seconds of arc. Likewise, the apparent position of the Sun in the sky is displaced 20 arc seconds from its true position.

When photons are emitted from the Sun, they take about 8.3 minutes to reach Earth. By that time the Earth has moved significantly in its orbit. The incoming photons are no longer on a strictly radial path, "straight down the tube" as it were. Instead, they have a very small tangential component. Because light has momentum, the effect would tend to slow the Earth in its orbit. The effect is known as the Poynting-Robertson effect; it causes dust particles in orbit about the Sun to spiral inward.

Now what about gravity? Let's suppose that the Sun "emits gravity" just like it emits photons. Do we see an aberration effect for gravity as we do for photons? Radiation pressure is repulsive but the effect of gravity is attractive. If there were such an effect, it would tend to speed the Earth up in its orbit rather than slow it down. "The net effect of such a force would be to double the Earth's distance from the Sun in 1200 years. There can be no doubt from astronomical observations that no such force is acting," notes Van Flandern. "From the absence of such an effect, Laplace set a lower limit to the speed of propagation of classical gravity of about $10^8 c$, where c is the speed of light." (Laplace, P. 1966 *Mechanique Celeste*, volumes published from 1799-1825). Astronomer Sir Arthur Eddington noted this effect too. (Eddington, A. E., *Space, Time and Gravitation*. Originally printed in 1920, reprinted by Cambridge University Press, 1987.)

If gravity and light propagate at the same speed, then the angle between the acceleration vector for the Earth-Sun system and the incoming photons from the Sun should be zero. Precise measurements however show that the Earth accelerates toward a position that is 20 seconds of arc in front of the visible Sun (that is, the Earth is accelerating to where the Sun actually is, not to where its light shows up in the sky 8.3 minutes later). This again shows that light and gravity cannot have the same propagation speed.

A third manifestation of the difference in propagation speeds comes from solar eclipses. The Sun has an aberration of 20 arc seconds. The Moon, however has an aberration of only 0.7 arc seconds due to its slower motion around the Earth. The Moon requires 38 seconds of time to move 20 seconds of arc in the sky relative to the Sun. During an eclipse the time of gravitational maximum can be compared with the time of light minimum. If there is no difference in propagation speed, the two times should coincide. But as Van Flandern notes: "We find that the maximum eclipse occurs roughly 38 ± 1.9 seconds of time, on average, before the time of gravity maximum. If gravity is a propagating force, this three-body (Sun-Moon-Earth) test implies that gravity propagates at least twenty times faster than light."

The article discusses other evidence from radar ranging and spacecraft data. These set a lower limit on the speed of gravity of $10^9 c$. Evidence using data from binary pulsar PSR1534+12 suggests an even more stringent lower limit of $2 \times 10^{10} c$.

The article also discusses Lorentzian relativity, Special Relativity, and General relativity, gravitational waves, gravitational radiation, supernova explosions, and other very interesting topics. It is clearly written and has several useful tables, illustrations, formulas, and a bibliography.

See also:

[6-14-03Update](#) (Note that the propagation velocity of a gravitational pulse is "at least several thousand times the speed of light, perhaps faster!" and that the intensity of the beam is apparently limited only by geometry, not diffraction.)

“The Cosmic Ether: Introduction to Subquantum Kinetics” Paul A.

LaViolette (2012) <http://www.sciencedirect.com/science/article/pii/S1875389212025205>

"The notion of an ether, or of an absolute reference frame in space, necessarily conflicts with the postulate of special relativity that all frames should be relative and that the velocity of light should be a universal constant. However, experiments by Sagnac (1913), Graneau (1983), Silvertooth (1987, 1989), Pappas and Vaughan (1990), Lafforgue (1991), and Cornille (1998), to name just a few, have established that the idea of relative frames is untenable and should be replaced with the notion of an absolute ether frame. Also a moderately simple experiment performed by Alexis Guy Obolensky has clocked speeds as high as $5c$ for Coulomb shocks traveling across his laboratory (LaViolette, 2008a). Furthermore Podkletnov and Modanese (2011) report having measured a speed of $64c$ for a collimated gravity impulse wave produced by a high voltage discharge emitted from a superconducting anode. These experiments not only soundly refute the special theory of relativity, but also indicate that information can be communicated at superluminal speeds."

"Measurement of the Speed of Gravity", Yin Zhu

(2013) <http://arxiv.org/ftp/arxiv/papers/1108/1108.3761.pdf>

Appendix B

The speed of Gravity:

An Observation on Satellite Motions

Abstract

"The radius of orbit of the geosynchronous satellite can be observed at the precision of less than 8cm. And, a force about $\sim 10^{-9}m/s^2$ can make the orbit of satellite shifted. Here, the gravitational forces of the Sun acting on the satellite from the present and retarded positions are calculated respectively, assuming that the retarded position is determined with that the speed of the gravitational force is equal to the speed of light. It is shown that the difference of the force between the present and retarded positions of the Sun acting on a geosynchronous satellite can be larger than $1 \times 10^{-7}m/s^2$. And, the difference of the radius of the orbit of the satellite perturbed by the gravitational force of the Sun from the present and retarded positions in 3000s can be larger than 8.2m. It indicates that the gravitational force of the Sun acting on the satellite is from the present position of the Sun and that the speed of the gravitational force is much larger than the speed of light in a vacuum."

"Measuring Propagation Speed of Coulomb Fields", R. de Sangro, G. Finocchiaro, P. Patteri, M. Piccolo, G. Pizzella (2012) <https://arxiv.org/abs/1211.2913>

The problem of gravity propagation has been subject of discussion for quite a long time: Newton, Laplace and, in relatively more modern times, Eddington pointed out that, if gravity propagated with finite velocity, planets motion around the sun would become unstable due to a torque originating from time lag of the gravitational interactions.

Such an odd behavior can be found also in electromagnetism, when one computes the propagation of the electric fields generated by a set of uniformly moving charges. As a matter of fact the Liénard-Weichert retarded potential leads to a formula indistinguishable from the one obtained assuming that the electric field propagates with infinite velocity.

Links:

"The Speed of Gravity - What the Experiments Say"
http://www.metaresearch.org/cosmology/speed_of_gravity.asp

"Experiments indicate that gravity and electrodynamic forces both propagate far in excess of lightspeed." (from abstract) http://www.metaresearch.org/cosmology/gravity/speed_limit.asp

Meaning of the "speed of gravity"
<http://www.metaresearch.org/home/Viewpoint/Kopeikin.asp>

"Kopeikin and the Speed of Gravity"
<http://www.metaresearch.org/media%20and%20links/press/SOG-Kopeikin.asp>

"French Nobel Laureate turns back clock: Marshall's global experiment, von Braun memories evoked during August 11 solar eclipse" http://science.nasa.gov/science-news/science-at-nasa/1999/ast12oct99_1/ (includes a list of various gravitational anomalies)

"Beyond Einstein: non-local physics" Brian Fraser (2015) BeyondEinstein.html

html 10/99

The Speed of Electric Fields

Newton's law of gravity has no time dependence, and no velocity dependence. According to Newton's formula ($F=Gm_1m_2/r^2$), the gravitational force acts instantaneously. If the Sun, for instance, were to suddenly disappear from existence, the light that had been emitted from it would still continue flowing towards Earth for about 8.3 minutes, but the gravitational effect would disappear instantly.

This also means that the gravitational force from a moving body will show no aberration due to its motion. The force from a "source" of gravity will point directly (that is, radially) to a "detector" of gravity with no displacement due to time, or motion, and with no need to calculate "retarded positions", etc.

Most of us are familiar with the concept of aberration even though we do not use the term. Next time you hear a high-altitude jet aircraft in the sky, look up and see where it is. You'll find that it is far ahead of the sound that it makes. This is because sound in the atmosphere travels approximately 1 mile every 5 seconds. For a jet directly overhead at 30,000 feet the sound won't reach you for about 30 seconds. During that time the jet travels an additional 4 miles or so. Hence, the sound and the source of the sound seem to be in two different positions. This difference is the "aberration" and the position directly overhead is the "retarded position."

Other equations in physics, such as that for Coulomb force ($F=kq_1q_2/r^2$), have the same form as that for gravitational force. This raises obvious questions: Does the force between electric charges act instantaneously? Is the force free of aberration if one of the charges is moving?

The previous article ([The Speed of Gravity : not less than \$2 \times 10^{10}c\$](#)) presented evidence that the propagation speed for such forces is at least extremely fast, far in excess for that of light:

"Experiments indicate that gravity and electrodynamic forces both propagate far in excess of lightspeed." (from abstract) http://www.metaresearch.org/cosmology/gravity/speed_limit.asp

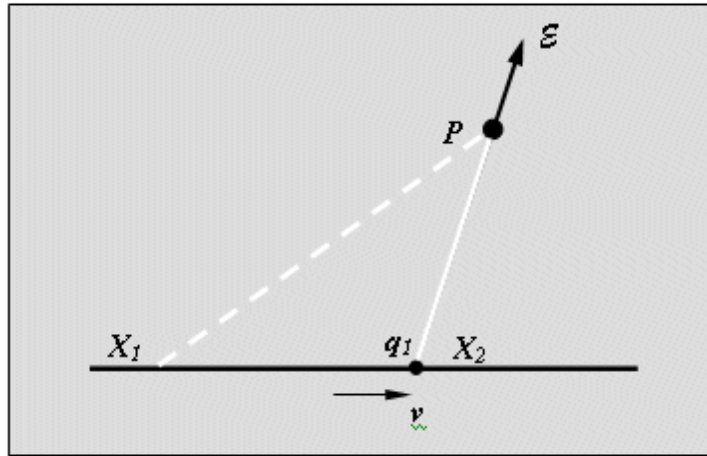
We would now like to find evidence that is more directly in the realm of electrical science, instead of astronomy. In astronomy, "all gravitational interactions between bodies in all dynamical systems had to be taken as instantaneous." But will this hold true for electrical forces? How do physicists design particle accelerators, where the speed of the particle is comparable to the supposed "speed of the electric field"? Does the speed of the field seem to be instantaneous, or do the designs have to allow for an aberration effect and "retarded positions."

Professor of Physics, A. P. French, has a relevant note in his very informative book, *Special Relativity* (1968), p. 242-243; 267:

"Now the electric field due to a stationary source charge is radial and, of course, spherically symmetrical; that is, it is the same in all directions. It is simply the Coulomb field If the source charge is moving uniformly, the electric field is no longer spherically symmetrical. Its strength is different in different directions. But, at each instant, the direction of the electric field is still radial with respect to the position of the source charge at that same instant.

If you think about this last result a bit—that at each instant the electric field due to a uniformly moving source charge is directed radially away from the position of the source charge *at that same instant*—you may begin to realize that this is a very surprising result."

To see why this is so surprising, consider the following illustration:



The electric field from a moving electric charge has no aberration.

Electric charge, q_1 , is moving at high speed in a particle accelerator from X_1 to X_2 . A charge detector is located at P and it can detect both the intensity and direction of the field associated with q_1 . Hypothetically, q_1 is emitting an electric field which propagates at the speed of light. As q_1 passes through location X_1 , the field is on its way to P , but takes a finite time to get there. But by the time the field reaches P , q_1 has actually moved to X_2 . From what direction then does the detector at P see the electric field as q_1 arrives at X_2 . Does it see the field as though it were at the "retarded position" of X_1 ? Or does it see it as emanating from X_2 where q_1 is presently located?

French continues:

"Nevertheless, the field at P points away from the *present position* of q_1 . Nature behaves in such a way that, for a uniformly moving source charge, even though the field produced at some point P originated from the location and behavior of the source charge at an *earlier time*, nevertheless the field points away from the position of the source charge at the present time. It is as though nature calculates where the source charge should be at the present time and acts accordingly. . . . Thus a result which at first glance may seem rather obvious is seen, upon closer examination, to be quite surprising—but nevertheless true."

But it is surprising only if, as French says, "if we believe that no effect—no mass, no energy, no force—can be transmitted with a speed greater than c ". If the electric field propagates instantaneously, then the lack of aberration is no surprise at all. We just simply have a different problem requiring a different explanation, namely, how can electric fields propagate instantaneously?

The answer to that problem is simple. Electric fields don't propagate. They are "non-local" in a spatial reference system, much like the concept of time, which is not affected by spatial position.

The concept of "non-local" effects is hard to grasp for most people. So consider a few illustrations. Suppose I have a cloth doll and I stick a pin in it. The pin leaves a hole in the doll. We could say that the effect of my action was "local", that is, cause and effect are clearly related, and they are related spatially.

Now suppose I go to the local Voodoo-Dolls-R-Us store, and get a voodoo doll that has been "correlated" with some evil criminal in Haiti. I stick pins in the head of the doll, and the guy in Haiti instantly gets a headache. This is an example of "non-local" action. Cause and effect are separated. I would have a hard time proving that the guy's headache is actually due to my actions with the doll.

Let's say I go back to the store and get their deluxe model, the Universal Voodoo Doll. I stick pins its head, and all humans on Earth (including me) get a headache at that same instant. This is an even stronger version of "non-locality". The effect simply does not care about "where" or "there". The only "connection" the headache events share is the instant of time, which is the same for all victims.

Electric, magnetic, and gravitational fields act this way. They have "non-local" effects. It is as though they produce instantaneous "action-at-a-distance" without any intervening medium or "connection" in space. Physicists are uncomfortable with this concept. They get such a headache thinking about it, they even call it "voodoo physics" occasionally. They would much rather believe that the fields are propagated at the speed of light, despite the evidence to the contrary.

The source of these non-local effects is *temporal motion*. Instead of being the everyday "space divided by time" type of motion, it is just the inverse: "time divided by space". It is a motion in three-dimensional time instead of three-dimensional space. It does not have a spatial starting point, nor a spatial end point, nor a spatial trajectory connecting the two. It is inherently a "when" type of motion that does not know or care about "where". It is non-directional (knowing only "towards" or "away"), has instantaneous effects, and is unlimited in spatial extent.

Read [The Origin of Intrinsic Spin](#) to learn more about temporal motion. Read [The Problem of Quantum Locality](#) for more about the non-locality concept. The [notes](#) following the article on the Shapiro time delay (below) might also be helpful.

References:

Special Relativity, A.P. French, 1968, Chapter 8, "Relativity and electricity", p. 242-243;267.
All *italics* in the citations are from the book.

Related material:

"Maxwell's Objection to Lorenz' Retarded Potentials" Kirk T. McDonald (2009, 2012)
<http://puhep1.princeton.edu/~mcdonald/examples/maxwell.pdf>

After-thought:

I should add a note specifically about magnetic fields. Consider Faraday's law of induction in intergral form:

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \iff \oint_C \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt} \iint_S \mathbf{B} \cdot d\mathbf{S}$$

Physicist Thomas E. Phipps, Jr. notes that this equation:

"defines "flux" as an integral. This implies that any circuit senses *instantly via* its *emf*—e.g., by a set of voltmeters placed everywhere around the perhaps infinitely spatially extended circuit—any change of a global (integral) property. (If not, please tell me which voltmeter measures the flux change first. And feel free to place yourself in any inertial system!) This can only betoken instant and simultaneous actions at-a-distance—supposedly forbidden by the very term of reference of field theory, not to mention SRT. . . . The bones of quantum mechanics move perceptibly beneath the skin of the Maxwell field—*instant action-at-a-distance* being an integral aspect of quantum theory. The only known exception in the entire range of physical experience to the rule of instant action is radiation

(locally completed quantum processes) —the tail that hitherto has wagged the dog." (*Old Physics for New*, Thomas E. Phipps, Jr. (2006) p.15

) <http://www.angelfire.com/sc3/elmag/> <http://www.angelfire.com/sc3/elmag/files/EM05FL.pdf>

In other words, a change in a magnetic flux is "felt" instantaneously everywhere by a wire loop enclosing the flux, even if the loop is extremely large. There is no propagation delay.

See also:

"The Sherwin-Rawcliffe Experiment – Evidence for Instant Action-at-a-distance" , Thomas E. Phipps, Jr., *Apeiron* Vol. 16, No. 4, October 2009

(<http://www.dtic.mil/dtic/tr/fulltext/u2/625706.pdf>) <http://redshift.vif.com/JournalFiles/V16NO4PDF/V16N4PHI.pdf>

"Since the nineteenth century physical theorists have considered that electromagnetic mass must exhibit tensor properties if causal delays characterize the interactions of electric charges. In 1960 Chalmers W. Sherwin and Robert D. Rawcliffe enlisted the help of mentors of the A. O. Nier highresolution mass spectrograph to test this hypothesis, using the predicted mass line-splitting of a football-shaped Lu175 nucleus of spin 7/2 (a highly asymmetrical charge distribution). No line-splitting was observed. This null result showed that mass behaves in just the way Newton thought, as a scalar, never as a tensor. What, then went wrong with the theory? We argue that the basic assumption of retardation of distant action was at fault, and that the null result in fact provides strong inferential evidence of instant action-at-a-distance of a Coulomb field."

"In Memory: Chalmers W. Sherwin", Thomas E. Phipps

(1998) http://www.worldnpa.org/pdf/abstracts/abstracts_1276.pdf

“While at Illinois he conceived and caused to be performed the Sherwin-Rawcliffe experiment (“Electromagnetic Mass & the Inertial Properties of Nuclei,” Report 1-92, March 14, 1960, Coordinated Science Laboratory, University of Illinois, Urbana, Illinois), an experiment establishing the *lack of tensor properties of nuclear mass* that I personally consider to rank in significance with Michelson-Morely, as one of the great, all-encompassing null results of our time. It is a commentary on the prevailing state of the scientific literature that this experiment was never reported in the regular journals.”

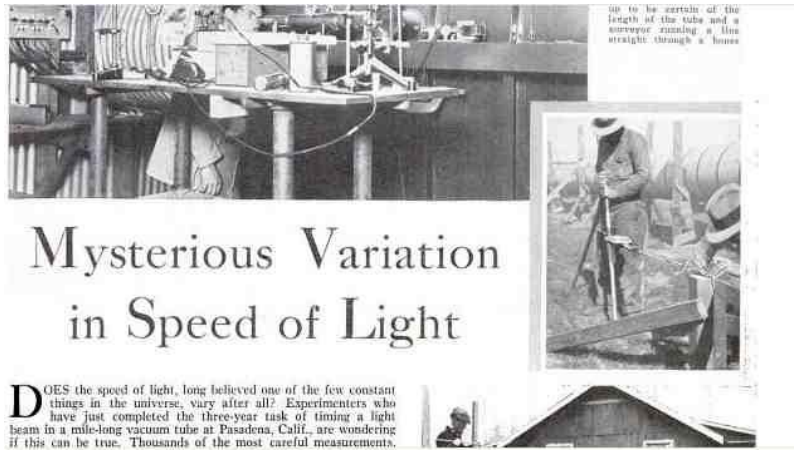
For those who are interested, *A Student's Guide to Vectors and Tensors* by Daniel Fleisch (2012) gives an excellent introductory treatment of tensors. This is the best single introductory book that I have read on this topic. Other outstanding works include "An Introduction to Tensors for Students of Physics and Engineering", Joseph C. Kolecki (Glenn Research Center, Cleveland, Ohio)

(2002) [http://www.grc.nasa.gov/WWW/k-](http://www.grc.nasa.gov/WWW/k-12/Numbers/Math/documents/Tensors_TM2002211716)

[12/Numbers/Math/documents/Tensors_TM2002211716](http://www.grc.nasa.gov/WWW/k-12/Numbers/Math/documents/Tensors_TM2002211716) ; *Mathematical Tools for Physics*, James Nearing (2010) "Tensors", chapter 12 (p.327-359) ISBN 10:0-486-48212-X. This book is a pleasure to read and is offered at a very reasonable price. The online version is also available at: <http://www.physics.miami.edu/~nearing/mathmethods/> .

html 9/2007b

Variations in the speed of light



Mysterious Variation in Speed of Light

DOES the speed of light, long believed one of the few constant things in the universe, vary after all? Experimenters who have just completed the three-year task of timing a light beam in a mile-long vacuum tube at Pasadena, Calif., are wondering if this can be true. Thousands of the most careful measurements,

"On some days it seemed to travel faster than others, by as much as twelve miles a second. Its speed seemed to vary with the season and also in a mysterious shorter cycle lasting about two weeks. Finally the scientists ended by taking an average of all the readings, which has just been announced as 186,271 miles a second."

Popular Science Monthly, March 1934, p. 25

http://books.google.com/books?id=GSgDAAAAMBAJ&pg=PA4&lpg=PA4&dq=%22Popular+Science%22+March+1934&source=bl&ots=TWK-rjHrvQ&sig=DY0FC1v09Z9mXj8nPMe6LLOxb9M&hl=en&sa=X&ei=XQSUUM3_KcGriQKXt4GQDA&ved=0CB8Q6AEwAA

The *measured* speed of light in a vacuum is really the speed of the gravitational system, as I [mentioned previously](#). I am still trying to sort out the implications of this and find supporting documentation. The claim seems to imply that the *measured* speed of light will experience variations due to changes in configuration of the local gravitational system (distance from the Sun, Moon, etc). It also implies that the Hubble constant and the Gravitational constant may not actually be constant.

See also:

[In Search of the Geometry of Space, Time and Motion](#)

"Fundamental constants are not constant—or maybe they are, we don't really know Researchers use quasars to map the value of the fine structure constant", Chris Lee (Nov 30 2011) <http://arstechnica.com/science/2011/11/fundamental-constants-are-not-constant-or-maybe-they-are-we-dont-know-really/>

"Speed of Light May Not Be Constant, Physicists Say", Jesse Emspak (2013) <http://news.yahoo.com/speed-light-may-not-constant-phycisists-133539398.html>

"Physicist suggests speed of light might be slower than thought", Bob Yirka, Jun 26, 2014, <http://phys.org/news/2014-06-physicist-slower-thought.html#ajTabs>

"Albert Einstein Wrong: Speed of Light Calculation May Be Wrong", <http://www.inquisitr.com/1325574/albert-einstein-wrong-speed-of-light-calculation-may-be-wrong/>

"Do physical constants fluctuate?", Rupert Shelldrake <http://www.sheldrake.org/experiments/constants/>

"Inconstant Speed Of Light May Debunk Einstein", Michael Christie (8-7-2002) <http://www.rense.com/general28/erin.htm>

"Variable speed of light" http://en.wikipedia.org/wiki/Variable_speed_of_light (theories)

"Speed of light not so constant after all Pulse structure can slow photons, even in a vacuum", Andrew Grant (January 17, 2015; February 21, 2015) <http://www.sciencenews.org/article/speed-light-not-so-constant-after-all>

"Physicists propose method to measure variations in the speed of light", [Lisa Zyga \(Apr 06, 2015\)](#) <http://phys.org/news/2015-04-physicists-method-variations.html>

Einstein's Lost Key: How We Overlooked the Best Idea of the 20th Century, Alexander Unzicker (2016)

I have also proposed that [photons are actually stationary](#) with respect to space and time. Although physicists in Academia are shocked when I suggest this, it is apparently not a new idea:

"There is no physical phenomenon whatever by which light may be detected apart from the phenomena of the source and the sink . . . Hence from the point of view of operations it is meaningless or trivial to ascribe physical reality to light in intermediate space, and light as a thing travelling must be recognized to be a pure invention." (*The Logic of Modern Physics*, P. W. Bridgman (1960) p. 153)

"According to special relativity the photon is stationary in time and the inertial mass is stationary in space; . . . Since a photon is bereft of rest mass and it is stationary in time it cannot be a projectile and it cannot have a trajectory;" <http://www.einsteinsmethod.com/Nonlocality.html> (*Einstein's Method: A Fresh Approach to Quantum Mechanics and Relativity* by Paul A. Klevgard (2008))

My own thoughts on Klevgard's comment is that the photon is stationary not only in time, but in space as well. The perceived "trajectory" possessed by any photon must therefore be a property of a gravitationally bound reference system, like the one we ordinarily use. But for this concept to work, gravitation must be a multidimensional (non-vectorial) motion. See [Gravitational motion has multiple dimensions](#) , [8-10-02 Note](#) , and [11-9-03 Note](#) . The photon speed then becomes a property of the gravitational reference system. (This could really mess up our current views on the Age of the Universe.)

Possibly also relevant are Miller's experiments which attempted to detect "ether drift" but may have instead detected variations in the speed of light that are dependent on a gravitational reference system:

It is also notable that this was the second time Michelson's work had significantly detected an ether, though in the first instance of Michelson and Gale (1925) the apparatus could only measure light-speed variations along the rotational axis of the Earth. These papers by Michelson and also by Kennedy-Thorndike have conveniently been forgotten by modern physics, or misinterpreted as being totally negative in result, even though all were undertaken with far more precision, with a more tangible positive result, than the celebrated Michelson-Morley experiment of 1887.

Michelson went to his grave convinced that light speed was inconstant in different directions, and also convinced of the existence of the ether. The modern versions of science history have rarely discussed these facts. ("Dayton Miller's Ether-Drift Experiments: A Fresh Look" by James DeMeo, Ph.D. <http://www.orgonelab.org/miller.htm>

html 11/12c

How to Construct a Sensitive Gravity Meter

The January 2000 edition of *Scientific American* has an interesting article about constructing a simple, inexpensive, but very sensitive gravity meter ("Detecting Extra Terrestrial Gravity", pages 94-96). More details, including photos, can be found at <http://www.eden.com/~rcbaker/> (titled "The Hi-Q Gravimeter/Seismometer") Also, if you need some coaching in the construction details or application, you might refer to <http://earth.thesphere.com/sas/WebX.cgi>

Renewed Interest in the Eötvös Experiments

Baron Roland von Eötvös (Eötvös is pronounced somewhat like "ut vush"; rhymes with "brush") was a Hungarian scientist who ran a series of precision gravitational measurements from the late 1880s to 1922. He used a special torsion balance with two weights; one weight was mounted horizontally and the other vertically. In this scheme one weight would be affected by the acceleration of gravity, and the other by the "centrifugal force" caused by the rotation of the earth. In effect, this allowed him to compare gravitational and inertial mass and see, with great precision, if they were equivalent. He also tested weights of differing composition (copper, water, platinum) to determine if "mass" was in some way dependent on composition. His experiments were very carefully and patiently done. They were state of the art until the early 1960s.

You can review various diagrams of his torsion balance at:

[Chapter XI. Gravity Measurements with the Eotvos Torsion Balance](#) (at <http://www.nap.edu/books/ARC000033/html/167.html>)

<http://www.mek.iif.hu/porta/szint/tarsad/tudtan/eotvos/html/stepcikk.html>

The results of his experiments showed that gravitational and inertial mass were equivalent to within a few parts per billion and were independent of composition. Later researchers, using a somewhat different approach, improved the precision by a factor of about 1000 over what Eötvös had obtained. But in 1986 some new interest developed in these experiments:

Ironically, a re-examination in 1986 of Eötvös definitive paper of 1922, sparked a lively controversy when the examiners concluded that, contrary to the long-held interpretation, the data in the paper actually provided evidence for a composition dependence of the gravitational acceleration. The origin of this effect (the establishment of which is far from certain) has been attributed to an attractive 'fifth force', . . . that depends not just on total mass, but on certain properties of the 'heavy' elementary particles (the baryons) of which a mass is composed. . . . the baryon number per unit of mass is not necessarily the same for dissimilar materials, since the packing of the baryons can be different." (*And Yet it Moves: Strange Systems and Subtle Questions in Physics*, Mark P. Silverman, 1993, p. 190)

"neither the concept of baryon number, nor the mass defect existed at that time. Without these concepts, Eötvös could have spent considerable time and effort in a fruitless attempt to find out why the scatter in his data points was larger than his error estimates. We can easily sympathize and imagine the gnawing feeling that something was wrong, or that something very important was being missed." ([http://www.kfki.hu/\(hu\)/~tudtor/eotvos1/onehund.html](http://www.kfki.hu/(hu)/~tudtor/eotvos1/onehund.html))

Back then (1922) the concept of intrinsic spin had not been developed either. And as the reader may know from reading the Advanced Propulsion article above, understanding intrinsic spin is *crucial* to understanding gravitation. Thus:

"To date [early 1990s] these experiments have not confirmed the original suggestion of a fifth force, as inferred from the Eötvös data by Fischbach and co-workers However, neither has any group pinpointed an error in the Eötvös experiment which could be the source of their suggestive data. Since all of the recent experiments differ from the original Eötvös experiment in various ways, the possibility remains that there is some theoretical model in which a subtle aspect of the original experiment which we have heretofore overlooked could explain why those authors saw an effect while the more recent ones do not. The significance of the Eötvös experiment is that it will continue to be a stimulus for new ideas, such as the recent suggestion . . . that spin may have played a role in the original work. However the search for new gravity-like forces turns out, it is clear that the Eötvös experiment has played a fundamental role in shaping our understanding of gravity and other possible forces in Nature." (See [http://www.kfki.hu/\(hu\)/~tudtor/eotvos1/onehund.html](http://www.kfki.hu/(hu)/~tudtor/eotvos1/onehund.html) for the complete references)

See also:

[Some Thoughts about Intrinsic Spin](#) and [The Origin of Intrinsic Spin](#) in the article [Intuitive Concepts in Quantum Mechanics](#).

"Gyroscope's unexplained acceleration may be due to modified inertia", Lisa Zyga (July 26, 2011)
<http://phys.org/news/2011-07-gyroscope-unexplained-due-inertia.html>

html 3/00

What the Neutron Interferometer Reveals about Gravitational and Inertial Mass

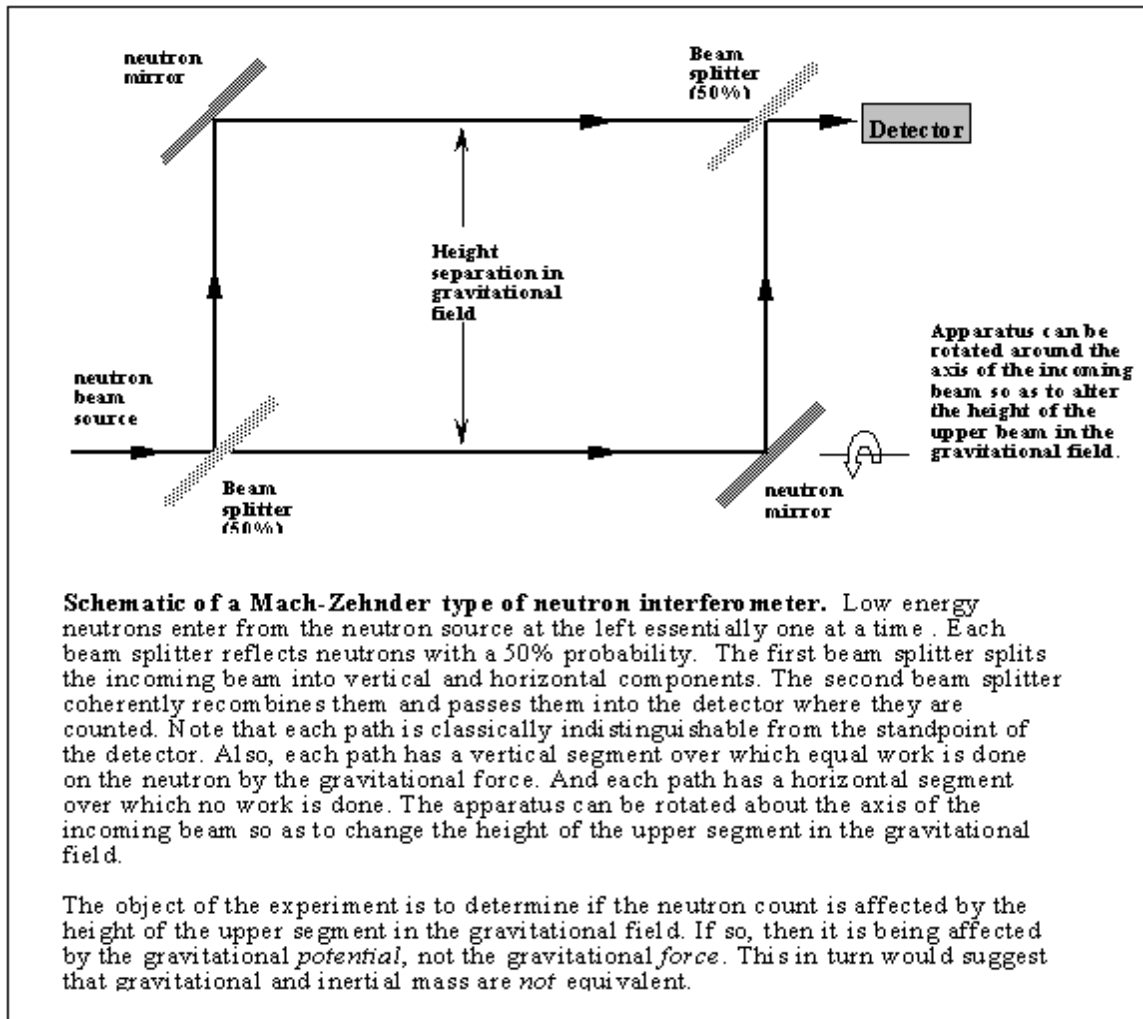
Another interesting hint that gravitational and inertial mass might not be equivalent comes from experiments with neutron interferometers using the Mach-Zehnder configuration.

First a bit of background about this type of interferometer. The Mach-Zehnder interferometer is one of several types of optical interferometers. Schematically it looks much like the illustration below, except of course it uses light instead of neutrons. Light comes in from the left and is split into a reference beam and a test section beam. The upper horizontal segment will have some sort of test apparatus inserted into it. It might be a simple tube (large or small, long or short) which has windows on each end. The test section is commonly used to study the flow of gases and is often a section of a wind tunnel, or a shock tube. The reference beam and test beam are recombined and form an interference pattern at the detector, which, in the case of an optical interferometer, could be a viewing screen or a photographic plate. Interferometers are *very* sensitive to minute changes in path length differences between the reference and test sections. The differences are caused by density variations in the gas due to flow patterns in the test section. What the observer will see is a series of fringes—a pattern of fuzzy dark lines that may look like curves or nested circles—that correspond to the flow contours of the gas.

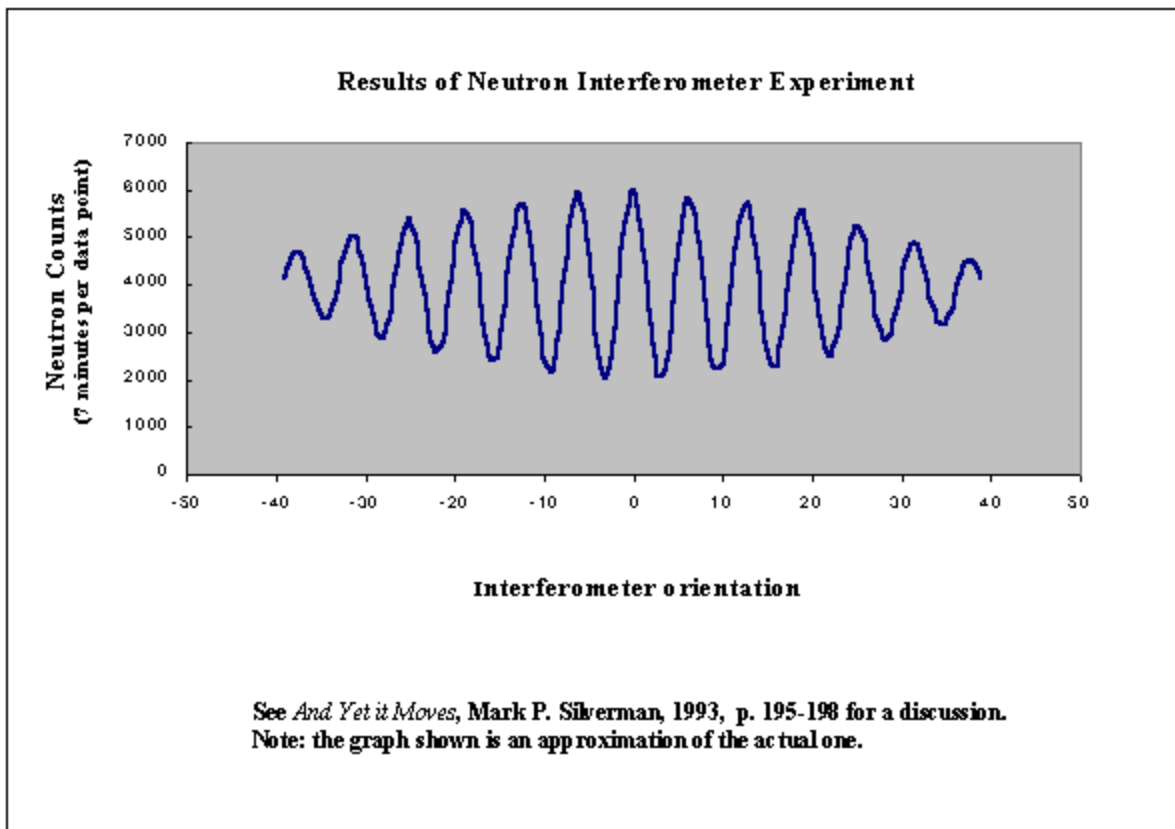
For instance, this type of interferometer has been used to study the behavior of plasma in a tube. The tube is something like a common fluorescent light tube with clear windows at each end, and with a magnetic coil wound along the length. It is placed in the test section. The interferogram with the plasma and magnetic field off, is a series of parallel lines. When the plasma and magnetic field are turned on, the pattern of parallel lines then shows a series of fine, nested concentric rings embedded in it, which represent the "pinch" confinement of the plasma. (See *Optics*, Eugene Hecht, 2nd ed. 1987, p358-359).

For the case at hand, neutrons are used instead of light. Neutrons, like all particles, also have wave characteristics. The neutron wave function can be computed for an interferometer and used to predict the

relative number of neutrons that will appear at the detector (a counter) for a specified circumstance. Neutrons have mass, and in this case we want to see how the presence of a gravitational field affects the neutron when it moves *horizontally* in the field. Classical physics predicts that it will not be affected. Quantum physics predicts that it will be, because the wave function has a potential energy term dependent on the *height* of the neutron in the field. The apparatus depicted schematically below compares the behavior of two neutrons following paths that have a height difference in the gravitational field.



When the experiment is actually done, the neutron intensity is found to vary periodically with the height of the upper horizontal section. This can be seen in the following diagram:



This result is relevant to studies of gravitation:

"The observation of this neutron interference phenomenon . . . demonstrates convincingly that the Earth's gravity can affect the motion of elementary particles under circumstances where it is not the gravitational force itself, but the difference in gravitational potential energy, that has direct physical significance. Interestingly, it illustrates as well that the equivalence principle [of gravitational and inertial mass] may be of questionable validity in the realm of quantum mechanics." (For a discussion of the particulars, see *And Yet It Moves: Strange Systems and Subtle Questions in Physics*, Mark P. Silverman, 1993, p. 195-198)

The effect is as though a gravitational field has a kind of "index of refraction for mass" in addition to manifesting a gravitational force. This effect might remind us of the interference effect that occurs when light is reflected from a pane of clear glass (see the third illustration in [Counterintuitive Quantum Mysteries](#)). As the glass is made thicker and thicker the reflectivity cycles from 0% to 16% then back to 0% then back to 16% and so on. Similarly, as the neutron interferometer is tilted about the axis of the incoming beam so as to change the height of the upper horizontal beam in the gravitational field, the number of neutrons detected by the counter cycles from a maximum to a minimum, then back to maximum, then to minimum, and so forth. It is as though the path length in the upper section were changing as the apparatus is rotated.

This is pretty hard to understand if gravitation is viewed simply as a vectorial force. The force concept is mathematically convenient but it does not depict the real situation and can be conceptually misleading. On the other hand, if the space/time ratio interpretation of gravitation is used, then gravitation is seen as a coupled motion, and the motion is operative in *all three linear dimensions* simultaneously (see [discussion](#) of scalar motion). The neutron has mass and therefore participates in this motion. The height in the field will therefore affect the *speed* of the neutron's horizontal motion and this is equivalent to a change in path length that can in turn be detected by the interferometer. As the change in equivalent path length cycles through multiples of the wavelength, the number of neutrons counted goes through maxima and minima.

(There is a related mystery, incidentally, the perplexing Aharonov-Bohm effect. Its difficulties are likewise caused by misconceptions about what scalar and vector potentials really represent. Also, the photon redshift in a gravitational potential ("Gravitational Redshift") as shown by the Pound & Rebka experiment (which used a Mössbauer detector instead of an interferometer) is a scalar potential effect very similar to that described above for the neutron interferometer. See <http://hyperphysics.phy-astr.gsu.edu/hbase/relativ/gratim.html#c2> , <http://www.rsc.org/membership/networking/interestgroups/mossbauerspect/intropart1.asp> for an overview and <http://www.quantum.univie.ac.at/research/thesis/gvdzdiss.pdf> ("Gravitational and Aharonov-Bohm Phases in Neutron Interferometry", Gerbrand van der Zouw, PhD-Thesis, University of Vienna, 2000) for a specific article. See also [The Gravitational Redshift](#) article below.)

Normally we would not be concerned about this effect. With ordinary massive objects the effect cannot be seen because the wavelength is too small. The wavelength of the neutron in this experiment was 1.4 Angstroms (essentially that of a thermal neutron at 300 K) This is comparable to interatomic distances in a crystal lattice, which in turn makes such crystals usable for neutron mirrors. In contrast, a one micron speck of dust with a mass of 10^{-15} kg and moving at a velocity of one mm/sec has a wavelength of 6.6×10^{-6} Angstroms. This is about a million times smaller than the interatomic distance. For something with the mass of a bullet, the effect would be utterly undetectable. Gravitational and inertial mass would therefore be equivalent "for all practical purposes." In other words, the trajectories of cannon balls would be independent of their mass.

However, when "practical purposes" start to include finding the design principles for asymmetric gravitational propulsion systems, this effect becomes highly relevant. This kind of experiment needs to be repeated with neutrons and atoms (such as hydrogen and helium) that have been *spin polarized*. This may introduce some asymmetries and even get rid of the fringe shift under certain conditions.

Other Links:

Quantum Gravitational States <http://www.aip.org/pnu/2002/573.html> , <http://physicsweb.org/articles/news/6/1/9>

html 4/00a

Spin Polarization of Atoms and Photons

The concept of atomic spin and spin polarization is a bit abstract for some of my readers. I intend to cover this topic more fully in an article on quantum mechanics at this site. For now, to get a better intuitive feel for this topic, the reader might explore some of the following links:

An article explaining how spin angular momentum can be efficiently transferred from photons to atoms can be found at:

<http://fuj.physik.uni-dortmund.de/~suter/research/lamr/background.html>

Some practical applications of spin polarized atoms in the medical field can be found at:

"Hyperpolarized Helium" (J.R.MacFall, H.C.Charles, J.Smith)at <http://camrd4.mc.duke.edu/camrdprojects> Select Hyperpolarized Helium.

"Hyperpolarized helium technique joins doctors imaging arsenal" (By David Nigro in "The Chronicle online") <http://www.chronicle.duke.edu/chronicle/09/01/03HyperpolarizedHelium.html>

"A Novel Lung-Imaging Method Using Magnetic Resonance Imaging With Hyperpolarized Helium-3" <http://spider.cso.uiuc.edu/cnrs/Cnrspresse/en359a2.htm>

(An MRI image of a human lung that used optically polarized Helium-

3) <http://www.physics.princeton.edu/~benlev/atomic.html>

"Head Full of Xenon?" http://www.bric.postech.ac.kr/science/97now/99_3now/990323c.html

"Tiny Bubbles Help Researchers See Inside of Blood Vessels" (by Karyn Hede George) <http://www2.mc.duke.edu/news/inside/980914/6.html> (click Cancel on the password dialog box)

As can be inferred from the above articles and applications, an atom can retain a particular spin polarization for a substantial amount of time. The "relaxation times" of spin polarized atoms are affected by the environment. "If the inside walls of the cell are suitably coated, collisions with the walls have little effect on the spin state of the atoms. . . . For example, for hydrogen atoms bouncing off teflon walls, tens of thousands of collisions are required for the magnetic moment of the hydrogen atom to become disoriented." (*Quantum Mechanics*, C.Cohen-Tannoudji, *et al.*, 1977, p. 452)

The reader will note, of course, that none of these articles have anything to do with "antigravity."

html 12/99

Some Related Links about "Gravity Modification Experiments"

There are plenty of articles about "antigravity" on the Internet. A very few are listed below. Peruse them and their many links at your leisure:

<http://www.gravity.org>

<http://www.padrak.com/agn/index.html>

<http://www.newphys.se/elektromagnum/physics/Stirniman/ElectrograviticsList>

<http://www.inetarena.com/~noetic/pls/Papers/rs-wallace-tampere.html>

<http://xxx.lanl.gov/abs/physics/0108005> "Impulse Gravity Generator Based on Charged $\text{YBa}_2\text{Cu}_3\text{O}_{7-y}$ Superconductor with Composite Crystal Structure", Evgeny Podkletnov, Giovanni Modanese. See "[Motion Cancellers](#)" [below](#) for more details.

As explained above in the note about the Eötvös experiments, there is a possibility that gravitational mass might have a composition dependence. This may seem to go against everything you have been told about THE LAW OF GRAVITY (!). If you need help in breaking out of the mental cages, consider a related phenomena, magnetism. We know magnetic effects can be created by electric currents. But they can be created in other ways too. So-called "permanent magnets" do not need any electric current to create a powerful magnetic field. And some permanent magnet compositions, Heusler alloys, do not even use ferromagnetic materials. One Heusler alloy has a composition of 65% copper, 25% manganese and 10% aluminum.

(See <http://www.newi.ac.uk/buckleyc/magnet.htm>) Would you have suspected such an alloy (chiefly copper) to be magnetic? There is also the Barnett effect whereby a weak magnetic field can be produced by rotating an unmagnetized iron cylinder at high speed about its long axis. Would you have suspected that rotating something that is non-magnetic and non-electrical would produce a magnetic field (the phenomena is known as "gyromagnetism")? So keep an open mind. Someday, "antigravitic" materials, schemes and phenomena may be just as common and ordinary as the magnetic ones are today. History shows that today's science fiction is tomorrow's technology. (See also "THE WALLACE INVENTIONS, SPIN ALIGNED NUCLEI, THE

GRAVITOMAGNETIC FIELD, AND THE TAMPERE EXPERIMENT: IS THERE A CONNECTION? by Robert Stirniman

" <http://www.rexresearch.com/wallace/wallaceinventions.pdf>)

Links pertaining to technology that was ahead of its time:

<http://www.tuc.nrao.edu/~demerson/bose/bose.html> microwave experiments prior to 1900

<http://en.wikipedia.org/wiki/Semmelweis> Ignaz P. Semmelweis and childbed fever

<http://www.uh.edu/engines/epi622.htm>

http://www.sciencecases.org/childbed_fever/childbed_fever.asp

<http://rinkworks.com/said/predictions.shtml> famous bad predictions

html 3/00

Gravitational Lensing and Deflection of Photons by Gravity

According to what has been presented in these pages, one would expect that photons would not be deflected by a gravitational field. Simply put, photons have no mass, and their path of travel should therefore not be affected by the presence of a massive body. Yet we see statements like the following in physics and astronomy textbooks:

". . . A beam of light will accelerate in a gravitational field in the same way as do more massive objects. For example, near the surface of the earth, light will fall with acceleration 9.8 m/sec^2 . This is difficult to observe because of the enormous speed of light. For example, in a distance of 3000 km, which takes about 0.01 sec to cover, a beam of light should fall about 0.5 mm. Einstein pointed out that the deflection of a light beam in a gravitational field might be observed when light from a distant star passes close to the sun Because of the brightness of the sun, such a star cannot be ordinarily be seen. Such a deflection was first observed in 1919 during an eclipse of the sun." (*Modern Physics*, Paul A. Tipler, 1978, p. 41)

According to this effect, light from stars will be bent slightly when moving past a dense, massive body. Light from the background stars that grazes the surface of the sun would be deflected 1.75 seconds of arc. For a white dwarf, the effect would be about 1 minute of arc. For a so-called neutron star, the effect would be 30 degrees. The observational effect would be much like looking at a field of black dots on a sheet of paper through a magnifying glass. Light from the dots is bent inward by the magnifying glass, but the effect to the observer is that the dots seem to move apart (become "magnified"). Of course, we have to ask the question: Is this predicted effect real, or is it just theoretical?

The existence of such an effect for the sun was supposedly proven observationally by professor/astronomer Arthur Stanley Eddington during a total solar eclipse on May 29, 1919. The eclipse blotted out the Sun's disk (and the bright effects in earth's atmosphere) thereby allowing the positions of the "fixed stars" very near it to be recorded on photographic plates. These star positions could then be compared with the same star positions on other photographic plates taken at night during a different time of the year.

Einstein's prediction of deflection was 1.75 seconds of arc right at the edge (or "limb") of the Sun. Unfortunately, the stars that were actually observed were all outside of two solar radii from the center of the Sun, and the maximum predicted deflection for that location was 0.8 arc seconds. As any amateur astronomer knows, the "seeing" at night at ordinary locations is 2 or 3 arc seconds or

worse, due to instabilities in the atmosphere. Hence, this experiment (performed during the day!) was done under less than minimum acceptable conditions, well into the noise level. Furthermore, one would want to measure stars distributed all around the Sun, but nature did not cooperate. Only a couple of the plates had "fairly good images of five stars, which were suitable for a determination". And these few, unfortunately, were all on one side of a line that could be drawn through the Sun's center. Other sources of error could have been significant too. The lensing effect, as seen by a telescope with a 343 cm focal length, would amount to a change in star position of only 0.01 mm on the photographic plate. Distortions of the optical system because of temperature changes during the eclipse could be another source of error. A change in focal length of only 0.1 mm could produce scaling errors between the eclipse plates and the reference plates of about the same order of magnitude as that predicted by Einstein. The observations were also done in the field, not at a regular observatory. Later experiments showed even wider scatter of data, differing from Einstein's prediction by as much as 60 percent.

Hence, I am not convinced that these observations were "proof" of gravitational lensing. The experiment required very delicate measurements but had large margins of error and uncertainty inherent in them. (For more technical details, see *Infinite Energy* Vol. 7, Issue 38. 2001 p. 19, "Anomalies in the History of Relativity", Ian McCausland, reprinted from *Journal of Scientific Exploration*, Vol. 13, No. 2, Summer 1999)

Other proofs of gravitational lensing involve, not star deflections, but duplications of quasar images:

Another example of the influence of curved spacetime is a gravitational lens. Very distant galaxies, called quasars, sometimes lie almost directly behind a massive galaxy. The result . . . is that we see what appear to be two identical quasars instead of just one. (*Understanding the Universe*, Phillip Flower, 1990, p. 591)

I cannot accept this as a proof either. It presumes the existence of an unobservable massive galaxy. Also, quasars, as clearly shown by their redshifts, involve motion that is greater than the speed of light. According to what I have presented in this and other articles, such speeds are temporal. That means that quasars have, at a minimum, one dimension of motion in time, with the other two dimensions remaining in space. How this kind of phenomena maps into a spatial reference system is not well understood. Possibly ~~Apparently~~, the missing dimension can make the phenomena look as though space were split in two, much like we were seeing the object along with its mirror image. In fact images of other energetic astronomical objects show a mirror effect much like that claimed for some quasars. Some examples:

Hourglass nebula: <http://www.seds.org/hst/Hourgls.html> , <http://oposite.stsci.edu/pubinfo/jpeg/Hourgls.jpg>
Eta carinae: <http://www.seds.org/hst/96-23a.html> , <http://www.seds.org/hst/WFPCetaCar.html> .
NGC 7009 Saturn Nebula <http://antwrp.gsfc.nasa.gov/apod/ap971230.html>
NGC 7027 <http://hubblesite.org/newscenter/archive/1996/05/>
NGC 6826 http://imgsrc.hubblesite.org/hu/db/1997/38/images/d/formats/full_jpg.jpg
CRL 2688 Egg Nebula <http://hubblesite.org/newscenter/archive/1996/03/>
M2-9 Wings of a Butterfly Nebula <http://antwrp.gsfc.nasa.gov/apod/ap020106.html>
[NGC 6302](#) Bug Nebula
NGC 5307: A Symmetric Planetary Nebula <http://antwrp.gsfc.nasa.gov/apod/ap971231.html>
quasar HE 1104-1805 http://upload.wikimedia.org/wikipedia/commons/thumb/0/0c/Quasar_HE_1104-1805.jpg/220px-Quasar_HE_1104-1805.jpg

http://en.wikipedia.org/wiki/Red_Square_Nebula [http://www.newscientist.com/article/dn11577-red-square-
nebula-displays-exquisite-symmetry/](http://www.newscientist.com/article/dn11577-red-square-
nebula-displays-exquisite-symmetry/)

http://en.wikipedia.org/wiki/Red_Rectangle_Nebula

http://en.wikipedia.org/wiki/Bipolar_nebula

http://www.slate.com/blogs/bad_astronomy/2010/11/17/warm_dusty_rings_glow_around_a_weird_binary_star.html

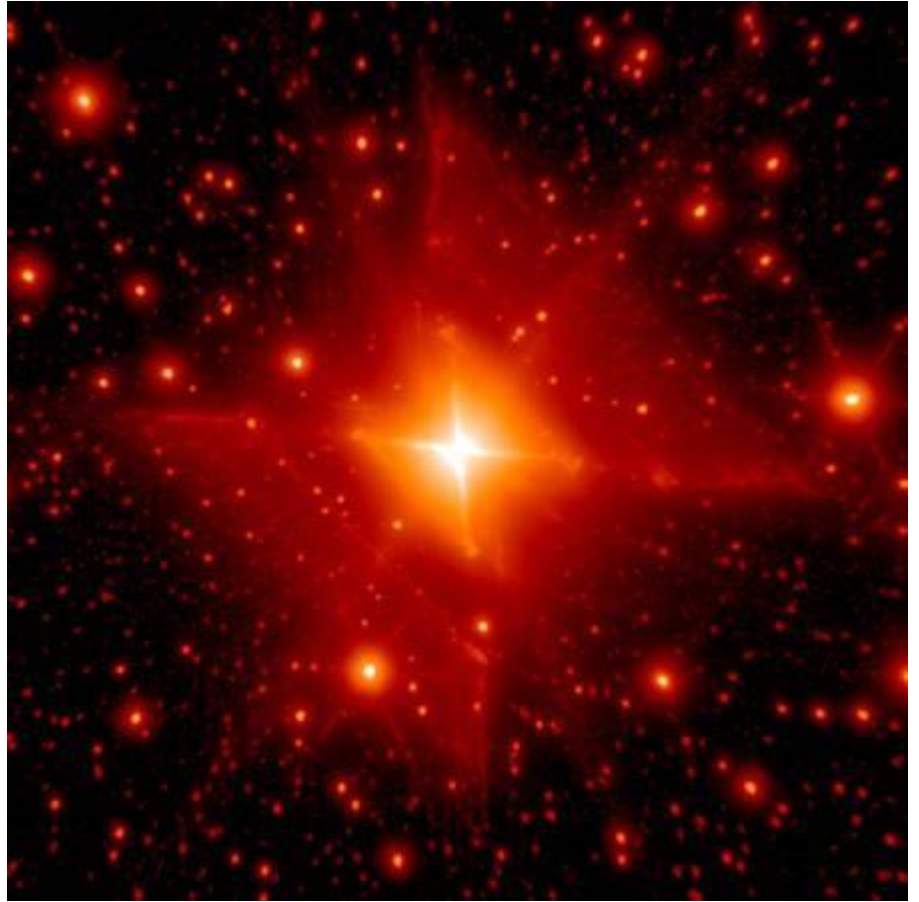
http://www.slate.com/blogs/bad_astronomy/2016/06/15/hubble_image_of_hb_12_a_dying_star_surrounded_by_gas_and_dust.html



Credit: <http://www.universetoday.com/61103/what-is-a-nebula/#more-61103>
(three of these appear to be the hourglass type seen "top down")



Hubble Space Telescope WFPC2 image of the Red Rectangle Nebula



http://en.wikipedia.org/wiki/Red_Rectangle_Nebula

http://en.wikipedia.org/wiki/Red_Square_Nebula <http://www.newscientist.com/article/dn11577-red-square-nebula-displays-exquisite-symmetry/>

Hence, the apparent duplication of some quasar images may be due to an effect that is completely different from that causing the supposed deflection of star light by gravitation.

All is not lost however:

"Eclipse observations to test the relativity effect have continued over the years, but the measures are very difficult to make and the precision of the confirmation is not high. Far higher accuracy has been obtained recently at radio wavelengths. Simultaneous observations of the same source with two radio telescopes far apart can pinpoint the direction of the source very precisely. The United States National Radio Astronomy Observatory at Greenbank, West Virginia, with radio telescopes 35 km apart, observed several remote astronomical radio sources . . . when the sun was nearly in front of them. The apparent directions of the quasars showed shifts similar to those of stars seen near the sun. The accuracy of these observations is high enough to confirm the Einstein prediction to within 1 percent." (*Exploration of the Universe*, G. O. Abel, D. Morrison, S. C. Wolff, 1987, 5th edition, p. 584)

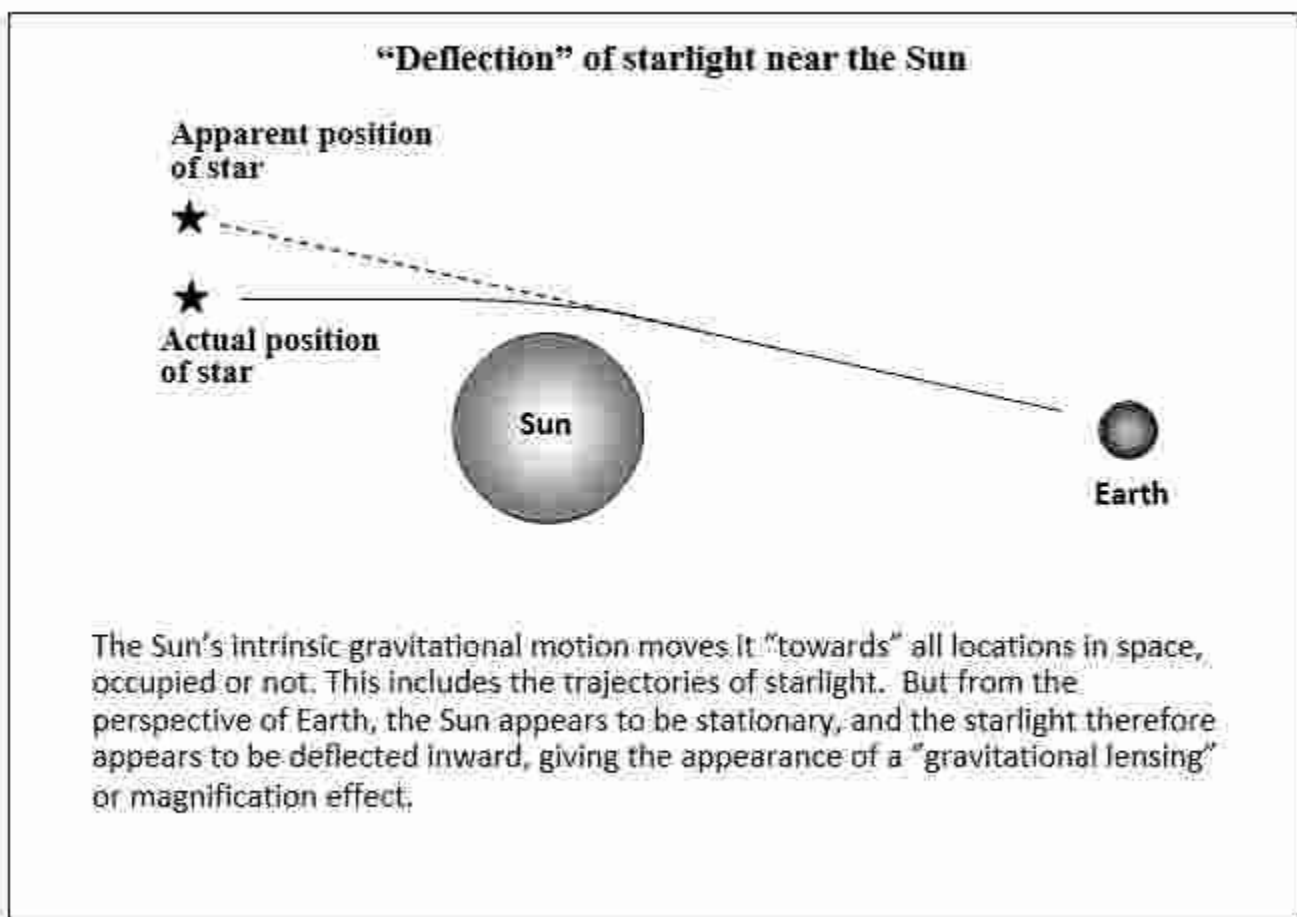
"Recent improvements in very long baseline interferometry (VLBI) have made it necessary to take the deflection of light into account over the entire celestial sphere. For a source at 90° from the Sun, for instance, the deflection is only a milliarcsecond, but it is still detectable." (*The New Physics*, Paul Davies (editor), 1989, p.13)

This kind of experiment appears to have an acceptable design. It was like the one performed by Eddington, except it used radio telescopes and quasi-stellar ("starlike") radio sources. The radio

telescopes are in effect the photographic plate, and the plate has to be large because radio wavelengths are much longer than optical wavelengths. It is also capable of high precision. The interferometric methods used can detect angular separations and changes thereof as small as a few hundred *microarcseconds* of arc. Hence, I accept the claim as factual, and conclude that starlight is in fact deflected as it passes through a gravitational field. (See *The New Physics*, Paul Davies (editor), 1989, p.13)

But according to what I have presented at this website, photons do not gravitate and space is not curved. So how can the path of photons be bent as they pass near the Sun?

I think the answer is simple. It has to do with gravity being a three-dimensional *scalar* motion (having a magnitude, but no direction except that it is simply "towards" all locations in space, whether occupied or not). The star light is simply not deflected by the gravitational field of the Sun, nor is the space around the Sun curved. The Sun is a gravitating object and therefore possess this type of scalar motion. In the context of the reference system, however, which seems to insist on assigning *vectorial* directions to motions that are inherently directionless, we do not see the *Sun* as moving "towards" the star positions. Rather we invert the picture and claim that the Sun is stationary, and that the *starlight* is being deflected inward "towards" the Sun. This certainly makes sense in the context of everyday experience, but the alternative interpretation is still consistent with what I have presented here, and will produce the same observational facts.



The effect is as though we had drawn a bunch of dots on the surface of a balloon, then taken one big dot as a stationary reference, and then deflated the balloon. The fabric of the balloon represents

space. The dots occupy a fixed position on the surface of the balloon and do not move relative to it, just like photons occupy a fixed position in space and move *with* it rather than *through* it. We will say that the big dot (the Sun) is really a little piece of paper, and that as the balloon contracts, the fabric of the balloon is actually in motion underneath it. In other words, the Sun is what is actually moving relative to space. Yet it is very easy to view it as stationary, and to attribute the motion that it actually has to the star positions, which in fact have no motion.

It is quite natural, incidentally, for physicists and astronomers to talk about curved space in this situation. When I was a kid, I went to a school that had a miniature merry-go-round. We kids would sometimes play "catch" on this rotating merry-go-round by throwing a ball straight across the center to another kid. To an observer on the ground, the ball traveled a straight path once it left our hands. But to us kids on a rotating platform the ball's path was strongly curved, and was very difficult to catch. The same effect could be produced by a kid on the stationary ground throwing a ball to a kid on the merry-go-round. We understood these effects because the mechanics of the situation could be clearly seen. But if we did not know the merry-go-round was rotating, we would have had to invent some other explanation. It probably would have been something like "Space becomes curved in the vicinity of merry-go-rounds".

In other cases physicists introduce unrealities as a matter of convenience. Suppose a missile is launched towards New York from the North Pole. As the missile travels, the earth rotates underneath, until, we shall say, Chicago has moved into position underneath the missile instead of New York. To an observer on the ground, the missile has taken a curved path. Curved paths are normally caused by forces acting perpendicular to the line of travel. If we wish to preserve the illusion that the earth is stationary, we can introduce a "fake force" (the Coriolis force) into the calculations to make the calculated path and the actual path coincide. Such calculations are very important in figuring the paths of artillery shells in flight. (The British found this out the hard way once, when they calibrated their tables for Coriolis effects in the northern hemisphere, and then fought a war in the southern hemisphere, where the effect is just the opposite. The shells initially missed their intended targets by a wide margin.)

You can see another common example of reference system effects by watching the moon rise (day or night). In the east it may initially appear like an upside-down bowl. As it rises in the sky, it appears to "stand up" on edge. As it sets in the west, it becomes rightside-up like a normal bowl. You might conclude that the moon *rotates* as it travels across the sky (making half a turn in twelve hours). But this is only an appearance. An observer at the North Pole would not see this behavior (or at least not so obviously).

These examples all involve rotations, and have no direct connection to gravitational effects like the bending of light. They are intended only to illustrate how it is possible for one motion to couple with another motion —often an unnoticed motion— and give the appearance of motion of another sort, or even no motion at all. Such "reference system effects" are often very subtle and can cause a lot of confusion when we are trying to investigate fundamental phenomena like the behavior of light and gravity.

I think this section, incidentally, is an example of how college textbooks are often vague and sloppy with their facts, but with a lot of digging through several of them, you can usually resolve the

discrepancies and distinguish between fact and theory-presented-as-fact. The texts often have good, if very general, information and the math is very useful too. But the conceptual interpretations are often badly flawed and considerable effort and thought are required to sort things out.

html 12/01

The Gravitational Redshift and the Principle of Equivalence

The gravitational redshift is an effect predicted by Einstein's Principle of Equivalence (1907) which was later incorporated into General Relativity (1916). The Principle could be stated as:

A homogeneous gravitational field is completely equivalent to a uniformly accelerated reference frame.

What that means is customarily illustrated with the "Einstein elevator". It is a "thought experiment" that uses an ordinary elevator and a beam of light shining from a side wall to show the consequences of the Principle. There are four cases:

Case #1: The elevator is at rest on the earth. The horizontal light beam coming out of the wall is seen by an observer in the elevator to bend downward. The light falls in the gravitational field on a parabolic path exactly like a ball thrown horizontally, or a stream of water from a garden hose. (We call this a "thought experiment" because the deflection of the light beam is actually far too small to be seen in the elevator. But it is predicted by the Principle of Equivalence.)

Case #2: We move the elevator to remote outer space, far away from any massive body. A small rocket engine on the bottom of the elevator accelerates it "upward" at 9.8 m/sec^2 (equivalent to the gravitational acceleration on earth). We find that the light beam deflects downward and that its behavior, to an observer inside the elevator, is indistinguishable from case #1.

Case #3: While we are in remote outer space, we shut off the rocket engine. We now find that the light beam goes straight across the elevator without being deflected.

Case #4: We come back to earth and put the elevator in orbit around the earth. The path of the elevator is curved as it falls around the earth just like the Space Shuttle or a satellite. The curved path causes an acceleration which exactly balances out the effect of the gravitational field of the earth. The path of the light beam is again straight.

The idea that gravity could deflect a light beam, incidentally, is not a recent development. Newton predicted such an effect with his particle model of light, but the effect predicted by Einstein was twice as great. Einstein's version proved to be correct.

So gravity is equivalent to an accelerated reference frame. This insight is fortunate and helpful. From the standpoint of conventional physics the nature of gravity is mysterious and non-intuitive. If we set up an experiment and try to predict how it will be affected by a gravitational field, we may have difficulty visualizing the outcome. But if so, we can just put the experiment into an accelerated box.

Understanding *motion* is much easier than understanding the actions of mysterious forces. (See also: [Why is gravitation an accelerated motion? What powers gravity?](#))

In this "motional" interpretation of Relativity, the photons are *not* attracted downward to the earth. Rather, the earth is accelerating upwards into the photon path (case #1). It is exactly like the elevator accelerating upwards into the photon path (case #2). Because our reference frame is attached to the earth or the inside of the elevator, the photon's path appears to curve.

Relativity treats light as a form of energy that can be attracted by gravity, and so another trick is possible with light. We could place a light source on the floor of the elevator (case #1) and shine it upwards. If light moves upwards "against gravity" it will lose a very small amount of energy and become redshifted. Or we could place the light source on the ceiling and the detector on the floor. In this case light falls in the gravitational field, and it will gain energy and become slightly blueshifted.

This is again indistinguishable from what would happen within the Einstein elevator which is accelerating upwards (case #2). If the light is on the floor, the detector on the ceiling is accelerating *away* from the photon. It therefore sees the photon as redshifted. If the light is on the ceiling, the detector on the floor is accelerating *towards* the photon. It therefore sees the photon as blueshifted. If the

elevator is in free fall around the earth (case #4) there will be no redshift or blueshift because the gravitational acceleration is balanced out by an accelerated motion.

In the "motional" interpretation of Relativity, gravity actually *is* accelerated motion, not merely equivalent to it. The redshift/blueshift that is caused by the accelerated motion of the elevator is the same type of phenomena caused by an accelerating earth. The only difference is dimensional: the elevator accelerates in one dimension; the earth accelerates outwards in three dimensions simultaneously (scalar motion—motion that has only a magnitude and no inherent vectorial direction). Both the elevator and the earth qualify as an "accelerated reference frame" and yet both appear to be stationary when viewed from within each system. In the actual situation, the photons are stationary and the earth, or elevator, accelerates into them (gravitational motion). The "towards" motion applies regardless of whether the earth is moving across the photon path (giving the appearance of a bent path) or whether it moves parallel or directly into it (colliding with it, so to speak, at the speed of light).

The experiments by Pound, Rebka, and Snyder at the Jefferson Physical Laboratory at Harvard circa 1960 have verified the existence of the gravitational redshift/blueshift effect to within one percent of the theoretical value. Those fascinating experiments were done with an extremely high resolution energy spectrometer that utilized the Mössbauer effect in iron 57. Corrections for relativistic effects are also built into the Global Positioning System (GPS). For additional details, visit some of the following links:

<http://hyperphysics.phy-astr.gsu.edu/hbase/relativ/gratim.html#c2>

<http://www.phys.uidaho.edu/~pbickers/Courses/310/Notes/book/node232.html>

<http://vishnu.mth.uct.ac.za/omei/gr/chap5/node2.html>

<http://www.lns.cornell.edu/spr/2000-02/msg0021868.html>

<http://www.phys.lsu.edu/mog/mog9/node9.html>

<http://www.metaresearch.org/cosmology/gps-relativity.asp>

Mössbauer spectroscopy, http://en.wikipedia.org/wiki/M%C3%B6ssbauer_spectroscopy

For more insights on multi-dimensional motion, see the various discussions that are scattered around at this website such as those in:

[Some Thoughts on Intrinsic Spin
Energy from Massless Particles?](#)

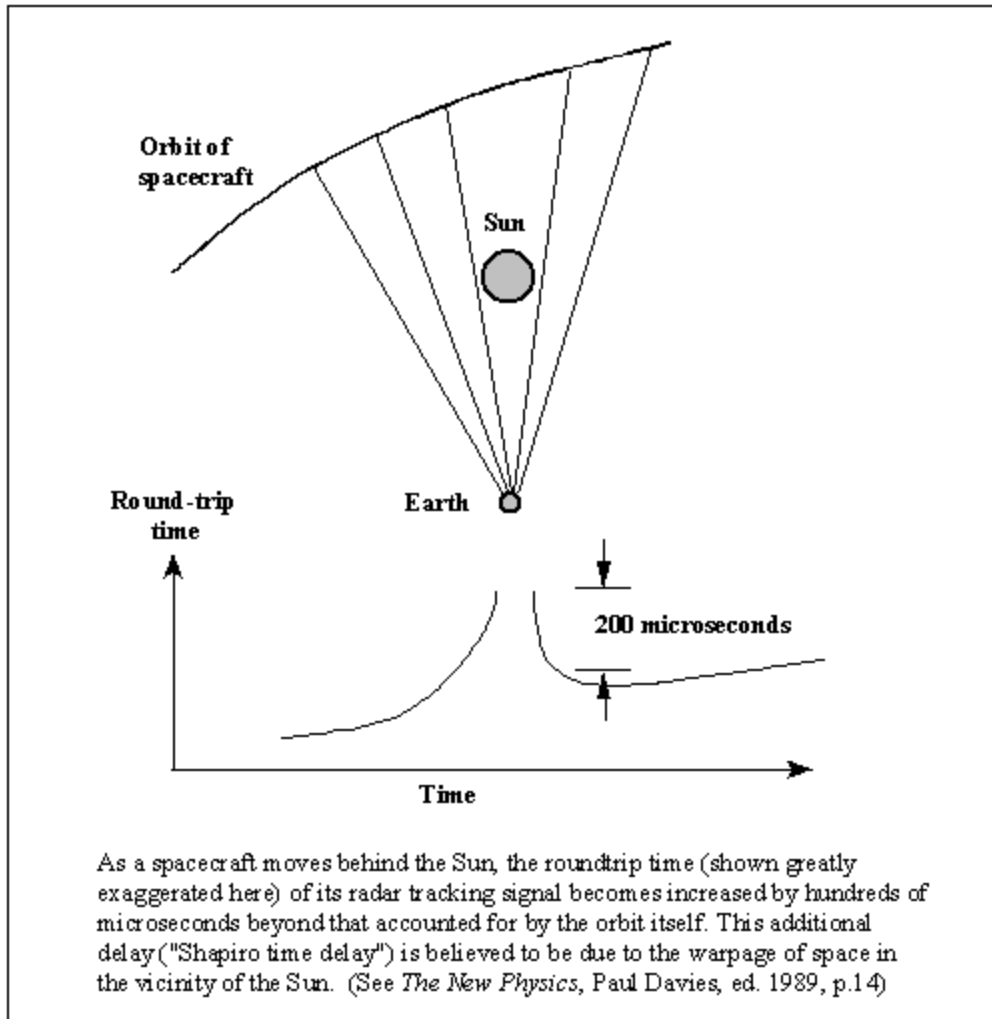
In conclusion it can be seen that the gravitational deflection of starlight ("lensing"), the gravitational redshift/blueshift, the instantaneous "action-at-a-distance" and "inverse square force" characteristics of gravitation, and the Shapiro time delay (see below) all have a common origin. They can all be understood in a simple, intuitively satisfying way only if gravitation is treated as an intrinsic *motion*, not as a force or warps in space.

html 1/02

The Shapiro Time Delay

In the 1960s Irwin I. Shapiro predicted that there would be a time delay introduced into the round trip time of radar signals as they reflected off a planet passing behind a massive body like the Sun. The delay would be caused by the warpage of space due to the presence of the Sun's mass. (Shapiro, Irwin I., 1964, Physical Review Letters. 13: 789; Shapiro, Irwin I. et al., 1971, Physical Review Letters, 26, 1132) . This was another good test of General Relativity, and the effect does indeed appear to be factual:

"In the two decades following Shapiro's discovery of this effect, several high-precision measurements have been made using radar-ranging techniques that evolved from the Venus echo work of 1959-60. Three types of targets were employed: planets such as Mercury and Venus, used as passive reflectors of the radar signals; spacecraft such as *Mariners* 6 and 7, used as active retransmitters of the signals; and combinations of planets and spacecraft, known as 'anchored spacecraft', such as the *Mariner 9* Mars orbiter and the 1976 *Viking* Mars landers and orbiters. The *Viking* experiments produced dramatic improvements in the determination of the time delay, because anchoring the spacecraft reduced errors due to random fluctuations in their orbits (planets are very imperturbable), and because noise introduced into the tracking signal by the rough planetary topography and poor planetary reflectivity is removed by the use of transponding spacecraft." (*The New Physics*, Paul Davies, ed., 1989, p.14)



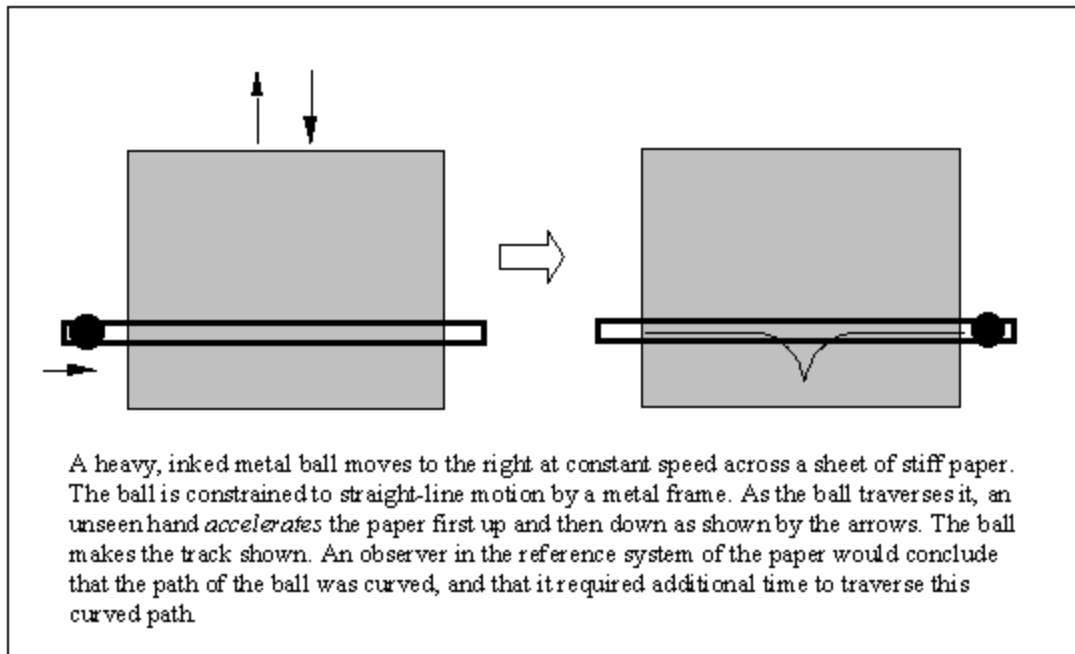
See also "Delay of Light in a Gravitational Field" <http://www.whfreeman.com/modphysics/PDF/2-2bw.pdf> and others: <http://www.geocities.com/newastronomy/animate.htm> , <http://www.si.edu/opa/researchreports/9892/saoside.htm> , <http://renshaw.teleinc.com/papers/timedela/timedela.stm>

The 200 microseconds is the radar distance equivalent of about 40 miles (roundtrip). So this is like saying that the spacecraft, with a planet attached to it, jumped 20 miles out of its normal orbit as it passed behind the Sun. The observations are "explained" by claiming that the Sun's mass causes a warp in space, and consequently the path of a radar beam passing near the Sun has to go through space that is stretched out, and this causes the additional time delay.

You have probably seen the illustrations of this effect. They show a rubber sheet stretched out across a hoop (like the top edge of a garbage can). Straight lines are then drawn on the sheet and some lines pass near the center of the sheet, and others are closer to the edge. A weight is then placed in the center of the sheet. The sheet deforms downward, with the greatest deformation being at the center. The lines are still at their same positions on the sheet, but the ones near the center are stretched out longer than the ones near the edges. The time delay for a radar beam is thus due to a change in the geometry of space itself, not to fluctuations in the orbital path, and is greatest for signal paths grazing the Sun.

Unfortunately, no one has given a conceptual explanation of how the mass grabs hold of the fabric of space and warps it, and so the "explanation" is not very satisfying. It is like explaining a mystery with an enigma. (I used to be amazed that people actually regarded this as an explanation.)

I would like to offer an alternative explanation. Consider the following illustration:



This situation is quite a bit like that with the [Einstein elevator](#). In the elevator (remember) the path of the light beam is actually straight, but the *acceleration* of the elevator and the observer within it, causes the path to appear curved in exactly the same way a stream of water or a ball thrown horizontally appears to curve downward here on earth (except of course, that light travels very much faster than a stream of water and its path cannot really be seen to curve). If the elevator were accelerating in the opposite direction, the curvature would likewise be in the opposite direction.

In the above illustration, the ball is constrained by a straight metal track and is analogous to the light beam. The paper is what we think is flat, stationary space-time. The motion of the paper is analogous to the accelerated gravitational motion near the Sun. However, if we are residing on the paper like tiny bugs, we have the same motion that the paper has, and do not realize that the paper gets yanked up and down (we feel an acceleration, but we remain "stationary" at the same spot on the paper). We bugs know that the ball is constrained to follow a straight path, but it actually traces out a curved (parabolic) path. We realize that this could be caused by a warp in the fabric of the paper, or it could be caused by motion of the paper, neither of which is observable to us bugs.

So how do we choose between the two alternatives? Equations like $E=mc^2$ suggest that, if the equation is to be dimensionally consistent, then m must be some kind of space/time ratio just like the speed of light (the c term) is a space/time ratio. If this is the case, then mass must be what we call motion or speed. Moreover, Einstein's [Principle of Equivalence](#) states that gravitation is equivalent to an accelerated reference frame. We could take this one step further and say that gravitation *is* accelerated motion, not just equivalent to it. The premise of Scriptural Physics also requires an understandable, plainly evident universe (no inherent mysteries). Motion is much easier to understand and more plainly evident than invisible warps in space. Hence, the "motional" interpretation of gravitation seems to be the best one. (See also: [Why is gravitation an accelerated motion?](#))

There are some superficial difficulties, however, and we must educate our intuition a little bit. Consider this problem: A man jumps upwards from the earth. According to the "motional" interpretation of gravity, the man is floating momentarily in free space, but the earth has motion and rushes out to collide with him, accelerating him thereafter so that he has the sensation of weight. Meanwhile, another man on the opposite side of the planet does the same thing, and experiences the same result. How can the earth be moving outward to meet both men? How can the earth be moving simultaneously in diametrically opposite directions? This must be an unusual kind of motion!

Actually, scientists have the same sort of problem. To explain the expansion of the universe they use an analogy of an explosion (the "Big Bang"). The explosion blows everything apart in a directionless fashion. The motion is simply "away" from the original location. You have probably also heard the analogy of the expanding balloon. Points on the balloon's surface move away from each other as the balloon is inflated. This is another kind of directionless expansion.

Scientists also distinguish between "force vectors" and "force fields". A force pushing a rocket is in the "force vector" category. But the force around a charged particle is in the "force field" category. Forces are apparent in both situations, but the latter has a kind of "doesn't care" attitude about direction. Its essential "direction" seems to be only "towards" or "away".

The motional interpretation of gravity requires a similar kind of "directionless motion". Mathematicians would call it "scalar motion" instead of "vectorial motion." It is either "towards" or "away" (from everything) and has no property but a signed magnitude. Note that this is simply a description. It is not a theory or an explanation about what causes this type of motion (see [spin](#)). Instead of describing the situation with the term "force field", we just use the term "scalar motion". Again, motion is much easier to understand. The "force field" concept requires action-at-distance, and that is an idea that makes scientists uncomfortable.

Because scalar motion is towards or away from everything, it is necessarily a multidimensional motion in the context of the usual reference system. Instead of using the balloon analogy, let's use a picture on a TV screen. As the camera zooms in on a scene, *the points on the picture move outward and away from each other*. The picture enlarges or expands. The expansion takes place in both the horizontal and vertical dimensions of the picture. Yet this is just *one motion*, not two. It is one motion of the two-dimensional type.

Another analogy uses Microsoft windows on a computer display. Let's say you want to expand a window. You put the cursor on an edge and then do a click-and-drag. This expands the window in one dimension. You can also click-and-drag the other edge, and expand the other dimension. Note that these are two separate applications of one-dimensional motion. But there is an even simpler way to expand a window. Do a click-and-drag on a corner. This is *one* application of a *two-dimensional* motion. Conceptually, you could generalize this even further. If you could click-and-drag on the corner of a cube, you would have *one* motion of the *three-dimensional* type.

This multidimensional motion is exactly what we need for gravitation. Are you intuitively more comfortable with it now? Or when you watched the picture on the TV, did you find yourself thinking "The camera is warping the space on my TV screen"? Or maybe "The camera is exerting a force field on the picture"? Hopefully, your mind simply said "The camera is in motion *and that explains what I am seeing*." Actually, your brain does the same sort of image processing as you walk down the street or drive a car. Your visual system has a built in "scalar motion processor", and you cannot get more intuitive than that!

It is this gravitational motion of the Sun then, not warps in space, that introduces the equivalent of "more space" and thus the Shapiro time delay.

8-10-02 Note: The view that gravitation is *one* multidimensional motion requires that its "propagation velocity" be instantaneous. Because it is one motion, like the moving points on the TV picture, there is nothing that is propagated, and the action between all points is necessarily instantaneous. See [The Speed of Gravity](#) above. Note that this "action-at-a-distance" has a different character than the non-local action of the EPR paradox. In that situation, if two photons originate in the same event, their Schrödinger waves become "phase entangled", and even though they separate spatially, it can be demonstrated experimentally that they are still connected somehow, and that an action on one has instantaneous effects on the other, regardless of the spatial separation. (See [The Problem of Quantum Locality](#)). In this case there are two objects (photons) but there are also two kinds of location, a three-dimensional spatial location and a three-dimensional temporal location. The latter is "non-local" to the spatial system and is responsible for the appearance of instantaneous action-at-a-distance. In the case of gravitation, there are also two objects (say, the Earth and Moon), but only the spatial motion is considered. They are connected by *one* multidimensional gravitational *motion*. There is nothing that is propagated, and so actual measurements of the "speed of gravity" give speeds that are so far in excess of the speed of light that only a lower limit on the speed can be given.

11-9-03 Note: You may suspect multidimensional motion is involved somehow when physicists use words like "fields", "potentials", and the "Aharonov-Bohm effect" to describe the phenomena:

"It is possible to interpret the Aharonov-Bohm effect without supposing that the potentials are real by letting the electromagnetic interaction be nonlocal—that is, by permitting action at a distance. Although physicists have traditionally resisted nonlocal theories, it turns out that nonlocal effects may be built into the quantum-mechanical description of nature. There are experiments for which the most natural explanation seems to require that an action at one location produce an

instantaneous result at a distant location. This phenomenon is a subtle one in which the principle that signals cannot travel faster than light is not violated . . . and it is surprising and poorly understood. It is a different kind of nonlocality from that suggested by the Aharonov-Bohm effect, but each situation hints that the quantum-mechanical universe, in some strange unexpected way, may be a nonlocal one.

The Aharonov-Bohm effect is a rich phenomenon with numerous implications. As only one example, it suggests that in quantum mechanics the concept of force is no longer useful. The equations of quantum mechanics never involve forces, only potentials. . . . the effect does seem to demonstrate that potentials are more fundamental than forces in the microscopic world." (*Classical & Modern Physics*, F.J. Keller, W. E. Gettys, M.J. Skove, (1993) p. 915-917. See also [The Problem of Quantum Locality](#)

6-21-07 Note: Physicist Mark P. Silverman explains a bit about the Aharonov-Bohm effect in a book review (http://www.trincoll.edu/~silverma/reviews_commentary/neutron_interferometry.html):

The Aharonov-Bohm (AB) effect is a quantum interference effect that depends on spatial topology and can be manifested only by particles endowed with electric charge. A split electron beam, for example, made to pass in field-free space around (and not through) a region of space within which is a confined magnetic flux, will, upon recombination, exhibit a flux-dependent pattern of fringes. Thus, by a judicious adjustment of the magnetic flux, one can produce an interference *minimum* in the forward direction, even though the optical path length difference of the two beam components is null. The electrons do not experience a magnetic field locally, and therefore are not acted upon by a classical Lorentz force.

There is also the Aharonov-Casher effect:

As neutral particles, neutrons do not exhibit what is traditionally regarded as *the* AB effect. However, neutrons have a magnetic moment and give rise to a companion topological phenomenon known as the Aharonov-Casher (AC) effect. In the latter, a split neutron beam is made to pass around a region of space within which is a confined electric charge and, upon recombination, gives rise to a charge-dependent interference pattern. The experimental confirmation of this effect, which may be interpreted as an example of spin-orbit coupling, was performed at the University of Missouri Research Reactor in 1991.

And the Colella-Overhauser-Werner effect:

In their book, the authors describe the so-called COW experiments (for Colella-Overhauser-Werner) in which a beam of neutrons, coherently split into two components moving parallel, but displaced vertically from one another, are recombined to yield an interference pattern that depends on the gravitational potential difference of the two beams.

For my thoughts on the latter see "What the Neutron Interferometer Reveals about Gravitational and Inertial Mass" [above](#). See also [The Shapiro Time Delay](#) and [Feynman's disk paradox](#).

I believe that these experiments show how a multidimensional motion manifests itself when interacting with another multidimensional motion of different dimensions. Gravitational motion inherently has three *motional* dimensions, only one of which can be manifested in our reference system, which uses three dimensions of spatial displacement and one dimension of time progression displacement. Therefore, one dimension of the gravitational motion acts "Newtonian" or as a "force" or as "gravitational potential energy". Moreover, the motional dimensions are inverted relative to our common reference system (t/s instead of s/t). This inversion makes the motion non-local, non-directional, and with no spatial trajectory. We use the words "potentials" and "fields" to describe the tendency for this type of motion. The reference system can likewise depict one Newtonian potential, but the other two are not normally manifest. Their presence, however, can be revealed by clever experimental techniques like those used in the AB, AC, and COW experiments.

All this implies that we can expect yet another mystery to appear on the physics scene someday: a reactionless force generator. By using field technology, the generator would create a beam of mechanical force, but the generator would not experience an "equal and opposite" (Newtonian) reaction. Instead, the reaction would be "equal and *radial*" (perpendicular) to the beam generated, and would seem to cancel itself out within the generator. The system would act like a cannon but with no Newtonian kick-back.

Lack of Recoil in Railguns

Apparently, an effect similar to that described in the paragraph above has been seen in rail guns. This effect is magnetic, instead of gravitational, but the similarities are intriguing:

"The rails need to withstand enormous repulsive forces during firing, and these forces will tend to push them apart and away from the projectile." <http://en.wikipedia.org/wiki/Railgun>

That, in and of itself, is not unexpected, as it is predicted by Faraday's law of induction. What is surprising to investigators is the lack of a reaction force:

"An interesting debate in railgun research circles is the location, magnitude, and cause of recoil forces, equal and opposite to the launched projectile. The various claims do not appear to be supported by direct experimental observation. . . . The research is ongoing but we have observed that the magnitude of the force on the armature is at least seventy times greater than any predicted equal and opposite reaction force on the rails." (AN INVESTIGATION OF THE STATIC FORCE BALANCE OF A MODEL RAILGUN by Matthew K. Schroeder, June 2007 (thesis paper); <http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=ADA473387&Location=U2&doc=GetTRDoc.pdf>)

In other words, there seems to be some "missing recoil" in connection with radial electromagnetic forces. Investigating, I found this comment (quoted in part) on the Internet (<http://sci.tech-archive.net/Archive/sci.physics.research/2008-12/msg00010.html>)

"There is very little room for skepticism about the paper. Large scale tests performed by the US Navy of a prototype rail gun involved a 3.35 Kg projectile with a muzzle velocity of 2520 meters/sec. This gives a momentum in excess of 8000 Kg-meters/sec, enough to send a 200 Kg rail gun backward at over 40 meters per second. A conventional gun with similar performance would require a massive and extensive recoil absorption apparatus. There is none needed with a rail gun. . . .

The lack of recoil in rail guns has disastrous consequences for physics; it is a direct and unequivocal demonstration that the law of conservation of momentum is incorrect." ("Rail Guns don't recoil", Canup, Robert E., December 2008)

The lack of recoil is, shall we say, "non-intuitive". But it is certainly not "disastrous" for physics. The momentum is still there, just not where we expect it to be, or acting in the expected (Newtonian) manner.

See also:

["Motion Cancellers"](#) (below).

["The Origin of Intrinsic Spin"](#)

"An Overview of the Nature of Time" by Brian Fraser (has relevant comments about gravitation)
essay: http://www.fqxi.org/data/essay-contest-files/Fraser_NatureOfTime.pdf
discussions: <http://www.fqxi.org/community/forum/topic/294>

The Faraday Paradox at http://en.wikipedia.org/wiki/Faraday_paradox

"Video: Railgun Blasts an Aerodynamic Round Seven Kilometers Through A Steel Plate", <http://www.popsci.com/node/53495/?cmpid=enews042111>

<http://www.popsci.com/future-war-new-ships-will-determine-control-contested-waters> Popular Science July 2015 p. 49 states that a rail gun being tested by the Navy accelerates a shell, which weighs about 35 pounds, from zero to 5,000 miles per hour in 1/100 of a second. "It can strike with 32 megajoules of energy, roughly equal to the force of a locomotive smashing into a wall."

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The Relativistic Correction Factor, Gamma (γ)

If you study Special or General Relativity you will soon encounter the "relativistic correction factor", gamma, which is usually given as:

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

The velocity term, v , is the conventional speed of the object in motion and c is the speed of light. Gamma itself is just a dimensionless (pure) number. As per the formula, γ is approximately 1 at ordinary terrestrial speeds. At speeds 99.9% of light, γ becomes about 22. It is a correction factor, not something that stands alone, and applies to speeds in space. It is used to compute relativistic momentum, relativistic energy, length contraction and time dilation at high speeds.

Physics textbooks have all sorts of examples about how and why it is used. Here is one concerning muons:

Both the length contraction and time dilation are easy to observe for objects moving at velocities whose magnitudes are an appreciable fraction of that of light. A particularly convincing example is found in the behavior of particles called muons. These are known to be formed at an elevation of around 10,000 m, near the top of the atmosphere, as a byproduct of collisions of rapidly moving cosmic rays with the molecular constituents of the atmosphere. The muons are projected toward the surface of the earth at velocities of about $0.999c$. They are unstable particles; on the average each lives for 2.2×10^{-6} sec, as measured in a reference frame in which the muons are stationary, before decaying into other particles. Now a particle moving at essentially 3.0×10^8 m/sec for 2.2×10^{-6} sec will travel only 660 m. Hence it might seem that all muons would have decayed long before they are able to reach the ground, since they must travel around 10,000 m to do so. But, in fact, observations show that nearly all the muons formed at the top of the atmosphere reach ground level.

Time dilation explains the observations. A prediction as to whether or not a muon can traverse the thickness of the atmosphere before it decays should not use 2.2×10^{-6} sec for the time available. This value is the proper time the particles live, on the average, because it is measured in a reference frame in which they are at rest. Instead, the corresponding dilated time should be used since the observations are made in a reference frame in which the muons are moving at a very high velocity. For $v/c = 0.999$, the time dilation factor has the value $1 / \sqrt{1 - v^2 / c^2} = 1 / \sqrt{1 - 0.998} = 1/0.045 = 22$. Hence the dilated lifetime has the value $22 \times 2.2 \times 10^{-6}$ sec = 4.9×10^{-5} sec. A particle moving at 3.0×10^8 m/sec for this time will travel a distance of 14,000 m, more than enough to reach ground level before decaying. —*Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles*, R. Eisberg, R. Resnick, Second Edition, 1985, p. A-9

Relativity can even predict the actual numbers of muons expected at sea level, not just the expectation that most will arrive there:

It is easy to distinguish experimentally between the classical and relativistic predictions for the number of muons detected at sea level. Suppose that we observe with a muon detector 10^8 muons in some time interval at an altitude of 9000 m. How many would we expect to observe at sea level in the same time interval? According to the nonrelativistic prediction, the time taken for these

muons to travel 9000 m is $(9000 \text{ m})/0.998c \approx 30 \text{ } \mu\text{sec}$, which is 15 lifetimes. Inserting $N_0 = 10^8$ and $t = 15T$ into Equation 1-0 $[N(t) = N_0e^{-t/T}]$, we obtain

$$N = 10^8 e^{-15} = 30.6$$

We would thus expect all but about 31 of the original 100 million muons to decay before reaching sea level.

According to the relativistic prediction, the earth must travel only the contracted distance of 600 m in the rest frame of the muon. This takes only $2 \text{ } \mu\text{sec} = T$. Thus the number expected at sea level is

$$N = 10^8 e^{-1} = 3.68 \times 10^7$$

Relativity predicts that we should observe 36.8 million muons. Experiments of this type have confirmed the relativistic predictions. —*Modern Physics*, Paul Tipler, 1978, p. 13

(An alternative interpretation is that time progression remains completely uniform, and that motion affects the decay "constant".)

Modern physics does not clearly explain why the Universe acts this way. Consequently, gamma becomes a type of sophisticated "fudge factor" that is used in the equations to make the answers agree with experiment. Hopefully we can educate our intuition by seeking some additional insights into what the gamma equation is trying to tell us.

With some elementary math, we can rearrange it into a different form:

$$1 - v^2/c^2 = 1/\gamma^2$$

$$1 = 1/\gamma^2 + v^2/c^2$$

$$c^2 = c^2/\gamma^2 + v^2$$

The last equation with the sum of squares suggests a Pythagorean relationship or a "Euclidean distance" relationship with the speed of light. The relationship could also be written in terms of orthogonal functions (sine and cosine, complex numbers, vectors, etc.). My own term for this kind of math is "orthogonal sum".

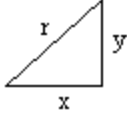
The "orthogonal sum" idea shows up frequently in physics and mathematics:

Pythagorean theorem:
 $r^2 = x^2 + y^2$

Electrical Impedance:
 $Z^2 = R^2 + X^2$

Einstein's energy equation:
 $E^2 = (mc^2)^2 + (pc)^2$

Gamma:
 $c^2 = c^2/\gamma^2 + v^2$



A slide from my presentation ["The Quest for the Stardrive"](#)

Gamma applies only to speeds in space. However, motion at speeds comparable to that of light involve temporal speeds (motion in three-dimensional time) as well as spatial speeds (motion in three-dimensional space). If we want to combine a temporal speed with a spatial speed, we have to use an orthogonal sum—exactly what this equation is using. Hence, we could replace the c^2/γ^2 term with a term that represents a temporal speed, which when stated in terms of our spatial reference system would be an inverse speed. When written in s/t dimensions, such an equation would look like the following:

$$(s/t)^2 [=] (1/(t/s))^2 + (s/t)^2$$

The [=] means that only the dimensions are being considered, not numeric magnitudes.

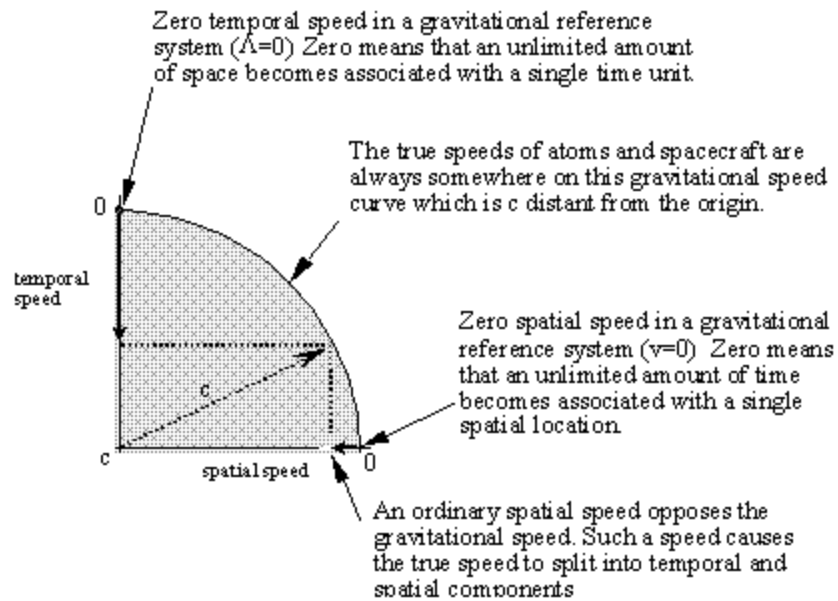
These two forms of the gamma equation tell us:

- A gravitational reference system, be it a planet, a spacecraft, or an atom, always moves at the speed of light. In fact, *everything* moves at the speed of light.
- The complete speed relative to such a system actually has two orthogonal components: a temporal speed and a spatial speed. When the spatial speed is zero ($v=0$), the speed of the system is entirely in time. Time flows, but space "stays put" or "is stationary". On the other hand, if the system is moving at the (spatial) speed of light ($v=c$), then space flows, and time "stays put" or "stops".

In this interpretation, we can immediately see the reason for time dilation at speeds comparable to that of light. At c , the phenomena remains in the same time unit and does not experience the flow of time. At speed c , clocks would have an indefinitely long tick. Unstable particles would have indefinitely long life-times. At speeds slightly less than light, time flows a little bit, but not nearly as fast as we normally experience it. The muons in the example above have their lifetimes stretched out by a slow passage through the time units.

I prefer to illustrate the relationship of the two speeds with this kind of diagram:

Speeds in a gravitationally bound reference system



A non-gravitating object like a photon always moves at the speed of light. Its position on the diagram would be at the origin. Note that the origin is not zero. The origin represents the "no motion" datum for the physical universe (photons are actually stationary, but the "fabric" of space and time expands at the speed c) The speed is divided equally between space and time in a 1/1 ratio. The expansion of space (numerator) is exactly cancelled out by the expansion of time (denominator) and vice versa. The "flow" of either is apparent only when space and time are considered separately as abstractions (not as an inseparable ratio).

A gravitating object like a star also moves at the speed of light, but its speed is not split equally between space and time. In this case, an unlimited amount of time becomes associated with a single spatial position (time flows, space is stationary. Loosely, $s/t = 1/\infty$).

A gravitating object like a spacecraft also moves at the speed of the gravitational system. However, it may have an additional speed imposed on its gravitating atoms. The spatial and temporal components of this speed must still sum to the speed of light. At speeds near that of light, the true speed is almost entirely spatial (space flows, time is stationary. Loosely, $s/t = \infty/1$)

Note that there are no zero or infinite speeds in this system. There aren't even any non- c speeds! These supposed "other speeds" are only abstractions convenient to humans.

2-17-14 Note: A review of this diagram suggests there is a problem with the last sentence in the next-to-last paragraph. The speed $s/t = 1/\infty$ from a standpoint of a gravitational reference system is zero speed in space, c speed in time (ordinary "local physics"). At the speed of light, which is actually intermediate on the [speed spectrum](#) from our standpoint, the speed would be c speed in space, and c speed in time (which reduces to 1/1). At the other extreme is zero speed in time, and infinite speed in space ($s/t = \infty/1$) which is instantaneous action-at-a-distance from our gravitational observational standpoint (fully "non-local physics").

In the true physical situation the "natural" or real "zero" is c (or $1/c$) and spatial and temporal speeds are displacements away from the origin. The math is similar to the familiar $r = r \sin(\theta) + r \cos(\theta)$ of high school trigonometry where $r=1$. But trying to explain this from the perspective of a gravitational reference system, and using separate space and time dimensions, instead of "motional dimensions" introduces some conceptual difficulties with the math.

And so I don't know if this note clarifies or only adds to the confusion. Pythagoras encountered a similar problem, and [my comments on that](#) might be helpful. See also [Gravitational motion has multiple dimensions](#)

3-9-14 Note: Here is more food for thought on the $c^2 = c^2/\gamma^2 + v^2$ equation. I apparently have had a blind spot regarding the "units" in this equation. The left side can be time/space or space/time. These are identical at the speed of light and so it does not matter which is used.

As for the right side, the least strained interpretation is that the first term is truly a temporal speed and the second is truly a spatial speed. In physics terms a "non-local speed" is being combined with a "local speed". The first is more like energy and the second is, of course, a velocity.

My blind spot appears to be that an "orthogonal sum" can not only sum independent things, ~~but things of a completely different character as well.~~

Consider these examples. The Pythagorean Theorem sums independent x and y lengths, but the sum (the hypotenuse) is still a length. In physics class we would add x and y velocities, but the result was still a velocity. Or we could combine various weights of red, green, and blue independent color dimensions, but the result was still color. ~~But this trait of "independence with sameness" is not really necessary.~~

In familiar terms, we could add (combine) 3 pounds of carrots and 4 pounds of potatoes in a pot of water. The resultant is neither carrots nor potatoes, but is something else that includes the character of both. In this case we can call it "soup", or more specifically a "soup taste vector". The length of 5 shows how much of this specific soup taste we have to distribute.

Similarly we could add old refrigerators, junked cars, rotting garbage, dirt etc. and call it a "landfill vector". We could even devise a vector "inner product space" and take dot products of the "landfill state vector" with a unit vector representing a particular component, to find out how much stuff of a particular kind we have in the landfill (something that might interest the EPA, for instance). Such methods are well known to mathematicians and quantum physicists.

Hence, there is no need to force the units on the right side of the equation to agree in character, as long as the concept of Euclidean distance still makes sense (it would not make sense, say, in a pressure-temperature-volume diagram). But what is needed is an adjustment in magnitude for the temporal term as seen from a spatial reference system. Hence, gamma (γ) needs no units and can still be a pure number.

6-8-14 Sooner or later I will get this right. I now think all the terms have the dimensions of space/time (ordinary velocity) and that gamma can remain dimensionless (a pure number). The units really have to be the same to preserve the concept of Euclidean distance. In the soup example, the dimensions are NOT potatoes or carrots, but *pounds*. In the landfill, the dimensions could be

tons or cubic yards but NOT refrigerators, cars, etc. The gamma term simply changes the magnitude of a temporal motion into the magnitude that would be seen in a spatial reference system as an ordinary spatial velocity.

6-23-16 Another twist on the "summation" concept comes from vector and Geometric Algebra:

"How can we add, e.g., a scalar and a vector? Are we not adding apples and oranges? Yes, but there is a sense in which we *can* add apples and oranges: put them together in a bag The apples and oranges retain their separate identities, but there are "apples + oranges" in the bag. (*Linear and Geometric Algebra*, Alan MacDonald (2010) p. 81)

This is the sense that a quaternion is the "sum" of a scalar and a vector, or a complex number is the sum of a real part and an imaginary part. In Geometric Algebra "the vector space G^3 consists of objects of the form $M = s + \mathbf{v} + \mathbf{B} + \mathbf{T}$, where s is a scalar, \mathbf{v} is a vector, \mathbf{B} is a bivector, and \mathbf{T} is a trivector." Each part retains its own identity and can be "summed" (in the usual sense of the word) only with another part of like kind in a different object. But the object itself may be the "sum" of distinctly different parts in the sense of being in the same bag.

To get a better intuitive feel for this, consider this rather contrived illustration. Imagine you are on a boat in a river with some extraordinarily ignorant boatmen. The boatmen do not know what a river is. The river you are on is, to them, a long lake. When the boat is rowed out to a spot in the middle of the long lake, the "magic wood" in the boat's hull makes the land flow by. You point out that the land seems to move because the boat is in a river of moving water and is being carried along by the motion of the water, and that is why the land seems to flow by. But the boatmen are unconvinced. They are on a lake, and the lake water is stationary. They throw a cork overboard and say "See, the cork stays exactly in the same place as the boat, exactly as it does on land, where we did the same test. We are not moving. It is the land that moves, not us."

Later, you discover that the boat has a motor. And so you propose an experiment. You drive the boat upstream with the motor on. The boatmen remark that "The land has stopped flowing, but now the water moves." They throw another cork overboard, and it rapidly moves away. They seem disappointed that you do not believe in the powers of the "magic wood" in the boat's hull. It is as though you have cheated by using the motor.

One thing you realize in this situation, is that no matter what you do, the boat is always moving. If you turn off the motor, the boat moves with respect to the land. If you drive upstream with the motor on, the boat moves with respect to the water. At intermediate speeds, you are moving with respect to *both* land and water. If you wrote physics equations to describe the situation, you would always have an extra "speed factor" popping up in the equations somewhere.

And that is how things are in a gravitationally bound reference system. Space stays put, but time flows past us. But if we get into a spaceship and move at the speed of light, we find that space flows past us, but time becomes stationary. No matter what we do, something is still moving! And a speed factor, c , keeps showing up in fundamental physics equations like $E=mc^2$, $E=pc$, and $\mathcal{E}=cB$. If we try to measure the relationship between a magnetic field and an electric field, we find that different observers with different speeds, will see different magnitudes of the magnetic and electric components (see the [example](#) in the Motion Cancellers article below). And unlike the situation with the boat where the speeds are purely spatial and of the same basic nature, the speed of an object in the context of a gravitational system is a combination of two speeds of a dissimilar nature.

And so the total speed has to be computed by orthogonal addition of the two terms. This means that they are inextricably intertwined with each other, and that our simple concepts of space and time must be augmented with some really obnoxious "relativistic" relationships.

At ordinary everyday speeds these complex relationships can be ignored. But they are still present, and can be detected with high-precision instruments, even at low speeds. An experiment with ultra precise atomic clocks flown on commercial airline flights in 1971 demonstrated the kinematic time shift (Special Relativity) and the gravitational time shift (General Relativity). And lately there have also been hints of the Lense-Thirring "frame drag" caused by rotation of a gravitational body like the Earth.

The Tajmar effect from Quantised Inertia", M.E. McCulloch (June 17, 2011)

"It has been found experimentally by [1-3] that when rings of niobium, aluminium, stainless steel and other materials are cooled to 5K and spun, then accelerometers and laser gyroscopes, not in frictional contact, show a small unexplained acceleration in the same direction as the ring, with a size $3 \pm 1.2 \times 10^{-8}$ times the acceleration of the ring for clockwise rotations, and about half that value for anticlockwise ones. This is called the Tajmar effect and is similar to the Lense-Thirring effect (frame-dragging) predicted by General Relativity, but is 20 orders of magnitude larger and shows the added parity violation. The effect has not yet been reproduced in another laboratory." <http://arxiv.org/pdf/1106.3266.pdf>

"Guidelines to Antigravity", Robert L. Forward, *American Journal of Physics*, Vol. 31, No. 3, 166-170, March, 1963 (Received 12 September 1962) http://www.academia.edu/3336384/Antigravity_-_by_Robert_L.Forward

"EINSTEIN'S general theory of relativity provides a number of ways to generate non-Newtonian gravitational forces. Theoretically, all of these forces could be used to counteract the gravitational field of the earth, thus acting as a form of antigravity. The three outlined here were probably known by Einstein before he published his paper on the principle of general relativity in 1916. They were first specifically derived by Thirring in 1918, and since then have been contained in nearly every text on general relativity.

The equations of general relativity not only predict the usual radial Newtonian gravitational force behavior of a stationary mass on a stationary test body, but they also predict that a moving mass can create forces on a test body which are similar to the usual centrifugal and Coriolis forces, although much smaller. In addition, when the general relativity field equations are linearized, they result in a set of dynamic gravitational field relations similar to the Maxwell relations. Thus one can use intuitive pictures from electromagnetic theory to design theoretical models. Whether the effects predicted by the linearized theory really exist, will, of course, have to be checked by repeating the calculations with the nonlinearized field equations."

Three cases are covered:

1. A massive rotating ring with a test body below it and centered on the rotation axis. The result: "the rotating mass not only forces the test body away from the axis in an imitation of centrifugal force, but also pulls it upward into the plane of rotation"
2. A rotating massive spherical shell, with a test body moving inside the shell.
3. A large accelerated mass near a small test body. It is found that the accelerated body drags the test body along with it. "In addition to the usual Newtonian attraction, the test body experiences forces in the direction of the acceleration and the velocity of the large body . . . "

Update 5-19-2003: Buried in this interpretation somewhere is a suggestion that gravitation is necessarily non-directional. Our planet is "moving through time" or "time is passing by us". In other words, our Earth is moving relative to time. The real motion must be some dimensional version of a t/s ratio (three-dimensional time per unit of clock space). Temporal motion, however, has no direction in space. The gravitational motion can therefore have a signed magnitude, but vectorial direction is fundamentally meaningless here. It follows that gravity must necessarily have the $1/r^2$ or "inverse square" force (motion) distribution [explained earlier](#). Other inverse square forces will likely have an analogous structure (t^3/s^3 for mass, t^2/s^2 for magnetic "charge", t^1/s^1 for electric charge). Also implied is: 1.) the motion of a spacecraft within the spatial system can make the passage of time seem to slow down to zero, but cannot make time speed up, and 2.) the fundamental motion of a spacecraft will always oppose gravitational motion; it must be "towards c" and not "away from c and towards more gravity". See also: http://fqxi.org/data/essay-contest-files/Fraser_NatureOfTime.pdf ; "Luxon Hypothesis" <http://www.tardyon.de/other.htm>

Update 2-9-2015a

I need to comment on the practical implications of this interpretation of gamma. Here is what I see:

1. Mass does not increase with increasing speed. Instead, a directly measureable spatial motion is converted to a non-directly measureable temporal motion. Temporal motion (t/s) is the inverted form of spatial motion (s/t). At speeds less than that of light, the spatial motion predominates. At "speeds" above that of light, all space and time relationships invert (from our perspective), and the temporal motion predominates. (Temporal motion is equivalent to what physicists call "non-local" motion; spatial motion is called "local" motion. The former is non-directional in a spatial reference system, and has only a magnitude, like energy; the latter is ordinary velocity)

2. Energy is a better measure of the "amount of motion" at relativistic speed than spatial velocity. The natural, fundamental pattern for speed is c , the speed of light, and its inverse is $1/c$, which has the dimensions of energy. This explains the behavior of particles in a particle accelerator. An electron with a speed of 0.995 that of light, has an energy of about 15MeV. At a speed of 0.99999995 that of light, it has an energy of 5GeV. Note that the speed has increased by a factor of only 1.0005 but the energy has increased by a factor of 300. How can there be such a huge increase in energy with only a tiny (5 parts in ten thousand) speed increase? It is because the measure of the "amount of motion", speed, is misaligned with the problem. The "amount of motion" instead goes mostly into the t/s term (energy). (In a more normal circumstance the non-directional momentum would be seen as "thermal motion".)

3. If "temporal speeds" are technologically accessible, we could develop a completely new kind of space propulsion system that is not based on the production of ordinary velocity. It would have to be a "field propulsion" technology based on the non-local characteristics of electric, magnetic, and gravitational fields. It would be capable of non-local motion: an object could go from "here" to "there" without traversing the intervening space (that is, it has no trajectory. An object would appear, then disappear, then reappear somewhere else). Ordinary spatial motion is also possible. And it seems possible that the two could mix, depending on how the type and dimensions of the momentum map into our reference system; spatial dimensions could overlap, and an object could appear to be semi-transparent, seemingly "materializing" out of thin air, and even occupying the same space with something else. Such an object may also manifest side-effects of powerful electric and magnetic fields.

Such a propulsion system would NOT have a Newtonian reaction, like a rocket ship. The *reaction* in such a system would be radial and symmetric and cancel itself out. The reaction is like the Poynting vectors in a charging capacitor of cylindrical construction. The vectors point

radially inward and cancel out to yield no net momentum (unless the capacitor is asymmetric). The *action* itself is perpendicular to the plane formed by the *reaction* vectors. That means a spacecraft could be entirely self-contained and "bootstrap" itself (and its occupants) to high spatial velocities or even non-local motion. It would be like a railgun accelerating itself with no recoil. The structure of the ship, however, must be strong enough to withstand the radial reaction.

Special and General Relativity and the gamma correction factor work fine for reference system effects. But remember that these theories are "local" by intention and design. They assume causality in space, that all speeds must be spatial, and that speeds must be less than c . They are out of scope when applied to "non-local" phenomena. See the article below: [In Search of the Geometry of Space, Time, and Motion](#) .

"Call to me and I will answer you and tell you great and unsearchable things you do not know." —Jeremiah 33:3, *NIV*

html 2/03

In Search of the Geometry of Space, Time, and Motion

Author's note: An article of this title exists in my notes in a fragmented outline form. I never wrote it up because it was lengthy and seemed to lack "personal relevance" to my readers . But many of you might enjoy the fragment below. Maybe someday I'll write up the whole thing, but it would be much too long to include in Advanced Stellar Propulsion. (The blue text means that it is still being edited/reviewed.)

<snip>

The problem of metrics

The Euclidean metric worked fine for thousands of years, and still works fine today for ordinary purposes. But in the last two hundred years or so, questions have been raised about the physical applicability and scope of the Euclidean metric:

Tensor Analysis Theory and Applications to Geometry and Mechanics of Continua, I. S. Sokolnikoff, 2nd ed. (1964) p.105-016:

There is no branch of mathematics in which the tyranny of authority has been felt more strongly than in geometry. The traditional Euclidean geometry, based on a set of "self-evident truths" and created largely by the Alexandrian School of mathematicians (around 300 B. C.), dominated the thought and shaped the development of physics and astronomy for over 2000 years. There were a few bold souls, even among the ancient mathematicians, to whom "self-evident truths" contained in Euclid's axioms did not seem convincing, but the prestige of logical structure of Euclid's *Elements* was so high and the hand of authority so heavy that they hindered the development of mathematics for centuries.

In 1621, Sir Henry Savile raised some questions concerning what he called "two blemishes" in geometry, the theory of proportion and the theory of parallels. . . . In 1826, a Russian mathematician, Nicolai Lobachevski, presented to the mathematicians faculty of the University of Kazan a paper based on an assumption that it is

possible to draw through any point in the plane two lines parallel to a given line. The geometry developed by Lobachevski proved just as devoid of inner inconsistencies as Euclidean geometry. Indeed, it contained the latter as a special case and implied the arbitrariness of the concept of length adopted in Euclidean geometry.

In 1831, a Hungarian mathematician, John Bolyai, published results of his independent investigations which conceptually differ little from those of Lobachevski, but which perhaps contain a deeper appreciation of the metric properties of space. Bolyai pointed out, just as Lobachevski did, that his geometry in the small is approximately Euclidean and only a physical experiment can decide whether Euclidean or non-Euclidean geometry should be adopted for the purpose of physical measurement. Thus it appears that there are no *a priori* reasons for preferring one geometry to another. However, it was only after Riemann's profound dissertation on the hypotheses underlying the foundations of geometry appeared in print (published posthumously in 1867) that the mathematical world recognized fully the role played by the metric concepts in geometry.

Riemann appears to have been unaware of the work of Lobachevski and Bolyai, although it was well known to Gauss. Later, Beltrami published his classical paper on the interpretation of non-Euclidean geometries (1868) in which he analyzed the work of Lobachevski, Bolyai, and Riemann and stressed the fact that the metric properties of space are mere definitions. . . .

The reason this is important today is because non-local effects must be considered in the more general physical picture of space, time, and motion. In a non-local situation, events and entities are demonstrably intimately and immediately connected, but not by *spatial* proximity or *spatial* contact, and are therefore free of the limitations normally imposed by spatial distance. Consider the EPR effect. This effect implies that two photons can be spatially separated by light years and yet still be "together" in some way, such that an action on one affects the other instantaneously. In other words, it implies that it is possible to set up instant Star Trek-like communications between spacecraft that could be hundreds of lights years apart in space.

And so what is your metric for "distance" in this situation? What is a realistic measure of "separation"? It is certainly not Euclidean. But the Euclidean notion of distance is 'a mere definition'. Might another definition be more appropriate? And could this have physical applications, say, for space travel? Might things actually be *closer* than we think they are, just not in space? (See also "Teleportation Is Real – But Don't Try It at Home", Danielle Dowling, Jan. 29, 2009 , <http://www.time.com/time/health/article/0,8599,1874760,00.html> ; also <http://newsfeed.time.com/2012/05/15/beam-them-up-scotty-chinese-physicists-reportedly-break-teleportation-record/>)

When you sit in your chair and read this article, you are at equilibrium with Earth's gravitational force. Nevertheless, you are experiencing an acceleration of about 9.8 m/sec². But you are not moving to a new "where". Gravitation is a non-local motion. It moves you to a new "when". If you don't believe me just look at your watch. It is ticking off the seconds while you are in the same place. Still don't believe me? Remember, General Relativity teaches that clock rates are affected by gravitation. Clocks slow down in a high gravity environment, and experiments have demonstrated this effect. You have both a "when" and a "where" location. And so does your chair. Acceleration can affect the locations of both. So how do you write an expression specifying the true "physical distance" between you and the chair? And will it still be valid for interatomic distance (discussed below)? Or for stars in ultracompact galaxies (discussed below)? And at very high speeds, motion

acquires more of a non-local character. What will you see when you look out the window of your spacecraft? How will you measure "distance" and do navigation?

Our notions about motion are in need of adjustment too. As per Einstein's Special Relativity, physicists believe that nothing can exceed the speed of light in a vacuum. But today this needs to be interpreted as "nothing can exceed the *spatial* speed of light in a vacuum." There may be other kinds of speeds, that is, other kinds of motions. Consider astronomical redshifts:

"The most distant observed gamma ray burst was GRB 090423, which had a redshift of $z = 8.2$.^[65] The most distant known quasar, ULAS J1120+0641, is at $z = 7.1$.^{[66][67]} The highest known redshift radio galaxy (TN J0924-2201) is at a redshift $z = 5.2$ ^[68] and the highest known redshift molecular material is the detection of emission from the CO molecule from the quasar SDSS J1148+5251 at $z = 6.42$." (<http://en.wikipedia.org/wiki/Redshift>)

Z is the redshift that the telescope sees compared to the laboratory reference value. It is just a number. The interpretation is left up to the astronomer. A z that is greater than one, implies speeds that are greater than light. Simplistically, a z of 5.2 would imply a speed of over 5 times that of light. But because of the acceptance of Special Relativity, physicists and astronomers find this interpretation hard to accept. And so they use Special Relativity theory to "correct" these speeds to sublight values. In other words, they map the speeds into a system of purely *spatial* motion, so that it is always less than the speed of light.

We see the same "corrections" applied in other situations. Experiments show that the speed of gravity and the speed of electric fields is instantaneous. But today's theories win out over fact. The speed of gravity gets "corrected" down to that of light, even though NASA cannot use this "correction" in their orbital calculations. Only an instantaneous speed for gravity gives the correct answers.

Clearly, we need a more comprehensive metric for motion. Our notions about space and time are derived from motion. Motion is not "made of" a relation between space and time. Motion comes first. Think of how you make a box. Do you start with an "inside" and an "outside"? Or do you start with the box itself first, and then *define* what is meant by an "inside" and an "outside"? Motion is the primary concept, space and time are secondary, derived concepts.

Problems with time

Our view of motion affects our view of time. In physics, time is generally treated as a parameter, not as a variable. Action occurs "in space", not "in time" Time is used as a *descriptor* not a *participator*. Time is "external" to the motion. Because of this, physicists have proposed eliminating the concept of time as being fundamental. Consider Amrit S. Sorli's paper, "Time is Derived from Motion through Timeless Space":

"A growing number of modern researchers are challenging the view that space-time is the fundamental arena of the universe. They point out that it does not correspond to physical reality, and propose "timeless space" as the arena instead. . . . Time and clocks are man-made inventions. Motion is primary, time is secondary. Time is an artifice of measurement, a useful tool that permits us to build mental and mathematical models for our daily lives as well as for our physics and cosmology. But time as a fundamental entity has no role in physics.

[Conclusion] When physical objects move, they move through space, not through space-time, and not through time. Time is derived from this motion through space, and space itself is timeless. Whilst the speed of light is considered to be a maximum rate of motion, this varies with the local environment, the photon is an extended entity that experiences no time, and some atomic-scale physical phenomena appear to be timeless. Clocks are macroscopic measuring devices which accumulate local internal motion, and we can record a sequencing of that motion and the changes that occur in space. But we can find no evidence to support the existence of space-time as a fundamental entity. Accordingly we must conclude that we live in a timeless atemporal universe of space and motion, where the past and future only exist in the human mind, and the only eternity is now." ("Time is derived from motion through timeless space", Amrit S. Sorli, http://www.fqxi.org/data/forum-attachments/TIME_IS_DERIVED_FROM_MOTION.pdf)

And this from Carlo Rovelli's paper "Forget time" (2008):

"Following a line of research that I have developed for several years, I argue that the best strategy for understanding quantum gravity is to build a picture of the physical world where the notion of time plays no role at all. I summarize here this point of view, explaining why I think that in a fundamental description of nature we must "forget time", and how this can be done in the classical and in the quantum theory. The idea is to develop a formalism that treats dependent and independent variables on the same footing. In short, I propose to interpret mechanics as a theory of relations between variables, rather than the theory of the evolution of variables in time. " ("Forget Time", Carlo Rovelli, 2008, http://www.fqxi.org/data/essay-contest-files/Rovelli_Time.pdf)

And this from "The Nature of Time" by Julian Barbour

"I will not claim that time can definitely be banished from physics . . . Nevertheless, I think it is entirely possible—indeed likely—that time as such plays no role in the universe." ("The Nature of Time", Julian Barbour http://www.fqxi.org/data/essay-contest-files/Barbour_The_Nature_of_Time.pdf)

And this from " 'Space Travel is Utter Bilge' ", a quote from astronomer Sir Richard Wooley in 1956, used as the title of an article by Donald Yeomans (2002), a JPL senior research scientist wherein he states:

"We must re-examine the physical properties of space itself if we are to understand the relation between electromagnetic and gravitational forces. We must also re-examine our concept of time. It is possible that time is more than one-dimensional." <http://greyfalcon.us/restored/Secrets%20of%20the%20Saucer%20Scientists.htm>

And this from "Physical Principles of Advanced Space Propulsion Based on Heims's Field Theory", Walter Dröscher, Jochem Häuser (2002) <http://www.hpcc-space.com/publications/documents/PrinciplesOfAdvancedSpacePropulsionAIAA-paper-2002-4094.pdf>

"In this context, space and time are not the container for things, but are, due to their dynamic (cyclic) nature, the things themselves. This is an entirely different physical picture from the approach of simply adding the stress-energy-momentum tensor of the electromagnetic field to the right-hand side of Einstein's field equations . . . "

For additional articles about time

see: <http://www.fqxi.org/community/essay/winners/2008.1> And <http://milesmathis.com/time.html>

Problems with "space"

Similar arguments could just as validly be applied to space. We might need to "forget space" too, at least as a *fundamental* concept. I have asserted that the quantum mechanical world is a world that is

limited to one unit of space. There is no "inside" to this space. It is non-metrizable. We therefore cannot specify trajectories or velocities in the quantum world. The "happenings" are in three-dimensional time, not space. Only a non-local (and therefore non-directional and probabilistic) description can be given.

Clearly, a choice of metric will be affected by quantization boundaries: phenomena that involve one unit of space, one unit of time, or one unit of their ratio (space/time or time/space) may appear/behave/measure in a strangely non-intuitive manner from the view point of humans who are accustomed to a reference system that is quite "distant" :-) from these boundaries. According to current views in physics, the photon, for example, experiences no time flow at all. Now it is appropriate to ask, Does it even experience space flow? Like a leaf in a river, it might be stationary with respect to what is really moving.

A choice of a distance metric also affects interatomic distance measurements, and we know something weird is going on with that. When certain salts are melted, the volume of the melt increases compared to the volume of the unmelted solid. This would lead us to expect that the interatomic distances in the melt would increase slightly. But in fact the distance *decreases*:

"There is another important fact about the melting process. When many ion lattices are melted, *there is a 10 to 25% increase in the volume of the system* (Table 5.10). This volume increase is of fundamental importance to someone who wishes to conceptualize models for ionic liquids because one is faced with an apparent contradiction. From the increase in volume, one would think that the mean distance apart of the ions in a liquid electrolyte would be greater than in its parent crystal. On the other hand, from the fact that the ions in a fused salt are slightly closer together than in the solid lattice, one would think that there should be a small volume decrease upon fusion. How is this emptiness—which evidently gets introduced into the solid lattice on melting—to be conceptualized?" (*Modern Electrochemistry: ionics*, John O'M. Bockris, Amulya K. N. Reddy, 2nd ed, 1998, p. 611-612)

"Such "volumes of nothingness" must be present to account for the large increase in volume upon fusion while at the same time the internuclear distance decreases (see Tables 5.9 and 5.10)" (Bockris, *ibid.*, p. 619)

". . . this space is counterintuitive to the internuclear distances given by X-ray or neutron diffraction. The internuclear distances found in molten salts are smaller, not bigger, as might be thought from the increase in volume." (Bockris, *ibid.*, p. 620)

(For more on this see [Melted volume increases, but internuclear distance decreases. Why? and Natural Quantities . . .](#))

Still more trouble with the interatomic distance metric is suggested by the ultra high density of matter inside white dwarf stars:

"the average density of matter in a white dwarf must therefore be, very roughly, 1,000,000 times greater than the average density of the Sun, or approximately 10^6 grams (1 tonne) per cubic centimeter.^[1]" (http://en.wikipedia.org/wiki/White_dwarf)

Scientists try to explain this fantastically high density with very contrived "explanations" like "electron degenerate matter" and "neutron stars". But again the whole problem may result from some misconceptions about the appropriate metric for interatomic distance. It is important for us to understand what is going on here, and it has implications for space travel.

The density of matter in a white dwarf is greater than that of ordinary water by a factor of 10^6 . In a so-called neutron star it is 10^{14} . What if "space" could, by technical means, be shortened somehow by a factor of 10^{14} ? The Andromeda galaxy is approximately 2×10^6 light years from Earth. If by

artificial means we would "shrink" the distance by a factor of 10^{14} , then Andromeda would only be 10^{-8} light years distant. That is about 0.3 light seconds—closer than the Moon is to Earth. Distances in the universe would become trivial from a space travel standpoint. That may seem far-fetched and hard to visualize. But if *motion* is the *real* metric, as suggested above, our concepts of what we call space or time are quite artificial. Motion is a ratio between space and time (s/t). Suppose we could somehow put more *time* between atoms. That would decrease the effect of the spatial unit, seemingly shrinking it. Ultrahigh density matter could be made in the laboratory. Nature does it somehow. Why can't we do the same? And if we could do it in the laboratory, why not in open space? The "inverseness" of the space/time relationship in *motion* implies that *spatially* distant objects might be close *temporally*.

Related: Is it possible to have an "inverted star"? That is, a star where the heavy elements "ungravitate" to the surface and the lighter elements gravitate to the core? Here is a note from *Science News* "Odd white dwarf offers peek at core", Christopher Crockett (April 30, 2016,) p. 12-13:

White dwarfs . . . are the last place astronomers expected to find a nearly pure oxygen atmosphere. . . a newly discovered white dwarf . . . has no hydrogen or helium at its surface. Its atmosphere is dominated by oxygen. . . While oxygen dominates this white dwarf's atmosphere, neon and magnesium come in second and third . . . In 2007, Dufour and colleagues reported a similar strange sighting: several white dwarfs whose atmospheres were loaded with carbon instead of hydrogen and helium. . . "This white dwarf might only be a freak. . . Although often in science, it's the exception that makes you understand a great deal later on."

And there are other astronomical objects that suggest problems with the distance metric. But instead of space between atoms, the problem is space between stars. One example pertains to 'ultra-compact dwarf galaxies' :

"UCDs were discovered in 1999. Although they are still enormous by everyday standards, at about 60 light years across, they are less than 1/1000th the diameter of our own Galaxy, the Milky Way." <http://www.sciencedaily.com/releases/2009/02/090212093900.htm>

Another pertains to the internal structure of quasars:

"Some quasars display changes in luminosity which are rapid in the optical range and even more rapid in the X-rays. Because these changes occur very rapidly they define an upper limit on the volume of a quasar; quasars are not much larger than the Solar System.^[4] This implies an astonishingly high energy density." (<http://en.wikipedia.org/wiki/Quasar>)

Quasars are apparently super-compact galaxies. They seem to be an extreme example of the UCDs.

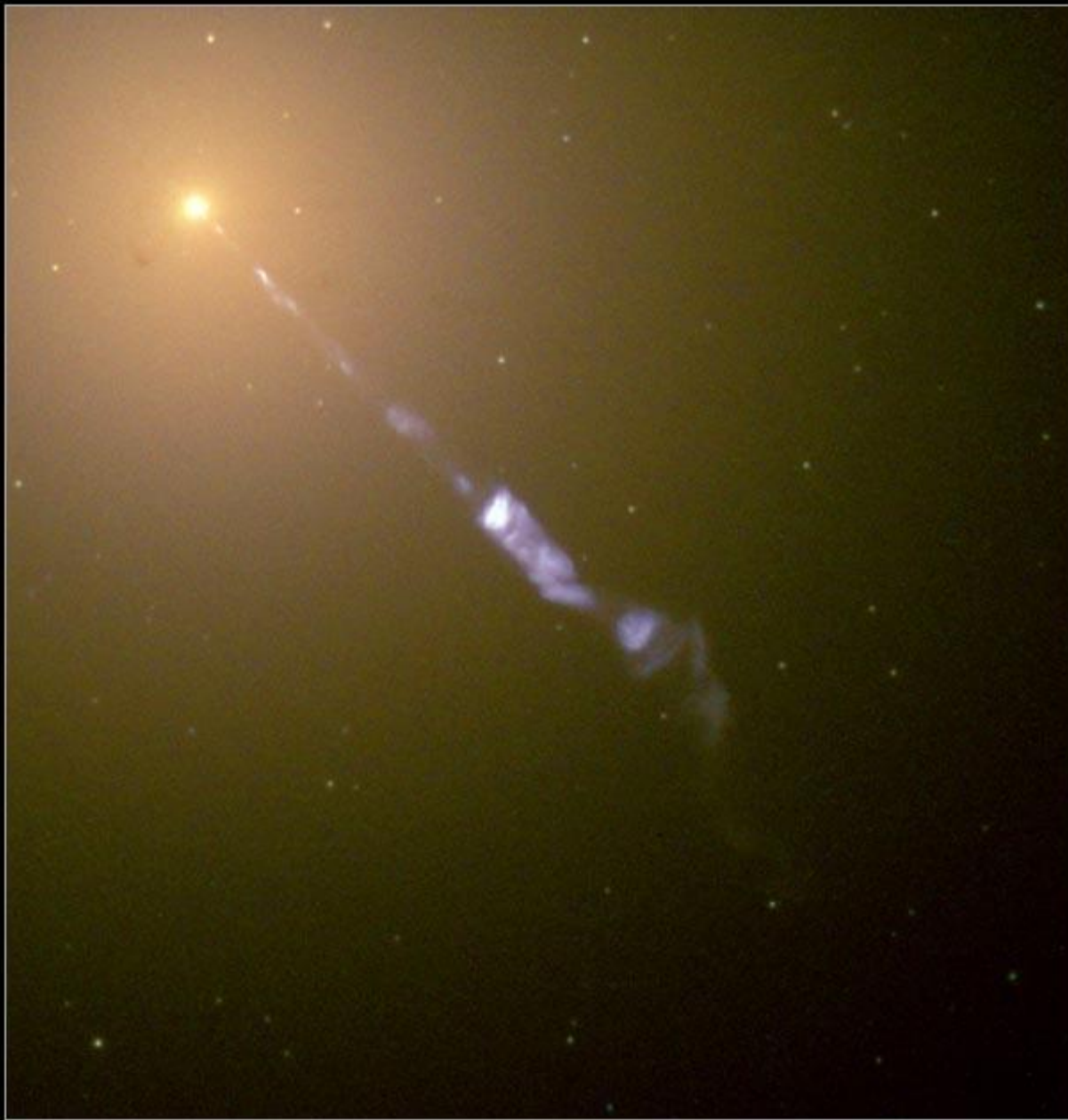
Another conundrum is that quasars, thought to be the most distant objects in the universe, are associated with nearby galaxies:

"The apparent distance of quasars may be illusionary, and they could be nearby. In fact, a good deal of evidence demonstrates that redshifts cannot be trusted as indicators of distance when it comes to quasars." <http://www.livingcosmos.com/quasar.htm>

Apparently, large galaxies can eject compact objects that expand. Those "knots" in the M87 jets could each be a highly 'compressed' collection of stars that eventually expand back out into small galaxies after ejection:

"To the unconventional astronomer, especially to Halton Arp, who has been the primary collector of these discrepant observations, it looks as if the primary galaxy is ejecting "babies" that grow up into companion galaxies." <http://www.thunderbolts.info/tpod/2005/arch05/050106universe-arp.htm>

The M87 Jet



Hubble
Heritage

PRC00-20 • Space Telescope Science Institute • NASA and The Hubble Heritage Team (STScI/AURA)

http://apod.nasa.gov/apod/image/0007/m87jet_hst_big.jpg

The idea of compressed structures expanding back out into normal density structures reminds me of nova (novae) associated with white dwarf stars. As already noted above, these stars are comprised of extremely dense material. Novea could be a manifestation of a process that causes an ultradense star to adjust its density back to normal. Exactly what is going on here is not at all clear, but it

probably involves a quantization boundary, which in turn requires a "motional metric" ([discussed below](#)) to be properly understood.

Following this line of thought, there is even a several decades old theory that the Earth itself is physically expanding:

"Global Expansion Tectonics a More Rational Explanation", James Maxlow http://tmgnow.com/repository/global/expanding_earth.html

"The Expanding/Growing Earth", David Bressan (2011):

"A much stranger idea to explain the assumed phenomena was proposed by the German physicist Pascual Jordan in 1966 - the increase of earth was imputable to the general dilatation of the space-time continuum." <http://historyofgeology.fieldofscience.com/2011/01/expandinggrowing-earth.html>

"In 1966, Jordan published the 182 page work *Die Expansion der Erde. Folgerungen aus der Diracschen Gravitationshypothese* (The expansion of the Earth. Conclusions from the Dirac gravitation hypothesis)^[4] in which he developed his theory that, according to [Paul Dirac's hypothesis](#) of a steady weakening of gravitation throughout the history of the universe, the Earth may have swollen to its current size, from an initial ball of a diameter of only about 7,000 kilometres (4,300 mi)." http://en.wikipedia.org/wiki/Pascual_Jordan "

An even stranger claim is in a German patent by Karl Nowak ([Verfahren und Einrichtung zur Aenderung von Stoffeigenschaften oder Herstellung von stark expansionsfaehigen Stoffen](#) . in English: "Method and arrangement to the Change of Material Characteristic or Manufacture of Strongly Expansive-Capable Materials"), German No. 905 847 Class 12g, Group 101 (1943, published 1954; DE0905847C)) Henry Stevens offers these comments:

According to Karl Nowak's 1954 German patent, patent number 905847, Class 12g, Group 101, by a process of extreme cooling coupled with pressure, the basic atomic structure of material can be changed. It is reduced, narrowed and confined in terms of atomic, crystalline structure. . . . Admittedlly, at first the idea of compression cooling as a means to change atomic structure sounds a lot like junk science.

At this point Dr. Gordon Freeman weighs in with some remarkable scientific insight. According to Dr. Freeman, an elements [*sic*] behavior is determined by its arrangement of electrons orbiting the nucleus of that elemental atom. Seven electron shells are present around the core. Under high pressure electrons are shifted to lower orbits and new orbital overlappings are formed. This changes the whole behavior of the element concerning color, boiling temperature, density, and so forth.

The trick seems to be to cool and compress the material and then gradually release the pressure. The material will retain its new properties at least for several months. (*Hitler's Suppressed and Still-Secret Weapons*, Henry Stevens (2007) p. 127;)

Such a claim is both hard to believe and hard to ignore. Certainly there are strong suggestions from several sources that we still have a lot to learn about interatomic distance and related effects. (See also "Scientists Fabricate Room Temperature Superconducting Material"<http://www.nextenergynews.com/news1/next-energy-news3.19a.html>)

Here is another little tidbit to consider. Cryogenic processing of ferrous metals is used to transform austenite into martensite even after the usual heat tempering treatment:

Factually, if you were to examine mass heat treated items like many available drill bits, saw blades, etc., you would find many that show only 50% to 60% transformation. This is the area in which cryogenics can really strut its stuff. The reason is that cryogenics is the only method known that can complete the transformation to 99.8% to 100% martensite, or come at all close to it. Martensite, as you recall is the fine hardened grain structure that you strive for in the heat treat process. . . .

Deep freezing of metals has been around for many years. It has been in use for at least 30 to 35 years to stress relieve cast iron gears and weldments. This is the reason you will find dry ice at a welding supply store. Welders discovered many years ago that they could rely on dry ice to stress relieve welds. . . . The Chinese . . . are now selling end mills that have been cryogenically frozen.

Cryogenic processing has also been used to reclaim "overcooked steel". This kind of steel has a high percentage of "retained austenite", which greatly reduces hardenability. Its magnetic properties have been so severely altered, a magnetic chuck might not be able to hold it in position for machining. This kind of steel may actually *shrink* during heat treatment. The internal structure of this metal is so messed up that reheat treating the part usually does not remedy the problem. However, it can usually be completely restored by cryogenic processing. (*Heat Treatment Selection, and Application of Tool Steels*, William E. Bryson, 2009, p. 107,114,170-171)

The point here is that even in a metal soaked to liquid nitrogen temperatures, there are still plenty of things happening. The metal may look inert and inactive, but it is not.

These are examples of instances where space itself seems to have 'shrunk', or at least is not behaving in the way we expect it to. Certainly it does not behave in the manner implied by a simple Euclidean metric.

This is totally off the subject but I just could not resist:

"Under the influence of the magnetic field, the number of internal defects decreases as a result of their self-elimination under the action of the Lorentz force. These changes lead to a reduction in the barriers to dislocation movement and thereby increase the material plasticity." ("Hyperplasticity effect under magnetic pulse straightening of dual phase steel", AP Falaleev, VV Meshkov, and A Shymchenko IOP Conf. Series: Materials Science and Engineering 153 (2016) 012014 doi:10.1088/1757-899X/153/1/012014)

This is something like annealing, but it does not use heat and is much faster.

Relativity "paradoxes"

This probably reminds us of the Special Relativity "paradoxes" where one dimension of an object seems to shrink in the dimension of its high speed motion. However, this seems to be only a reference system effect, not an actual physical effect (one that would result in high densities, high temperatures, etc). As noted above (Sorli), there are strong doubts that the Universe actually uses this particular metric (the so-called "Minkowski space" ; and because of the *ict* term, it is obviously non-Euclidean, in case anyone is wondering).

Examples for Special Relativity effects are usually presented as something with high speed motion as measured from a gravitational reference system (Earth). In this situation there *are* "relativistic effects" that have to be taken into account. But one thing that I have never seen discussed in the literature is the "distance" metric for two spacecraft both moving at speeds comparable to light (relative to Earth). In view of the increasingly non-local character of motion at high speeds, what is the "relative motion" or "relative distance" applicable to just the spacecraft themselves? To me, this is the essence of the claim of Relativity that "all motion is relative". But that claim only seems to take into account the characteristics of space (and time) as seen from an Earthlike (gravitational) reference system. In other words, physicists would have trouble with this question: "Two spaceships with identical, initially synchronized clocks are moving at 50% of the speed of light. Which spacecraft has the slow clock?" (See also "Herbert Dingle Was Correct! Part VIII The Twins Paradox And Dingle's Apostasy From Orthodox Relativity" By Harry H. Ricker III <http://www.gsjournal.net/old/science/ricker30.pdf> and http://en.wikipedia.org/wiki/Herbert_Dingle#Controversies)

Here is another one that probably appears in the literature somewhere: Two identical twins of the same height walk away from each other. Each sees the other as "shrinking in the distance". Which twin does the *real* shrinking? Is this an actual effect (a change in physical dimensions)? Or is it just a reference system effect (a matter of appearances only) ? What happens when the twins come back together?

Special Relativity seems to have limited applicability (as the name implies). Rotational motion, for instance, is generally regarded as absolute. If I spin around in my chair once per second, I am rotating relative to the rest of the Universe. Or is the Universe violently whipping around me? Mathematically both pictures are equivalent, but only one is physically realizable. I think it is clear that rotational motion is indeed absolute. (See Sagnac effect) Special Relativity cannot apply. Says Feynman:

"There is no "relativity of rotation." A rotating system is not an inertial frame, and the laws of physics are different. We must be sure to use equations of electromagnetism with respect to inertial coordinate systems." (*The Feynman Lectures on Physics*, Richard P. Feynman, (1964) Vol. 2 page 14-7)

But . . . what do you do with linear acceleration? Linear acceleration can be detected absolutely too. Does absolute acceleration result in absolute motion or only relative motion? (See Sagnac effect in translational motion)

Another problem is implied by the compensation given to clocks in the Global Positioning System. Clocks in orbit will run slow compared to a clock on the ground. Hence, the clocks for orbit are precalibrated to run slightly fast while they are on the ground so that they will have the same manifested clock rate as the ground clock when in orbit. It is clear that this compensation cannot be symmetric. That is, the same compensation cannot be applied to either set of clocks. That means that the motion is not "purely relative" as claimed by Special Relativity.

You have probably read through the Einstein train example in the textbooks. There are two lightning strikes, one at either end of the train. Both are simultaneous to an observer on the ground

at the midpoint next to the train. But they are not simultaneous to the observer riding at the middle of the moving train (at least that is what we think, even though no one actually asks). The math is simple. The logic is self-consistent. Some would call the whole thing "beautiful and elegant" (despite the messy physics). The train example seems intuitive, ironclad, and irrefutable. But does *nature* really work this way? We have to be careful. Remember quantum mechanics? It is illogical, non-intuitive, even weirdly perverse, until you take into account the ("non-local") effects of three-dimensional time. Then it becomes substantially more intuitive. Photons are very quantum mechanical, even those used by Einstein's train. If you add in the effect of temporal motion to the train problem, you will preserve simultaneity of distant events. But if you do that, you are effectively working the problem in "motional dimensions" instead of 4-dimensional space-time, and again Special Relativity does not apply.

Keep in mind here that Special Relativity and General Relativity are *local* theories. They artificially (but usefully) map temporal motion into a spatial reference system:

In 1905 Albert Einstein's Special Theory of Relativity postulated that no material or energy can travel faster than the speed of light, and Einstein thereby sought to reformulate physical laws in a way which obeyed the principle of locality. He later succeeded in producing an alternative theory of gravitation, General Relativity, which obeys the principle of locality. ("Principle of locality", http://en.wikipedia.org/wiki/Principle_of_locality)

In General Relativity, the "locality" arises by treating space as a connecting medium, rather than as something that separates. It is much like the Faraday/Maxwell field concept where the field was "action through a medium from one portion to the contiguous portion". The idea of being "spatially connected" is virtually the definition of "locality".

The Universe is both *local* and *non-local* in its fundamental nature. It is a mistake to try (in general) to map non-local phenomena into a local reference system. This realization was not around in 1905. The only well-known non-local phenomena back then were the action-at-a-distance "fields" of gravitation, magnetism, and electrostatics. The field concept was an attempt to make their non-local behavior more like local behavior, and thus more compatible with human intuition. Arguably, the first "hard-core" contact with non-locality came with Quantum Mechanics in the 1920s. Later, came the EPR "paradox" (1935) at Einstein's own hand, who again argued for a "local" interpretation. The Aharonov–Bohm effect emerged in 1949-1959. Then Chalmers W. Sherwin and Robert D. Rawcliffe [experiment](#) in 1960. Then [Bell's Inequality Theorem](#) in 1964. Then the experiments of John Clauser and Stuart Freedman (1972) and Alain Aspect (1981). These experiments (and others) demonstrated non-local behaviors at a fundamental level. Out-of-scope application of Relativity to non-local phenomena at the insistence (tyranny?) of the scientific community has resulted in a lot of misunderstandings (and animosity) and has held back advancement of physics for over 100 years. Scientists still insist that the speed of gravity, magnetic, and electric fields are limited to the speed of light. (A major misconception: see the [speed of gravity](#) and the [speed of electric fields](#))

The so-called Twin Paradox has a similar standing. This is where one twin stays on Earth and the other goes away in a rocket ship at some significant fraction of the speed of light. Upon his return, he has aged *less* than his twin on Earth. But this is not the official paradox; this is just a simple prediction of Special Relativity. The paradox is that *either* twin can be viewed as being younger

than the other, because the motion can only be "purely relative". The fact that the *cause* of one type of motion can be distinguished from the other is irrelevant to the paradox. That physicists so readily accept this paradox as science (which itself has not been demonstrated) says some really awful things about our science institutions. (My "take" on this is that the twin moving at high speed, ages relative to a "flow-of-space clock", with *time* not progressing, and the twin on Earth, ages relative to a "flow-of-time clock" with *space* not progressing. Both age at the same rate (but on different types of clocks), and have the same final age on Earth. There is no paradox if the ages are referred to the progression of an "orthogonal sum" clock that incorporates *both* time and space progression effects. The effects of *both* local and non-local behaviors need to be taken into account.)

Another hint that motion is not "purely relative" is implied by Faraday's rule of induction. Says Feynman:

"So the "flux rule"—that the emf in a circuit is equal to the rate of change of the magnetic flux through the circuit—applies whether the flux changes because the field changes or because the circuit moves (or both). The two possibilities—"circuit moves" or "field changes"—are not distinguished in the statement of the rule. Yet in our explanation of the rule we have used two completely distinct laws for the two cases— $\mathbf{v} \times \mathbf{B}$ for "circuit moves" and $\mathbf{del} \times \mathbf{E} = -\partial\mathbf{B}/\partial t$ for "field changes".

We know of no other place in physics where such a simple and accurate general principle requires for its real understanding an analysis in terms of two different phenomena. Usually such a beautiful generalization is found to stem from a single deep underlying principle. Nevertheless, in the case there does not appear to be any such profound implication. We have to understand the "rule" as the combined effects of two quite separate phenomena."— Richard P. Feynman, *The Feynman Lectures on Physics* Vol. II, pp. 17-2

Note the asymmetry in the behavior. This seems to imply some sort of absolute motion. We probably *are* indeed missing a "single deep underlying principle" with a "profound implication". See also http://en.wikipedia.org/wiki/Faraday_Paradox

Similar experiments with a charged disk, and a B field detector also give analogous paradoxical results.

See [../qm/RadiationCircularChargeMotion.html#FeynmanFaradayFluxRuleParadox](http://qm.RadiationCircularChargeMotion.html#FeynmanFaradayFluxRuleParadox) and [SpeedMagneticField](#) .

Another "paradox" is becoming evident in sunspot observations:

"This first solar image from NuSTAR demonstrates that the telescope can in fact gather data about sun. And it gives insight into questions about the remarkably high temperatures that are found above sunspots—cool, dark patches on the sun. Future images will provide even better data as the sun winds down in its solar cycle." <http://phys.org/news/2014-12-sun-sizzles-high-energy-x-rays.html>

A sunspot is roughly 4000 K, versus 5800 K for the photosphere. High temperatures, X-rays, and magnetic fields suggest that sunspot activity has a non-local character. Its relationship with our reference system would become inverted: hot stuff will appear cooler. This could mean that sunspots could be far hotter than we might imagine. The gas could be fully ionized, and being therefore unable to absorb radiation, would become transparent. They should also *expand* (not

contract) with time as they cool down. (Apparently, something similar can happen on a galactic scale: "Mystery Galactic Gamma-ray 'Bubbles' Defy Explanation", Ian O'Neill (Aug 1, 2014) <http://news.discovery.com/space/galaxies/mystery-galactic-gamma-ray-bubbles-still-defy-explanation-140801.htm> Hypothetically, the hot stuff would appear as microwaves, but when the observational situation re-inverts back to "local", the microwaves then look like gamma rays. If the inversion point is the Rydberg frequency, the math is roughly $(1/(10^9/10^{16})) (10^{16}) = 10^{23}$ Hertz. The jet in the M87 galaxy (shown above) may likewise be an example of re-localization behavior. As gravitation reduces the speed of the ejected material, it becomes more "local" and begins to expand as a spatial object. It is astonishing to realize that M87 is probably ejecting *galaxies* in these jets (as per Dr. Halton Arp), and that our own Milky Way could have been one of them!)

Effects of the reference system are not limited to Special Relativity. When you do physics experiments, you get two effects that become combined. One effect is the "pure physics" part, and the other is reference system effects that are combined in with the results, often in insidious, covert, almost perverse ways. This is true even of the commonly used Euclidean metric.

A classical example is the one in which an object is dropped high from the mast of a moving boat. The object will fall straight down to the bottom of the mast, at least as seen by people on the boat. But a person on land will see a different picture. The object has both forward motion due to the boat and downward motion due to gravity. When viewed against the background of a mountain, the object actually falls on a parabolic path, like a bomb dropped from an airplane. Of course, the observer must either have very keen observation skills, or some good photographic equipment to actually see this. Physicists understand this one, and can easily sort out the two, even though people will still ask, "But what did it *really* do? Did it fall down *straight* or *curved*? It cannot be both . . ." But physics will only tell us what we see from what viewpoint. If we could see things from "God's perspective", we would know what it "really" does. Alas, most of us think we are still human.

The trouble really starts when the reference system effects are not understood. Astronomers realize that the Universe is expanding. Far galaxies have a recession velocity, implied by the observed redshifts of spectral lines. Most galaxies are moving away from us in all directions at various speeds. But unless you believe that we occupy a privileged observational position, our galaxy is also participating in the same expansion. Some of that redshift belongs to us. But astronomers take our position as "stationary" and assign the full redshift (or velocity) value to the observed galaxy. The galaxy is assigned a velocity that it does not really have, and our position is regarded as having zero velocity, something that it does not really have either (and I am only referring to the recession, not all the other known motions).

Another related mess concerns what I call the gravipause:

"The belief from decades ago was that the (cosmological) redshift was caused by the Big Bang that blew everything apart, resulting in the observational redshift. But the Cosmological Principle points out a problem with that. If everything is supposed to look statistically the same from all viewpoints, then observers in other galaxies must be seeing the same kind of redshift behavior. In other words the redshift must result from a CENTERLESS expansion of space , not from an explosion.

The view that is gaining currency now is that space itself expands or is "emergent" (new spatial units are being generated by some unknown process). It is like time, in that it progresses. But it progresses in three dimensions, and we call that an expansion.

Opposing the expansion is gravitation, which is centered on an object (planet, star, galaxy). We interpret the resulting motions in terms of forces, the cosmological expansion force, which is not affected by distance, and the gravitational force, which has a $1/d^2$ dependence. Because of this, there is necessarily a distance where the forces are at equilibrium, a distance I call the "gravipause" (which, in this definition, involves only ONE body, and space itself). For stars it is apparently a few light years, and for galaxies it is apparently a few million light years. Inside this distance, objects come together, and outside this distance, objects move apart (and faster the farther apart, because of the lessening influence of gravitation, and because there are more lengthening units of space in between, like links in a chain).

Astronomers surely understand these things. But they don't seem to recognize the implications. What happens to the Big Bang theory if the redshift did not come from an explosion? They know about Einstein's cosmological constant and gravitational force, but they do not recognize that the two imply a gravipause. Also, the calculated "Hubble constant" would be dependent on the location from which the observations are made (a large versus small galaxy), and they don't recognize that either. And why are stars separated by light years, but not by light weeks? Why don't globular clusters collapse? And so

forth." "<http://intjforum.com/showthread.php?t=69831> (Related: "Lemaître's Limit ",

Ian Steer <http://arxiv.org/ftp/arxiv/papers/1212/1212.6566.pdf> ; http://en.wikipedia.org/wiki/Hill_sphere)

Here we see an applicability problem, even when the common metric for spatial distance is used. Gravitation seems to have three regions. Gravitational force near a star starts out strong but declines rapidly with distance (the $1/d^2$ region). At the gravipause, gravitation is still present, but falls off less rapidly (the $1/d^1$ region, or "Hubble space" as it could be called). Beyond that, quantization causes the gravitation to disappear completely (the $1/d^0$ region, where it does not decrease at all, because there isn't any). At this juncture, the only effective "force" involved is the expansion of space, which hypothetically is proceeding at the speed of light. Hence, all very distant galaxies should be receding at the speed of light (there is no gravitational effect, applicable to our observational position, that would decrease the observed speed). This would give a redshift of $z = 1$.

This comment from Wikipedia seems appropriate here:

The **accelerating universe** is the observation that the universe appears to be expanding at an increasing rate. In formal terms, this means that the cosmic scale factor $a(t)$ has a positive second derivative,^[1] so that the velocity at which a distant galaxy is receding from us should be continually increasing with time.^[2] The first suggestion for accelerating universe from observed data happened in 1992, by Paál et. al.^[3] In 1998, observations of type Ia supernovae also suggested that the expansion of the universe has been accelerating^{[4][5]} since around redshift of $z \sim 0.5$.^[6] (http://en.wikipedia.org/wiki/Accelerating_expansion_of_the_cosmos)

Note the phrase "since around redshift of $z \sim 0.5$." I would expect this to be around redshift of $z = 1$ instead. But remember, half of that redshift is due to our own galactic recession motion (which is zero from our standpoint), and half of it is due to the recession affecting the observed galaxy. Have

the astronomers unwittingly included a reference system effect here? What is the true *physical* redshift? I think this is a good question.

A more fundamental metric

We presently use spatial displacement and time progression displacement as our reference system. It is based on *differences* of location, not on true physical units of space and time, and it creates an arbitrary zero datum. The construct is useful, but not fundamental. Of course, physicists will complain that there isn't any such thing as a "physical unit" of space or time. But that is ok. As was quoted above, their comrades are trying to get rid of the concept of space and time as being *fundamental* anyway. They are claiming that motion is primary, and that space and time are derived concepts. In other words, we really need a "motional metric" and need to work some of our physics problems in "motional dimensions", not space or time displacement dimensions.

This notion does indeed have a basis in fundamental physical equations. We are all familiar with $E=mc^2$. Note that there is no separate time term. $E=cB$ (in electromagnetics) is another one. Again, note that there is no separate time term. And Newton's gravitation: $F = G (m_1m_2)/r^2$. No time term there either. Time shows up only when connected with space, as in c , the speed of light. Its appearance in Newton's gravitation is concealed as a "motional potential" (expressed as force), and motion is, again, a relationship between space and time. Even in quantum mechanics, time is merely a parameter. The implication is that space and time are not truly *fundamental*, and that *motion* should be a more useful and *fundamental* concept. But if motion is the fundamental concept, then *both* space/time ("velocity") and time/space ("inverse velocity") are legitimate concepts. The former is "local" and the latter is "non-local". (The implications of this are mind-boggling.)

There will be resistance to this kind of thinking, the likes of which have occurred before. Remember our troubles with numbers? First, there were the "counting integers", which made perfect sense. Then someone came up with the concept of a "zero" —a number to represent nothing (unknown to the Romans). Then *negative* numbers came along (how could you have a *number* that was *less* than *nothing*?!). Then along came Pythagorus and "irrational numbers", the geometric representation of which, could be constructed with an ordinary compass and straight-edge (scandalous!). Still later, "imaginary numbers" came on the scene. At first, this baffled even the most brilliant mathematicians. But the need for them arose naturally in fairly ordinary mathematics, and the concept is now well accepted and very useful. I think the same will happen with "inverse velocity" (the term is actually self-contradictory because there is no trajectory and the effect is instantaneous).

Fundamentally, space and time seem to be *progressing*. They are not static. They are "emergent" as some physicists are claiming. This is no surprise, really, if *motion* is the fundamental entity for the physical universe. Space and time could be identical twins that are always linked together in a ratio called motion. This requires them to progress, for example, as 1/1, 2/2, 3/3 etc. The individual units are always changing, progressing, but the *ratio* remains constant. The ratio is "stationary" even though it has "moving parts", progressing at the speed of light (we will suppose). Yeegads! The "rest frame" is not resting! The speed of light thus becomes the new "zero" (actually 1/1), the

datum for no activity. This realization will allow physicists to develop a new metric, one that actually applies *fundamentally* to the physical universe. (See also [UnitEnergy](#))

This would also answer common questions that appear in the popular media. Example: "Where Is The Center of the Universe?" by Rose Pastore (*Popular Science* 4-20-2012, <http://www.popsci.com/technology/article/2012-04/fyi-where-center-universe>)

"First, it's important to know that the big bang wasn't an explosion of matter into empty space--it was the rapid expansion of space itself. This means that every single point in the universe appears to be at the center. . . . In the beginning, the universe was a single point. Where was that? It was, and still is, everywhere."

This anywhere/everywhere location of a "center" clearly has a non-local character. Said differently, it is simply a centerless expansion. And following that line of thought leads to the conclusion that it is also edgeless. The edge must be everywhere too. (perhaps the diffuse microwave background, and the diffuse gamma ray background, and the diffuse X-ray background, and the diffuse Far UltraViolet background, and the diffuse cosmic ray background, are trying to tell us something*). See also "The Mystery of the Cosmic Diffuse Ultraviolet Background Radiation", <http://arxiv.org/abs/1404.5714> ; <http://phys.org/news/2015-08-cosmic-mystery-deepens-discovery-ultra-high-energy.html#nRlv> ;

*"What we know as the universe could actually be just one of a pair that exists in the same space but at different times." (*Science News*, July 25, 2015, p. 17 "Times Arrow". My thoughts: There may indeed be two "parts" or "sectors" to our Universe. One has matter that gravitates in three-dimensional space and is localized in space. The other has "inverse matter" that gravitates in three-dimensional time and is "non-local" (spatially diffuse) from our standpoint. They operate by the same physical laws and would be statistically indistinguishable to an observer within each system.)

The use of "motional dimensions" as a fundamental unit implies that where (or when) there is no (fundamental) motion, there is no "physical" universe. There is no "where" there, and no "there" there either. If there is no "box", there is no inside or outside either. (The same arguments apply to time.)

There is no reason a spatial viewpoint has to be preferred in the ultimate reference system. Motion can be in space or in time (s/t or t/s) [See article](#). If we could view things from the standpoint of the speed of light (in three dimensions), space would not be expanding. The progression of time cancels the progression (expansion) of space, given the supposition that they are always paired into a ratio. [Photons](#) would be stationary. They go no-where and no-when. Mass would be what has actual motion (gravitation) relative to the 1/1 motional datum "fabric" or "ether". Gravitation would make mass move "towards" other masses and those masses would be colliding with the stationary photons in the process. (Photons "collide" or "separate" only when space or time locations are considered individually; this is the reverse of the EPR effect; See also [Variations in the speed of light](#))

The null result of the Michelson-Morley experiment needs to incorporate this insight. This experiment intended to measure the effect of the Earth's relative motion through the ether, the

"Aether Wind". But the *fundamental* motions of both the Earth and the ether are non-directional (i.e., scalar, like the progression of time). *They cannot be added vectorially*. The design of the experiment did not take this into account. The "ether wind" could not be detected, and this was taken as evidence for the non-existence of the ether itself—a conclusion that is not really justified. There may indeed still be an "ether" (a specific structure of space and time), but it is not the old, mechanical, "wavable medium" type of the 1800s, nor is it "empty space". The "new ether" must be a *dynamic* one (progressing and non-directional), something quite different from the *static* ether of the nineteenth century. (See also [Gravitational motion has multiple dimensions](#))

All this is exactly backwards to the way we think the Universe "obviously" works. Physicists and astronomers seem to have little trouble believing that "space exploded" and caused the Universe to come into existence. But the views presented here will seem even weirder, and so don't expect classes in hyperspace navigation to be offered at your local university anytime soon :-).

Links:

"Universe boundary in Einstein 1931 same as Lemaître 1927"
(<http://adsabs.harvard.edu/abs/2015AAS...22521504S>) a snippet: ". . . universe in balance, changing but always steady, eternal but ever-reborn, is exactly what we observe.")

"Einstein's aborted attempt at a dynamic steady-state universe", <http://arxiv.org/ftp/arxiv/papers/1402/1402.4099.pdf>

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Proof by Paradox method

a future topic?

Why is gravitation an *accelerated* motion? What powers gravity?

Acceleration normally causes an increase in speed and change of position. When you accelerate your car on the freeway, you are changing your position and your speed. An engine is required to power this acceleration. If gravitation is equivalent to accelerated motion, then what powers the gravitational engine? And when I stand on Earth, I am being accelerated by it. So where am I going? What is my current velocity after many years of acceleration at 9.8 m/sec^2 ? How far have I gone during my lifetime? Why am I still in the same old solar system that I was in years ago?

To answer this, we need to know what other kinds of motion can cause acceleration. Acceleration can cause a change of *speed* or a change of *direction* (or both). In the car we think of acceleration as changing our speed. But we would also be accelerated if our direction were changing (through use of the steering wheel) even though our miles-per-hour were constant.

Let's suppose a mysterious thing happened to my house. While I slept, the entire house began quietly rotating. I wake up the next morning and pour myself some coffee. In the kitchen the coffee goes straight into the cup, just as I would expect. Then I wander into the living room. I pour myself another cup, but the coffee stream goes somewhat sideways instead of straight down. I begin thinking, "The house is settling . . . must be on the edge of a sink hole." But I pour another cup in the kitchen and it again goes straight down. The stream only deviates when I get near the outer walls in other parts of the house. It is as though there is a kind of "bent gravity" or "wall magnetism" or something. I have no idea what causes it. It is just a mysterious force that was not there yesterday. I know forces result in acceleration. So I start asking myself the same questions: "Where am I going? What is my current velocity? . . ."

To an observer *outside* the house, there is no such mysterious force. The effect is caused by rotational motion. A physicist describes it this way:

"Another example of pseudo force is what is often called "centrifugal force." An observer in a rotating coordinate system, e.g. in a rotating box, will find mysterious forces, not accounted for by any known origin of force, throwing things outward toward the walls. These forces are due merely to the fact that the observer does not have Newton's coordinate system . . ." (*The Feynman Lectures on Physics*, Vol. I, p. 12-11)

Hmmm . . . That reminds us of the Einstein elevator. We gave the elevator a linear acceleration of 9.8 m/sec^2 by powering it with a small rocket engine and the result was indistinguishable from normal gravity. But here we see an alternative. We could put the Einstein elevator in a centrifuge and whirl it around with increasing speed until the occupant experiences the same acceleration. But there is an obvious difference. After the centrifuge gets up to speed, we can turn off the power. The occupant will *still* experience acceleration even though nothing is powering it (in a normal elevator, the acceleration would stop immediately, but the speed would continue at its last value if the deceleration due to Earth's gravity is ignored) So here we have the equivalent of "gravity", but there is nothing that powers it. The effect results from uniform, unchanging motion. But it has to be motion of a special sort: *rotational* motion.

So now we must ask, Could gravitation be a pseudo force? Physicists have asked the same question:

"One very important feature of pseudo forces is that they are always proportional to the masses; the same is true of gravity. The possibility exists, therefore, that *gravity is itself a pseudo force*. Is it not possible that perhaps gravitation is due simply to the fact that we do not have the right coordinate system?" (*The Feynman Lectures on Physics*, Vol. I, p. 12-11)

In their ultimate character, we could say:

rotational motion is a uniform change of direction with no change of position

temporal motion is a change of position with no inherent direction

In other words it could be that this kind of temporal motion (i.e., gravitational motion) is a completely uniform *unaccelerated* motion when seen from a more complete, true-to-all-facts reference system. It needs nothing to power it. But because we are in a *spatial* reference system, we experience it as accelerated motion. This is just an idea of course, and needs further investigation and exposition. (Update: See [Beyond Einstein: non-local Physics](#) .)

"And what is hidden he brings out to the light" —Job 28:11

The Kinematic Time Shift, Gravitational Time Shift

The existence of kinematic and gravitational time shifts were confirmed by the Hafele and Keating Experiment in 1971. (Kinematics pertains to times, lengths, speeds, etc. Essentially, it is concerned only with the space and time coordinates, and has nothing to do with masses and gravitation.) The Georgia State University physics/astronomy web site offers us this summary:

Hafele and Keating Experiment

"During October, 1971, four cesium atomic beam clocks were flown on regularly scheduled commercial jet flights around the world twice, once eastward and once westward, to test Einstein's theory of relativity with macroscopic clocks. From the actual flight paths of each trip, the theory predicted that the flying clocks, compared with reference clocks at the U.S. Naval Observatory, should have lost 40+/-23 nanoseconds during the eastward trip and should have gained 275+/-21 nanoseconds during the westward trip ... Relative to the atomic time scale of the U.S. Naval Observatory, the flying clocks lost 59+/-10 nanoseconds during the eastward trip and gained 273+/-7 nanosecond during the westward trip, where the errors are the corresponding standard deviations. These results provide an unambiguous empirical resolution of the famous clock "paradox" with macroscopic clocks." J.C. Hafele and R. E. Keating, Science 177, 166 (1972) See <http://hyperphysics.phy-astr.gsu.edu/hbase/relativ/airtim.html>

Around-the-World Atomic Clocks

In October 1971, Hafele and Keating flew cesium beam atomic clocks around the world twice on regularly scheduled commercial airline flights, once to the East and once to the West. In this experiment, both gravitational time dilation and kinematic time dilation are significant - and are in fact of comparable magnitude. Their predicted and measured time dilation effects were as follows:

Predicted:	Time difference in ns	
	Eastward	Westward
Gravitational	144 ± 14	179 ± 18
Kinematic	-184 ± 18	96 ± 10
Net effect	-40 ± 23	275 ± 21
Observed:	-59 ± 10	273 ± 21

See <http://hyperphysics.phy-astr.gsu.edu/hbase/relativ/airtim.html>

The kinematic time shift should be understandable in view of what is presented above about the [Relativistic Correction Factor, gamma](#). But we seem to be left with the question of "Why would a clock slow down when it is immersed in a gravitational field?" Most people's reaction is that if a clock acts that way, then it is not a very good clock. Or if it is a good clock, then it must be measuring *something*, but it is not measuring *time*. Although this behavior looks rather enigmatic, an explanation can be offered that is simple and intuitive.

The time shift formula is:

$$(T_A - T_E)/T_E = gh/c^2$$

where T_A is the elapsed time on the clock at altitude, T_E is the elapsed time on the clock on Earth, g is the acceleration of gravity, h is the height difference in meters, and c is the speed of light. (Note the similarity to the gravitational redshift/blueshift formula: $v/c = gh/c^2$).

Let's mentally estimate how small of an effect we are looking for on the right side of the equation. Taking g as 9.8 m/sec^2 , h as one meter, and c as $3 \times 10^8 \text{ m/sec}$, we can readily see the ratio is about 1 part in 10^{16} —an extremely small effect.

Now plug in some numbers from the Hafele and Keating experiment on the left side of the equation:

$$\frac{(179 \times 10^{-9} \text{ sec})}{(48.6 \text{ hours})(3600 \text{ sec/hour})}$$

That gives 1.02×10^{-12} for a height difference of 9400 meters. Dividing out the 9400 gives 1.085×10^{-16} which agrees well with our mental estimate for a *one meter* height difference.

Consider the conventional explanation for this effect from *The Feynman Lectures on Physics* (Vol.2, section 42-6 "Speed of clocks in a gravitational field")

"Suppose we put a clock at the "head" of the rocket ship—that is, at the "front" end—and we put another identical clock at the "tail" If we compare these two clocks when the ship is accelerating, the clock at the head seems to run fast relative to the one at the tail." (p. 42-9)

The critical thing to understand here is where the clocks are located relative to the motion of the rocket ship. In my elevator example, they would have to be mounted on the ceiling and on the floor, *not on the side walls*. Understanding the effect is straight-forward and is exactly like the explanation for [gravitational redshift/blueshift](#). Suppose the upper clock is used to control a device that emits pulses of light. The light pulses are emitted once every second and shine downward to a detector on the floor, which compares their timing upon arrival with an identical clock on the floor. During the transit interval of the pulse from ceiling to floor, the elevator is accelerating and the detector is therefore moving faster than it was when the pulse was first emitted. The detector is moving *towards* the emitter and sees the pulses as "crammed together slightly". (This is just like a Doppler shift with an extremely low frequency source—something we call a "clock".) The time separation between the pulses is now *less* than a second. We could say that the equipment on the floor wonders why the pulses are coming in faster than expected. It concludes that the clock on the ceiling that controls the emitter pulse stream is running fast (or that the clock on the floor is running slow).

We will reach the very same conclusion if we put the emitter on the floor and the detector on the ceiling. In this case the detector is moving *away* from the light pulse at a speed slightly faster than when the pulse was emitted. It sees the incoming pulses "stretched out". The interval between the pulses is now *more* than a second. And so we conclude that the clock on the floor must be running slow (or the one on the ceiling is running fast). Even though we have reversed the positions of the equipment, we still reach the same conclusion.

Now consider some variations that could be introduced.

1. We leave the emitter and detector on the floor (or ceiling) so that the light path is aligned in the same direction as the motion of the elevator. But we set the elevator to a constant speed (no acceleration). In this case no time shift will be detected. Similarly, no redshift/blueshift would be detected either. The speeds of emitter and detector remain the same and there is no Doppler shift detectable *within the elevator*.

2. We relocate the emitter and detector (and their clocks) so that they are on the side walls of the elevator and the light path is now perpendicular (transverse) to the motion of the elevator. In this case there will again be no time shift, nor redshift/blueshift. There will be no effect detectable within the elevator regardless of whether it is moving at constant speed or accelerating. The path of the light is slightly elongated due to the combination of the motions (a straight diagonal line for constant speed, or a slight curve for accelerated speed). The detector, however, can detect only the timing between pulses, and once they start arriving, the pulse rate is the same.

3. We put the emitter on a rocket ship and the detector on earth. In this case we will see the conventional Doppler shift. We can tell whether the rocket is moving towards us or away from us. We can also detect whether its speed relative to Earth is constant, accelerating, or even zero. But only the "radial component of the speed" (the portion directly towards or away from Earth) is detectable. This principle is widely used by astronomers.

So is there a problem with the clocks or not? No, the problem is with our intuition and the reference system. Gravity is an ordinary everyday thing. We simply do not expect, offhand, that gravity would have any effect on a time measurement. In contrast, hardly any of us have to

measure precise time intervals within a vehicle that is changing speed or direction (accelerating). But if that were an everyday task, we would be quite comfortable with the gravitational time shift too, because an accelerating reference system has the same effects on time interval measurement as gravity.

"You do not know the activity of God who makes all things." —Ecclesiastes 11:5

html 2/03
edited 7/07

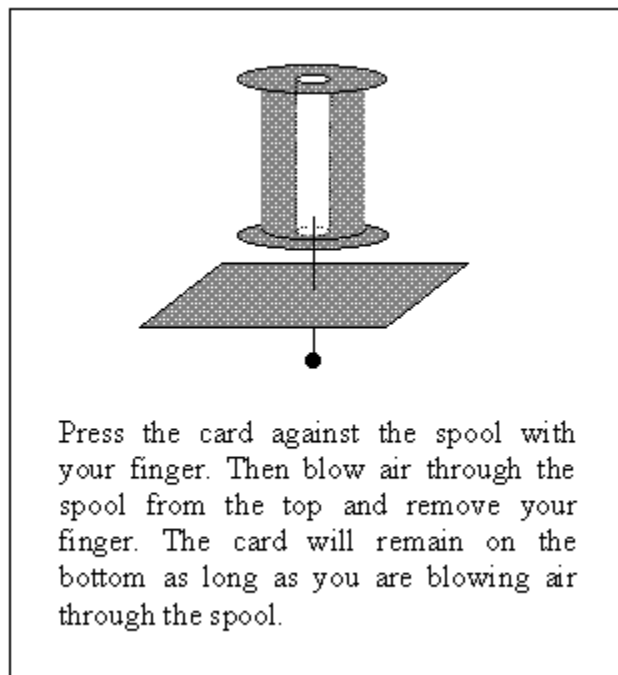
"Motion Cancellers"

(If you are just jumping into this section, you might need some background from: [Apparent Properties of Space and Time](#))

A motion canceller (my own term) is a scheme that can be used to cancel (or counterbalance) one motion of a multidimensional motion so that the other motions, which are usually not apparent, become manifest. The resultant motions are perpendicular to the motion used for cancellation.

As applied to gravitation, it means that you can apply a canceling motion (or "force" if you prefer the term) to a stationary object, and it will begin moving (or exerting a force), *not* in the direction of the canceling motion, but in a direction *perpendicular* to it.

To get a better intuitive feel for this, consider a non-technical example. It consists of an ordinary spool of thread, a pin, and a card (a business card will do) assembled as shown in the illustration below. Hold the card on the bottom of the spool (using the pin to center it in the hole) and then blow air down the shaft with your mouth. While you are blowing, move your hand away from the card. What do you think will happen?

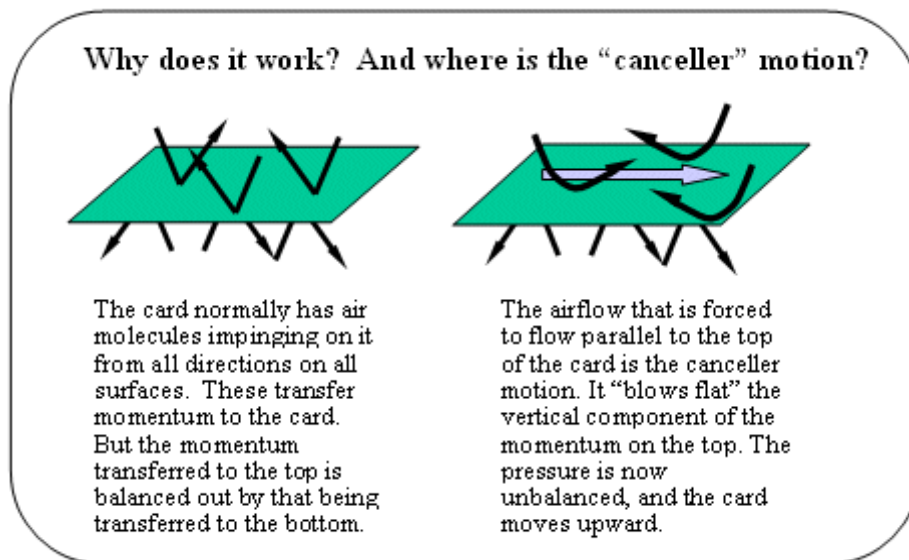


As every kid who has tried this in an elementary science class knows, the card will not be blown off the spool. It will remain attracted to the bottom as long as air is blown through the hollow shaft of the spool. This little experiment is used to illustrate the Bernoulli and Coanda effects of moving fluids. The principle has widespread applications in industry. A few obvious ones are carburetors in cars, steam jet ejectors used for

refrigeration, perfume atomizers, and Bernoulli wands used by the semiconductor industry to lift and move silicon wafers without touching the circuit side (not to be confused with vacuum wands, which are used on the backside).

How does it work? The card is normally bombarded by air molecules coming from all directions and having every orientation. Each ricocheting air molecule has a momentum component that is perpendicular to the face of the card. All these components add up to produce a pressure on each face of the card. As long as the card is fully immersed in air and the bombardment is random, the pressures will be equal, and the card does not move.

But when the card is placed near the spool, and air is blown through the shaft, the pressures become unbalanced. The air flow bends parallel to the surface of the card, and the perpendicular component on the spool side is literally "blown away" (partially). The perpendicular component on the other side of the card is thus unopposed, and an unbalanced pressure develops which moves the card towards the spool. The harder you blow, the more firmly the card moves towards the spool. (The pin simply keeps the card from sliding sideways.)



A slide from my presentation "[The Quest for the Stardrive](#)"

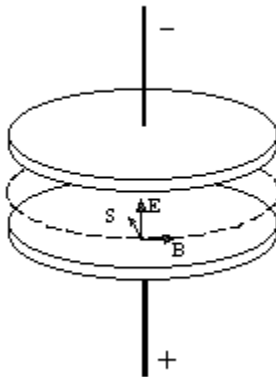
Note that air moving in two dimensions, in a plane parallel to the card, has caused the card to move perpendicular to the air flow. It has made apparent the existence of an effect that is otherwise not observable. One motion is used to cancel a hidden motion; the "canceller motion" does not directly produce the resulting motion, but allows an existing motion to become manifest. (loosely, this meets the definition of a motion canceller.) If you could repeat the equivalent of this experiment in the vacuum of outer space, the card would simply be blown off, as there is no opposing motion from air molecules. (See also https://en.wikipedia.org/wiki/Coand%C4%83_effect , https://en.wikipedia.org/wiki/Magnus_effect , https://en.wikipedia.org/wiki/Trench_effect)

The motion canceller idea can also give us insights on physical concepts that otherwise seem to be counter intuitive. One class of problems of this sort involves the Poynting vector. This vector, $\mathbf{S} = \epsilon_0 c^2 \mathbf{E} \times \mathbf{B}$, tells us how electromagnetic energy flows in space. It is often encountered in discussions about the properties of light, but it applies to other things too, like electric current in capacitors, a resistance wire, magnets with static charges, and so on. It often implies some surprising, and seemingly awkward things. Here is a textbook example from *Feynman Lectures on Physics*:

"Now we take another example. Here is a rather curious one. We look at the energy flow in a capacitor that we are charging slowly. . . . There is a nearly uniform electric field inside which is changing with time. . . . So there must be a flow of energy into that volume

from somewhere. Of course, you know that it must come in on the charging wires—not at all! It can't enter the space between the plates from that direction, because \mathbf{E} is perpendicular to the plates; $\mathbf{E} \times \mathbf{B}$ must be *parallel* to the plates.

You remember, of course, that there is a magnetic field that circles around the axis when the capacitor is charging. . . . Its direction is shown in [the figure]. So there is an energy flow proportional to $\mathbf{E} \times \mathbf{B}$ that comes in all around the edges as shown in the figure. The energy isn't actually coming down the wires, but from the space surrounding the capacitor." (*Feynman Lectures on Physics*, Vol II, p. 27-7)



A slowly charging capacitor has an electric field (\mathbf{E}) building up between the plates. Because the field is changing, there is also a magnetic field (\mathbf{B}) that encircles the capacitor. The Poynting vector points in the direction of energy flow (\mathbf{S}) into the capacitor. Note that the energy flow points towards the central axis. This implies that the energy is NOT coming down the wire, but instead comes from the "empty space" outside the capacitor.

Also:

"Our programme of measurement of forces related to electromagnetic momentum at low frequencies in matter has culminated in the first direct observation of free electromagnetic angular momentum created by quasistatic and independent electromagnetic fields \mathbf{E} and \mathbf{B} in the vacuum gap of a cylindrical capacitor. A resonant suspension is used to detect its motion. The observed changes in angular momentum agree with the classical theory within the error $\sim 20\%$. This implies that the vacuum is the seat of something in motion whenever static fields are set up with non-vanishing Poynting vector, as Maxwell and Poynting foresaw." ("Observation of static electromagnetic angular momentum *in vacuo*", M.Graham, D.G.Lahoz. *Nature*, 285, 154, 1980. <http://www.tts.lt/~nara/introduc/introduc.htm>)

(This also brings to mind another topic of popular interest: the Biefeld-Brown effect. Suppose the capacitor is *asymmetric* in that it has plates with very different areas. The electric field will be shaped somewhat like a cone, instead of a cylinder, and will be highly divergent. The "lifters" constructed with such principles are usually "leaky", due to corona effects, and require electric current to keep them charged. The current is of course accompanied by a magnetic field. The resultant Poynting vector is directed inward toward the central axis, but now also has a vertical component. Could this flow of energy/momentum be related to the source of lift claimed for these devices? And does the electric gradient between the ionosphere and the earth (about 100 volts per meter) have anything to do with lift generation?

Refs: <http://jnaudin.free.fr/lifters/main.htm> , <http://jnaudin.free.fr/html/nasarep.htm> , <http://www.americanantigravity.com/about.html> , <http://www.meridian-int-res.com/Aeronautics/APS.htm> The asymmetric construction may be a way of dealing with the gravitational [symmetry problem](#).


(Yet another thought on this involves a *moving* dielectric. The lifters use an air dielectric, which, due to the ion wind effect, is moving through the capacitor plates. This means it is always charging (because it is getting "new" unpolarized dielectric) and therefore developing a Poynting vector. The thrust might be the *sum* of the ion wind momentum transfer and the electromagnetic momentum denoted by the Poynting vector. This suggests a couple of other variations. Make a dielectric disk out of barium titanate and rotate it. A pair of (asymmetric) electrodes charges a portion of the disk as it rotates, and another pair of electrodes discharges the portion as it rotates under the second pair (either discarding the energy or recycling it). Another extremely simple proof of principle configuration uses oil in a wide-based U-tube. Asymmetric plates are mounted radially on the glass

base of the U-tube. When the voltage is turned on, the oil should move, and a momentary pressure differential should cause a difference in the height of the oil in the vertical sections of the U-tube; this would be intended only as a demonstration of an effect that does not involve ion wind)

See [Update 4-4-11 on the Biefeld-Brown effect](#):

The section that was here previously has been moved to:
[Poynting vector insights \(electromagnetic momentum\)](#)

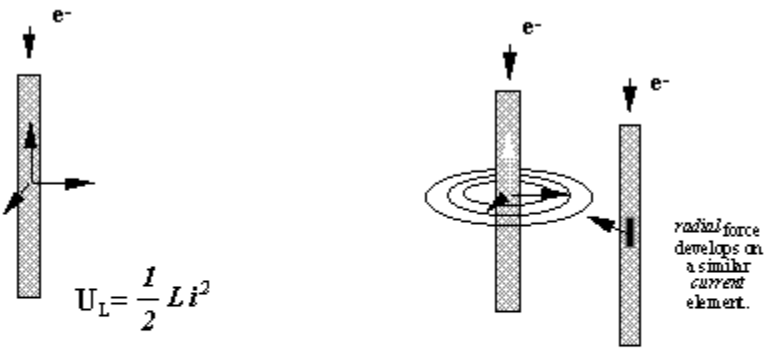
Let's now try a more technical example involving gravitational motion. We run electrons through a metal bar as shown in the illustration below:



A gravitating metal bar is moving towards all other locations in space in all three dimensions.

The metal bar is a time structure and can be moved through space, thereby producing a velocity.

The expression for energy takes the form shown.

$$E = \frac{1}{2} m v^2$$


Electrons are a space structure. Moving space through a time structure likewise produces a velocity. The expression for energy takes the same form as that for moving a time structure through space.

Motion of the electron space partially cancels the "towards" motion of the bar in one dimension. This leaves two dimensions of gravitational motion active radially. This is how an electric current produces a "magnetic" force.

$$U_L = \frac{1}{2} L i^2$$

(The idea that an electron is equivalent to rotational space ("spin space" as contrasted to extension space) is discussed more thoroughly in the first three articles of [Some Thought Provoking Issues](#). It is also illustrative to compare the space/time dimensions of mv^2 and Li^2 . Both must reduce to the dimensions of energy. According to the [discussion of the Hamiltonian](#), energy is t/s and mass is t^3/s^3 . If electron current is space per time, then the dimensions of L (inductance) must be t^3/s^3 , which is the same as that for mass. This makes perfect sense: the nature of the bar is not changed by moving it through space, nor is it changed by moving space through the bar. See also Feynman, *Lectures*, Vol 2, p. 17-12)

In this example, the bar is moving in all three dimensions of extension space simultaneously. (This multidimensional motion of *one* object is somewhat difficult to visualize, and you might need to review the above two sections about [Gravitational Lensing](#) and [Gravitational Redshift](#).) The motion of the electron space through the bar "cancels" the spatial motion of the bar in one dimension. The other two dimensions of the gravitational motion are still active and act perpendicularly (radially) to the long axis of the bar. This resultant is still a scalar motion and will become manifest with another object possessing the same type of motion. Hence, two wires so treated will be moving "towards" each other. This is an effect that we call "magnetic". Also, because it is two-dimensional, the resulting motion is "orientable" in the context of a gravitationally bound reference system.

This situation also reminds me of an oddity noted by Tesla. In some of his experiments "extra" voltage seemed to come out of nowhere:

This time it was most intense. Tesla could not get away from the shocks, regardless of his distance from the apparatus across his considerably large gallery hall. He scarcely could get near enough to deactivate the rotating switch. From what he was able to painfully observe, thin sparks of a bright blue-white color stood straight out of the line with each electrical contact.

The shock effects were felt far beyond the visible spark terminations. This seemed to indicate that their potential was far greater than the voltage applied to the line. A paradox! The dynamo charge was supplied at a tension of fifteen thousand volts, yet the stinging sparks were characteristics of electrostatic discharges exceeding some two hundred fifty thousand volts. Somehow this input current was being transformed into a much higher voltage by an unknown process. No natural explanation could be found. No scientific explanation sufficed. There was simply not enough data on the phenomenon for an answer. And Tesla knew that this was no ordinary phenomenon. Somewhere in the heart of this activity was a deep natural secret. Secrets of this kind always opened humanity into new revolutions.

Tesla considered this strange voltage multiplying effect from several viewpoints. The problem centered around the fact that there was no magnetic induction taking place. Transformers raise or lower voltage when current is changing. Here were impulses. Change was happening during the impulse. But there was no transformer in the circuit. No wires were close enough for magnetic inductions to take place. Without magnetic induction, there could theoretically be no transformation effect. No conversion from low to high voltage at all. Yet, each switch snap brought both the radiating blue-white sparks and their painful sting.

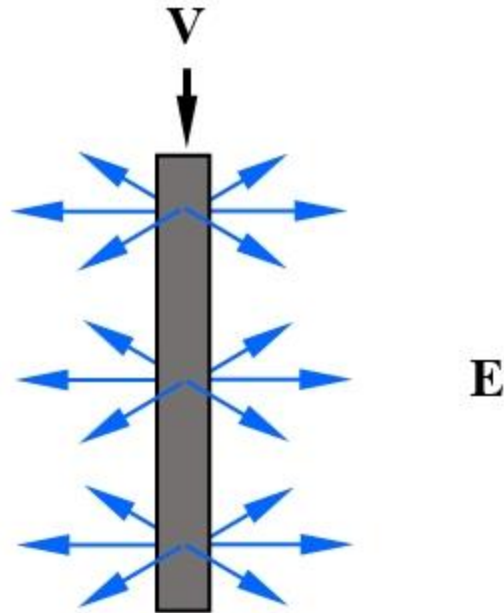
Tesla noted that the strange sparks were more like electrostatic discharges. If the sparks had been direct current arcs reaching from the test line, he would surely have been killed with the very first close of the switch. The physical pressure and stinging pain of these sparks across such distances could not be explained. This phenomenon had never been reported by those who should have seen and felt its activities.

Tesla gradually came to the conclusion that the shock effect was something new, something never before observed. He further concluded that the effect was never seen before because no one had ever constructed such a powerful impulse generator. No one had ever reported the phenomenon because no one had ever generated the phenomenon.

Tesla, now in possession of an effect which was not predicted by Maxwell, began to question his own knowledge. . . . The choice was clear: accept the empirical evidence and reject the conventional theory. For a time he struggled with a way to "derive" the shock effect phenomenon by mathematically wrestling "validity" from Maxwell's equations ... but could not. A new electrical principle had been revealed. . . . What had historically taken place was indeed unfortunate. Had Maxwell lived after Tesla's accidental discovery, then the effect might have been included in the laws. Of course, we have to assume that Maxwell would have "chosen" the phenomenon among those which he considered "fundamental". (<http://journal.borderlands.com/2010/the-broadcast-power-of-nikola-tesla-part-1/> , Gerry Vassilatos — from [Borderlands \(Vol. LII, Number 2, Second Quarter 1996\)](#))

Possibly, this could be related to a motion cancelling effect. The experiments used monopolar, high voltage, high current, *pulsed* electrical discharges. Alternating current could not produce this effect. Mechanical pressure and heating effects were also observed. The phrase "stood straight out of the line" is consistent with a motion cancelling effect. Possibly, the applied pulse caused something that was balanced and not observable, to become unbalanced and therefore observable. The mechanical effects suggest some sort of momentum density change (Poynting vector) due to the fast changing electrical field. Maxwell's equations apparently are not inclusive of a $d(E)/dt$ effect. Note that this discovery occurred after Maxwell's equations have been published.

Tesla's "etheric carrier" develops a radial electric field when voltage is first applied, or when voltage is pulsed. Initially, here is no electron current in the wire.

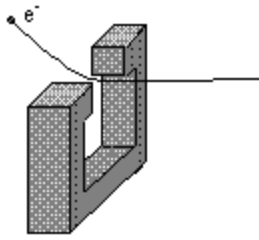


Working hypothesis: Motion of the "etheric carrier" partially cancels the "towards" motion of the bar in *two* dimensions instead of one. This leaves one dimension of gravitational motion acting radially. The result is a *radial electric* field instead of a *radial magnetic* field.

The effect is not understood, but may have something to do with Weyl fermions or neutrinos.

For more technical examples, see [Motion Couplers and Momentum Converters](#) and [Weyl Fermion links](#).

A similar effect can be produced by moving a wire through a magnetic field, or by moving electrons in free space through a magnetic field:



In your TV set a magnetic field bends the path of an electron in a direction that is perpendicular to both the direction of the field and to the original electron path. It has a motion canceller!

An electric field is scalar motion in one dimension. A magnetic field is scalar motion in two dimensions. These are not motions of the same sort and cannot couple. Hence, a *stationary* electron is not affected by a *stationary* (and uniform) magnetic field. For the deflection effect to appear, there must be relative motion.

"The Paradox of Relative motion: It is interesting to note that two observers in motion relative to one another may correctly measure different electric fields. If their relative velocity is small compared with the speed of light . . . both will observe approximately the same total force acting on a charge moving in an electromagnetic field, but they will disagree on the division of this force into its electric and magnetic components." —*Introduction to Electromagnetic Fields and Waves*, Charles A. Holt, 1963, p. 69

Think about that next time you are bored with a TV program! 😊

Dimensional relationships like this involve a factor of the speed of light. In this case the electric field and the magnetic field are related by the equation $\mathcal{E} = cB$, where c is the speed of light. Hence, this "electromagnetic effect" is definitely nothing weak or subtle. It is used in motors, for example, that run everything from simple floor fans to gigantic pumps for municipal water supplies, as well as many other types of devices.

Atoms of the metal bar possess gravitational motion and, again, are moving in all three dimensions of extension space simultaneously. How would an atom act if one of these dimensions of motions could be cancelled by a "motion canceller". We can get a clue from the behavior of massless particles. In contrast to *massive* particles, *massless* particles lack one dimension of the gravitational motion. They possess only momentum, not mass. The space/time relationships are shown in the table below. (The table is copied from the article [Energy from Massless Particles?](#), which has more information on mass, inertia, and massless particles).

Symbol	Name	Space/time dimensions	C Factor	Energy Term
E	energy	t/s	c^0	E
p	momentum	t^2/s^2	c^1	pc
m	mass	t^3/s^3	c^2	mc^2

Whereas *massive* particles are moving "anti" to the outward progression of space and time in *three* dimensions (t^3/s^3), *massless* particles, like the neutrino, have this anti-motion only in *two* dimensions (t^2/s^2). This means that massless particles cannot fully participate in the motion that is characteristic of a gravitationally bound reference system. Hence, massless particles will move at the speed of light relative to such a system. This missing dimension of motion can, of course, have any orientation relative to the reference system.

Now we begin to see what might be required of an antigravity device. Atoms are built from the 4π and 2π intrinsic spins as explained in [The Atomic Spin System](#). There is no way to get rid of these intrinsic spins and still have intact atoms, because the spins are the source of chemical properties—a defining characteristic of atoms—as well as the gravitational motion. Instead, the most likely approach would be to use a "motion

canceller" to cancel out one dimension of the gravitational motion. If this could be done, the device could be made to move at speeds up to that of light. In essence, the device would act like a macroscopic analog of a massless particle. Of course, the influence of the "motion canceller" needs to be fully controllable.

See also: "United States gravity control propulsion research", http://en.wikipedia.org/wiki/United_States_gravity_control_propulsion_initiative

With these insights, you might want to review the gravity modification experiments performed a few years ago at Tampere, Finland and more recently by NASA. Some of many links:

"Finnish researcher reportedly discovers gravity-change effect"
<http://www.spectrum.ieee.org/INST/nov96/gravity.html>

"Superconductive Components, Inc. awarded phase II contract by NASA on gravity modification" <http://www.superconductivecomp.com/nasap2award.htm>

"Breakthrough as scientists beat gravity."
<http://www.borderlands.de/gravity.finland.php3>

"Tampere Anti-Gravity Report"
<http://members.ozemail.com.au/~joi/issue4/ar185.html>

And others:

<http://xxx.lanl.gov/abs/physics/0108005> "Impulse Gravity Generator Based on Charged $\text{YBa}_2\text{Cu}_3\text{O}_{7-y}$ Superconductor with Composite Crystal Structure", arXiv:physics/0108005 v2 30 Aug 2001, Evgeny Podkletnov, Giovanni Modanese. (32 pages, 7 figures).

From the abstract: "An apparatus has been constructed and tested in which the superconductor is subjected to peak currents in excess of 10^4 A, surface potentials in excess of 1 MV, trapped magnetic field up to 1 T, and temperature down to 40K." The apparatus produces a "focused beam" which propagates "without noticeable attenuation through different materials and exerts a short repulsive force on small movable objects and independent of their composition. It therefore resembles a gravitational impulse. The observed phenomenon appears to be absolutely new and unprecedented in the literature." (p. 1)

From the article: The repulsive force "on pendulums made of different materials does not depend on the material but is only proportional to the mass of the sample. Pendulums of different mass demonstrated equal deflection at constant voltage. This was proved by a large number of measurements using spherical samples of different mass and diameter. The range of the employed test masses was between 10 and 50 grams. . . . Measurement of the impulse taken at close distance (3-6 m) from the installation and at the distance of 150 m gave identical results, within the experimental errors. As these two points of measurements were separated by a thick brick wall and by air, it is possible to admit that the gravity impulse was not absorbed by the media, or the losses were negligible. . . . This work indicates that a kind of artificial gravity can be generated using the unique properties of superconducting ceramic materials and a combination of electric and magnetic forces." (p. 8-9, 27)

References:

http://xxx.lanl.gov/PS_cache/physics/pdf/0108/0108005v2.pdf (paper)
<http://lanl.arxiv.org/ftp/physics/papers/0209/0209051.pdf> (illustrations after references)

Illustrations: (these links keep changing; you might have to do some Googling):

http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure1and2.jpg (32.3 kB, current as of Sept 2012)

Impulse Gravity Generator (initial setup)

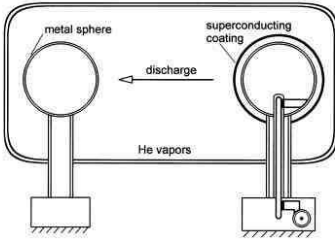


Fig. 1

Impulse Gravity Generator (improved variant)

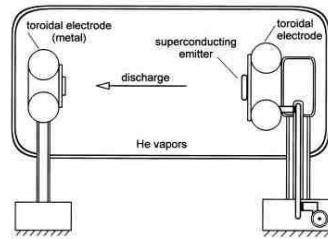


Fig. 2

http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure3.jpg (40.0 kB discharge chamber; current as of Sept 2012)
http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure5.jpg (14.0 kB, current as of Sept 2012)

Impulse Gravity Generator (discharge chamber)

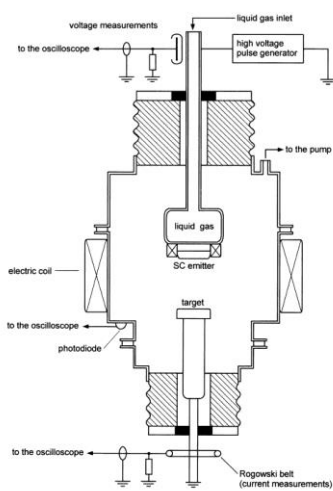


Fig. 3

Pendulum in a Glass Cylinder under Vacuum

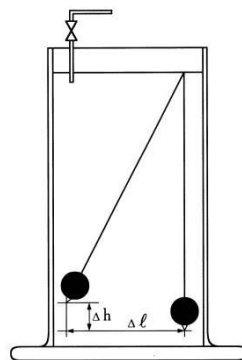


Fig. 5

http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure4.jpg (22.4 kB, current as of Sept 2012)
http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure6.gif (5.1 kB, current as of Sept 2012)
http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure7.gif (3418 bytes, current as of Sept 2012)
http://lanl.arxiv.org/PS_cache/physics/ps/0108/0108005v2.figure8.gif (3125 bytes, current as of Sept 2012)

Other refs:

http://xxx.lanl.gov/PS_cache/physics/pdf/0108/0108005v2.pdf (paper)
<http://lanl.arxiv.org/ftp/physics/papers/0209/0209051.pdf> (illustrations after references)

Interview Dr. Eugene Podkletnov - Full Length Uncut Fixed (2004) <http://www.youtube.com/watch?v=AgyAFEIQZcU&feature=related>

Similarity to "dark rays" of Tesla:

Analysis of this situation proved that electrical energy or electrically productive energies were being projected from the impulse device as rays, not waves. Tesla was amazed to find these rays absolutely longitudinal in their action through space, describing them in a patent as "light-like rays". These observations conformed with theoretical expectations described in 1854 by Kelvin.

In another article Tesla calls them "dark-rays", and "rays which are more light-like in character". The rays neither diminished with the inverse square of the distance nor the inverse of the distance from their source.

They seemed to stretch out in a progressive shock-shell to great distances without any apparent loss.(
<http://journal.borderlands.com/2010/the-broadcast-power-of-nikola-tesla-part-1/> , Gerry Vassilatos)

See:

Lost Science, Gerry Vassilatos, p. 87+
(http://www.tuks.nl/pdf/Reference_Material/Aetherforce_Library/Lost%20Science/Gerry%20Vassilatos%20-Lost-Science-Complete-Edition.pdf)

The Free Energy Secrets of Cold Electricity , Peter A. Lindemann, D.Sc
, http://www.teslasociety.ch/info/NTV_2011/free.pdf

<http://www.freepatentsonline.com/0685957.pdf> , <http://www.freepatentsonline.com/0685958.pdf> ,

https://ia700403.us.archive.org/19/items/CompletePatentsOfNikolaTesla/Complete_Patents_Nikola_Tesla.pdf

(<http://www.freepatentsonline.com/6417597.pdf> "Gravitational wave generator" , Robert M. L. Baker, July 9, 2002)

Note: The terminology use to describe these effects is misleading. A "gravity wave" is neither longitudinal nor transverse in character. It is not a wave either. It is a mechanical effect ("pressure wave") that is instantaneous and not propagated (i.e., a "non-local" effect). The beam is formed by the geometry of the generating device and is not diffraction limited in the manner of light waves.

Antigravity Replication Experiments:

<http://www.amasci.com/freenrg/tamp.txt>
Tampere Replication -- How to

<http://www.gravity-society.org/exp.htm>
"Demonstration of transient weak gravitational shielding by a YBCO LEVHEX at the superconducting transition", John Schnurer

<http://www.freepatentsonline.com/WO1998023976A2.pdf>
"Improved apparatus and method for gravitational modification", John Schnurer

<http://www.amasci.com/freenrg/bw.txt>
BUSINESS WEEK ONLINE NEWS FLASH! September 25, 1996 ONE STEP CLOSER TO AN ANTIGRAVITY MACHINE

<http://www.gravity-society.org/phc.txt>
A possibility of gravitational force shielding by bulk YBa₂Cu₃O_{7-x} superconductor", E. Podkletnov and R. Nieminen

<http://www.gravity-society.org/msu.htm>
"Weak gravitation shielding properties of composite bulk YBa₂Cu₃O_{7-x} superconductor below 70 K under e.m. field", E. Podkletnov

<http://www.allbusiness.com/energy-utilities/utilities-industry-electric-power/5518389-1.html>
"A theory of the Podkletnov effect based on general relativity: anti-gravity force due to the perturbed non-holonomic background of space", by Rabounski, Dmitri, Borissova, Larissa; Progress in Physics, July 1 2007

<http://www.docstoc.com/docs/71619295/803-page-Collection-of-Papers-on-Anti-Gravity-Research>
"803-page Collection of Papers on Anti-Gravity Research "

Other Antigravity Patent claims:

Technical and Theoretical Specifications for Warp Drive Technology

Andrew Peter Worsley, Peter John Twist, June 19, 2003

<http://12.espacenet.com/espacenet/viewer?PN=US2003114313&CY=ep&LG=en&DB=EPD>

<http://12.espacenet.com/espacenet/bnsviewer?CY=ep&LG=en&DB=EPD&PN=US2003114313&ID=US2003114313A1+I+>

(<http://www.uspto.gov/patft/index.html>) United States patent database

(http://ep.espacenet.com/espacenet/ep/en/e_net.htm <http://worldwide.espacenet.com/>) European patent database

(<http://www.freepatentsonline.com>) James Ryley's site

(Some words of caution: a patent attorney once told me that devices do not actually have to work to be granted a patent. Patents can be granted on "plausibility" without an actual demonstration of a working device. Also, many offbeat technology patents seem to have a lot of highly technical circumlocution and obfuscatory nonsense in their "Theory of Operation" section. Apparently, this is just fluff to impress patent examiners or investors. Some of these patents clearly merit skepticism.)

<http://www.rexresearch.com/hooper/3610971.htm> "All-Electric Motional Field Generator", William J. Hooper

A relevant fact is that atomic spin coordination is possible in high-temperature superconductors:

"Many atoms have a magnetic property called spin, which makes them behave as tiny bar magnets. Scientists noticed in experiments even 10 years ago that at a temperature just below the superconductivity threshold, the spins of many atoms in some copper oxide compounds fluctuated in a coordinated manner. . . Now "it's pretty much been proven that the [spin coordination] is present for all high-temperature superconductors," comments Andrey V. Chubukno of the University of Wisconsin-Madison" —Science News, March 16, 2002, Vol 161, No 11, p. 173-174. (<http://www.sciencenews.org>) (See also "The Wallace inventions, spin aligned nuclei, the gravitomagnetic field, and the Tampere experiment: is there a connection?" by Robert Stirmiman " <http://www.rexresearch.com/wallace/wallaceinventions.pdf>)

"Secret of superconductivity in sight" 24 January 2002 <http://physicsweb.org/article/news/6/1/16>

How high is high-temperature?

"Currently, the superconductor with the highest critical temperature ever recorded is Mercury Barium Thallium Copper Oxide or $\text{Hg}_{0.2}\text{Tl}_{0.8}\text{Ca}_2\text{Cu}_3\text{O}$, which has a critical temperature of 139 K at one atmosphere. This superconductor is a type of ceramic copper oxide and its critical temperature was determined in 1995 by Chakoumakos, Dai, Wong, Sun, Lu, and Xin. Apparently, metal-copper oxide ceramic superconductors have high critical temperatures, which might unlock the key of synthesizing a high temperature superconductor that is superconductive under room temperature conditions." <http://hypertextbook.com/facts/2002/MichaelNg.shtml>

Some superconductors are very sensitive to processing parameters, such as heating and cooling rates:

"The recent discovery of superconductivity at temperatures up to 125 K has led to unprecedented worldwide research efforts to understand mechanisms and properties so that these materials can be utilized advantageously for energy conservation in applications such as electrical energy transmission and storage, transportation, and electronics. One family of these materials, containing Bi, Sr, Ca, Cu, and O, is very sensitive to the temperature of heating and the rate of cooling during processing. A wide range of properties is possible, depending on these parameters. This sensitivity to heating temperature and cooling rate suggested an investigation in the PSU ballistic compressor to determine the effects of rapid heating and cooling on the properties of these materials." http://physics.pdx.edu/faculty_files/das/dash.htm See also "Enhancement of T_c of Bi-Sr-Ca-Cu-O Superconductor by Rapid Heating and Cooling in a Ballistic Compressor" Q. Duan, J. Dash, M. Takeo, and J. Huang, J. Appl. Physics, 69, 4897 (15 April 1991); http://physics.pdx.edu/faculty_files/tak/takeo.htm ; pulsed power might be useful extremely fast heating/cooling <http://pps.coe.kumamoto-u.ac.jp/streaming/PulsedPower/RAM/bluhm/pplsson3.ram>

Clearly the design of such a "motion canceller" would be facilitated by a factual model of the atom (one based on intrinsic spin systems), and by a re-write of all physical equations in terms of space/time (or time/space) ratios. Such an approach will surely lead to powerful and general solutions to perplexing problems in physics. The biggest obstacle by far however, will be in overcoming our own preconceived ideas and misconceptions about how the Universe actually works.

"The problem of creating something which is new, but which is consistent with everything which has been seen before, is one of extreme difficulty." (The Feynman Lectures on Physics, Vol. II, p. 20-10 to 2011)

6-14-03 Update: Some additional articles have appeared on this subject: recently:

"Podkletnov maintains that a laboratory installation in Russia has already demonstrated the 4in (10cm) wide beam's ability to repel objects a kilometre away and that it exhibits negligible power loss at distances of up to 200km. Such a device, observers say, could be adapted for use as an anti-satellite weapon or a ballistic missile shield." (Jane's Defence Weekly 29 July 2002, Anti-gravity propulsion comes 'out of the closet', By Nick Cook, JDW Aerospace Consultant, London) See <http://www.gravity-society.org/>

The following two citations are from "Investigation of high voltage discharges in low pressure gases through large ceramic superconducting electrodes" (Evgeny Podkletnov, Giovanni Modanese, 26 Apr 2003 (final version), <http://www.arxiv.org/pdf/physics/0209051>)

"The propagation velocity of the radiation is still unknown, too. This can be measured in principle by placing two identical detectors A and B along the beam, at a known distance from each other (for instance, the maximum observed distance, AB=150 m). If the beam propagates with the speed of light, then the detection delay will be of the order of 10^{-6} s. This can be observed by comparing the signals of the two detectors as seen at the middle point between A and B. Then for a check one can exchange A with B. The method requires that the detectors have a temporal resolution better than 10^{-6} s. In general, it is difficult to obtain fast rise times in detectors based on mechanical transducers." (Section 5)

"The repulsive character of the force is not explainable in the classical gravitational theory, either." (Section 4.2)

3-30-11 Update: (source: *Secrets of Antigravity Propulsion*, Paul A. LaViolette, 2008, p. 175-178)

". . . at a higher discharge voltage, of around 10 million volts, the gravity wave pulse became so strong that it was able to substantially dent a 1-inch thick steel plate and punch a 4-inch diameter hole through a concrete block! . . . Podkletnov also disclosed that his improved pulse generator exhibited increased thrust power even when energized with 5 million-volt pulses. Also, he noted that these powerful pulses would sometimes bend the generator's copper anode as well as damage the walls of the discharge chamber. . . .

Podkletnov's team measured a far higher velocity for the concrete-smashing gravity impulses produced by their improved Marx bank pulse generator. Using a pair of synchronized atomic clocks to measure the arrival time of the impulses at separate locations, they were able to determine that the impulses were traveling at least several thousand times the speed of light, perhaps faster!"

(For more about the possible physics behind this, see [my \(flawed but corrected\) comment](#) about the second time derivative of the E field. See also [Water Capacitors-Electrical](#) .)

If the Podkletnov gravitational impulse device operates on the motion canceller principle, the "beam" propagation velocity should be infinite. In other words, the effect is instantaneous. Nothing is propagated, for reasons previously outlined in the [8-10-02 Note](#) above in the Shapiro Time Delay article and [elsewhere](#). The effect is repulsive because the "towards" motion of gravity is cancelled in one dimension between the two participating objects. These objects no longer (fully) participate in the motions of a gravitationally bound reference system and are not coming together at the same rate in all dimensions. The effect will look like "repulsion" in the context of a laboratory reference system.

There are also some more clues about the occupant acceleration problem [noted previously](#) :

"Because the impulse gravity beam penetrates bulk material and seems to act independently of target composition, it will uniformly accelerate all spacecraft components in the beam path. Even at high accelerations, the spacecraft components would not experience any internal stresses; a spacecraft being

propelled by an impulse gravity beam would behave as though it were in freefall. Uniform acceleration of all spacecraft components means that even delicate payloads might safely undergo very high accelerations." (EVALUATION OF AN IMPULSE GRAVITY GENERATOR BASED BEAMED PROPULSION CONCEPT, Chris Y. Taylor, Giovanni Modanese, page 5; presented 7-10 Jul 2002; Published by the American Institute of Aeronautics and Astronautics, Inc., 2002. See <http://www.arxiv.org/pdf/physics/0209023>)

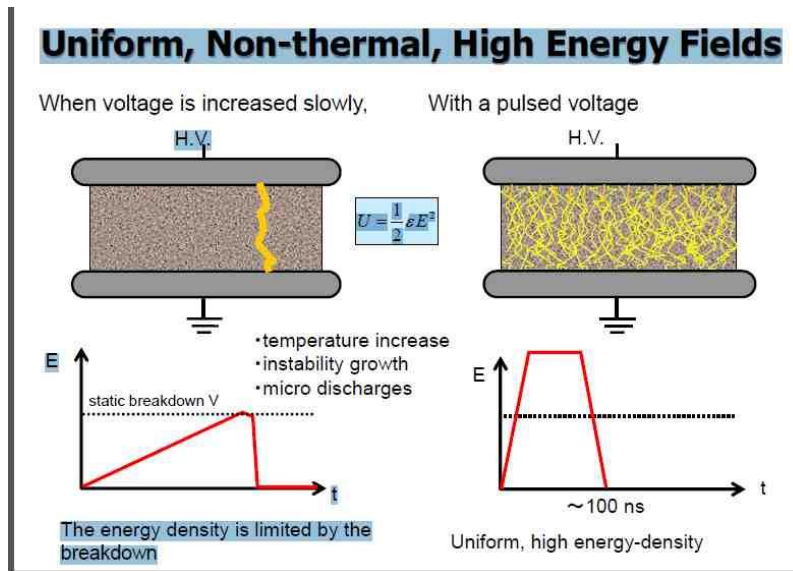
At this point, the indications are that spacecraft speeds up to that of light appear to be technically feasible and practical (but not as currently envisioned as "beamed propulsion"). Speeds greater than light do not appear to be forbidden, but such speeds would be temporal, rather than spatial. However, that might prove to be an advantage. The "inverseness" of space/time ratios implies that locations which are widely separated in three-dimensional space are comparatively close in three-dimensional time. The operational equivalent of the science fiction "warp drives" might prove to be possible after all. (See also the diagram, [Speeds in a Gravitationally Bound Reference System](#) and its discussion. Another aspect of this is that the speed of electric, magnetic, and gravitational fields are instantaneous, i.e., far in excess of the speed of light (See [Speed of Gravity](#), [Speed of Electric Fields](#)). This implies that propulsion "speeds" effectively far greater than light speed can be produced. The effects would not conform to Special Relativity, however, as temporal speeds do not have a spatial trajectory, and involve "the physics of non-locality". This could produce delocalization of the affected object (i.e., it may disappear from view, become intermingled with other matter, etc. even though it remains in the very same spatial location.)

(A clarification about Reactionless Propulsion: The beamed propulsion concept requires an Earth based generator to transmit the beam to the spacecraft and push it along. The craft could be just an ordinary spacecraft, or even a chunk of rock. Although this scheme has some applications, I don't believe it is practical and safe for space flight in general. But there is an alternative: mount the generator on the spacecraft. It would at first seem that there is no point in mounting such a generator on a spacecraft because the beam generating apparatus produces no Newtonian back reaction. A beam projected from the rear of the craft would NOT produce any forward thrust on the spacecraft. But the fallacy here is that of Newtonian thinking. The beam is NOT like rocket exhaust. In order for it to produce a thrust on the spacecraft, the generator would have to be mounted at the rear, and the beam projected *forward* into the spacecraft itself. This would push all components/occupants of the spacecraft *forward* and drag the attached beam generator along with it. This is the literal equivalent of a person 'picking himself up by his own bootstraps' to leap a tall building. It is physically impossible using Newtonian action/reaction mechanics. But in the Motion Canceller concept, the reaction is perpendicular to the beam (in all radial directions) and cancels itself out within the generator). See my comment about [reactionless force](#) and [railgun recoil](#). This also implies that the best shape for such a spacecraft would be something having radial symmetry, like a saucer or a cigar. This facilitates keeping the entire craft, and its occupants, within the boundaries of the beam.)

Can mechanical structures handle internal high g acceleration? Here is a partial table from <http://en.wikipedia.org/wiki/G-force>

Shock capability of mechanical wrist watches ^[25]	> 5,000 g
V8 Formula One engine , maximum piston acceleration ^[26]	8,600 g
Rating of electronics built into military artillery shells ^[27]	15,500 g

With a superconducting emitter, the beam effect is uniform across the face of the emitter. Are superconductors therefore required? I don't have enough information to answer this question. The beam could be approximately uniform across the face of a *non*-superconductor provided a *fast pulsed* voltage is used. Here is a slide from *Pulsed Power Engineering, 2011*, Prof. Sunao Katsuki lecture series Introduction, page 14:



http://www.eecs.kumamoto-u.ac.jp/~katsuki/lectures/pp_eng/no1.pdf

"Each spark gap has a variance of its breakdown voltage, which can be characterised by the standard deviation $\sigma_a(U)$ Therefore, to achieve the largest possible number of channels, we must reduce $\sigma_a(U)$ and decrease the pulse rise time dU/dt as much as possible." (*Pulsed Power Systems*, Hansjoachim Blum (2006) p. 95)

Can this be done by hobbyists? Yes:

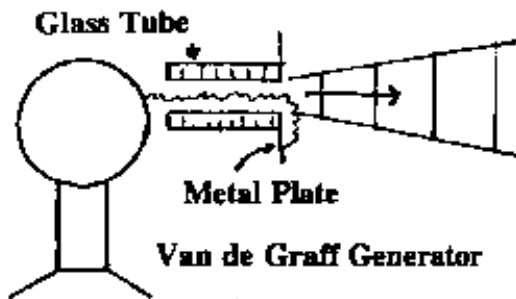
"The idea of making electrodes parallel enough to discharge along their entire length is intimidating especially if you have ever tried to do this along a very long spark gap. Under normal conditions it is perhaps impossible to get a spark jumping across a long narrow pair of electrodes, to cover their entire length. You will always get a tiny bright spark at one place at a time. This was one of the reasons the TEA laser before building one, seemed intimidating.

As it turns out in the case of TEA [Transversely Excited Atmospheric pressure] lasers, the extremely fast voltage transition between the electrodes creates a discharge across their entire length. Adjustment for this condition is relatively easy. " ("Simple Homemade T.E.A. Laser", Nyle Steiner, K7NS (Oct 2007) <http://www.sparkbangbuzz.com/tealaser/tealaser7.htm>

Higher *energy* density, as well as beam uniformity, can be delivered with pulsed power because of a multiple channel effect. However, the anitgravity effect may still depend on the spin coordination that is possible in high-temperature superconductors. But an interview with Dr. Eugene Podkletnov beginning at the 21:10 point (and 48:17) suggests alternatives to superconductors. <http://www.youtube.com/watch?v=AgyAFElQZcU&feature=related>

"But to be absolutely honest now, after twelve or fifteen, already, years of research in this field, we came to the conclusion that it is not necessary to use superconducting materials in order to modify the gravity field. We can use rotating magnetic fields, and we can turn to normal conductors, which is much easier, much easier, and uh, ah, this method has a lot of advantages." http://portal.groupkos.com/index.php?title=Eugene_Podkletnov_portal

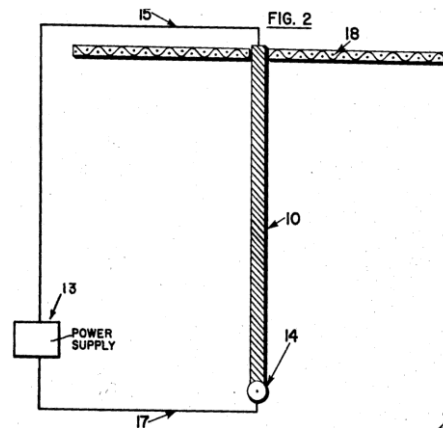
And there may even be still other schemes. See "Van de Graaff Generator Effect-Force Concentration", Charles R. Morton <http://amasci.com/freenrg/morton1.html> . This scheme does not use high temperature superconductors and seems to resemble the [Biefeld-Brown effect](#) more so than the Podkletnov effect. Note that both use (or can use) pulsed high voltage electric fields. The Frolov "T-Hat capacitor" also seems related to the Morton effect, although it uses static fields. ("Propulsion unit using asymmetrical (gradient) electric capacitors", Alexander V. Frolov, <http://www.faraday.ru/t-cap.html> ; compare with Brown's patent <http://www.freepatentsonline.com/3187206.pdf>) These effects need to be investigated at much higher power levels.



Morton's Van de Graaff Generator Effect Apparatus

<http://amasci.com/freenrg/morton1.html>

[06.pdf](#)



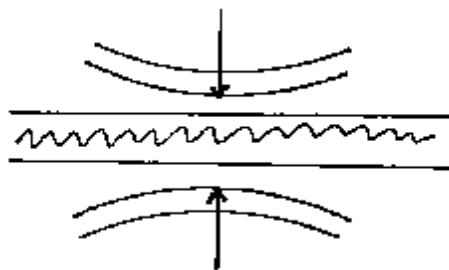
Brown's Electrokinetic

<http://www.freepatentsonline.com/31872>

Incidentally, Morton describes what *could* be a radial reaction force ([as above](#)) to a longitudinal pulse force:

"The spark fired through a glass tube toward a metal plate with a hole in it. From the tube came a beam of energy unlike anything I had ever heard of. . . . unlike the VandeGraaff explosion, this beam of force passed through metals. . . . the force was so powerful that it sent bits of paper flying.

As the years passed, I developed better and better methods of producing the beam. Then one day it happened - instead of repelling matter, the beam attracted matter. Even radiation pressure could not explain this phenomena. . . . When the spark went through the glass tube, the air collapsed around it".



<http://amasci.com/freenrg/morton1.html>

Morton's description is lacking in detail and I simply don't know what to think of it. Perhaps my readers could try this simple experiment and offer some feedback. Likewise for the experiments of Martin N. Kaplan. See also

the forum

discussions: http://groups.google.com/group/sci.physics.relativity/browse_frm/thread/25991020eef22a11...

<http://amasci.com/freenrg/mort2.txt>

<http://groups.yahoo.com/neo/groups/forcefieldpropulsionphysics/conversations/topics/1027?var=1>

<http://groups.yahoo.com/neo/groups/forcefieldpropulsionphysics/conversations/topics/1403>

<http://www.esotericscience.com/Magnetism.aspx>

<http://xxx.lanl.gov/abs/physics/9906059>

Propulsion Through Electromagnetic Self-Sustained Acceleration

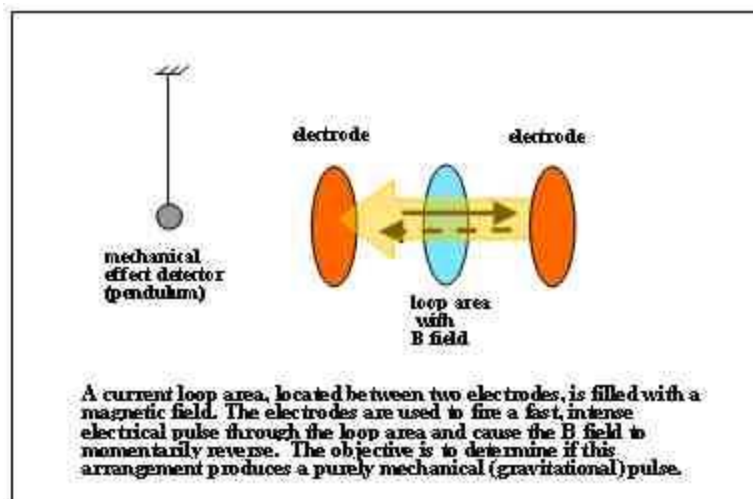
Authors: Vesselin Petkov

(Submitted on 29 Jun 1999 (v1), last revised 9 Jul 1999 (this version, v4))

Abstract:

As is known the repulsion of the volume elements of an uniformly accelerating charge or a charge supported in an uniform gravitational field accounts for the electromagnetic contribution to the charge's inertial and gravitational mass, respectively. This means that the mutual repulsion of the volume elements of the charge produces the resistance to its accelerated motion. Conversely, the effect of electromagnetic attraction of opposite charges enhances the accelerated motion of the charges provided that they have been initially uniformly accelerated or supported in an uniform gravitational field. The significance of this effect is that it constitutes a possibility of altering inertia and gravitation.

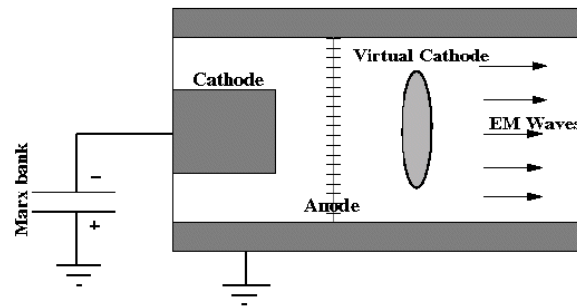
This vague situation suggests another somewhat more difficult experiment. I call it a "gravitational pulse tube". I have no idea if it will work. (see [math error note](#)) The discharge pulse must be unidirectional (no "ringing" or current reversals). The basic scheme is as shown:



If someone is experimenting with such a device, I doubt if the effects would be recognized as coming from such a source: <http://www.cbsnews.com/news/cause-of-mystery-beach-blast-in-rhode-island-solved/> (read the comments) See also [shockwave-thru-a-coin](#) experiment (*LIFE* Nov 23, 1942 p. 132).

Another device, a *viricator*, is used to generate microwave pulses in the gigawatt to terawatt range. It has superficial similarities to the Morton device, except it uses an evacuated waveguide (instead of an atmospheric pressure dielectric tube) and an axial magnetic field. The Marx bank is the equivalent of a powerful Van de

Graaff generator. Hobbyists need to be careful not to generate intense microwave pulses (or X-rays) when creating design variations intended to explore the Morton effect.



<http://en.wikipedia.org/wiki/Vircator>
<http://www.freepatentsonline.com/4345220.pdf>
<http://www.freepatentsonline.com/4730170.pdf>

"The monotron as a gridded microwave tube", Joaquim J. Barroso
(2003) http://www.plasma.inpe.br/LAP_Publicacoes/LAP2003/JJBarroso_Poster_LAWPP2003b.pdf
<http://www.freepatentsonline.com/3339149.pdf>

Crossed-Field Amplifier:

http://en.wikipedia.org/wiki/Crossed-field_amplifier
[http://www.radartutorial.eu/08.transmitters/Crossed-Field%20Amplifier%20\(Amplitron\).en.html](http://www.radartutorial.eu/08.transmitters/Crossed-Field%20Amplifier%20(Amplitron).en.html)
<http://www.its.bldrdoc.gov/media/31069/CohenRadarTxOverviewISART2011.pdf>
<http://www.dtic.mil/dtic/tr/fulltext/u2/627469.pdf>
<http://www.freepatentsonline.com/4376908.pdf>

See also: [George Samuel Piggott's Electro-Gravitation experiments](#)

Anyway, more about Podkletnov:

"Breaking the Law of Gravity" by Charles Platt (Mar 1998)

<http://www.americanantigravity.com/podkletnov.html>
http://www.wired.com/wired/archive/6.03/antigravity_pr.html

Some NASA related links are listed below (try rating my website with the criteria in the first citation below):

Millis, M., "NASA Breakthrough Propulsion Physics Program", NASA/TM-1998-208400, (June 98) (9 pg.). <http://www.grc.nasa.gov/WWW/bpp/TM-1998-208400.htm>

Millis, Marc G. "Challenge to Create the Space Drive," In Journal of Propulsion and Power (AIAA), Vol. 13, No. 5, pp. 577-682, (Sept.-Oct. 1997). <http://www.grc.nasa.gov/WWW/bpp/TM-107289.htm>

Millis and Williamson, ed., "NASA Breakthrough Propulsion Physics Workshop Proceedings," NASA/CP-1999-208694, Proceedings of a conference held at and sponsored by NASA Lewis Research Center in

Cleveland Ohio, August 12-14, 1997. (Jan. 99) (456 pg.). **NOTE** A condensed, 10-page summary of this workshop is available as: Millis, M. "Breakthrough Propulsion Physics Workshop Preliminary Results," NASA TM-97-206241 (Nov. 97). <http://www.grc.nasa.gov/WWW/bpp/TM-97-206241.htm>

Advanced Space Transportation Program <http://sli.nasa.gov/ast/astp.html>

"To find out more about BPP's challenges and new concepts, check out "Warp Drive, When?" <http://www.grc.nasa.gov/WWW/PAO/warp.htm> "

"To stay aware of any further developments or emerging opportunities associated with the BPP Project, please revisit the Project web site from time to time <http://www.grc.nasa.gov/WWW/bpp/> "

You can also access the NASA WWW and do a word search on your topic of choice. The "Search" capability of "Space Link" may provide you a wealth of information. <http://www.grc.nasa.gov/Doc/search.htm>

NASA funding mechanisms have had breakthrough propulsion added to their solicitation topics. If you are doing work in this field, you might want to investigate the funding opportunities. See <http://sbir.gsfc.nasa.gov/>

"Responsive Coverage Using Propellantless Satellites", George E. Pollock, Joseph W. Gangestad, James M. Longuski, http://www.responsivespace.com/Papers/RS6/SESSIONS/SESSION%20II/2002_POLLOCK/2002P.pdf (this has nothing to do with antigravity, but is interesting in its own right) Also: "New Synchronous Orbits Using the Geomagnetic Lorentz Force", Brett Streetman, Mason A. Peck (2007) http://www.spacecraftresearch.com/files/StreetmanPeck_JGCD2007.pdf

Some interesting links about space and time:

Luxon Hypothesis: "H. Zeigler proposed in 1909 that relativity phenomena would be a natural result if the most elemental particles of mass were made of smaller particles that all moved at the constant speed of light." <http://www.tardyon.de/other.htm>

The Reciprocal System, <http://www.rsystem.org>

The Collected works of Dewey B. Larson, <http://www.rsystem.org/dbl/index.htm>

<http://www.courses.fas.harvard.edu/~phys16/Textbook/> This is a textbook by David Morin that has "grown out of the first-semester honors freshman physics course that has been taught at Harvard University during recent years." It is quite good. Chapter 5 is about "The Lagrangian Method" which is very useful, general, and powerful in both classical mechanics and quantum mechanics. Chapters 10,11,12, and 13 are about Relativity. I especially agree with the author's approach to teaching:

"One thing many people don't realize is that you need to know more than the correct way(s) to do a problem; you also need to be familiar with many *incorrect* ways of doing it. Otherwise, when you come upon a new problem, there may be a number of decent-looking approaches to take, and you won't be able to immediately weed out the poor ones. Struggling a bit with a problem invariably leads you down some wrong paths, and this is an essential part of learning. To understand something, you not only have to know what's right about the right things; you also have to know what's wrong about the wrong things. Learning takes a serious amount of effort, many wrong turns, and a lot of sweat. Alas, there are no short-cuts to understanding physics." —David Morin

"It is He who reveals the profound and hidden things."
—Daniel 2:22

html 3/02g

The Biefeld-Brown Effect

Update 4-27-11 on the Biefeld-Brown effect:

United States Patent Office

3,187,206

Patented June 1, 1965

1

2

3,187,206

ELECTROKINETIC APPARATUS

Thomas Townsend Brown, Walkertown, N.C., assignor,
by mesne assignments, to Electrokinetics, Inc., a corporation of Pennsylvania

Filed May 9, 1958, Ser. No. 734,342

23 Claims. (Cl. 310—5)

This invention relates to an electrical device for producing thrust by the direct operation of electrical fields.

I have discovered that a shaped electrical field may be employed to propel a device relative to its surroundings in a manner which is both novel and useful. Mechanical forces are created which move the device continuously in one direction while the masses making up the

trode of special configuration whereby the electric lines-of-force are made to converge at a distance from the electrode. One illustrative embodiment of this invention which satisfies the above requirement is an arcuate surface or, alternatively, a system of wires, tubes or plates embedded in a dielectric surface and forming a directive array. One such highly-charged electrode acting within and upon an ambient of different electrical potential will move in response to the forces created by the shaping of the electrostatic field. If a smaller electrode is added at or near the focus of the field-shaping electrode and mechanically attached to that electrode, both electrodes as a system will move in a direction of the larger or field-shaping electrode. As is mentioned above the field-shaping

In popular practice, there appear to be two technical embodiments of the Biefeld-Brown effect: electrokinetics and electrogravitics. The former develops thrust from an electrostatic ion wind effect generated by a high voltage source (tens of kilovolts or higher). These are the "lifters" you see demonstrated on the internet. They are low mass devices and will not work in a vacuum but are capable of lifting their own weight.

The other type generates thrust by using asymmetric electrical fields, combined with high mass, high K asymmetric capacitors. This type of device will produce thrust in a high vacuum (10^{-6} Torr), or when the electrodes are enclosed in Plexiglas shields (or plastic bags) to contain the ion wind or when immersed in transformer oil to suppress corona and ion wind effects. Operation is more efficient without corona leakage, and higher voltages are also possible (the thrust effect scales approximately as the square or cube of the voltage). Cone shaped dielectrics work better than cylindrical dielectrics. High K, high mass dielectrics (like barium titanate) work better than, say, glass or polyethylene. Capacitors with a symmetric construction produce no thrust. High voltages (50-100 kV) are required to produce moderate thrust. The thrust is towards the larger, (usually positive) electrode; during spark discharges, thrust appears to be independent of electrode geometry

or polarity. Pulsed DC, DC with an AC waveform imposed, or even AC itself, works better than constant polarity DC. Thrust characteristics may depend on electrical waveform asymmetry. There is general suspicion in aviation circles that the B2 bomber (United States) operates on these principles. (See Brown's patent, Electrokinetic apparatus (1965-06-01) <http://www.freepatentsonline.com/3187206.pdf>)

(An AC waveform imposed on a high DC voltage reminds me of the so-called Hutchinson effect, which seems to be present in some form when some sort of a combination of a Tesla coil (AC) is energized in the presence of a strong DC potential (100kV or more) say from a Van de Graaff generator. I played with both of these as a kid, though not at the same time. All these technologies are potentially world changing, and ones that every Tom, Dick, and Harry has access to—for better or for worse. So pay attention here . . .)

These two effects are different and are often confused. A study sponsored by NASA is an example:

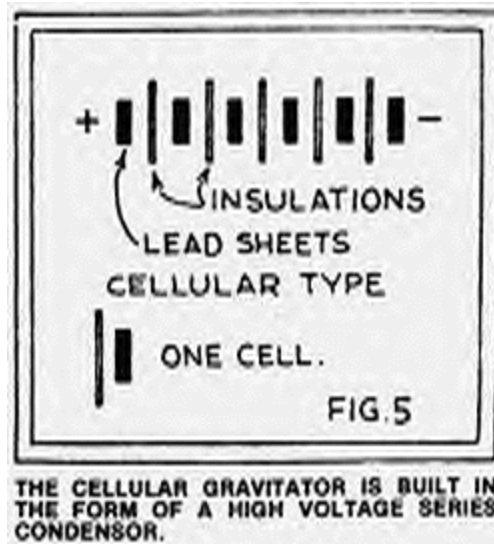
This paper reports on the results of tests of several Asymmetrical Capacitor Thrusters (ACTs). . . . The model assumed the thrust was due to electrostatic forces on the leakage current flowing across the capacitor. It was further assumed that this current involves charged ions which undergo multiple collisions with air. These collisions transfer momentum. All of the measured data was consistent with this model. Many configurations were tested, and the results suggest general design principles for ACTs to be used for a variety of purposes. ("Asymmetrical Capacitors for Propulsion", Francis X. Canning, Cory Melcher, and Edwin Winet, Institute for Scientific Research, Inc., Fairmont, West Virginia, 2004; <http://gltrs.grc.nasa.gov/reports/2004/CR-2004-213312.pdf>)

Their use of the term "Asymmetrical Capacitor Thrusters" notwithstanding, what was tested here was clearly an ion wind effect. Contrast this study with Brown's comments in his article "How I Control Gravitation" , T.T. Brown , *Science & Invention* (August 1929):

Since the time of the first test the apparatus and the methods used have been greatly improved and simplified. Cellular "gravitators" have taken the place of the large balls of lead. Rotating frames supporting two and four gravitators have made possible acceleration measurements. Molecular gravitators made of solid blocks of massive dielectric have given still greater efficiency. Rotors and pendulums operating under oil have eliminated atmospheric considerations as to pressure, temperature and humidity. The disturbing effects of ionization, electron emission and pure electro-statics have likewise been carefully analyzed and eliminated. . . .

Let us take, for example, the case of a gravitator totally immersed in oil but suspended so as to act as a pendulum and swing along the line of its elements. When the direct current with high voltage (75-300 kilovolts) is applied the gravitator swings up the arc until its propulsive force balances the force of the earth's gravity resolved to that point, then it stops, but it does not remain there. The pendulum then gradually returns to the vertical or starting position even while the potential is maintained. The pendulum swings only to one side of the vertical. Less than five seconds is required for the test pendulum to reach the maximum amplitude of the swing but from thirty to eighty seconds are required for it to return to zero. . . .

MASS of the dielectric is a factor in determining the total energy involved in the impulse. For a given amplitude an increase in mass is productive of an increase in the energy exhibited by the system ($E = mg$).



In particular, note the reference to "totally immersed in oil", and "solid blocks of massive dielectric" and the use of *lead* sheets, and the momentary (not continuous) impulse, in Brown's cellular type of thruster. This is clearly NOT a device that depends on "charged ions which undergo multiple collisions with air" (NASA). Brown's 300311 patent also states that "said linear force or motion is furthermore believed to have no equal and opposite reaction that can be observed by any method commonly known and accepted by the physical science to date" (page 1, line 24) and "This motion seems to possess no equal or opposite motion that is detectable by the present day mechanics" (page 2, line 63; [see discussion above](#)). This is in contrast to the NASA document which states "These collisions transfer momentum." It is very clear that the NASA study investigates a completely different device and a completely different effect.

Others have recognized this too:

The "Biefeld-Brown Effect," sometimes referred to as the "Townsend Brown Effect," is frequently erroneously associated with ionic wind "lifters," . . . The pure Biefeld-Brown Effect does not incorporate an ionic wind component. ("Stress in Dielectrics (Biefeld-Brown Effect)", <http://www.qualight.com/portal.htm/brown/>)

The Wikipedia article on the Biefeld–Brown effect seems to add to the confusion: "This creates a high field gradient around the smaller, positively charged electrode." But in Brown's patents, the positive electrode is actually the larger one. http://en.wikipedia.org/wiki/Biefeld%E2%80%93Brown_effect (accessed 4-4-11) , <http://www.freepatentsonline.com/3187206.pdf>

Another problem is spelled out in the Wikipedia article:

Critics and supporters alike have called throughout the years for vacuum experiments, in order to eliminate ion wind contributions from the devices. While there have been a handful of such experiments, most notably the efforts of Dr. R.L. Talley in the late 1980s and early 1990s, there is still a great deal of discrepancy over whether the effect is directly related to gravity or not, ^{[[citation needed](#)]} mainly because it isn't predicted by conventional [electrostatics](#) or [general relativity](#).^{[[citation needed](#)]} (http://en.wikipedia.org/wiki/Biefeld%E2%80%93Brown_effect)

The effect is not predicted by conventional physics. It is therefore easy to write it off as more "internet mythology" and "crazy patents" by delusional people and "air-head techno babblers" (of which there are many). Additionally, these topics are often mixed in with other "stuff" about UFOs,

extraterrestrials, psychic phenomena, teleportation, and so forth. The physical theories offered might not use your favorite terminology, and some words, like "ether" and "gravitational radiation" may raise red flags. Scientists would likely conclude that investigating this effect, and others like it, is probably a waste of time and money. This simply shows how hard it is for an idea that has no peers to get "peer reviewed". Public investigation/implementation of the effect has been left to hobbyists and inventors.

Another effect noted by Brown (above) and Piggott ([elsewhere](#)):

Less than five seconds is required for the test pendulum to reach the maximum amplitude of the swing but from thirty to eighty seconds are required for it to return to zero. . . .

The possibility that this has something to do with spin relaxation times should be investigated:

"an atom can retain a particular spin polarization for a substantial amount of time. The "relaxation times" of spin polarized atoms are affected by the environment. "If the inside walls of the cell are suitably coated, collisions with the walls have little effect on the spin state of the atoms. . . . For example, for hydrogen atoms bouncing off teflon walls, tens of thousands of collisions are required for the magnetic moment of the hydrogen atom to become disoriented." (*Quantum Mechanics*, C.Cohen-Tannoudji, *et al.*, 1977, p. 452) See comment about [spin relaxation time](#) and [Gravomechanical effect](#).

See also: Guidelines to Antigravity, Robert L. Forward, *American Journal of Physics*, Vol. 31, No. 3, 166-170, March, 1963. Abstract::

"This paper emphasizes certain little known aspects of Einstein's general theory of relativity. Although these features are of minor theoretical importance, their understanding and use can lead to the generation and control of gravitational forces. Three distinctly different non-Newtonian gravitational forces are described. The research areas which might lead to methods for the control of gravitation are pointed out and guidelines for initial investigation into these areas are given." http://u2.lege.net/culture.zapto.org_82_20080124/antigravity/Robert%20L.Forward%20-%20Guidelines%20to%20Antigravity.pdf

I should add that while this research has mostly an aerospace focus, there may be more down-to-earth and immediate applications as well. If [electroaerodynamics](#) can reduce *drag*, or if a hundred pounds of barium titanate and a few hundred kilovolts can produce significant *thrust*, this technology could be used to increase gas mileage for automobiles, or reduce fuel expenses on long-distance trucking (or used as a maneuvering engine inside a ship). The requirements in these applications would be much more easily met than those in aerospace applications, and could be demonstrated by almost any advanced electronics hobbyist. (For some ideas, see <http://www.amazing1.com/hv-dc-power-supplies.htm>)

And now for a quiz. WHAT are THESE things? Are the photos real or fake? There were several witnesses (<http://www.ufocasebook.com/bestufopictures10.html>) A few examples:



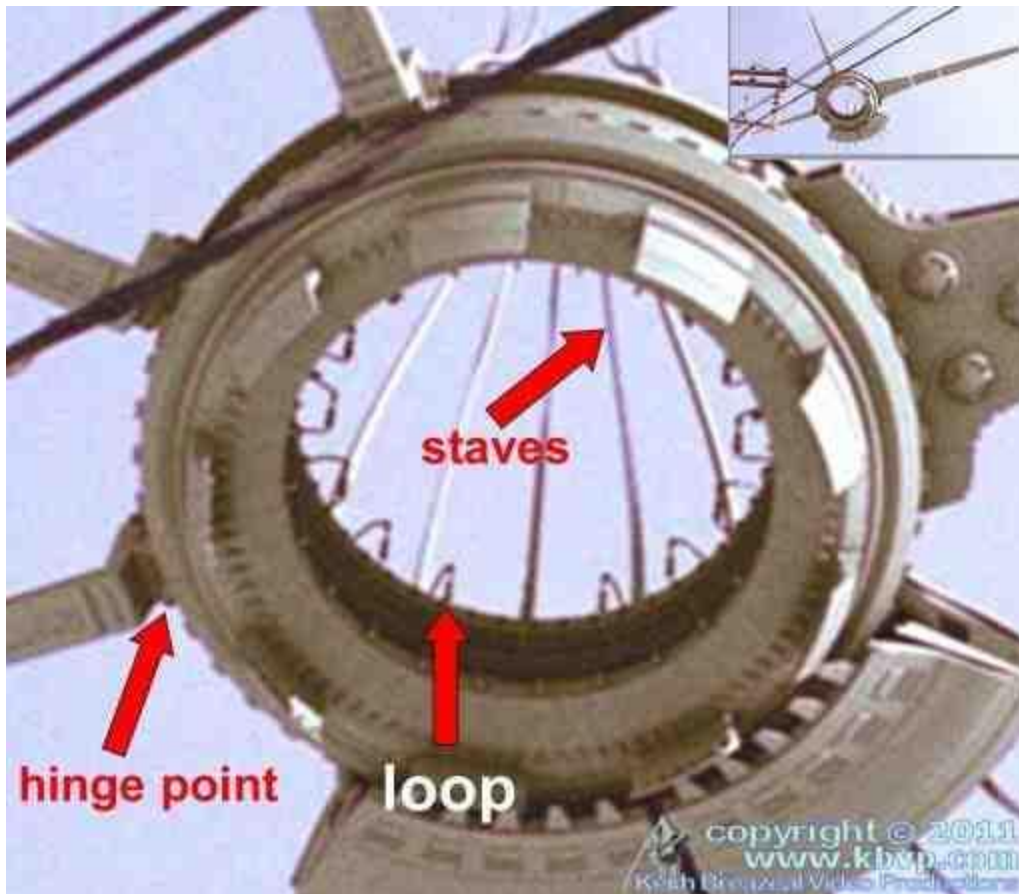
<http://www.youtube.com/watch?feature=endscreen&v=BXpVJnpu8Ac&NR=1>



<http://www.youtube.com/watch?feature=endscreen&v=BXpVJnpu8Ac&NR=1>



<http://forums.comicbookresources.com/showthread.php?175147-New-UFO-photos-Best-Evidence-Yet>



"California UFO Drone Analysis of the Center Hub Structure"

<http://www.kbvp.com/taxonomy/term/113>

<http://www.kbvp.com/ufo-drone-analysis>

These photos are of interest because IF they depict an actual device, they offer significant clues about how field levitation might be achieved. The "stave" configuration seems consistent with the use of pulsed monopolar high voltage electric fields with asymmetric time derivatives, and with possibly electrically phased rotation of such fields. This brings to mind the [Poynting vector](#), curl and asymmetric momentum density relations $\nabla \times E = -\partial B / \partial t$ and $\nabla \times B = J / \epsilon_0 c^2 + 1 / c^2 (\partial E / \partial t)$, and [historical reports of electrogravity effects](#). The big rings might imply the use of magnetic fields (possibly several, and possibly also phased).

See also "California Drones" (aka "Dragon-fly drone"*) http://droneteam.com/mediawiki/index.php/Chad_details ;

http://www.dronehoax.com/drone_history/isaac_documentation.htm (more pictures, statements about the language)

http://www.bibliotecapleyades.net/ciencia/ciencia_flyingobjects11.htm (separate photos)

<https://www.google.com/search?q=palo+alto+caret+laboratory>

<https://www.google.com/search?q=katakana+font>

<http://screenrant.com/sarah-connor-chronicles-california-drones-mystery-brusimm-4647/>

<http://www.youtube.com/watch?v=ehxixQxVxg8>

<http://www.theoutpostforum.com/tof/showthread.php?831-California-type-drone-seen-in-germany>

<http://droneteam.com/history/yosemite/>

<http://strangetimesusa.blogspot.com/2012/02/ufo-or-military-drones-faa-clears.html#!/2012/02/ufo->

[or-military-drones-faa-clears.html](#)

<http://truthfall.com/weird-dragonfly-aerial-drones-the-chad-photos/>

*It is called a "dragonfly drone" because "it moves like a dragonfly". Its motion is jerky, not smooth and continuous. This is consistent with the idea that field propulsion systems would use point-to-point, start-stop navigation. As for the photos, some regard them as 'too detailed to be faked'; others regard them as 'having too much detail to be real'. (Similar claims can probably be made about the 1969 moon landings!)

Field

visualizations: <http://web.mit.edu/8.02t/www/802TEAL3D/visualizations/guidedtourtour/Tour.htm>

Some others:



http://www.youtube.com/watch?v=Gptvau1c_bf4
&feature=player_embedded

http://www.youtube.com/watch?v=Gptvau1c_bf4
&feature=player_embedded

<http://www.youtube.com/watch?v=sqKAQBee-a0>
&feature=player_embedded (00:01:03)

<http://www.youtube.com/watch?v=53mtdCCWh6k> (2:41)



http://www.youtube.com/watch?v=_xkF-aHYT3A&feature=player_detailpage&list=PLC082FD18CA2D69A6#t=62s



http://www.youtube.com/watch?v=5dRCIHxyGVY&feature=player_detailpage#t=1025

(Pictures like these remind me of a problem I have with organizations that investigate UFO sightings: they only investigate *sightings*. As such, they are like "investigative journalists" and "mystery writers". But people like me want to know what these things are, not just that they are mysterious. I can understand why UFO organizations would not have a physics and engineering research staff, but they could at least give a list of contacts for groups who are investigating the physics behind these things. UFOs seem to have mastered the "physics of non-local phenomena" (for lack of a better term, although "[monstrous physics](#)" also appears in the popular literature). This kind of physics appears in the public textbooks only in the form of quantum mechanics. We need to extend the science of non-local behaviors to things the size of aircraft carriers that can float in the

sky and which can disappear in an instant (<http://youtu.be/DNFyjWANDmw?t=127>) or make high speed right angle turns. Engineerable *technology* of this sort has been around for over a hundred years, but the *science* behind it has never been made public.)

What is perhaps a start at addressing the science questions can be found at <http://droneteam.com/drt/index.php?topic=869.0>

If you want more in-depth coverage of the Biefeld-Brown effect and related effects, I highly recommend reading:

Secrets of Antigravity Propulsion by physicist Paul A. LaViolette (2008).

"Progress in Electrogravitics and Electrokinetics for Aviation and Space Travel", Thomas F. Valone, presented at the Space Tech. App. Info. Forum, Albuquerque, NM; <http://users.erols.com/iri/ProgressElectrograviticsElectrokinetics.PDF> , <http://www.integrityresearchinstitute.org/>

Electrogravitics Systems, Vol I, Thomas Valone, 6th ed., 2008

Electrogravitics II, Thomas Valone, 3rd ed., 2008

T.T. Brown's Electrogravitics Research, Thomas Valone, Integrity Research Institute

T.T. Brown Family web site, <http://www.qualight.com/portal.htm/brown/>

"Electric Flying Machines", T.T Brown, http://www.bibliotecapleyades.net/ciencia/ciencia_flyingobjects25.htm

"Electrogravitics systems reports on a new propulsion methodology", Thomas Valone, 2001; http://www.bibliotecapleyades.net/archivos_pdf/electrogravitics_systems.pdf

"Can Electricity Destroy Gravitation?", Prof. Francis E. Nipher Electro-Gravitic Experiments, (1918) <http://www.rexresearch.com/nipher/nipher1.htm>

"Theoretical explanation of the Biefeld-Brown Effect", Takaaki Musha, http://www.thelivingmoon.com/41pegasus/03PDF_files/Biefeld_Brown_Effect.pdf

"Explanation of dynamical Biefeld-Brown Effect from the standpoint of ZPF field", Takaaki Musha <http://jnaudin.free.fr/lifters/musha/Musha.pdf>

"Force on an Asymmetric Capacitor", Thomas B. Bahder and Chris Fazi, March 2003. <http://arxiv.org/ftp/physics/papers/0211/0211001.pdf>

"Asymmetric capacitor operating in high vacuum", <http://www.youtube.com/user/hec031> (in this experiment the direction of thrust is towards the negative, smaller electrode. Max voltage was 18kV @ 3 micro amp)

"Study on the influence that the number of positive ion sources has in the propulsion efficiency of an asymmetric capacitor in nitrogen gas", A A Martins¹ and M J Pinheiro², <http://arxiv.org/ftp/arxiv/papers/1009/1009.6111.pdf>

"T. T. Brown's 1955-1956 Paris Experiments Revealed", <http://starburstfound.org/electrograviticsblog/?p=49>

NOTE: the articles that formerly occupied this space have been moved to: [Various reported electrogravity, magnetogravity and gravomechanical effects](#)

Brown's patents:

A Method of and an Apparatus or Machine for Producing Force or Motion (Nov. 15, 1928)

[British Patent 300311](#); "How I control gravitation" <http://www.rexresearch.com/gravitor/gravitor.htm>

Electrostatic motor (1934-09-

25, <http://www.freepatentsonline.com/1974483.pdf>

Electrokinetic apparatus (1960-08-

16) <http://www.freepatentsonline.com/2949550.pdf>

Electrokinetic transducer (1962-01-

23) <http://www.freepatentsonline.com/3018394.pdf>

Electrokinetic generator (1962-02-

20) <http://www.freepatentsonline.com/3022430.pdf>

Electrokinetic apparatus (1965-06-

01) <http://www.freepatentsonline.com/3187206.pdf>

Electric generator (1965-07-

20) <http://www.freepatentsonline.com/3196296.pdf>

Method and Apparatus for Producing Ions and Electrically-Charged Aerosols (1967-01-03) [3296491](#)

Fluid Flow Control System (1970-06-

30) <http://www.freepatentsonline.com/3518462.pdf>

(Motion of contaminants <http://www.electrotechnik.net/2013/04/breakdown-in-liquids-due-to-presence-of.html>)

A. H Bahnson patents:

Electrical Thrust Producing Device <http://www.freepatentsonline.com/2958790.pdf>

Electrical Thrust Producing Device <http://www.freepatentsonline.com/3263102.pdf>

<http://jnaudin.free.fr/lifters/bbsv2/index.htm>

Other information:

"How do floating water bridges defy gravity?", Chelsea Whyte, (2012) <http://phys.org/news/2012-11-bridges-defy-gravity.html>

"Utilization of poly(ethylene terephthalate) plastic and composition-modified barium titanate powders in a matrix that allows polarization and the use of integrated-circuit technologies for the production of lightweight ultrahigh electrical energy storage units (EESU)" <http://www.freepatentsonline.com/7466536.html> , <http://en.wikipedia.org/wiki/EESU>

"This paper reports the successful creation of a new ultracapacitor structure that offers a capacitance density on the order of 100 to 200 Farads per cubic centimeter; versus the current state of the art capacitance density of 1 F/cm³. " ("New mega-farad ultracapacitors", Bakhoun, E., 2009, http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=4775259

"An asymmetric supercapacitor using RuO₂/TiO₂ nanotube composite and activated carbon electrodes", Yong-Gang Wang, Zi-Dong Wang, Yong-Yao Xia, 2005, http://www.chemistry.fudan.edu.cn/usr2000/xyy/pdf_web/2005/ea-ruo2.pdf

"We report the observation of extremely high dielectric permittivity exceeding 10⁹ and magnetocapacitance of the order of 10⁴ % in La_{0.875}Sr_{0.125}MnO₃ single crystal." ("Giant dielectric permittivity and magnetocapacitance in La_{0.875}Sr_{0.125}MnO₃ single crystals", R. F. Mamin, T. Egami, Z. Marton, and S. A. Migachev, 29 March 2007; DOI: [10.1103/PhysRevB.75.115129](https://doi.org/10.1103/PhysRevB.75.115129) ; PACS numbers: 77.22.d, 71.45.d, 75.47.Lx; http://repository.upenn.edu/cgi/viewcontent.cgi?article=1158&context=physics_papers)

"Extremely high values of the relative permittivity up to 10⁷ and the magnetocapacitance up to 10⁵ % have been found in La_{1-x}Sr_xMnO₃ single crystals (x = 0.1, 0.11). These phenomena are observed even at room temperature." ("Giant dielectric susceptibility and magnetocapacitance effect in manganites at room temperature", R. F. Mamin, T. Egami, Z. Marton, C. A. Migachev and M. F. Sadykov, JETP Letters Volume 86, Number 10, 643-646, DOI: [10.1134/S0021364007220067](https://doi.org/10.1134/S0021364007220067))

"Moreover, our investigations in external magnetic fields up to 5 T reveal the simultaneous occurrence of magnetocapacitance and magnetoresistance of truly colossal magnitudes in this material." ("Colossal magnetocapacitance and colossal magnetoresistance in HgCr₂S₄", S. Weber, P. Lunkenheimer, R. Fichtl, J. Hemberger, V. Tsurkan and A. Loidl, <http://arxiv.org/ftp/cond-mat/papers/0602/0602126.pdf>)

Calcium copper titanate, k= 250,000 (http://en.wikipedia.org/wiki/Relative_permittivity) ; "Advanced Calcium Copper Titanate/Polyimide Functional Hybrid Films with High Dielectric permittivity", Zhi-Min Dang, *et al.* (2009), [http://www.paper.edu.cn/index.php/default/scholar/downpaper/dangzhimin511435-201001-20\[1\].pdf](http://www.paper.edu.cn/index.php/default/scholar/downpaper/dangzhimin511435-201001-20[1].pdf)

"Counterintuitive discovery boosts supercapacitor energy storage", Leo Williams, June 17, 2011, <http://www.rdmag.com/News/2011/06/Materials-Electrical-Engineering-Counterintuitive-discovery-boosts-supercapacitor-energy-storage/>

Dissectable Leyden jar retains its charge after

disassembly/reassembly: http://www.physics.ucla.edu/demoweb/demomanual/electricity_and_magnetism/electrostatics/dissectible_leyden_jar.html
<http://www.sci-supply.com/productVideo.asp?id=222>
http://en.wikipedia.org/wiki/Leyden_jar

"The Antigravity Underground", Clive

Thompson, http://www.wired.com/wired/archive/11.08/pwr_antigravity_pr.html

<http://www.amazing1.com/hv-dc-power-supplies.htm>

Water capacitors-Electrical: (dielectric is distilled water) (disambiguation: [WaterCapacitors-Chemical](#))

<http://www.freepatentsonline.com/3558908.pdf> "High voltage impulse generator", Kulikov, Lagunov, Nesterikhin, Fedorov, 1971:

"Since the spark gap is of a controlled type, the capacitor operates as a transmission line. Because of this, the rate of rise of the current can be readily increased, since the internal impedance of the transmission line is purely resistive. . . . The water capacitor produces a negative voltage pulse of 250 kilovolts at 250 kiloamperes with a rise time of 50 nanoseconds."

Marx

generators: http://en.wikipedia.org/wiki/Marx_generator , <http://skyfi.org.ru/photos/?path=marksge>
<http://www.youtube.com/watch?v=vPPMaDH7L7I> , <http://ru-abandoned.livejournal.com/977217.html>

Organic liquid capacitors:

<http://www.freepatentsonline.com/3903460.html> "Capacitor with liquid dielectrics", Tsacoyeanes, Charles W.,

Payne, Richard, Levine, Morton A., 1975) : "A considerable effort has been applied in recent years to the development of high energy capacitors using water as the dielectric. The principal attraction of water is its high dielectric constant (78.3) which compares with values of only 2-3 for the transformer oils conventionally used in capacitors. Furthermore, the dipole relaxation time for water is in the picosecond time region and therefore has little effect on the discharge characteristics. . . . it has been found . . . that a range of high dielectric constant liquids possess characteristics that make them useful as capacitor dielectrics. They show a substantial improvement in energy storage capability, and also possess other important advantages over water. The liquid dielectrics of this invention are organic solvents with dielectric constants ranging from 30-200. They are well-known to organic chemists and have recently found important applications in electrochemistry. . . . The use of the organic liquid dielectric materials of this invention enables practical energy densities to be increased by a factor of 3 or more over currently available devices which use a water dielectric and the organic liquids have a much more stable conductance."

See also my own [Capacitor Tests](#).

Various reported electrogravity, magnetogravity, and gravomechanical effects

George Samuel Piggott Effect "Electro-Gravitation"

<http://www.rexresearch.com/piggott/piggott.htm> (includes a "dark belt" observation)

<http://www.keelynet.com/gravity/piggott.txt>

<http://www.freepatentsonline.com/1006786.pdf> (1911, Piggott's static generator for a space telegraph)

<http://borderlandresearch.com/book/lost-science/electric-flying-machines-thomas-townsend-brown/9>

<http://www.ttbrown.com/forum/viewtopic.php?f=10&t=12&start=90&st=0&sk=t&sd=a>

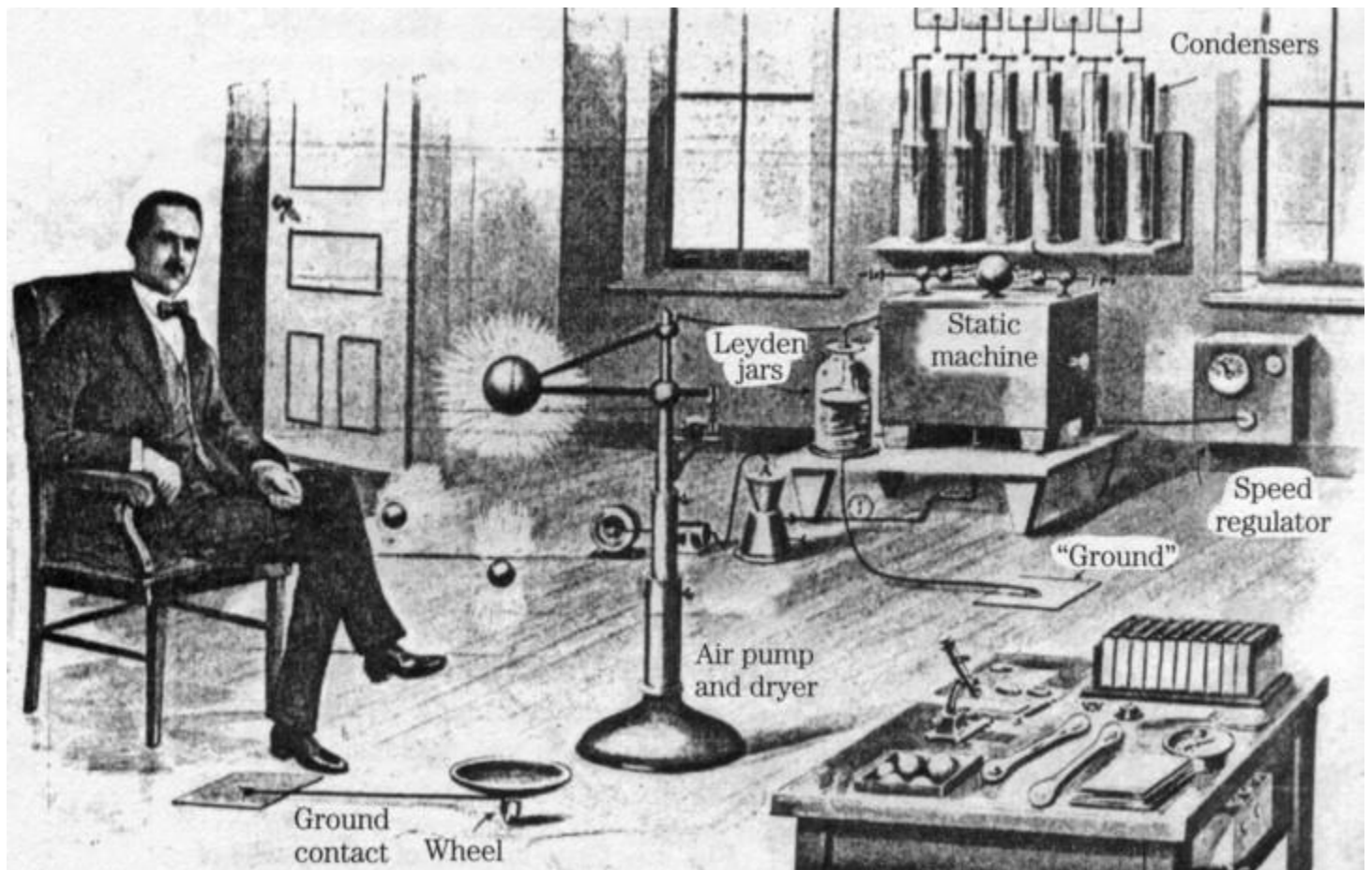


Fig. 1

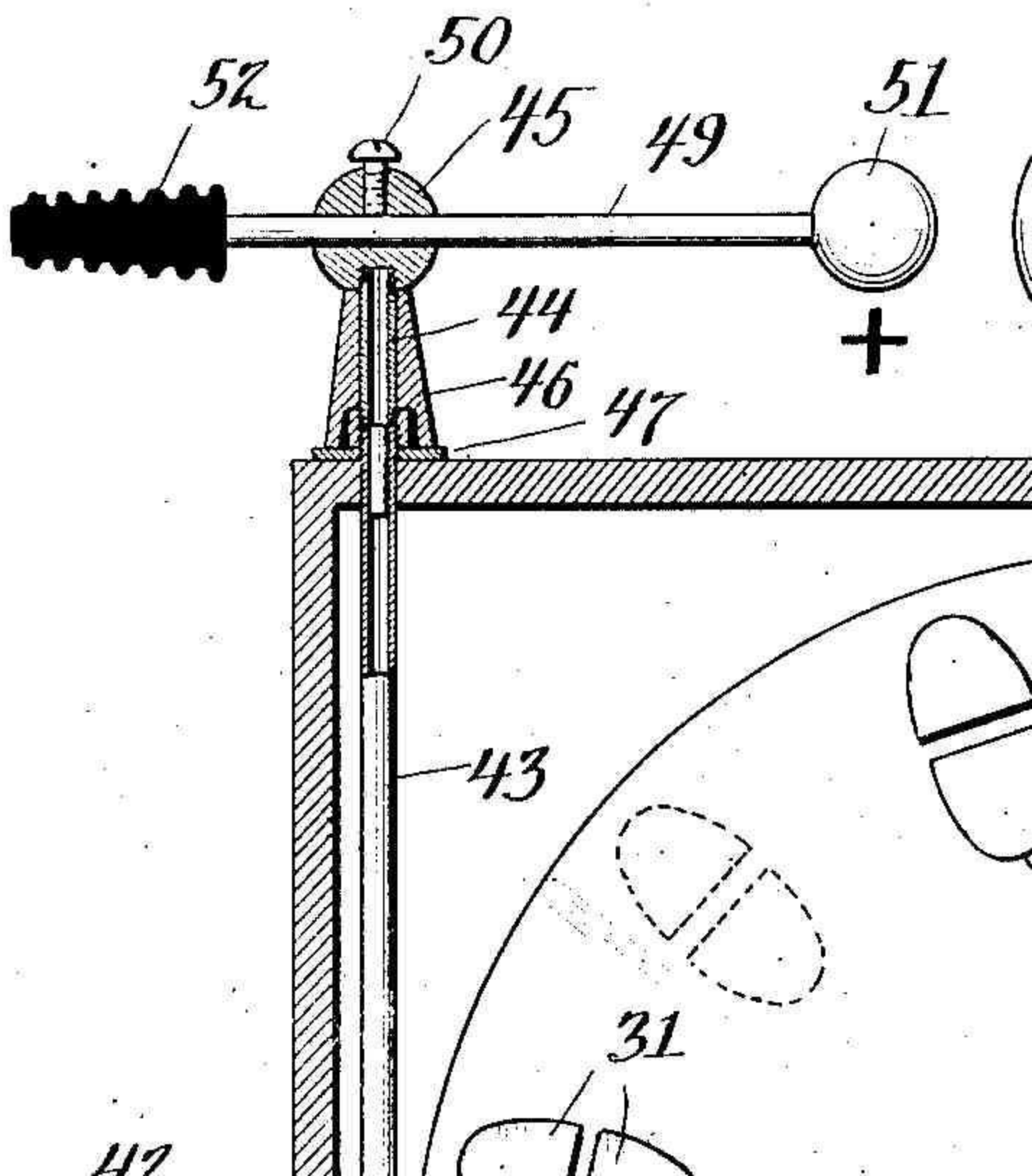
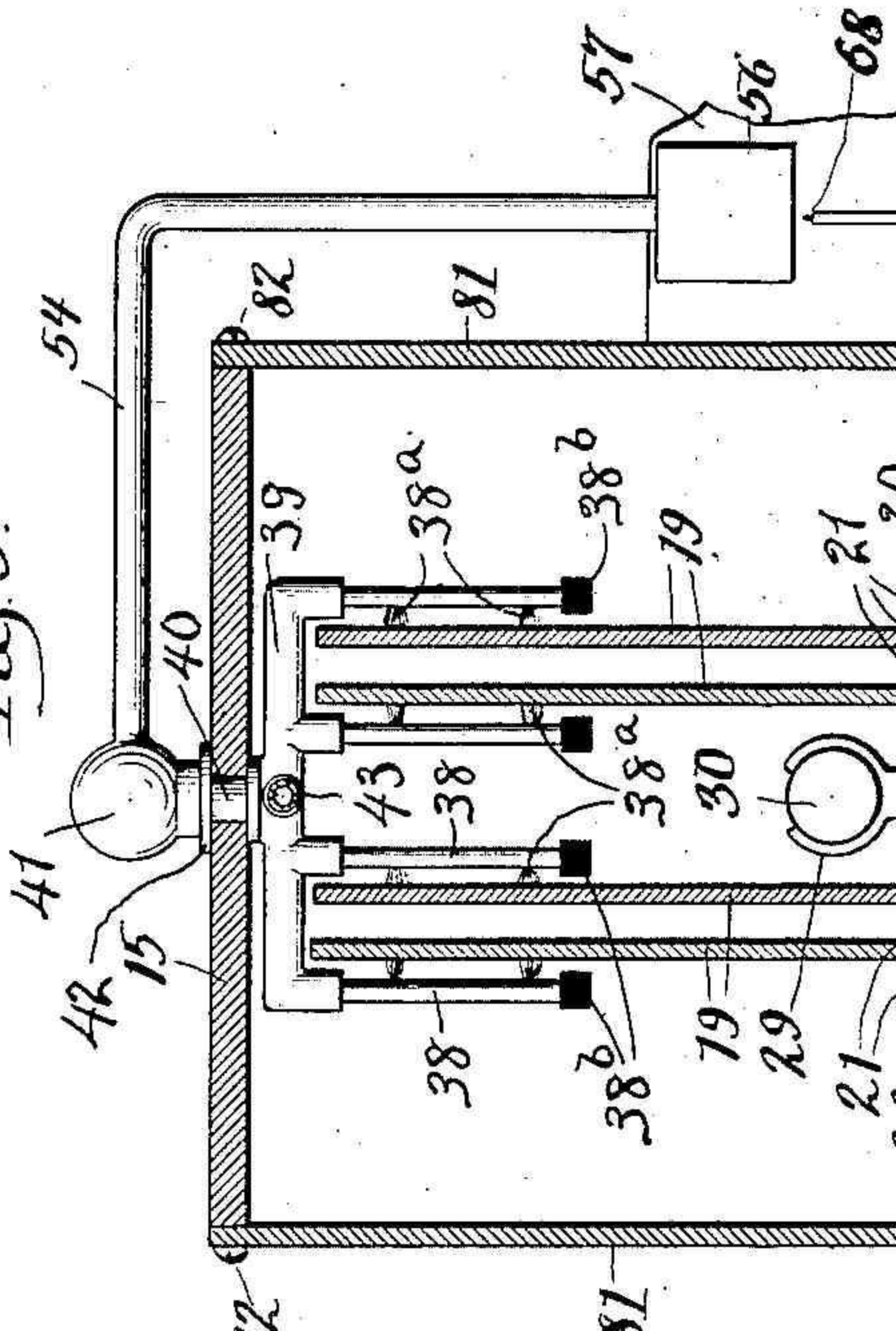


Fig. 3.



A quick reading of Piggott's [patent](#) (filed 1903, issued 1911) describes an electrostatic generator ("influence machine") for use in "space telegraphy" (radio). The machine is essentially an industrial strength Wimshurst machine with multiple pairs of counterrotating disks. It is enclosed in an air tight container which is pressurized with dry air to about 30 p.s.i. The air is supplied by a pump and dried over anhydrous calcium chloride (other schemes, using a dry ice cold trap, for example, could be used). The Leyden "condensers" on the wall are apparently part of the Wimshurst design. The output is stored in a bank of "Leyden jars" to the left of the "Static Machine". One side on the bank connects to ground, and the other goes to the machine and the sphere on the stand next to Piggott. Details of the patent relate to the machine's use in "space telegraphy" wherein a single discharge (spark) represents a "dot" and two closely spaced discharges represent a "dash". The machine was powered by a 1/4 kilowatt electric motor.

The machine is clearly capable of producing pulsed, high voltage electricity of either polarity, and with a fairly strong amount of current (~~at least several tens of microamps, more~~ likely hundreds of microamps). (http://en.wikipedia.org/wiki/Wimshurst_machine http://en.wikipedia.org/wiki/Van_de_Graaff_generator) The repetition rate would be whatever is sufficient for use in telegraphy. It is not clear from the picture however, whether the levitation effect is occurring with a pulsed field or a purely static field; it is difficult to see how a *static* field could produce the levitation and dark band effects. Because he intended to use the machine in space telegraphy, the spark repetition rate would be important, and certainly he would have tested it. ~~If the above represents such a test, the so-called spark gap "switch" was probably at the big Leyden jar and was connected to the test sphere by a cable. Likely the spark gap was configured to ground the sphere (rather than charge it, which is another possibility); this would result in a slow rising edge and a fast falling edge of the voltage waveform at the sphere. (Either configuration should work, but there are a lot of unknowns here. (~~ It is more likely Piggott tested the machine in the normal configuration in which it was to be used. The spark gap is above the words "Static machine"; actual connections are not clear from the photo, but it appears the test sphere was connected to the "Leyden jar" and then to the spark gap through the aerial (85) terminal. The fundamentals are very similar to those of Tesla's monopolar, monodirectional pulsed fields used in his Magnifying Transmitter, and also to Edwin Gray's "cold electricity" machines (<http://www.freepatentsonline.com/3890548.pdf>), and to the Testatika Machine designed by Paul Baumann. For some good background, read *The Free Energy Secrets of Cold Electricity*, Peter A. Lindemann, D.Sc (2000) http://www.teslasociety.ch/info/NTV_2011/free.pdf)

For the design of an ultrafast sparkgap switch see [CapacitorTests/CapacitorTests.html#BiconicalFastSparkGaps](#) Tesla used magnetically quenched spark gaps, but they were not designed for coaxial, impedance controlled systems. There are all sorts of modern techniques to generate high voltage, fast rise time, monopolar pulses.)

A possible investigative concept machine could be built from a source of monopolar (+) high voltage source such as a Van de Graaff generator (500,000 volts @ a couple hundred microamps), a spark gap switch, and several coaxial delay lines (each with a different delay) each connecting to rods or spheres on a circular periphery. The delays are such that a fast, rotating electric field is produced from a single spark. A much slower mechanically rotated pulsed field should also be investigated. What comes to mind are the rotary spark gaps of the early radio days (prior to the

1920s) and the automotive ignition distributor. Even the [cavity magnetron](#) (with added multiple outputs) comes to mind. Piggott's experiments apparently did not use intentionally rotated fields, nor did [Farrow's](#). Other applications of this sort of technology, such as the [Nazi aircraft ignition disrupter](#) and the [dragonfly drone](#), apparently did (however, these devices require a directional control feature).

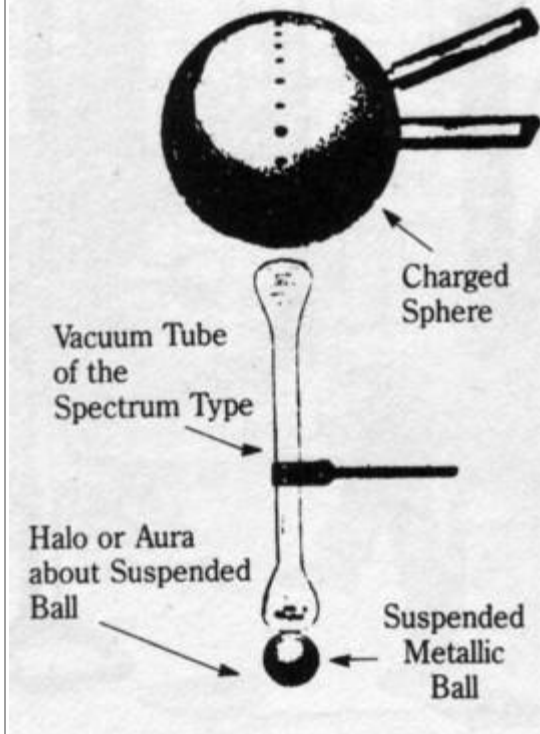
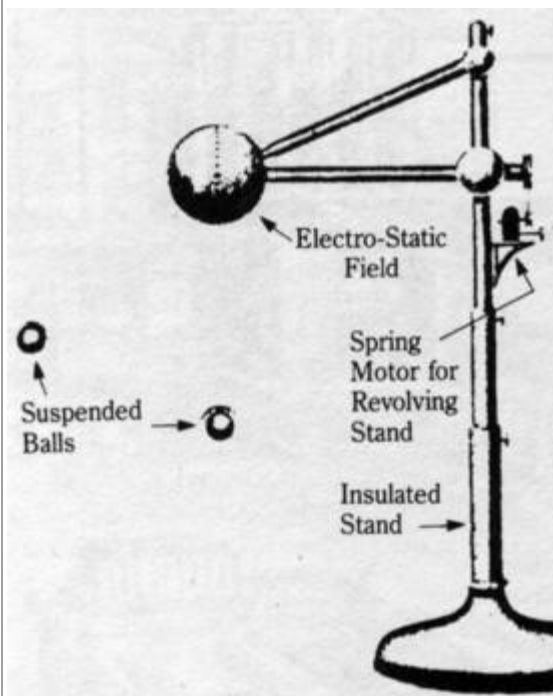
Piggott's levitation experiments were performed with a small sphere serving as the high voltage electrode. Says <http://www.rexresearch.com/piggott/piggott.htm> :

Figure 3 illustrates suspension stand and field producing electrode. The latter can be revolved in any direction by means of a spring motor shown on the upper section of the stand.

The small apertures seen in electrode, which is hollow, are there for the purpose of ascertaining the action of the reduced field tension at these points, and are also made use of to hold different sized metallic discs, which are cemented to insulating plates, forming condensers, the function of which is to create weak opposite polarities at these points and thus show a reaction on the suspended object and also a greater ocular effect in the vacuum tube.

Figure 4 is a detailed drawing of the vacuum tube principally used; this is of the spectrum type, without sealed-in electrodes and when introduced into the electrical fields, flows very brightly at its extremities, especially giving a sharp line bordering the dark space around the metallic object. A very high vacuum is sustained in the tube and it is found necessary to build it of a very perfect insulating glass; the bulb must be kept absolutely dry on its outer surface.

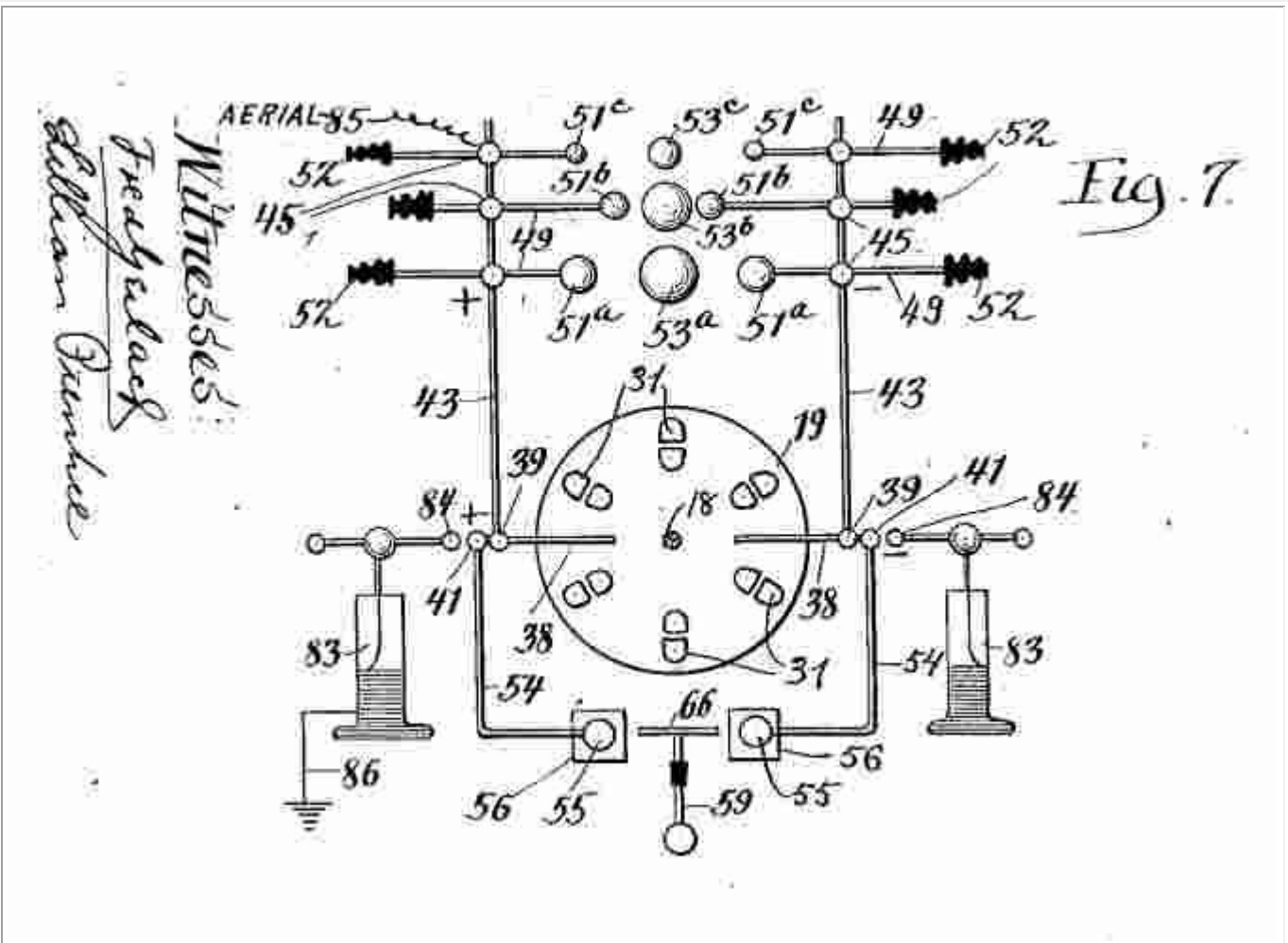
Were these "apertures" essential to the levitation effect? Did Piggott actually use "different sized metallic discs, which are cemented to insulating plates, forming condensers" on the sphere during his experiments? Were these some version of the [one hundred million volt intensifiers proposed by Tesla](#)? We can only wonder if these details were crucial to the levitation effect.



<http://www.rexresearch.com/piggott/fig3.jpg>

<http://www.rexresearch.com/piggott/fig4.jpg>

Additional Note: The essence of Piggott's pulse forming scheme is found in Fig. 7 of the patent:



5 When the
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terminal u
chine will
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electricity.
will leak a
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15 with the c
which inc
A sufficien
leak from
the other t
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once occur
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depression
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machine is
30 spark at c
charge ter

The antenna or "aerial" is item 85 and is connected to the positive HV terminal. There are three sets of spark gaps shown (51), only one of which is in use at any one time. The central sphere (53) in the gap is used to vary the capacitance for tuning ("syntonizing") the emission (See also [Righi Spark Gap](#)). Spheres 51 are about 1.5 inches in diameter and the intermediate sphere (53) is about 3 or 4 inches in diameter. "When a signal is to be transmitted the negative terminal 51 is preferably adjusted to a position quite close to the intermediate discharge ball 53 while the positive discharge terminal 51 is placed about an inch away from the center discharge ball so that a heavy strong spark occurs between the positive sparking terminal and the center discharge ball." The two Leyden jars, or series of jars, are at 83 and are used for improving efficiency and for tuning. The signaling switch (59) in figures 4 and 5 is pressed to move a corona leak rod (66), allowing charge to rapidly build up and rapidly fire the spark gap (comprised of 51,53, 51), the length of which is adjustable. (Note that the signal switch is used to turn OFF the leak; this machine was intended for signaling, not antigravity. See also [#TrapsForUnwary](#))

Here is a partial description of Piggott's electrogravitic experiments from "Electric Flying Machines: Thomas Townsend Brown", Gerry

Vassilatou (http://www.bibliotecapleyades.net/ciencia/ciencia_flyingobjects25.htm <http://borderlandresearch.com/book/lost-science/electric-flying-machines-thomas-townsend-brown/1> ;

"Mr. Piggot observed a strange electro-gravitational effect. It was first seen, the result of accidental occurrences while performing unrelated electrical experiments.

Mr. Piggot was able to suspend heavy silver beads . . . and other materials in the air space between a charged sphere and a concave ground plate when his generator was fully charged at 500,000 electrostatic volts. The levitational feat was only observed when the charged sphere was electropositive.

The Piggot effect was clearly not a purely electrical phenomenon. If it were, then the presence of the grounded plate would have destroyed the effect. The very instant in which a discharged passed to ground, every suspended object would have come crashing down. But, without the ground counterpoise, the levitational effect was not observed. Mr. Piggot believed that he was modifying the local gravitational field in some inexplicable manner, the effect being the result of interaction between the static field generator and some other agency the ground.

Piggot further stated that heated metal marbles fell further away from the field center than cold ones. These suspended marbles remained in the flotation space for at least 1.25 seconds even after the static generator ceased rotating. The marbles fell very slowly after the field was completely removed; a noticeable departure from normal gravitational behavior.

Mr. Piggot stated that suspended objects were surrounded by a radiant "black belt". . . . Effects developed by Piggot were entirely similar to those observed by Nikola Tesla, who employed high voltage electrostatic impulses.

The Piggott device certainly discharged its tremendous charge in a rapid staccato-like fashion to the ground plate. The rate of this disruptive unidirectional field certainly it was a very rapid impulse rate.

. . .

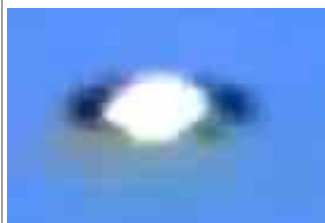
George Piggot mentioned the mysterious “black band” which appeared around his highly charged suspended metal marbles. Light seemed to disappear into these zones. But it was Nikola Tesla, whose forgotten and ignored testimony on the perceptual effects of high voltage electrical systems took first place. Tesla produced such intense electrical arcs that the same strange blackout effects were repeatedly observed. In the case of Tesla’s famed Colorado Springs Experiments, the blackout effect produced a lingering state

Noted in his published diary, the results followed the intense activity of his Magnifying Transformer. Visual distortions, clarifications, black shadows, black streamers, black waves, lingered for hours all around his plateau laboratory, whereby he stated that:

“These phenomena are so striking that they cannot be satisfactorily explained by any plausible hypothesis, and I am led to believe that possibly the strong electrification of the air, which is often noted to an extraordinary degree, may be more or less responsible for their occurrence.” "

What is a possible explanation for the lingering "black belt" and lingering antigravity effects seen in the experiments of Tesla and Piggott, and in observations of UFOs (see below)? A working hypothesis is that these are both manifestations of temporal momentum effects on the air in the surrounding environment. It is well known that jet aircraft leave behind *spatial* momentum effects on the air during flight (wind, air turbulence, etc.) and that these effects take time to dissipate. The same could be true of temporal momentum effects on the air (absorption of light being one of them?). But in such a case, there may not be a change in spatial position, as this is a kind of "motionless motion." Likewise, jet aircraft don't suddenly fall out of the sky when they shut off their engines. Presumably, a similar effect may apply to UFOs. If their propulsion means were shut off, they would be expected to descend like a fluttering leaf or feather, not drop like a bomb.

UFOs with possible dark band ("black halo") effects:



http://www.youtube.com/watch?feature=player_embedded&v=sxOJ3qIJ8G0

http://www.youtube.com/watch?feature=player_embedded&v=5dRClHxyGVY#t=339

<https://www.youtube.com/watch?v=6KNkfpj3s5A>

http://youtu.be/eTSiyrsv_9o?t=380

<http://youtu.be/HVWCDiYZ7tc?list=PLf01VYJU5IQJ1NWhfRCGIaW4Krl2G4XIw>



<http://nuforc.org/S119606.jpg>

(image has been enlarged and sharpened)

<https://www.youtube.com/watch?v=piafeZs3ogc&feature=youtu.be>
@4:50

<https://www.youtube.com/watch?v=Gpzv3FLDTvc>



This strange ring was seen in England. Various conventional explanations are offered.

http://www.youtube.com/watch?feature=player_embedded&v=MqxMF42Llak

<https://youtu.be/geSFbSNPZks?t=199>

This is an actual *smoke* ring made by a smoke ring machine.

<http://www.youtube.com/watch?v=IJgpSTnn5aE>



Possible example of partially localized UFO showing part of the black band.

<http://www.ufocasebook.com/2010/georgia091210.jpg>

http://www.youtube.com/watch?v=l_Lzb8fdJaA

January 28 2005

<https://www.youtube.com/watch?v=xGo5yY2LbZQ>

October 12, 2008

<https://www>

March 11, 20



Black band effects even show up in infrared photos of UFOs.

UFO ON İSTANBUL/RİVA 6.5.2015
TARİHİNDE ÜMİT PAKER



This UFO shows a dark black wake which quickly disappears!



Another possible example of black halos and black wake effects.

<http://www.openminds.tv/missouri-witness-photographs-triangle-ufo/>

TARAFINDAN ÇEKİLMİŞTİR. http://www.youtube.com/watch?v=XObsbvPUKuU	http://youtu.be/kCAYSnh3I7Q Also: http://cufos.org/taylor.pdf	37203 http://www.openminds.tv/new-jersey-witness-says-ufo-lights-connected-by-black-bar/37263
--	--	--

Flying Saucer Review, Jan-Feb 1979: "It looked like two saucers joined at the rims by black band"

http://www.youtube.com/watch?v=AMz0oafObW0&feature=player_detailpage#t=65
http://www.youtube.com/watch?v=AMz0oafObW0&feature=player_detailpage#t=156

http://youtu.be/x_BnS683nCA 11-6-2015 UFO rods Sunnyvale, CA

<http://www.youtube.com/watch?v=jBFo2xSDTbc> (view in full screen mode)

https://www.youtube.com/watch?v=I_eEdrCiSOA#t=331 (similar)

<https://www.youtube.com/watch?v=leE7AT9v-Rk>

<https://youtu.be/E23e9cye9M> "INSANE! Best UFO Sightings Of June 2015 [Breaking News] Share This!" ("black halo" at 28:57 and 29:30)

<https://www.youtube.com/watch?v=NO0QjKzTo-M> "Freaky black circle over Disneyland"

<http://www.youtube.com/watch?v=kWM0twSuBQY&ebc> "Black Smoke Portals" Opening in Skies Around The World? (2015)

Milwaukee sightings 7-27-15 (Caution: profane language) <http://youtu.be/2IWWqp0PhbI>

"UFO Releasing Glowing Orbs Into a Formation in Western Massachusetts", <http://youtu.be/Kp4jxRPCaz8> <http://youtu.be/Yc5StQpaUqk>
 "UFO Orb or Government Experiment Caught on Camera (Strange Lights in the Sky)" <http://youtu.be/hU7K2SUuqPM?list=UU3cUZkyN3CPqlw1BGzChsgA>

"Video captures 10 white globes floating in sky above Osaka in Japan", http://youtu.be/xIG8TwyV_qE

"The Best UFO Cases Ever Caught On

Tape", https://www.youtube.com/watch?v=N1H9S_Yk89Y https://youtu.be/N1H9S_Yk89Y?t=1995 (one of several)

"Mysterious rings were seen in Ulan-Ude" http://www.openminds.tv/wp-content/uploads/information-items_3643.jpg
<http://www.google.com/search?q=mysterious+sky+rings>

". . . he took three photographs of the metallic-appearing object, and a forth of a black "smoke ring" left behind by the object after it departed at high speed." (*The UFO Evidence*, Vol. 2, Richard H. Hall (2001) p. 284)

<http://www.caelestia.be/ringvortex.html> "Ring-shaped vortices"

Note: If you want to inspect YouTube videos frame-by-frame or in slow motion, go to <http://rowvid.com/> and paste in the URL of the YouTube video. (examples:

http://youtu.be/_BgJEXQkjNQ?t=71 (watch for a UFO at 1:11 (upper right to left) for about 5 frames)

<http://www.youtube.com/watch?v=0drMT6bOpGY> (UFO starting at 00:10)

<http://youtu.be/elpy1em9rOE> (UFO starting at 00:28.45) <http://youtu.be/lpdBEFuH-yk> (UFOs starting at 00:12.06

It should be noted that the 1880s and 1890s saw the development of high voltage electrical machines and spark gaps "switches" that could be used to generate radio waves and microwaves:

Just one hundred years ago, J.C. Bose described to the Royal Institution in London his research carried out in Calcutta at millimeter wavelengths. He used waveguides, horn antennas, dielectric lenses, various polarizers and even semiconductors at frequencies as high as 60 GHz; much of his original equipment is still in existence, now at the Bose Institute in Calcutta. Some concepts from his original 1897 papers have been incorporated into a new 1.3-mm multi-beam receiver now in use on the NRAO 12 Meter Telescope. . . .

Hertz had used a wavelength of 66 cm; other post-Hertzian pre-1900 experimenters used wavelengths well into the short cm-wave region, with Bose in Calcutta [7,8] and Lebedew in Moscow [9] independently performing experiments at wavelengths as short as 5 and 6 mm. <https://www.cv.nrao.edu/~demerson/bose/bose.html>

This means that the technology of those days was capable of producing high voltage, monopolar pulsed power with asymmetric rise and fall times. This is exactly the kind of circumstance that surrounds the discovery of electrical levitation effects. One would certainly wonder if this has anything to do with the "airship sightings" of the late 1890s .

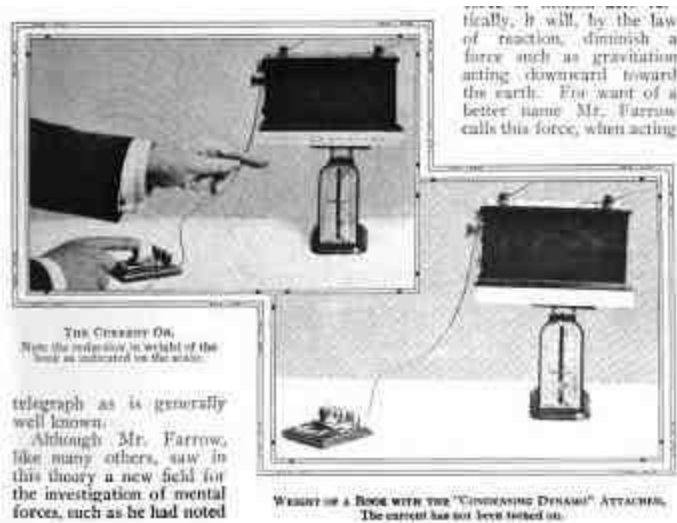
Loose ends:

<http://alterreddimensions.net/2013/mysterious-new-mexico-brilliant-flash-of-light-august-15-1999> ; http://www.sandia.gov/LabNews/LN09-10-99/meteor_story.html

Edward S. Farrow Gravity Reduction:

<http://www.rexresearch.com/farrow/farrow.htm> (weight reduction by means of a "condensing dynamo" circa 1911; Note reference to "condensing dynamo" and "current sent the wheels in the dynamo whirring". The description is too vague to reproduce the device (words in the article and the photos suggest, possibly, it included the equivalent of a powerful ignition coil ("Ruhmkorff coil"), a rotary spark gap, and aerial wires). A patent was not issued.

Ruhmkorff coils can produce monopolar pulsed high voltage with asymmetric time derivatives on the rise and fall times of the high voltage. This, and the Piggott experiment, suggest that high voltage pulsed monopolar (+) power with asymmetric time derivatives may somehow be connected with levitation or weight reduction effects.



Ruhmkorff

<http://www.rexresearch.com/farrow/farrow.htm>

coil <http://www.sparkmuseum.com/INDUCT.HTM>

<http://keelynet.com/gravity/farrow.htm>

<http://www.thebirdman.org/Index/Others/Others-Doc-Science&Fortean/+Doc-Science-StrangePhysics/TamingGravity.htm> (The article states "In all likelihood it was no more than an electromagnet". This is very unlikely given the above descriptions.)

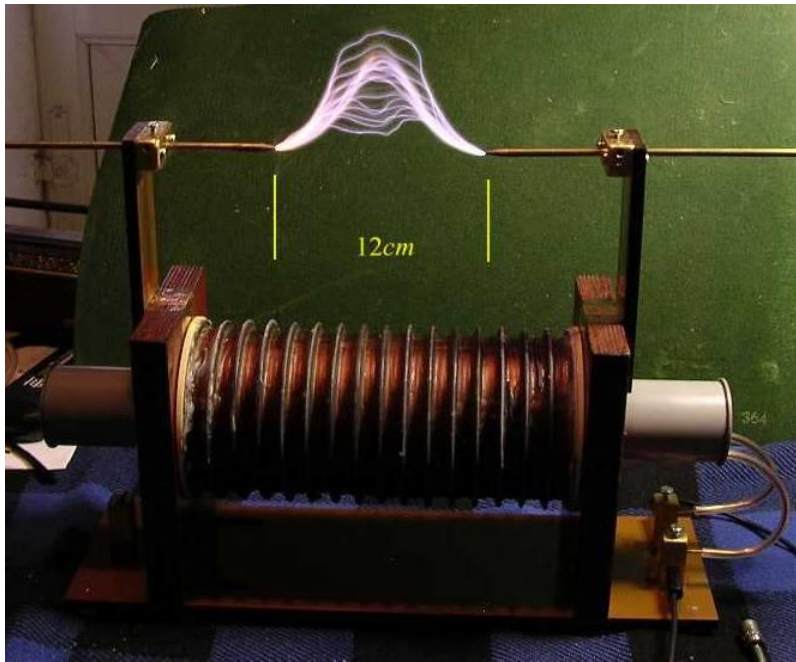
<http://books.google.com/books?id=eLIMAAAAYAAJ&pg=PA260&lpq=PA260&dq=edward+farrow+condensing+dynamo&source=bl&ots=2LhmIyuQsz&sig=Kvw4Zbrp8epEZa6SjVRWkoMgzo&hl=en&sa=X&ei=rat0UKvgEYKsjAK3i4GACw&ved=0CDAQ6AEwAw#v=onepage&q=edward%20farrow%20condensing%20dynamo&f=false> (alternate source)

http://www.auctiva.com/hostedimages/showimage.aspx?gid=780399&ppid=1122&image=470211125&image_s=470211109,470211125,470211142,470211088&formats=0,0,0,0&format=0 (4 pictures of Technical World Magazine, "Gravity Conquered at Last", Vol XVI, No.3, November 11, pages 257-260)

"How to overcome Gravity by Hertzian Air Waves", <http://query.nytimes.com/mem/archive-free/pdf?res=F40C12FF3A5517738DDDAF0994DF405B818DF1D3> (the reference to Hertzian air waves implies that the wires going out of the photo are aerials intended to spread the effect)

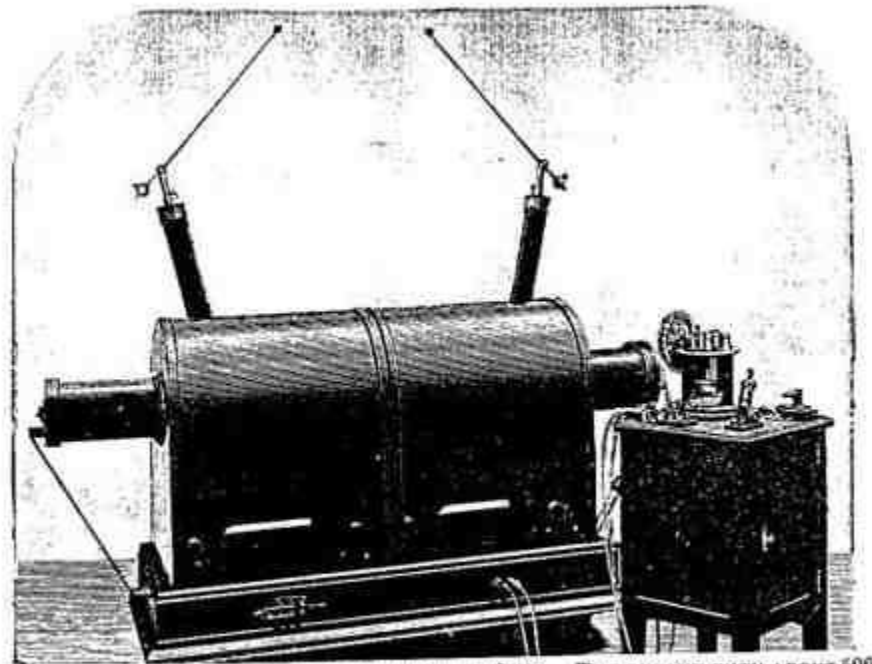
"Science versus Gravity" (Flight Magazine, Dec 2, 1911) <http://www.flightglobal.com/pdfarchive/view/1911/1911%20-%201046.html>

Ruhmkorff Coils:



<http://twfpowerelectronics.com/~kurt/InductionCoils/12cmSpark1703.jpg>

(Notice the stack of "pancake" windings)



ONE OF TWO RUMKORFF COILS MADE BY QUEEN & CO. THE OUTPUT WITH ABOUT 500 WATTS OF CURRENTS IN THE PRIMARY WAS A TORRENT OF SPARKS 45 INCHES IN LENGTH.

<http://www.electrotherapymuseum.com/2005/Norrie/index.htm> (4th edition, 1907 ?)

<http://archive.org/download/inductioncoilsho00schn/inductioncoilsho00schn.pdf> (2nd edition, 1901)

(note spark length of 45 *inches*)

"Induction Coils How to Make Use and Repair Them", H.S. Norrie

(1907) <http://www.electrotherapymuseum.com/2005/Norrie/index.htm>

<http://archive.org/download/inductioncoilsho00schn/inductioncoilsho00schn.pdf> (recommended)

Dr. Francis E. Nipher Electro-Gravitic Experiments

<http://www.rexresearch.com/nipher/nipher1.htm#1> (studies on gravitation)

http://en.wikipedia.org/wiki/Francis_Eugene_Nipher

<http://kirkwood.patch.com/listings/nipher-middle-school>

<http://library.wustl.edu/units/spec/archives/guides/pdf/nipher.pdf>

<http://genforum.genealogy.com/nipher/messages/2.html>

(Dr. Nipher was an esteemed educator and was professor of physics at Washington University at St. Louis, Missouri. He was also president for several years of the St. Louis Academy of Science and of the Engineers Club. He wrote several valuable papers in the late 1800s. Nipher Middle School was named after him.)

Hutchison effect:

<http://www.hutchisoneffect.ca/>

http://www.world-mysteries.com/hutchison_e.htm

<http://www.slideshare.net/johnkhutchison/hutchison-effect>

<http://www.youtube.com/watch?v=tnBdhsXI088&feature=related>

http://www.youtube.com/watch?v=Gf_z2QFQxLk&NR=1

<http://www.skywise711.com/Skeptic/Hutchison/hutchison.html>

<http://www.americanantigravity.com/documents/The-Ultimate-Hutchison.pdf>

http://en.wikipedia.org/wiki/Northern_Mysteries :

"In 1979, Hutchison claims to have discovered a number of unusual phenomena, while trying to duplicate experiments done by Nikola Tesla. He refers to several of these phenomena jointly under the name "the Hutchison effect", including: levitation of heavy objects; fusion of dissimilar materials such as metal and wood; while lacking any displacement, the anomalous heating of metals without burning adjacent material; the spontaneous fracturing of metals; changes in the crystalline structure and physical properties of metals; disappearance of metal samples."

<http://www.scribd.com/doc/15125148/Secrets-of-Cold-War-Technology> (p 50; Hutchison effect by Tesla?)

Passage through various kinds of matter always produced new and strange effects. To illustrate the fact that these currents were not electrical, not some new manifestation of electronic current, Tesla often publicly performed a very strange demonstration. He grasped the upper terminal of one of his large Transformers with one hand, while in the other hand holding a thick metal bar. Ether current flowed through carbonaceous and watery media without harm. Nevertheless, Tesla dramatically proved the strange bombarding power of these non-electronic currents as the metal in his hand either melted or exploded. The reaction of materials was entirely due to the bombardment effect of æther on the matter. But matter alone was not the only variable which could effect new ætheric phenomena. Geometries also shaped the phenomena.

Searl effect (and similar):

Searl:

<http://searlsolution.com/>

<http://www.searlsolution.com/documents/searlslevitydiscgenerator.pdf>

http://www.youtube.com/watch?feature=player_embedded&v=kJX17LgBYaQ



<http://searlsolution.com/members/technology6.html>

("An Example of Self–Acceleration for Incompressible Flows", Jens Lorenz, Randy Ott (2013)

<http://www.math.unm.edu/~lorenz/publi/selfac.pdf> some sort of possible relevance?)

Roschin and Godin:

"Orbiting Multi-roller Homopolar System", Vladimir Vitalievich Roschin, Sergi Mikhailovich Godin (2004)

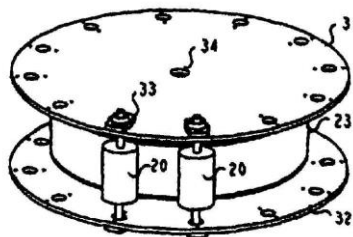


FIG. 3

<http://www.freepatentsonline.com/6822361.pdf>

About Strange Effects Related to Rotating Magnetic Systems, M.

Pitkänen <http://www.worldsci.org/pdf/ebooks/Pitknen-AboutStrangeEffectsRelatedtoRotatingMagneticSystems.pdf> (see chapter 3)

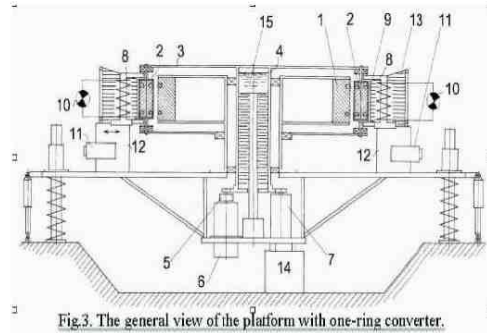
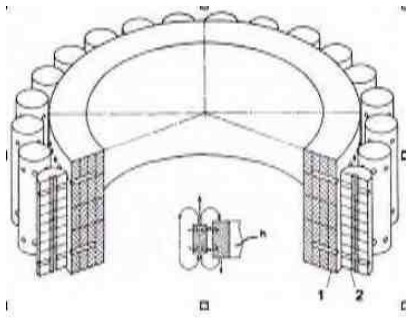


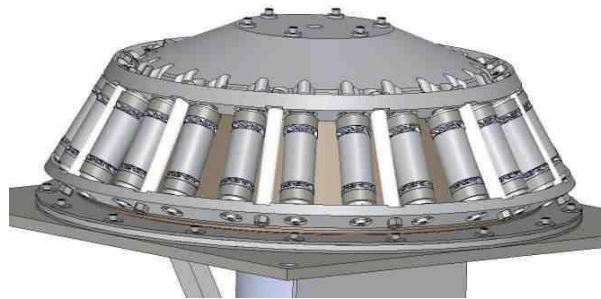
Fig.3. The general view of the platform with one-ring converter.

Morningstar:

"The Morningstar Energy Box", Paul A. Murad, Morgan J. Boardman, John E. Brandenburg, Jonathan McCabe, Wayne

Mitzen http://www.morningstarap.com/downloads/Morningstar%20Energy%20Box%20AIAA%202012_4_920.pdf

"Abstract. The Morningstar Energy Box is a derivative of both the Searl device and a variant of the Russian Scientists Godin and Roschin. Laminated rollers and a main ring with ferromagnetic fluid are used to enhance electrical and magnetic properties. The device is constrained by a mechanical cage to hold the rollers. An operational theory for the Energy Box uses rotating electromagnetic fields different from either Searl or the Russians. Moreover, the Russians made several serious claims that produced self-acceleration to generate electricity, created a large weight loss when spun in one direction and weight gain when spun in the opposite direction. They also claimed their device generated discrete magnetic walls. To date, no one has validated these outrageous Russian claims. However, the Energy Box found similar phenomenon regarding the discrete magnetic walls with both weight gain and loss, although not at the same magnitude. Where they claimed to lose as much as 35% of the weight of a 375 kg armature, the Energy Box in an early test only lost 2 to 5 pounds of its 190 pounds at steady-state. During transient rotation changes, the weight change dropped as much as 20 to 40 pounds. However, a last test series recorded a weight lost of 14 pounds with a 7.3% change during steady-state. We can state that we saw similar phenomena as the Russian claims as well as lost weight and the device may represent an advanced propulsion scheme for space travel."



Tapered Ring Device

http://www.morningstarap.com/downloads/Morningstar%20Energy%20Box%20AIAA%202012_4_920.pdf

<http://www.morningstarap.com/downloads/The%20Murad-Brandenburg%20Equation.pdf>

It would be insightful to know if (or how) the tilt and rotation addresses the gravitational [symmetry problem](#). Also, atoms do have a space/time "polarity" and so it is not necessarily "outrageous" that rotation would produce "a large weight loss when spun in one direction and weight gain when spun in the opposite direction."

Nikola Tesla:

Number 2, Second Quarter 1996))

"Tesla was sure that this new discovery would produce a completely new breed of inventions, once tamed and regulated. Its effects differed completely from those observed in high frequency alternating current. These special radiant sparks were the result of non-reversing impulses. In fact, this effect relied on the non-reversing nature of each applied burst for its appearance. A quick contact charge by a powerful high voltage dynamo was performing a feat of which no alternating generator was capable. Here was a demonstration of "broadcast electricity".

Most researchers and engineers are fixed in their view of Nikola Tesla and his discoveries. They seem curiously rigidified in the thought that his only realm of experimental developments lay in alternating current electricity. This is an erroneous conception which careful patent study reveals. Few recognize the documented facts that, after his work with alternating currents was completed, Tesla switched over completely to the study of impulse currents. His patents from this period to the end of his career are filled with the terminology equated with electrical impulses alone.

The secret lay principally in the direct current application in a small time interval. Tesla studied this time increment, believing that it might be possible to eliminate the pain field by shortening the length of time during which the switch contact is made. In a daring series of experiments, he developed rapid mechanical rotary switches which handled very high direct voltage potentials. Each contact lasted an average of one ten-thousandth second.

Exposing himself to such impulses of very low power, he discovered to his joy and amazement that the pain field was nearly absent. In its place was a strange pressure effect which could be felt right through the copper barriers. Increasing the power levels of this device produced no pain increase, but did produce an intriguing increased pressure field. The result of simple interrupted high voltage DC, the phenomenon was never before reported except by witnesses of close lightning strokes. This was erroneously attributed however to pressure effects in air.

...

Tesla made electrical measurements of this projective stream. One lead of a galvanometer was connected to a copper plate, the other grounded. When impulses were applied to wire line, the unattached and distant meter registered a continual direct current. Current through space without wires! Now here was something which impulses achieved, never observed with alternating currents of any frequency.

Analysis of this situation proved that electrical energy or electrically productive energies were being projected from the impulse device as rays, not waves. Tesla was amazed to find these rays absolutely longitudinal in their action through space, describing them in a patent as "light-like rays". These observations conformed with theoretical expectations described in 1854 by Kelvin.

In another article Tesla calls them "dark-rays", and "rays which are more light-like in character". The rays neither diminished with the inverse square of the distance nor the inverse of the distance from their source. They seemed to stretch out in a progressive shock-shell to great distances without any apparent loss.

...

Most imagine that the Tesla impulse system is merely a "very high frequency alternator". This is a completely erroneous notion, resulting in effects which can never equal those to which Tesla referred. The magnetic discharge device was a true stroke of genius. It rapidly extinguishes capacitor charge in a single disruptive blast. This rapid current rise and decline formed an impulse of extraordinary power. Tesla called this form of automatic arc switching a "disruptive discharge" circuit, distinguishing it from numerous other kinds of arc discharge systems. It is very simply a means for interrupting a high voltage direct current without allowing any backward current alternations. When these conditions are satisfied, the Tesla Effect is then observed.

...

The asymmetrical positioning of the capacitor and the magnetic arc determines the polarity of the impulse train.

If the magnetic arc device is placed near the positive charging side, then the strap is charged negative and the resultant current discharge is decidedly negative.

Tesla approached the testing of his more powerful systems with certain fear. Each step of the testing process was necessarily a dangerous one. But he discovered that when the discharges exceeded ten thousand per second, the painful shock effect was absent. Nerves of the body were obviously incapable of registering the separate impulses. But this insensitivity could lead to a most seductive death. The deadly aspects of electricity might remain. Tesla was therefore all the more wary of the experiments.

He noticed that, though the pain field was gone, the familiar pressure effect remained. In its place came a defined and penetrating heat. "

See also [Poynting vector insights](#) (below) and [Biconical Fast Spark gaps](#).

"Dynamo Electric Machine", Nikola Tesla (1889) <http://www.freepatentsonline.com/0406968.pdf>

The Free Energy Secrets of Cold Electricity, Peter A. Lindemann, D.Sc
, http://www.teslasociety.ch/info/NTV_2011/free.pdf ,

https://ia700403.us.archive.org/19/items/CompletePatentsOfNikolaTesla/Complete_Patents_Nikola_Tesla.pdf

http://nrgnair.com/MPT/zdi_tech/tesla/common/radiant/TRE1.htm (
<http://donsmithcoils.blogspot.com/2010/06/don-l-smith-device.html> ,
<http://www.youtube.com/watch?v=TI5XWz8aZvo>, <http://cactuss.ru/wp-content/uploads/sites/4/2012/05/pjkbook-21-extract.pdf> ,
http://freenrg.info/Misc/Resonance_NRG_Methods_Donald_Smith.pdf) , _

Magnetohydrodynamic (field propulsion but *not* antigravity)

"Magnetohydrodynamic propulsion apparatus", J. F. King
(1967) <http://www.freepatentsonline.com/3322374.pdf>

Tornadoes

The chaotic electrical environment associated with tornadoes includes pulsed monopolar electrical power, polarity reversals, rotating electric fields, radio waves, etc. Could this environment produce weird levitation effects that are not explainable by air flow? While still speculative, there are suspicions that it can. See "Tornadic levitation" in :

The Electromagnetic Nature of Tornadic Supercell Thunderstorms, Charles L. Chandler (2007~2014)

http://charles-chandler.org/Geophysics/Tornadoes.php?text=full&images=true&units=imperial#id_33

Burkhardt Heim

"Physical Principles of Advanced Space Propulsion Based on Heims's Field Theory" Walter Dröscher, Jochem Häuser (2002)

"The coupling obtained from Heim's theory is derived from fundamental principles, and is very different from the ones obtained by other ad-hoc approaches. Heim's theory is therefore much more interesting, since it may allow gravity manipulation at lower energy densities, and is based on new physics, thereby leading to new predictions. There may be several new and surprising physical phenomena with far reaching consequences that are predicted by Heim's theory. Some of these can be checked against presently available experimental data, both from cosmology and quantum physics. The physical principle is presented of how to construct a space propulsion device that does not use any propellant, instead is based on an energy transformation process. . . . Since the interaction between gravitation and electromagnetism reduces the inertial mass of a material object, it is called *inertial transformation*. Since conservation laws for momentum and energy are strictly adhered to, the theory requires *superluminal* velocities, without contradicting Einstein's theory of relativity. Heim's physical theory, provided it reflects physical reality, has the potential to lead to a completely new concept of space transportation." <http://www.hpcc-space.com/publications/documents/PrinciplesOfAdvancedSpacePropulsionAIAA-paper-2002-4094.pdf>

"Guidelines for a Space Propulsion Device based on Heim's Quantum Theory", Walter Dröscher, Jochem Häuser (2004)

"According to *HQT*, a *transformation of electromagnetic energy into gravitational energy* should be possible. It is this interaction that is used as the physical basis for the novel space propulsion concept, termed *field propulsion* [1, 2], which is *not conceivable within the framework of current physics*." <http://www.hpcc-space.com/publications/documents/aiaa2004-3700-a4.pdf> (*italics are in original*)

"Coupled Gravitational Fields A New Paradigm for Propulsion Science", Walter Dröscher, Jochem Häuser (2010)

"There seems to be substantial evidence of novel gravitational phenomena, based on both new theoretical concepts as well as recent experiments by Tajmar et al. at AIT, Austria that may have the potential to leading to advanced space propulsion technology, utilizing two novel fundamental force fields. According to EHT these forces are represented by two additional long range gravity-like force fields that would be both attractive and repulsive, resulting from interaction of electromagnetism with gravity. . . .

A simple analogy is used to differentiate between the classical rocket principle (including all other means of propulsion) and the novel field propulsion concept of EHT incorporating spacetime as a physical quantity. Suppose a boat is in the middle of a large lake or ocean. In order to set the boat in motion, a force must be mediated to the boat. The classical momentum principle requires that a person in the boat is throwing, for instance, bricks in the opposite direction to push the boat forward. However, everybody is well aware of the fact that there is a much better propulsion mechanism available. Instead of loading the boat with bricks, it is supplied with oars, and by rowing strongly the boat can be kept moving as long as rowing continues. The important point is that the medium itself is being utilized, i.e., the water of the lake or ocean, which amounts to a completely different physical mechanism. The rower transfers a tiny amount of momentum to the medium, but the boat experiences a substantial amount of momentum to make it move. For space propulsion the medium is spacetime itself. Thus, if momentum can be transferred to spacetime by field propulsion, a repulsive or recoil force would be acting on the space vehicle moving it through the medium, like a rowing boat." <http://www.hpcc-space.com/publications/documents/AIAA2010-021-NFF-1.pdf>

http://en.wikipedia.org/wiki/Heim_theory

<http://www.hpcc-space.com/publications/index.html>

James E. Cox

"Dipolar force field propulsion system"

<http://www.freepatentsonline.com/4663932.pdf>

Glenn E. Hagen

"Flying apparatus" (atmospheric ion propulsion system)
<http://www.freepatentsonline.com/3120363.pdf>

Chris B. Hewatt patent

"Method and apparatus for gyroscopic propulsion" (???)
<http://www.freepatentsonline.com/7832297.pdf>

Jean Claude Lafforgue patent:

"Isolated systems self-propelled by electrostatic forces" (March 1, 1991) FR

2651388 http://worldwide.espacenet.com/publicationDetails/biblio?DB=EPODOC&adjacent=true&locale=en_EP&FT=D&date=19910301&CC=FR&NR=2651388A1&KC=A1

(See also <http://jnaudin.free.fr/lfpt/index.html>)

E. J. Saxl patent:

"Device for measuring gravitational and other forces", <http://www.freepatentsonline.com/3357253.pdf>

Woodward patent:

"Method and apparatus for generating propulsive forces without the ejection of propellant", <http://www.freepatentsonline.com/6098924.pdf>

"Method for transiently altering the mass of objects to facilitate their transport or change their stationary apparent weights" <http://www.freepatentsonline.com/5280864.pdf>

<http://www.freepatentsonline.com/6347766.pdf>

Rex L. Schlicher

"Nonlinear electromagnetic propulsion system and method"

<http://www.freepatentsonline.com/5142861.pdf>

Hector L. Serrano patent:

WO

2000058623 http://worldwide.espacenet.com/publicationDetails/originalDocument?FT=D&date=20010118&DB=EPODOC&locale=en_EP&CC=WO&NR=0058623A3&KC=A3

http://worldwide.espacenet.com/publicationDetails/biblio?DB=worldwide.espacenet.com&II=9&ND=3&adjacent=true&locale=en_EP&FT=D&date=20001005&CC=WO&NR=0058623A2&KC=A2

http://www.oocities.org/warpcore91/jlnlabs_sfptv1.pdf

"Propulsion Device and Method Employing Electric Fields for Producing Thrust" <http://www.freepatentsonline.com/6492784.pdf>

Alerander P. de Seversky

<http://www.freepatentsonline.com/3130945.pdf>

"Ionocraft"

Leon Sprink, Jacques Ravatin patents:

<http://www.rexresearch.com/sprink/sprink.htm>

British 685522

WO8000293 // [FR2421531](#)

Jonathan W. Campbell patents:

<http://www.freepatentsonline.com/6317310.pdf>

<http://www.freepatentsonline.com/6411493.pdf>

<http://www.freepatentsonline.com/6775123.pdf>

Henry Wm Wallace patents:

<http://www.freepatentsonline.com/3626605.pdf> , "Method and Apparatus for Generating a Secondary Gravitational Force Field"

<http://www.freepatentsonline.com/3626606.pdf> , "Method and Apparatus for Generating a Dynamic Force Field"

<http://www.freepatentsonline.com/3823570.pdf> , "Heat Pump"

"The Wallace inventions, spin aligned nuclei, the gravitomagnetic field, and the Tampere experiment: Is there a connection?", Robert Stirniman, May 1998, <http://antigravitypower.tripod.com/stirniman/stirniman21.html>

Schlicher patent:

"Nonlinear Electromagnetic Propulsion System and Method", <http://www.freepatentsonline.com/5142861.pdf>

<http://adsabs.harvard.edu/abs/1971PhRvD...3..823S> , http://prd.aps.org/abstract/PRD/v3/i4/p823_1

Zinsser Effect:

<http://www.integrityresearchinstitute.org/Electrogravitics/ElectrograviticsAIAApaperValone2008.pdf>

Saxl Torsion Pendulum

http://en.wikipedia.org/wiki/Erwin_Saxl ,

<http://adsabs.harvard.edu/abs/1971PhRvD...3..823S> , http://prd.aps.org/abstract/PRD/v3/i4/p823_1

<http://www.integrityresearchinstitute.org/Electrogravitics/ElectrograviticsAIAApaperValone2008.pdf>

Grahm-Lahoz:

<http://www.tts.lt/~nara/introduc/introduc.htm>

Victor Schauberger:

<http://discaircraft.greyfalcon.us/Viktor%20Schauberger.htm>

<http://jnaudin.free.fr/html/repulsin.htm>

<http://www.schauberger.co.uk/home.html>

Morton Effect

"Van de Graaff Generator Effect", Charles R. Morton <http://amasci.com/freenrg/morton1.html>

Alexander Frolov's ELG-Hat Capacitor (related to Morton effect?)

<http://jnaudin.free.fr/html/elghatv1.htm>

<http://www.faraday.ru/pot.htm>

<http://www.faraday.ru/t-cap.html>

Trouton-Noble Experiment:

<http://jnaudin.free.fr/html/troutnbl.htm>

http://en.wikipedia.org/wiki/Trouton%E2%80%93Noble_experiment

Counter-rotating (or opposed) magnetic fields effect:

"Systems for producing gravity neutral regions between magnetic fields, in accordance with ECE-theory", Charles W. Kellum (2012) <http://www.freepatentsonline.com/20120105181.pdf>

"Crossfield-Homopolar Device", Charles W. Kellum (2012) <http://aias.us/documents/DeviceDev/HPexp2.pdf>

"Propulsion System Using the Antigravity Force of the Vacuum and Applications", Baptista de Alves Martins (2010)

<http://www.freepatentsonline.com/WO2010151161A2.pdf> ; <http://www.freepatentsonline.com/WO2010151161A8.pdf> (119 pages, 22 figures; several references to magnetic vector potential)

"John Brandenburg on Antigravity and Gravity-Control", <http://www.americanantigravity.com/news/space/john-brandenburg-on-antigravity-and-gravity-control.html>

https://www.google.com/search?q=counter+rotating+magnetic+fields&hl=en&rls=com.microsoft:en-us:IE-SearchBox&rlz=1I7ADBF_en&tbm=ischn&tbo=u&source=univ&sa=X&ei=1aBKUfqLNmq0iQKHhICgCg&ved=0CH0QsAQ&biw=1016&bih=569

"Moving flame experiment with liquid mercury: possible implications for the Venus atmosphere", Schubert, G. and J. A. Whitehead, (1969) *Science*, 163, 71--72

Abstract. A bunsen flame rotated under a cylindrical annulus filled with liquid mercury forces the liquid mercury to rotate in a direction counter to that of the rotating flame. The rate of rotation of the liquid is several times greater than that of the flame. This

observation may provide an explanation for the high velocities of apparent cloud formations in the upper atmosphere of Venus. http://www.who.edu/cms/files/69Sch&WhScience_32423.pdf

Gravomechanical Effect

"Anomalous weight reduction on a gyroscopes right rotation around the vertical axis of the earth", H. Hayasaka and S. Takeuchi (1989) http://earthtech.org/experiments/tajmar/papers/p2701_1.pdf

"Responding to Mechanical Antigravity", Marc G. Millis, Nicholas E. Thomas (2006) http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20070004897_2007004127.pdf

<http://www.rexresearch.com/brown2/brown2.htm#90> :

91. Triboexcitation of Sorrento (FL) Red Sand.

Catalina Island; March 30, 1973.

Test No. 90 has been repeated today, making sure that the weighing was accurately done at the Avalon Post Office (It is now confirmed by the Postmaster, Pete G. Salamunovich).

The sample of red sand which was tested was contained (as in Sec. 90) in a glass Mason jar. In two day since the last excitation test on March 28, the weight had returned to normal; i.e., 1 lb-14-1/2 oz. It was then shaken for 30 minutes and then immediately (within 3 minutes) weighed. It then weighed less than 1 lb-4-1/4 oz, having lost at least 1/2 oz, possibly 0.3 oz.

This loss of weight (if 0.3 oz is considered) represents a greater degree of excitation than that recorded in Test 90. This may have been expected, as the duration of shaking was increased 10 minutes. This represents a loss of weight of 1 part in 101.6 or 0.984%. This represents an excitation of 9.84 millighos or a value of g approx 970.6 cm/sec² !

This apparent confirmation is intriguing, to say the least!

T.T. Brown (3-30-73)

Witnessed: J.P. Quillin (3-30-73)

(BF comment: My initial reaction to this was "This is just crazy!" But motion has a both spatial component and a temoral component (not the same thing as clock time). Gravitation is mostly temporal motion. Apparently, shaking the sand causes the atoms to seek a new equilibrium with the combination of the two motions; the added temporal component would espress itself as a potential, and would have a sign opposite to the normal gravitational motion. This would manifest itself as a weight loss. When the shaking stops, this kind of temporal motion should "decay", somewhat like a diffusion (i.e., non-directional). Hence, this experiment might not be as crazy as it at first seems.

<http://www.bibliotecapleyades.net/tesla/occultether/occultether03.htm>

Around 1870, Thomson had conducted experiments which seemed to indicate that "gravitational action" could be induced by spheroidal bodies oscillated by electrical currents or mechanical pulses (F. Guthrie Phil. Mag. xli [1871], p. 405). The surface pulsations could cause attractions or repulsions in respect to other bodies, as verified by Thomson. Tesla was aware of Thomson's work during his student days in Graz, Austria, beginning 1875, when he was 19.

Thomson's work undoubtedly served as the spark of inspiration for Tesla in his early conception of an "ideal flying machine" which would be propelled by electricity acting upon the ether. This explains Tesla's continual references to Thomson, such as demonstrating during his 1892 London lecture, a 'luminous wire' sign powered by a Tesla coil, which said "WILLIAM THOMSON".

At first, Thomson found that *ponderomotive forces* act between two solid bodies immersed in an incompressible fluid, when one of the bodies is immobilized and made to oscillate with a force which acts along a line between its center and that of a much larger sphere which is free. The free sphere was attracted to the smaller (immobilized) sphere, if its density was greater than the fluid, while a sphere of less density than the fluid was repelled or attracted, according to the ratio of its distance to the vibrator in relation to a certain quantity (Phil. Mag, xli [1871], p. 405; Letter, Thomson to F. Guthrie, p. 427.)

Thomson's experiments were analogical ones, for which he had evoked praise from his contemporaries even when he was still a teenager, although his refusal to believe anyone's assertions unless he could build an analogical model to prove them often led to the consternation of those of his contemporaries, such as Maxwell, who relied often on mathematical equations. The sphere experiments were designed to use mechanical and electrical wave methods to construct a model to probe the gravitational, inertial and momentive reactions of solid bodies in the ether.

The Faraday effect—the rotation of the plane of polarization of radiation in a dielectric medium (such as the atmosphere, space, and certain solid materials) in a magnetic field—stated that the angle of rotation of radiation is proportional to the magnetic field strength and the length of the path in the medium in the field. These early experimenters knew there was a connection between the rotatory motion and momentum, and sought to find it.

The rotatory (versus the linear) character of magnetic phenomena was strengthened by Thomson's experimentally verified conclusions on the magnetic rotation of light. This rotatory character not only influenced Tesla's discovery of the rotating magnetic field, but is also fundamental to inertia and momentum, as I will later explain, since movement of a charged body constitutes a current which creates a magnetic field which creates the rotatory motion which "bores" through the ether like a drill to create momentum.

Thomson's system was later investigated by **C.A. Bjerknes** between 1877 and 1910. Bjerknes showed that when two spheres immersed in an incompressible fluid were pulsated, they exerted a mutual attraction which obeyed Newton's inverse square law if the pulsations were in phase, while if the phases differed by a half wave, the spheres repelled. At one quarter wave difference, there was no action. Where pulses were non-instantaneous at distances greater than a quarter wavelength, attractions and repulsions were reversed (Repertorium d. Mathematik I [Leipzig, 1877], p. 268; Proc. Camb. Phil. Soc. iii [1879], p. 276; iv [1880], p. 29).

"Aether Vibrations-A Wave Based Universe"

(2012) http://www.bibliotecapleyades.net/ciencia/ciencia_fisica36.htm ; <http://beforeitsnews.com/alter-native/2012/07/aether-vibrations-2357376.html?currentSplittedPage=0>

Scalar or torsion waves now seem to play a significant role in explaining our physical reality. Although torsion fields are very weak they can be measured using torsion beam balances that were first developed by Kozyrev. Torsion waves create minute forces in matter and that's how they can be detected.

Torsion fields can be either static or dynamic. Static torsion fields can

take on the form of vortexes like the one mentioned in the implosion physics of Daniel Winter. These static vortex torsion fields in the fabric of the vacuum space can stay in one place for a very long period of time. Kozyrev discovered that torsion fields can also propagate through space as torsion waves at tremendous speeds at least one billion times the speed of light (10^9 C).

He noticed that all physical objects both absorb and radiate torsion waves.

By shaking, vibrating, deforming, heating and cooling physical objects they generate measurable torsion waves. Even the displacement of an object generates torsion waves that can be measured. All movement therefore from the vibrations of atoms to the orbits of our planets and stars leaves their traces in the form of torsion waves in the aether.

A very remarkable phenomenon that Kozyrev discovered by rotating gyroscopes is that they lose very small but measurable amounts of weight. Also firmly shaking objects could make objects lose weight. Now from our current understandings of physics this is quite impossible! It violates all physical laws, how can solid matter lose weight when it is spun at high speeds or shaken?

If we still believe that matter is made of little hard marbles called particles, yes this would be a great mystery!

However Kozyrev showed that the gyroscopes shed more torsion waves when shaken or spun, so that aetheric energy that sustains the object was shed back into the background sea of the aether. The momentary loss of aether energy accounted for the weight drop.

Dr. Harold Aspden of Cambridge University discovered a related phenomenon. He attached a powerful magnet to a gyroscope and spun it at high speeds. He measured the amount of energy required to accelerate the gyroscope to full speed to be a 1000 Joules. Now to his surprise when he stopped the gyroscope from spinning and restarted the gyroscope to spin again within 60 seconds after it stopped, it required 10 times less energy to spin the gyroscope to the same speed.

The spin of the gyroscope had added extra spin to the aether that sustains the gyroscope that lasted for a while before it wore off, rather like the momentum stored in the tea of a teacup after stirring it with a teaspoon. We now know that spinning magnets are strong torsion wave generators.

Ducretet

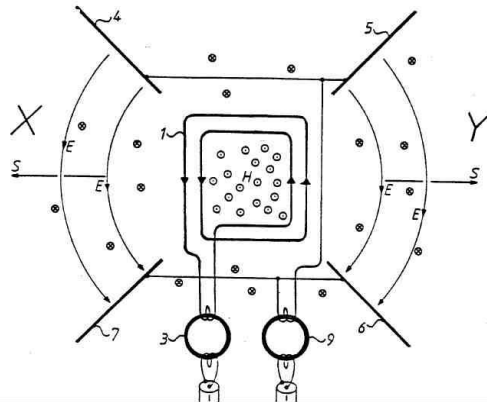
"At about this same time [1911], a small antigravitational device was independently developed in Paris. In this, a highly charged mica disc spun at high rate and levitated when electrostatically charged (Ducretet)." (*Lost Science*, Gerry Vassilatos (1999) p. 243 ; *Lost Science*, Gerry Vassilatos, http://www.tuks.nl/pdf/Reference_Material/Aetherforce_Library/Lost%20Science/Gerry%20Vassilatos%20-Lost-Science-Complete-Edition.pdf p.174)

<http://books.google.com/books?id=y8sSFTDkQ20C&pg=PA492&lpg=PA492&dq=ducretet+mica&source=bl&ots=XYdhnD6fX-&sig=EbNLvrI1d5DRF2sHLjJQYFcIxDw&hl=en&sa=X&ei=cEo9VNDgM4yzogTI6YDABw&ved=0CEUQ6AEwCQ#v=onepage&q=ducretet%20mica&f=false>

Poynting vector insights (electromagnetic momentum)

[edit in progress]

Another twist with the Poynting vector is embodied in the Crossed Field Antenna (CFA), which is constructed much like a capacitor, but acts like a radio antenna. Its claimed advantage is small size and higher gain, especially at long wavelengths, when compared to conventional towers or wire aerials. In a capacitor, the Poynting vector is always directed inward (even when the current reverses) but in the CFA, the E and B fields are manipulated so that the Poynting vector (S) is directed *outward*:



Radio Antennas, Maurice C. Hatley, Fathi M. Kabbary (1992)

<http://www.freepatentsonline.com/5155495.pdf>

As far as I know, this scheme has never been tested for gravity/antigravity effects. The voltages and waveforms might not be conducive to these effects anyway. But the configuration raises interesting questions about Poynting vector manipulations and directional control. The commonly accepted paradigm is that a meaningful Poynting vector is generated only if the E and B (or H) fields are from the same source (cannot be independent) and must be time varying. But the CFA alters the fields separately so as to create a "synthetic" Poynting vector (forbidden fun!). Physicist Feynman also reminds us about independent E and B fields; see [example](#). This implies that our current understanding of Maxwell's equations might be merely a subset of something more general. That, in turn, might help explain reports of some bizarre effects (unrelated to gravity) of unusual configurations of electromagnetic equipment. Here is snippet of a report about a Nazi weapon intended to stop Allied aircraft engines:

"This 'transmitter was a strange contraption, a tower surrounded by an array of posts with pear-shaped [*sic*] knobs on top. At the same time a similar system was erected on the peak of the Feldberg near Frankfurt. When it began operation, there were soon reports of strange phenomena in the vicinity of the Brocken tower. Cars traveling along the mountain roads would suddenly have

engine failure. A Luftwaffe sentry would soon spot the stranded car, and tell the puzzled motorist that it was no use trying to get the car started at present. After a while, the sentry would tell the driver that the engine would work again now, and the care [*sic*] would then start up and drive away." *Hitler's Suppressed and Still-Secret Weapons, Science and Technology*, Henry Stevens (2007) page 170-189 http://www.amazon.com/Hitlers-Suppressed-Still-Secret-Weapons-Technology/dp/1931882738#reader_1931882738 (Search inside with "motorstopmittel" and then select page 170 from list;

See also http://en.wikipedia.org/wiki/Levelland_UFO_Case , "The Tex Files: Levelland UFOs" <http://www.myfoxdfw.com/story/17512052/the-tex-files-levelland-ufos> ;

"UFOs: More Engine Effects", James McCampbell (1985) http://www.nicap.org/More_Engine_Effects.htm , <http://www.nicap.org/papers/ufointerf.htm>)

"And like Tesla, Marconi was reported to have been working on a war-ray. His, it was said, would when perfected be able to stop airplane and other motors many miles before invading forces could reach their goals. . . . Marconi said little about his mysterious ray, nor will Tesla discuss the details of his. It is his secret and he will not reveal it, he says, except to the United States Governmnet But of what it will do, he speaks freely. "This new type of force," he said the other day, "would operate through a beam one one hundred-millionth of a centimeter in diameter. . . . This beam would melt any engine, whether Diesel or gasoline-driven." (Marconi's partly-perfected beam was said to be ineffective against Diesel engines). "It would also ignite any explosives aboard any bomber. No possible defense against it could be devised, as the beam would be all-penetrating." " ("THE NEW ART OF PROJECTING CONCENTRATED NON-DISPERSIVE ENERGY THROUGH NATURAL MEDIA System of Particle Acceleration for Use in National Defense", Circa May 16, 1935, Briefly Exposed by NIKOLA TESLA, <http://www.teslaradio.com/pages/teleforce.htm> p. 25/26 This article has several links to several news stories on this topic from about 1934 to 1940. The stories would have been easily accessible to Nazi scientists of those days, and they could have figured out the remaining necessary details, as others evidently did before this time period.)

"Inventor Hides Secret of "Death Ray" ", "Before a group of scientists, it is reported, he once demonstrated that the radiations would kill rats, mice, and rabbits, even when the animals were incased in a thick-walled metal chamber.

" <https://books.google.com/books?id=2CYDAAAAMBAJ&q=Longoria#v=snippet&q=Longoria&f=false> Dr. Antonio Longoria; *Popular Science* (Feb 1940) p. 117)

http://en.wikipedia.org/wiki/Harry_Grindell_Matthews;

"The new Death-dealing Diabolic Rays," H. Grindle-Matthews (August 1924) <http://www.americanradiohistory.com/Archive-Popular-Radio/Popular-Radio-1924-08.pdf> paper page 148-155

"In 1923 Matthews claimed that he had invented an electric ray that would put magnetos out of action.[3] In a demonstration to some select journalists he stopped a motorcycle engine from a distance. He also claimed that with enough power he could shoot down aeroplanes,

explode gunpowder, stop ships and incapacitate infantry from the distance of four miles. Newspapers obliged by publishing sensational accounts of his invention."

https://en.wikipedia.org/wiki/Death_ray

The "Death Ray" (or "Beam") may have something to do with neutrinos or the [Weyl fermion](#).

Possibly relevant: (*Secrets of Cold War Technology: Project HAARP and Beyond* , Gerry Vassilatos (2000) <http://www.scribd.com/doc/15125148/Secrets-of-Cold-War-Technology> , p. 103)

His engineers began to suspect the real difference, but did not comprehend the initial facts which they considered. Marconi radio is wave technology. Tesla Technology is IMPULSE technology. Waves were weak. Impulses were strong. Only alternating currents will release the weak waves which Marconi insisted on using. Only violent, unidirectional spark discharges will release the mysterious kinds of Radiant Energy effects which Tesla reported. There were those who remembered the European patents in which "shock-excitation" proved to produce a more penetrating and superior kind of wireless signal. Largely pioneered by Germanic wireless developers, these shock-excitation methods were understood to be prolific sources of a different electrical phenomenon altogether. Raymond Heising, Count Georg von Arco, Alexander Meissner, Arno Brasch, Fritz Lange, Max Dahl, Fritz Lowenstein and a host of others recognized that Tesla had indeed found a special and rare kind of electrically stimulated effect.

Others include the so-called [Hutchison Effect](#) with its reports of levitation of heavy objects, delocalization ("dematerialization") of objects, anomalous mutilation of metals, and so forth, and the [Searl effect](#) with reports of weight loss, gravitational effects, temperature decrease, "magnetic walls", etc. What these configurations seem to have in common is the presence of high voltages, electromagnetic waves ("radio waves"), rotating fields, and a mixture of both *static* and *time varying* electric and magnetic fields—or something like that. (See also: Orbiting Multiroller Homopolar System, Roschin, *et al.* <http://www.freepatentsonline.com/6822361.pdf> and Tesla's patent "Dynamo-Electric Machine" (1889) <http://www.freepatentsonline.com/406968.pdf> ; "Beyond Electromagnetic Waves", Bibhas De, <http://www.bibhasde.com/radiocomm.html> ; "Vacuum Electromagnetic interaction", B R De, J. Phys. A: Math. Gen. 26 (1993) 7583-7588 <http://www.bibhasde.com/veipaper.pdf> ; "How to build a flying saucer", *Pentagon Aliens*, William Lyne, 3rd edition, p. 195-218 <http://www.whale.to/b/lyne.pdf>)

This raises questions I wish someone would investigate:

1. Accelerated *electric* charges produce ordinary electromagnetic radiation. What effect would be produced by accelerated *magnetic* charges? See: [Radiation from a charge in circular motion](#) and [math error note](#) . The latter note suggests that spatially accelerated magnetic fields and the first time derivative of an electric field will both independently produce Poynting vectors and therefore a momentum flow; a combination of these might possibly produce an effect very *different* from ordinary electromagnetic radiation (radio waves). See [UFO Physics](#) and note what is said about Weyl fermions and neutrino currents.

2. The speed of gravity and the speed of electric and magnetic fields are instantaneous (because they are "non-local" in their nature). The speed of light however, is finite, and is exactly midway between the spatial zero and the temporal zero for speeds. (see speed diagram) If light is a combination of electric and magnetic fields, or even a "pure electric" oscillation, why is its speed finite? Are other speeds possible for E and B field combinations between the speed of light and infinite (temporal) speeds? Are other speeds possible for E and B field combinations between the speed of light and zero (spatial) speeds? The E and B fields are inherently temporal in nature, but an inversion into the spatial spectrum of speeds might occur at a quantization boundary. A natural quantity of *speed* is c , the speed of light. But what is a natural quantity of, say, *voltage*? I have not given much thought about how to calculate it, but it appears to be at least several tens of millions of volts, possibly much larger. Voltages (and magnetic fields) approaching these levels could make for some very interesting (and really weird, even scary) physics. We are familiar with electric, magnetic, and electromagnetic fields (light). But are these just special, particular instances of something more general? Is there something "in between" these cases that was simply not apparent in Maxwell's day? (See also an example calculation of a unit quantity.)

3. The engine failure effects seem to be vaguely the reverse of the principles in the example above which compares the energy of a wire moving through space, with energy of space moving through a wire. The engine stopping effect might be due to not only the "ionization of the air" shorting out ignition systems, but something even more fundamental as well. The effect described below takes place inside a wire, and involves the wire's gravitational motion. Any field effect that alters that gravitational motion, would be expected to alter the electron motion as well (perhaps sending it sideways (leaping out of the wire), instead of along the wire. However, the effect reportedly has burned out spark plugs and neon signs.).

Tesla noticed and researched a similar effect. It occurred when DC dynamos were initially and suddenly switched into long transmission lines. Note the phrase (below) "bluish needles, pointing straight away from the line into the surrounding space." The effect occurred only during the instant of *initial* switch closure. (A large pulse of *stored* energy release would be expected upon *suddenly opening* a switch connected to a long DC transmission line, but this effect occurred *before* the electrical energy was actually in the line.)

and switchboard operators. In long cables, this instantaneous charge effect produced a hedge of bluish needles, pointing straight away from the line into the surrounding space. The hazardous condition appeared briefly, at the very instant of switch closure. The bluish sparking crown vanished a few milliseconds later, along with the life of any unfortunate who happened to have been so "struck". After the brief effect passed, systems behaved as designed. Such phenomena vanished as charges slowly saturated the lines and systems. After this brief surge, currents flowed smoothly and evenly as designed.

The effect was a nuisance in small systems. But in large regional power systems where voltages were excessive, it proved deadly. Men were killed by the effect, which spread its deadly electrostatic crown of sparks throughout component systems. Though generators were rated at a few thousand volts, such mysterious surges represented hundreds of thousands, even millions of volts. The problem was eliminated through the use of highly insulated, heavily grounded relay switches. Former engineering studies considered only those

For more details, see *Secrets of Cold War Technology: Project HAARP and Beyond* , Gerry Vassilatos (2000) <http://www.scribd.com/doc/15125148/Secrets-of-Cold-War-Technology> , p. 27)

Long transmission lines have two characteristics which may be relevant to the observed effect: they have a large amount of gravitational mass, and they have large loop areas (which may have been minimized for AC circuits, but not necessarily for DC circuits). Pulsing a large loop area with a fast rise-time pulse would momentarily destroy the symmetry and balance of the system with what I call the "Expansive Ether" which fills the loop area enclosed by the gravitational mass. The result could be a "backfire" of "hundreds of thousands, even millions of volts" upon connection to a dynamo producing only a few thousand volts. See further: [George Samuel Piggott Effect "Electro-Gravitation"](#) and ["Discussion"](#) . **Update:** Tesla apparently discovered a new type of electricity. See [UFO Physics](#) .

4. In the opening paragraph of the section on [Motion Cancellers](#), I said that "The resultant motions are perpendicular to the motion used for cancellation." This may help explain why UFOs are often reported as disk shaped. The electro/magnetic equivalent of the air flow across the card would be radial, and the resulting cancelled motion would be perpendicular to the disk (i.e., vertical). A disk would be the most natural form for this kind of field configuration. (See also [Reactionless Propulsion](#) and [AntigravityLoophole](#))

5. German research on the Nazi weapon described above was reportedly well underway by 1936 (Stevens, p.131). The American technical intelligence report is from 1945 (Stevens, p.174). During this period the German engineers and scientists involved in this effort would surely have noticed some levitation effects, and that in turn would have led to the development of saucer shaped flying machines within a few years. But there may have been predecessors even to that: related levitation effects were noted by George Samuel Piggott circa 1911 ([PiggottLinks](#)), by Edward S. Farrow circa 1911 ([Farrow links](#)), and [Dr Francis Nipher's electro-gravitation experiments](#) which were done circa 1916. Concurrent and even prior to all that was Nikola Tesla's experiments. And, (I find this interesting) there were waves of "airship sightings" in the late 1890s in the United States. All this suggests that these startling levitation effects could be demonstrated with electrical technology that has been known for 115 years! (http://en.wikipedia.org/wiki/Mystery_airship <http://borderlandresearch.com/book/lost-science/electric-flying-machines-thomas-townsend-brown/1>)

"UFO - NAZI Documentary 2016" <https://www.youtube.com/watch?v=vvX6H745kFU>

Possibly Relevant:

<http://journal.borderlands.com/2010/the-broadcast-power-of-nikola-tesla-part-1/> (**Gerry Vassilatos** — from Borderlands (Vol. LII, Number 2, Second Quarter 1996))

This new electrical force effect was a preeminent discovery of great historical significance. Despite his fact, few academicians grasped its significance as such. Focused now on dogmatizing Maxwell's work, they could not accept Tesla's excited announcements. Academes argued that Tesla's effect could not exist. They insisted that Tesla revise his statements.

Tesla's mysterious effect could not have been predicted by Maxwell because Maxwell did not incorporate it when formulating His equations. How could he have done so, when the phenomenon was just discovered? Tesla now pondered the academic ramifications of this new effect. What then of his own and possibly other electrical phenomena which were not incorporated into Maxwell's force laws? Would academes now ignore their existence? Would they now even dare to reject the possibility of such phenomena on the basis of an incomplete mathematical description?

<http://journal.borderlands.com/2010/the-broadcast-power-of-nikola-tesla-part-2/>

These radiant fields operated at far greater power than before. Strange effects were suddenly appearing at certain distances from the magnetic impulser. For one thing, Tesla noticed that metallic surfaces near the impulser became covered with white brush-like corona discharges. While the sparks played in trails across the metal surfaces, Tesla observed physical movement among the metal objects. Tensions and rocking motions. Both phenomena occurring simultaneously, he was utterly fascinated. The sparks themselves seemed alive. The moving metal objects seemed to suggest new motor effects.

"Propellant-less Electromagnetic Propulsion", Stavros G. Dimitriou, Dr. David King <http://jnaudin.free.fr/stvdm/doc/prplessp.htm>

"The electric waveforms used to generate the vectors of velocity and/or acceleration must have dissimilar slopes between the ascending and descending part of the signal. This is necessary in order to obtain a non-zero sum of the derivatives per period. Extensive analysis has been carried in [1] to optimize the parameters pertaining to each particular waveform.

The efficiency of the electrically generating domains of velocity and acceleration depends on the dimensions of the generating element, with regard to the fundamental wavelength of the waveform applied to it, as stated above."

"On the Existence of Undistorted Progressive Waves (UPWs) of Arbitrary Speeds $0 \leq v < \infty$ in Nature", Waldyr A. Rodrigues Jr. , Jian-Yu Lu (1997) Foundations of Physics, Vol. 27, No.3, p. 435-508 (1997) <http://link.springer.com/content/pdf/10.1007/BF02550165.pdf#page-2>

"Considerations on Undistorted-Progressive X-Waves and Davydov Solitons, Frohlich-Bose-Einstein Condensation, and Cherenkov-like effect in Biosystems", Marcus V. Mesquita, Aurea R. Vasconcellos, and Roberto Luzzi (3 June, 2003) http://www.sbfisica.org.br/bjp/files/v34_489.pdf

http://en.wikipedia.org/wiki/Plasma_antenna , <http://www.freepatentsonline.com/1309031.pdf>

Speculation on Potential Uses of Antigravity

A lot of people think antigravity is a joke, and so any uses of it are therefore purely imaginative. However, they might change their minds if they read the following:

"United States gravity control propulsion research", http://en.wikipedia.org/wiki/United_States_gravity_control_propulsion_initiative

"Emerging Possibilities for Space Propulsion Breakthroughs", Marc G. Millis (1995) http://www.nasa.gov/centers/glenn/technology/warp/ipspaper_prt.htm

"Conquest of Gravity Aim of Top Scientists in U.S.", New York Herald-Tribune, Sunday, November 20, 1955, http://www.bibliotecapleyades.net/ciencia/secret_projects/project048.htm .

"UFOs Merit Scientific Study", Hynek JA, *Science*. 1966 Oct 21;154(3747):329. PubMed PMID: 17751686.

<http://www.ufoevidence.org/documents/doc597.htm>

"I Know The Secret Of The Flying Saucers" by Maj. Donald E. Keyhoe, USMC (Ret.) (1966) <http://www.nicap.org/iknow.htm> A very interesting partial:

"With a real all-out effort this could happen a lot sooner than the 10 or 20 years many scientists have in mind.

But getting enough top men to work in the field is a problem. One scientist says, "Scientists are sensitive about their reputations and many of them still think antigravity is a joke. If they knew the facts, they'd be eager to get into it."

Fear among scientists is partially due to the Air force censorship of UFO reports. Air force censors not only hide the facts but also belittle those who publicly report UFO sightings. . . .

But AF policy notwithstanding, the drive to get the secret of antigravity is well underway. It can't be stopped now. But it *can* be speeded up. We are already spending billions on the space program – on the race to the moon, to Mars. Harnessing gravity could put us years ahead and save us enormous sums of money.

With control of the universe at stake, a crash program is imperative. We produced the A-bomb, under the huge Manhattan Project, in an amazingly short time. The needs, the urgency today are even greater. The Air Force should end UFO secrecy, give the facts to scientists, the public, to Congress. Once the people realize the truth, they would back – even demand – a crash G program.

For this is one race we dare not lose. – **Maj. Donald E. Keyhoe**" (1966)

" "Outside the Box" Space and Terrestrial Transportation and Energy Technologies for the 21st Century", Theodore C. Loder, III (2002)

Abstract : "This paper reviews the development of antigravity research in the US and notes how research activity seemed to disappear by the mid 1950s. It then addresses recently reported scientific findings and witness testimonies - that show us that this research and technology is alive and well and very advanced. The revelations of findings in this area will alter dramatically our 20th century view of physics and technology and must be considered in planning for both energy and transportation needs in the 21st century. "

"How To Investigate a Flying Saucer", Central Intelligence Agency (CIA) (January 2016)

<https://www.cia.gov/news-information/featured-story-archive/2016-featured-story-archive/how-to-investigate-a-flying-saucer.html>

". . . the CIA and USAF have learned a thing or two about how to investigate a UFO sighting. While most government officials and scientists now dismiss flying saucer reports as a quaint relic of the 1950s and 1960s, there's still a lot that can be learned from the history and methodology of "flying saucer intelligence." "

The article lists "10 Tips When Investigating a Flying Saucer". The methodology is conventional and sound, but the odd thing about this article is that the CIA seems to be recommending these procedures to the *general public* for the purpose of investigating UFO sightings. That would have made sense back in 1952 when the "Flying Saucers Problem" was a hot and openly discussed topic (http://www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0000015344.pdf) . But why now in 2016? This topic has been marginalized and ridiculed for decades. This now seems to lend it a degree of official respectability. And the recommendation to "Consult with experts" will become an invitation to stir the witch's brew as the questions won't just be about photography, weather balloons, and swamp gas. (See [UFO Physics](#), below; also the CIA has, in the past, encouraged reports of UFO sightings as a cover for the U2 program. See "6 decades of UFO sightings & Evidence", Nick Cook <https://youtu.be/cSCMhDEecQM> 1:40:53)

"Secrets of the Saucer Scientists", William F. Hamilton

III <http://www.ufoevidence.org/documents/doc1756.htm>

Project

Greenglow <http://projectavalon.net/forum/showthread.php?t=9386> <http://projectavalon.net/forum/4/>

"Antigravity update" N'Elkan Institute (2012) <http://www.nelkan.com/institute/winning-the-human-race/>

Antigravity is no joke. This is serious stuff.

The term "antigravity" as used below is defined as:

The ability by technical means to exert a mechanical push or pull on a target object of any material composition located at a distance without actually touching it with radiation, particles, or electric or magnetic fields. The mechanical effect "propagates" instantaneously and does not show wavelength, phase, or aberration effects like light. The effect can be focused, shaped, or concentrated in some manner, as is currently done with magnetic or electric fields, but not in the manner done with light or electromagnetic radiation. The effect can produce self-levitation or self-propulsion when applied back upon the mechanism generating the effect (a.k.a. non-Newtonian "bootstrapping"). Additionally, generation of the effect might involve a non-Newtonian radial reaction confined within the generating apparatus.

The term "field propulsion" is probably preferable to the more popular term "antigravity", as the latter implies that a gravitational field (e.g., from a planet) is necessary for propulsion. A field propulsion system would work just as well in deep intergalactic space. Rocket propulsion is like someone sitting in a boat and throwing bricks out the back end to get the boat to move. Field propulsion, in contrast, is like someone dipping oars directly into the water and exerting a force directly on the medium. The medium in this case is the fundamental space/time (*not* "space-time") structure of the physical Universe itself.

Hundreds of years ago, electric and magnetic phenomena were thought to be unrelated. But the later experiments of Gauss, Faraday, Maxwell and many other investigators showed that they are actually related in very definite ways. Nowadays conventional science suspects that the gravitational field is also somehow related to electric and magnetic fields. But modern progress in this area has been minimal, and gravitation remains an oddball that has not been "unified" with the other fields.

The various articles above suggest that there is a clear dimensional relationship between electric (t^1/s^1), magnetic (t^2/s^2) and gravitational (t^3/s^3) fields. These fields were treated as multidimensional *motions* (space/time ratios) rather than as some sort of mysterious action-at-a-distance effect. In principle, the concept of motion is completely understandable by the human mind. In practice, particularly as used here, some education of our intuition is definitely required. Motion of our ordinary experience is expressed as s/t ; this could be the motion of a raindrop falling through the atmosphere. Motion expressed as s^2/t would be like the motion of dots on the surface of an expanding sheet of rubber, or the motion of picture elements as a camera zooms in on a scene. Motion of the t/s form has no "path" in space, and requires "field equations" for its description. Rotational motions of either the s/t form or the t/s form are much less intuitive, as are combinations of "motions-of-motions" like momentum (t^2/s^2) which is a combination of linear spatial motion (velocity) and rotational temporal motion (mass). Every physical property can be expressed as some sort of space/time ratio ([see article](#)).

As you can see, the concepts can get messy very quickly, but with better exposition, better examples, more comprehensive equations, better experimental insights, etc., we should still be able to understand these things. They are not inherently beyond our comprehension.

We have already seen that mass (t^3/s^3) can be combined with electron current (space per time) to give a resultant magnetic field: $(t^3/s^3)(s/t) = (t^2/s^2)$ Note that the field remains "bound" to the mass that is so treated. The big questions implied now are:

1. Can *mass* be combined with yet another kind of motion so that its interaction with other masses becomes repulsive instead of attractive? Rotation, or combinations of rotations, would be a good candidate for investigation. See [effects of spinning an ordinary object](#). Other possibilities involve rotating magnetic fields, or asymmetrically pulsed monopolar electric fields.

2. Can concepts like permittivity and permeability be extended to some kind of "gravity saturable" material? *

3. Are there special materials (akin to dielectric and ferromagnetic materials) that can facilitate the utilization of such a property? If "nuclear spin" is involved in this, for example, then it might be productive to see how something like deuterium would respond to special configurations of electric and magnetic fields. A deuteron has a spin of +1, making it a boson. (http://en.wikipedia.org/wiki/Deuterium#Spin_and_energy) Bosons tend to clump into the same state—a trait that might be useful in this connection. But non-local physics (time/space) is so different from local physics (space/time) that even conceiving of a machine to utilize this trait for such a purpose would be difficult for us denizens of locality. Physicists will probably see the effect as an "anomaly" produced by an accidental and "useless" configuration of fields. (See [Piggott](#) for an example)

Other possibilities involve super- or hyperdeformed nuclei or excited spin states:

<http://en.wikipedia.org/wiki/Superdeformation>

<http://en.wikipedia.org/wiki/Hyperdeformation>

<http://www.webelements.com/gadolinium/isotopes.html>

<http://www.webelements.com/terbium/isotopes.html>

<http://www.webelements.com/dysprosium/isotopes.html>

<http://www.webelements.com/mercury/isotopes.html>

<http://www.physics.fsu.edu/GS10Yr/FallonNS06.pdf>

"From Single-Particle to Superdeformed: a Multitude of Shapes in MERCURY-191 and a New Region of Superdeformation", Ye, Danzhao (1991) *Dissertation Abstracts International*, Volume: 52-06, Section: B, page: 3125.

"Superdeformed bands in ^{150}Gd and ^{151}Tb : Evidence for the influence of high-N intruder states at large deformations" P. Fallon, A. Alderson, M.A. Bentley, A.M. Bruce, P.D. Forsyth, D. Howe, J.W. Roberts, J.F. Sharpey-Schafer, P.J. Twin, F.A. Beck, T. Byrski, D. Curien, C. Schuck Pages 137-142 *Physics Letters B*, Volume 218, Issue 2, Pages 119-262 (16 February 1989) [The article says that in some element isotopes, the values of dynamic moments of inertia are high at low spin speeds and decrease rapidly at high spin speeds Gadolinium150, Terbium151, but for others (Dysprosium) they are almost constant.]

"Nuclear Moments of Inertia at High Spin, M. A. Deleplanque
(1982) <http://www.osti.gov/bridge/servlets/purl/6593868-XcDoVC/6593868.pdf>

* "Guidelines to Antigravity", Robert L. Forward, Hughes Research Laboratories, Malibu, California, *American Journal of Physics*, Vol. 31, No. 3, 166-170, March, 1963 (Received 12 September 1962) http://www.academia.edu/3336384/Antigravity_-_by_Robert_L.Forward

"In studying analogies between electromagnetism and gravitation, it can be seen that one analogous quantity has not been investigated. This is the gravitational equivalent to the magnetic permeability. Electrical power distribution systems depend upon the anomalously large and nonlinear permeability of iron and other magnetic materials. Since all atoms have spin, all materials will have a gravitational permeability which is different from that of free space. Rough calculations show that this difference is very small, but experimental investigation may find materials with anomalously large or non-linear properties that can be used to enhance time-varying gravitational fields. Also, since the magnetic moment and the inertial moment are combined in an atom, it may be possible to use this property to convert time-varying electromagnetic fields into time-varying gravitational fields."

Actual experiments suggest that antigravity is definitely within reach of the technology available today, and might even be closer than most of us think. Fuller development of this technological capability will have many applications and many serious implications. I list a few of the more interesting ones below (construction equipment, terrorism, cheating at sports, etc., have not been included):

- **Safe, inexpensive access to space:** Access to low Earth orbit presently costs about \$10,000 per pound of payload. Hazardous propellants, special launch facilities, extensive ground crews and supporting equipment are required. The launch vehicles are not readily reusable like a commercial airliner. A propulsion system based on antigravity would strongly reduce launch costs, perhaps to less than \$1 per pound. Both launch and re-entry could be done at low speeds, greatly reducing risks. Access to low earth orbit would become as routine as ordinary intercontinental commercial air flights are today. Weight would apparently not be a problem; the kind of forces involved in such a propulsion system are 10^{40} stronger than gravity. Hovering over a location could be done without expenditure of energy (work is defined as force moving through a distance; how much energy does the Sun expend keeping the Earth in orbit?).
- **Access to the stars directly from earth:** With antigravity, flight to the stars and planets could be done directly from Earth without any need for intermediate bases on the Moon or Mars. Complete spacecraft could be assembled and provisioned here on Earth, instead of in space.
- **Adjustment of satellite orbits directly from Earth:** Communication satellites in synchronous orbits need small "station keeping" adjustments periodically. With antigravity as a maneuvering system, these adjustments could be done indefinitely because there is no depletion of propellant. Satellite orbits could also be altered by beaming a push or a pull from Earth, although this would require very precise aiming capability and probably several widely-separated beam sources.
- **Disposal of space junk:** Close Earth orbit currently has thousands of pieces of "space junk" flying around at very high speeds. With Earth-based antigravity, this junk could easily be de-orbited and allowed to burn up in the atmosphere.
- **Direct production of motion:** motion can be produced directly with this technology. There is no need for gears, bearings, cranks, pistons, turbine blades, wheels, lubricants, rockets, etc.

Friction would be minimal and conversion efficiencies very high. Basic machines would be simple and easy to manufacture.

- **Advanced personal transportation:** With antigravity, you could drive your vehicle anywhere in the world (even across oceans) on electronically defined paths. Such a vehicle could move in outer space as well as under the ocean. Speeds could be high. Distances to shopping centers would become trivial, even if hundreds of miles away from home. Roads would not be needed. The real estate market would be drastically altered.
- **Control of weather:** Use of antigravity would allow us to move hurricanes, tornadoes, deflect floods, and blow back forest fires.
- **Create perfect vacuum pumps:** Even a weak antigravity field could be used to sweep residual air molecules remaining at high vacuum into a collection port where they would be removed by a conventional turbo-molecular pump. Almost perfect vacuums would be obtainable even in large and slightly leaky vessels (A single finger print on the wall of a high-vacuum vessel can require 24 hours for the removal of volatile components).
- **Suppression of aircraft sonic booms:** A high-speed antigravity craft could be configured to move the air out of its forward path such that the air becomes increasingly rarefied nearer the craft. A sonic boom could not develop with such a configuration. Additionally, ordinary aircraft are supported by a pressure wave, which makes the magnitude of the sonic boom proportional to aircraft weight. But this would not be true of an antigravity craft, which gets its "lift" from a completely different source. (See <http://www.answers.com/topic/sonic-boom> Sonic boom suppression is already possible today through the use of electric fields; [see article](#))
- **Long-range navigational deflection for spacecraft:** A spacecraft moving at the speed of light could clear the path ahead of it. Interstellar space is generally quite empty, but even micron sized particles could pose a hazard to spacecraft moving at these speeds. High speed impacts by gas molecules could result in structural erosion, as well as collision generated gamma radiation which would be hazardous to the crew and electronics (like living inside of a particle accelerator). Another problem is ambient light. At relativistic speeds, microwaves and ambient starlight, X-rays, and gamma rays will be blue shifted to higher energies as viewed in the forward direction from a spacecraft. This, combined with the [relativistic headlight effect](#), could make for a formidable heating effect.
- **Short-range thermal insulation for spacecraft:** A spacecraft exploring a planet with a hot, corrosive atmosphere (like Venus) could insulate itself by repelling all external gas molecules away from its hull. This would be equivalent to placing the spacecraft inside a vacuum bottle.
- **Instantaneous interstellar communication:** Antigravity, as defined above, could be used for instantaneous communication over distances of light years. Instantaneous interstellar communication is probably best accomplished with the currently envisioned schemes that use "entangled" photons. Communication channels that use gravitational pulses would have relatively low bandwidth but would not require repositioning of special equipment containing precorrelated photons.
- **Alteration of planetary orbits:** The ellipticity, revolution rate, rotation rate, and polar orientation of a planet (or moon) could be altered by the use of antigravity technology.
- **Manipulation of light:** Antigravity technology would be able to create concentrated, extremely powerful gravitational fields. The effects should be strong enough to readily bend a beam of light. This opens up all sorts of possibilities in the science of optics:

Gamma ray focusing: Currently X-rays can be focused by grazing incidence mirrors. I know of no such devices for gamma rays, which have much higher energies.

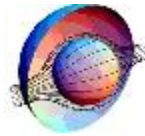
Giant aperture telescopes: In our huge universe, light is actually rather slow. Why bother with telescopes if we can just send a probe there and back at speeds much faster than light? One answer is that light carries a lot of useful information, and large surveys can be done rapidly from telescopes on Earth. Antigravity will not

make telescopes obsolete, but might be used to enhance their resolving power and extend the available spectrum.

Cloaking: It is probably possible to bend light around an object such that the light "flows" in a streamlined fashion. If so, the object would become invisible, at least from one point of view. Shielding a spacecraft from gamma rays might also be possible.

An interesting but different method of cloaking by the use of metamaterials can be found at:
<http://www.msnbc.msn.com/id/12961080/> by Alan Boyle, Science editor, MSNBC:

"Here's how to make an invisibility cloak. Theoretical cloaking device could soon become reality (sort of)"



"The black lines in this drawing show the path that light rays would take through a theoretical cloaking device. The device's metamaterial would be patterned in such a way to route the rays around the cloaked sphere."

- **Extreme pressure experiments:** Antigravity fields could be shaped with techniques analogous to what is done today with electric and magnetic fields, except that the effect is expected to be much more compact. Because the primary effect is mechanical, it should be possible to make devices that can produce extreme pressures. This capability could be used to study material at extreme densities (such as that inside the Earth or stars). Because physical-mechanical contact is not necessary, experiments can use BOTH extreme temperatures and extreme pressures. This capability may also make certain industrial processes more economical, such as chemical process operations that use supercritical solvents (<http://www.isopro.net/web8.htm>), or for making large diamonds for heatsinks and lenses, or for making high energy-density explosives. (See: "Nitrogen Power: New crystal packs a lot of punch", Alexandra Goho, Science News, July 17, 2004, Vol. 166, p.36-37, www.sciencenews.org/articles/20040717/fob4.asp and [high energy-density materials](#))

"Hypergravity helping aircraft fly further", Phys.org (2012) ["using titanium aluminide would reduce their weight by 45% over traditional components"] <http://phys.org/news/2012-11-hypergravity-aircraft.html>

If that seems too hard to imagine, see what can already be done with a powerful magnetic field. This link shows how a magnetic field can be used to shrink a U.S. metal coin to about 75% of its original diameter: <http://www.magnet.fsu.edu/education/tutorials/slideshows/shrinkingquarter/index.html> . The gravitational version of this experiment would be continuous, rather than pulsed, and far more powerful. (See also "Electromagnetic hammer" <http://www.youtube.com/watch?v=5inJ7sDndBI&feature=related>)

- **Deep sea exploration:** A vessel designed for deep sea exploration could fly from an inland base directly to the destination, submerge, and begin exploration. No support from a surface vessel would be needed. No propellers would be needed either because the propulsion system would be contained entirely inside the submersible. Such a vessel would be safer, require less maintenance, and be far more convenient to use than those available today.
- **Industrial processing:** Any industrial process that uses gravity or centrifugal separators to separate materials might benefit from a perfected antigravity technology. This would be especially true for substances that have only slight differences in densities such as atomic isotopes. (of interest: <http://techxplore.com/news/2017-01-whirligig-toy-bioengineers-cent-hand-powered.html>)

- **Medical uses:** A rotationless centrifuge could be used for separation of serum components and faster measurements of sedimentation rates. Non-contact levitation of patients (e.g.: burn victims) might also be possible.
- **Clearing of mine fields:** Land mines could be exploded remotely. Suppressing or containing the effects of the explosion would also be possible.
- **Pop-in reconnaissance:** An antigravity craft would be able to move with very high speeds and very high accelerations. Conceivably, it should be able to "pop-in" noiselessly at a target location, take a bunch of photos, and then suddenly depart—all within a few tenths of a second. Such a visit would be hard to detect visually. Observers who witnessed the visit might not be sure of what they saw, especially at night, and especially if there were some manufactured distractions.
- **Missile shield/satellite killer/asteroid deflector:** A target that is hit with a powerful, rod-shaped antigravity beam will experience high shear forces unless the beam envelopes the entire target. The effect would be like shooting a thin walled tube through a layer cake; a "plug" of all layers would be expelled intact, leaving a clean hole through the cake. This would certainly disrupt the operation of the missile or satellite (or spacecraft, or building, underground bunker, etc). A less powerful beam would simply damage it or push it away or alter its trajectory. The latter could be used to alter the incoming trajectory of a rogue meteor or asteroid, thereby avoiding catastrophic damage to structures on the ground. Only a few hours of warning would be needed.
- **Mega-gravity:** This is the opposite of antigravity. It is a technology that would presumably be possible when the science of antigravity is figured out. It could be used to make the weight of something *much* greater than normal. Obvious applications would be motionless centrifuges and vacuum pumps, industrial processes that require extreme pressure. Artificial gravity for spacecraft interiors should also be possible.
- **Utilization of Non-local effects:** It is reasonable to assume that non-local effects would accompany the "territory" of antigravity phenomena. It is not clear just what they would be, but might include "anomalous mixing of materials", "disintegrator beams", and "delocalization of objects" (meaning that they become invisible, or seemingly immaterial or spatially non-contiguous, wholly or partially). Spatial "blackout" effects might also be observable.

I think one of the best applications will be a startlingly new type of remote sensing. I am struggling with how to illustrate this. Perhaps these thoughts will help. Our perception depends on how an observer's motion couples to the motion of the object he is trying to perceive. If the observer is stationary and looks at an airplane propeller mounted on an airplane wing, he can see it clearly if it is stationary as well. But if it is rotating, it becomes nearly invisible. However, if we set up a camera, give it the characteristics of the human eye, and then rotate it to give it the kind of motion possessed by the rotating propeller, the propeller becomes visible again. But other things disappear. The wing and background, for instance, cannot be seen anymore. Some parts may be visible in either system; the engine cowling, which may have a rotational symmetry, may still be visible (an effect that might baffle the observer). (Compare medical X-ray stratigraphy. See "Medical X-Ray Techniques In Diagnostic Radiology", G.J.van der Plaats, P. Vijlbrief <http://www.amazon.com/Medical-X-Ray-Techniques-Diagnostic-Radiology...> page 261, "Special Radiographic Techniques")

Suppose now we attach temporal motion to an object, say, by means of powerful, specially configured electrical and magnetic fields. The object now has a different type of motion than the observer has, and it can disappear from view. But it is not just optically invisible. It has actually "delocalized"; it is not "there" anymore as a spatially contiguous physical object. It has shifted to a "when" type of location while the observer is in a "where" type of reference system. If we could invent a special camera with the same kind of temporal motion, this delocalized object

would become visible. But all the normal spatial stuff would become invisible. This implies that you could see right through a building, maybe even a planet. Temporal structures would become visible and the normal spatial structures would become transparent. This could lead to a fantastic new form of remote sensing. (Is *this* what UFOs are doing when they are seen leisurely hovering near the ground? . . . taking a survey of structures with temporal signatures?)

Possibly relevant: Transparent UFOs:

http://www.youtube.com/watch?v=WILN_Jcg1pc&feature=player_embedded#t=157
<http://unitedstatesufo.blogspot.com/2011/12/semi-transparent-long-tubular-ufo.html> ; <http://www.examiner.com/article/colorado-couple-v-shaped-semi-transparent-ufo-flew-low-and-silent> ; <http://the-v-factor-paranormal.blogspot.com/2012/02/huge-semi-transparent-v-shaped-ufo-over.html>
<http://ufodigest.com/article/illinois-witnesses-watch-triangle-ufo-become-transparent>

"UFO NEWS 2014 UFO ENCOUNTER JUNE 10 1931
82414" <http://nyufo.bravesites.com/entries/ufo-news/ufo-news-2014-ufo-encounter-june-10-1931-82414-> , <http://www.abovetopsecret.com/forum/thread600397/pg1>

Compare

similarities: <http://www.ufoevidence.org/topics/hudsonvalley.htm> ; <http://www.cbron.com/news/nation-world/space/article/Mystery-lights-over-Houston-keep-people-talking-5691206.php> ; <http://www.syracusenewtimes.com/26-july-2014-ufo-new-york-lights/>

See also the links listed in [The Hutchison Effect](#).

If you have trouble with the mental gymnastics of comprehending how something would appear in a different reference system, consider the technology of [holography](#), [spread spectrum signaling](#), and [cryptography](#). These convert ordinary comprehensible images or information into "noise". The information still exists in an intact, definite, form however, and can be converted back into its original form with the proper equipment and algorithms. Similarly, the link between a "where" type of reference system and a "when" type of reference system is encoded in the *motion* used to convert from a gravitational reference system to some other kind of system. The key question is: What type of *momentum*, temporal or spatial, is the object taking on relative to the reference system?

Another possible application is instantaneous communication. A message can be "written" directly at the destination without having to transmit it through intervening space. Likewise, a "bomb" ("bundle of energy"?) could be delivered to a destination without traversing the intervening space (a rather scary prospect!). See also [GammaBurst](#) . Presumably, physical objects could be transferred in a similar manner (e.g.: UFOs would not need doors for occupant entry/exit.) See also [Ball Lightning](#) ("Some appear within buildings passing through closed doors and windows. Some have appeared within metal aircraft and have entered and left without causing damage")

Rapid construction of tunnels might be another application. The "dirt" is simply delocalized (scattered to different where/when locations in the Universe). Huge tunnels and caverns could be made without having to haul away dirt or rock.

There are thoughts even today about using non-local effects for remote sensing:

Because time and gravity are innately linked . . . researchers would be able to use a clock as a sort of scale, correlating subtle fluctuation in a clock's ticking

rate with the mass below it. Clocks flying above enemy territory could detect missing mass below the surface—perhaps the location of a secret underground tunnel or cave. ("Quantum Timekeeping", Andrew Grant, *Science News*, March 8, 2014, p. 22 <https://www.sciencenews.org/article/quantum-timekeeping>)

[Non-local effects](#) are not limited by spatial contact or spatial proximity or spatial barriers. This opens up a completely new way to manipulate things in our physical universe (even including atomic structure). To most of us, such effects will seem magical and almost beyond belief. (See also: [In Search of the Geometry of Space, Time, and Motion](#), [Speed of Gravity](#), [Speed of Electric Fields](#))

See also <http://georesonance.com/>

"If not us, someone else will lead in the exploration, utilization and, ultimately, the commercialization of space, as we sit idly by."

A Journey to Inspire, Innovate and Discover [by using obsolescent technology], p. 12,
June 2004, http://www.nasa.gov/pdf/60736main_M2M_report_small.pdf

"This was a failure of policy, management, capability, and above all, a failure of imagination."

—Tom Kean, chairman of the commission investigating the September 11, 2001, attacks

"Boldly go where no man has gone before." —Star Fleet
"Look with favor upon a bold beginning." —Virgil

html 7/2004

What is a UFO?

"The Battle Of Los Angeles"

Test your opinion about "What is a UFO?" by reading about "The Battle Of Los Angeles" (<http://www.rense.com/ufo/battleofla.htm> , <http://www.militarymuseum.org/BattleofLA.html> , http://rationalwiki.org/wiki/Battle_of_Los_Angeles <http://www.youtube.com/watch?v=tAag2hn2w-w&feature=youtu.be> <http://youtu.be/1rv9Fpp2eQA>). On February 25, 1942, around 3 a.m., a UFO was sighted over Los Angeles, California. The Army fired 1,430 rounds of anti-aircraft shells at it with no effect on the object. About 100,000 or more people witnessed the incident. What do you think it was?



Spotlights and Antiaircraft fire over Los Angeles

<http://www.militarymuseum.org/BattleofLA.html>

Washington D.C. UFO incident

Also well-publicized was a series of UFO sightings in Washington, D.C. during July 1952:

"1952 Washington D.C. UFO

incident" http://en.wikipedia.org/wiki/1952_Washington_D.C._UFO_incident

"The sightings of July 19–20, 1952, made front-page headlines in newspapers around the nation."

"UFO over Washington DC. Film Footage from 1952" <http://www.youtube.com/watch?v=sTZ7O9cfpPQ> :



<http://www.youtube.com/watch?v=sTZ7O9cfpPQ>

"UFO - OVNI - UFOs In Washington D.C - 60 years ago" <http://www.youtube.com/watch?v=hObI12DD3-Y>

"UFOs in Washington D.C July 12, 1952 and Gen. Samford UFO press conference Pentagon, July 29, 1952" <http://www.youtube.com/watch?v=1iER6ESzscY>

"Washington 1952 UFO 'Flap' Video" <http://www.youtube.com/watch?v=hI4XJ3IsLDs&feature=related>

"1952-Washington D. C. Buzzed by UFOs", Billy Booth <http://ufos.about.com/od/visualproofphotosvideo/p/washingtondc.htm>
"The capabilities of the UFOs were far beyond our technological proficiency at the time."

By the time our first missions were off the ground, the UFOs were nowhere to be seen. But, when our planes returned to ground, the UFOs were back, as if taunting our defenses. For hours, U.S. planes chased the illusive targets, yet without success. Pilots could actually see the perplexing objects, but as they approached, the lights of the UFOs vanished."

"Washington DC UFO Merry go round" http://www.youtube.com/watch?v=S75oeBhhAbI&feature=player_embedded

UFO Sightings Washington DC. July 12 1952 http://www.youtube.com/watch?v=hObI12DD3-Y&feature=player_embedded

Invasion Washington: UFOs Over the Capitol, Kevin D. Randle (2001)

"First Contact Special Edition: 1952 UFO Eyewitness Howard Cocklin", <http://youtu.be/UQwwl1ln30Y>

Farmington UFO Armada:

<http://www.theufochronicles.com/2007/05/huge-saucer-armada-jolts-farmington.html>
<http://ufoevidence.org/cases/case880.htm>

<http://hubpages.com/religion-philosophy/The-Farmington-New-Mexico-UFO-Armada>

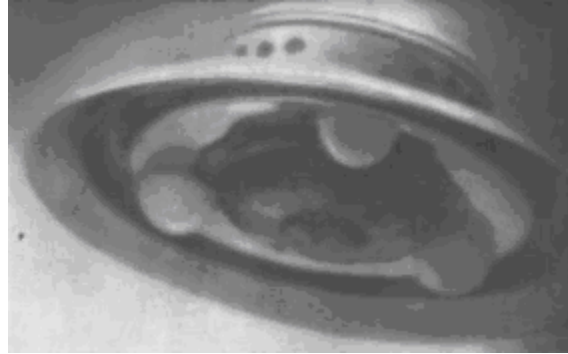
(related: <http://www.openminds.tv/amazing-first-hand-ufo-testimonials-from-dulce-new-mexico-families/35382>)



The Farmington Daily Times
March 18, 1950

If you are searching for information on UFOs, be aware that the names have been changed: UFOs are now "Unidentified Aerial Phenomena" or "unconventional aircraft" or "unconventional helicopters", etc. This change helps to abandon the popular connection between "UFOs" and "space aliens". Pilots and other observers are more willing to file reports on UAPs than on UFOs. If you are filing inquiries under the Freedom of Information Act, you need to play "exact word games". The authorities no longer investigate so-called "UFOs".

Some believe that these objects are man-made, being a secret Nazi technology within a secret society (or civilization) that survived WW II. What do you think?



http://en.wikipedia.org/wiki/File:George_Adamski_ship_1.jpg (Alleged photo of Haunebu II UFO from 1952)
<http://www.adamskifoundation.com/html/AboutGA.htm> (Attributed opinions about authenticity)

Hitler's Flying Saucers -A Guide to German Flying Discs of the Second World War, Henry Stevens (2003)

<http://www.tiono.com/model/FlyingSaucers.pdf> http://www.bibliotecapleyades.net/ufo_aleman/rfz/

"Because the object is unidentified, the object's source is also undetermined. Only a leap of faith can connect UFOs to an extraterrestrial course without first introducing proof. A radical hypothesis such as an extraterrestrial origin of UFOs requires overwhelming proof in order to be generally accepted. No such overwhelming extraterrestrial proof has ever been offered which has stood up to scrutiny. No crashed alien craft have ever been produced by anyone, inside or outside government. Likewise, no alien bodies have ever been found. No extraterrestrial culture, or alien technology has ever been uncovered by anyone. There is simply no actual evidence at all linking UFOs with an extraterrestrial source. Therefore, no such leap of faith should be made. We need to start all over again. All rational earthly explanations need to be exhausted before any extraterrestrial theories are even put forth.

Unfortunately, the simple truth is that, for the most part, UFO research has done a leap-frog to the extraterrestrial explanation without ever adequately exploring and exhausting a terrestrial origin. This statement is inclusive of everyone regardless of background or education. It applies to the charlatan UFO attention getters as well as to former NASA scientists with Ph.D.s. This is the condition of our current state of affairs in the UFO world.

...
Already in this brief discussion, the evidence, taken as a whole, is overwhelming. Please compare this to any and all extraterrestrial explanations of flying saucers. Here we have Germans who claim to have invented the idea of the flying saucer. We have Germans who claim to have designed flying saucers. We have Germans who claim to have built flying saucers. We have Germans who claim to have flown flying saucers. We have Germans who claim to be witnesses to flying saucers known beforehand to be of German construction. We have German construction details. And finally, we have a man who took pictures of a known German flying saucer in flight. The facts speak for themselves. During the Second World War the Germans built devices we would all call today "flying saucers". No other UFO explanation can even approach this in terms of level of proof." (*Hitler's Flying Saucers -A Guide to German Flying Discs of the Second World War*, Henry Stevens (2003) <http://www.tiono.com/model/FlyingSaucers.pdf>)

(My aside regarding a standard of proof: I can truthfully say that I have touched a piece of the moon (obviously extraterrestrial). I did it when I visited the National Air and Space Museum in Washington, D.C. decades ago. A little piece of moon rock was on display for people to touch. I thought "Who would want to touch a piece of rock from the Moon?" But no one was in line, and so I went over and touched it, just so I could say I did. Millions of other people have done the same. Can we do the same kind of thing for "extraterrestrial UFO artifacts"? Can you go to a museum and touch an extraterrestrial UFO seat cushion, or a star map, a family photo, a charm, a glove . . . anything?

Collecting data on UFO sightings is in an altogether different category. Collecting data on sightings is loosely like an astronomer collecting data on supernova explosions, except that the astronomer's data is much more precise, and he understands the object of his

study. Neither can be called "laboratory experiments", but eventually, commonalities will show up in the data sets, and some conclusions can be drawn.

Originally I thought UFOs were a kind of silly, "fringe" topic, evoking images like those on the front page of *National Enquirer* titled "President consults with space aliens"—ridiculous stuff I see at the checkout stand. Indeed, I had browsed through one supposedly authoritative book on free energy devices, but it was full of obfuscatory impressive-sounding technobabble and was scientifically useless. Still, my studies in quantum mechanics and electromagnetics suggested that antigravity ought to be doable, and, once we figure it out, *easily doable* at that! And if I could develop these insights, surely someone else could too. But if it is so easy, why aren't numerous people building these machines? Why aren't UFOs being seen all over the world and reported in the newspapers?

Normally, science depends on open discourse and discovery for its progress. But this is not the case with military science. Advanced developments will be kept secret for military advantage. Hence, two versions of science develop in parallel: one for public consumption and another for the military (usually accessible only on a "need to know" basis). When the public version catches up to the military version, the latter can be declassified and become public. UFOs then, could be a manifestation of a deep, dark, secret research project, possibly military in character. Reluctantly, I decided I had to look into this topic—one that no physicist would touch—expecting to sift through a lot of "nut case" literature just to see what I could find. To my utter surprise, some of the literature on this topic turned out to be quite well-researched and carefully reasoned (though necessarily somewhat speculative). I started with *Hitler's Suppressed and Still Secret Weapons, Science and Technology* by Henry Stevens, quoted above. Works by various other authors are listed below.)

See also:

"Unacknowledged special access programs", Joël van der Reijden (2005) http://www.bibliotecapleyades.net/sociopolitica/sociopol_usap.htm
"Top Secret Black Projects – Unacknowledged Special Access Programs", <http://www.abovetopsecret.com/forum/thread613064/pg1>
http://en.wikipedia.org/wiki/Special_access_program

"Nazi UFO ☯ Bell Flying Saucer Cover up Ancient Alien UFO Secret Technology 🕒 the History Project" <http://youtu.be/UI0Z6qZkFYo>

Dark Star, Henry Stevens (2011)

http://www.amazon.com/Dark-Star-Hidden-History-U-Boats/dp/193548740X#reader_B005LQQWU0

Hitler's Suppressed and Still Secret Weapons, Science and Technology, Henry Stevens (2007) http://www.amazon.com/Hitlers-Suppressed-Still-Secret-Weapons-Technology/dp/1931882738#reader_1931882738 (My review: these are both very well researched, thought-provoking books and are well worth reading.)

Reich of the Black Sun, Joseph P. Farrell (2004)

The SS Brotherhood of the Bell, Joseph P. Farrell (2006) My review: These highly interesting and well written books (usual misspellings excepted) describe various facts, legends, history, suppositions, etc. of the Nazi SS super high technology "wonder weapons" development during and somewhat after World War II. The Nazis apparently had built atom bombs but the war ended before they were able to deploy them. They were also working on other weapons that had far more terrifying and powerful capabilities, ones that would make the atom bomb seem feeble:

"This could only mean that there was a weapons system that possessed enormous range and degree of efficiency that lay beyond the nuclear weapons technology. Did the Third Reich really prepare the Doomsday Weapon? And if so, where is the technology today? Was it discovered by the Allies or does it lurk secretly deep in the earth waiting for its rediscovery? If such an Ultimate Weapon has already been in existence for more than fifty years, then it is a legitimate question to ask what today's military really, actually possesses." (page 96, quoted from *Das Geheimnis der deutschen Atombombe: Gewann Hitlers Wissenschaftler den nuklearen Wettlauf doch? Die Geheimprojekte bei Innsbruck im Raum Jonastal bei Arnstadt und in Prag*, Edgar Mayer and Thomas Mehner (2001) p. 89)

The Bell makes comments about the "monstrous physics" discovered and developed by the Nazis that "totally abandoned conventional physical laws" (page 220-221). These are described as "scalar waves", "longitudinal waves", "vorticular physics", etc. However, this just seems to be a lot of popular technobabble. The key words today should probably be "non-local physics", "nuclear spin", and a mathematical creature called "curl". The Nazis apparently discovered new, unconventional ways of applying these concepts to electric and magnetic fields. The results and capabilities would be astonishing—even seemingly magical—to the modern physicist. Our institutions cannot currently handle these concepts because the required paradigm shift is enough to choke a swampful of alligators,

and our staid, complexity-loving, overfunded atherosclerotic institutions are just not willing to go in wildly new directions. (See also: [In Search of the Geometry of Space, Time and Motion](#) , [Reactionless Propulsion](#), and [The Problem of Quantum Locality](#))

The Truth about the Wunderwaffe, Igor Witkowski, 2nd ed. (2013)

Saucers, Swastikas and Psyops, Joseph P. Farrell (2011)

Secrets of the Third Reich: The Rediscovery of Vimanas <http://www.youtube.com/watch?v=8ryS1o0u31E>

Man-Made UFOs 1944-1994 50 years of Suppression, Renato Vesco & C. H. Childress (1994). The title of this book says it all. It is "a comprehensive and in-depth look at the early 'flying saucer' technology of Nazi Germany and the genesis of early man-made UFOs . . ." (back cover). It is quite interesting from an historical perspective and is well-researched, well-written, and has abundant illustrations. It could use an index however. My favorite samplings:

What becomes clear to researchers into man-made UFOs and early German discoid craft is that this technology is real, "Above Top Secret," and is possessed by various groups on this planet today. Not only are the Americans and British said to have this technology but so do such countries as Russia, China, France, Italy, Israel, and Chile. Private corporations, individuals and agencies are also claimed to possess "craft." (p. 369; see also [quiz](#) above)

In June of 1936 Marconi demonstrated to Italian Fascist dictator Benito Mussolini a wave gun device that could be used as a defensive weapon. . . . Marconi demonstrated the ray on a busy highway north of Milan one afternoon. Mussolini had asked his wife Rachele to also be on the highway at precisely 3:30 in the afternoon. Marconi's device caused the electrical system in all the cars, including Rachele's, to malfunction for half an hour, while her chauffeur and other motorists checked their fuel pumps and spark plugs. At 3:35 [*sic?*] all the cars were able to start again. Rachele Mussolini later published the account in her autobiography. (p. 362)

It also comments (p. 338) on Air Force Regulation 80-17 , which I quote here, in part, from another source (<http://www.cufon.org/cufon/afr80-17.htm>):

AIR FORCE REGULATION 80-17

DEPARTMENT OF THE AIR FORCE
Washington, D.C. 19 September 1966
Research and Development
UNIDENTIFIED FLYING OBJECTS (UFO)

This regulation establishes the Air Force program for investigating and analyzing UFOs over the United States. It provides for uniform investigative procedures and release of information. The investigations and analyses prescribed are related directly to the Air Force's responsibility for the air defense of the United States. The UFO Program requires prompt reporting and rapid evaluation of data for successful identification. Strict compliance with this regulation is mandatory.

. . .

2. Program Objectives. Air Force interest in UFOs is two-fold: **to determine if the UFO is a possible threat to the United states and to use the scientific and technical data gained from study of UFO reports.** To attain these objectives, it is necessary to explain or identify the stimulus which caused the observer to report his observation as an unidentified flying object.

- a. Air Defence. The majority of UFOs reported to the Air Force have been conventional or familiar objects which pose no threat to our security.

(1) It may be possible that foreign countries may develop flying vehicles of revolutionary configuration or propulsion.

UFOs have, with impunity, invaded restricted airspace, prowled around nuclear missile sites, destroyed radar installations, and are capable by far, of out-maneuvering the most advanced military fighter aircraft any nation has produced. Popular opinion seems to favor the idea that this technology is extraterrestrial, being developed by "space aliens". But if in fact it has been *developed by humans*, this prospect is *even more frightening!* Does only one group or country have this capability? Or is there a "balance of power" —some equivalent of Mutual Assured Destruction (MAD)? How are they financed? Where is the manufacturing done? How has the science been help secret for so long? How did our proud country (or anyone's) "miss the boat"? Should we continue to develop rockets for space exploration, or develop other far superior technologies (which someone obviously possesses)? All sorts of awkward, agonizing questions can be raised. Some of these questions are addressed in this book.

Vesco's book also has an important chapter, *The Advent of "Suction Aircraft"*. Aerodynamic drag could be significantly reduced by sucking in the boundary layer on portions of a wing surface. The effect had practical limits when applied to conventional aircraft. It would work better if the fuselage could be eliminated. And so the next incarnation was a flying wing. An even fuller exploitation was possible with a saucer shaped aircraft. These aircraft used conventional technology, but had spectacular reductions in drag, and equally spectacular increases in speeds. Later, these developments were followed by stunning breakthroughs in the application of electric and magnetic fields to the field of aviation. The result is (apparently) the modern-day UFO.

Also valuable are the numerous photos and drawings of saucer craft. Included are sixteen photos from the Brown/Bahnson experiments.

Sideways relevant: "Super-insulated clothing could eliminate need for indoor heating", Lisa Zyga (Jan 2015) Silver nanowires are used to reflect infrared heat from the body. The fabric is also electrically conductive and could be used to control exposure to electric fields. <http://phys.org/news/2015-01-super-insulated-indoor.html>

The Rise of the Fourth Reich, Jim Marrs (2008). Some notable quotes:

"The Germans were defeated in World War II . . . but not the Nazis. They were simply forced to move." (p. 4)

"One edition of the *American Heritage Dictionary of the English Language* defined fascism as "a philosophy or system of government that advocates or exercises a dictatorship of the extreme right, typically through the merging of state and business leadership together with an ideology of belligerent nationalism." (p. 6)

"In twenty-first century America, many thoughtful persons have witnessed what appears to be a recycling of the events of pre-World War II Germany: the destruction of a prominent national structure; rushed emergency legislation; the rise of a secretive national security apparatus; attempts to resist both firearms and people, coupled with preemptive wars of aggression propelled by fervent nationalism." (p. 7)

"Lenin apparently came to understand that he was being manipulated. "The state does not function as we desired," he once wrote. "A man is at the wheel and seems to lead it, but the car does not drive in the desired direction. It moves as another force wishes." " (p. 10)

"President Woodrow Wilson, who was intimately connected with conspiratorial power, once wrote, "Some of the biggest men in the United States, in the field of commerce and manufacture, are afraid of somebody, are afraid of something. They know there is a power somewhere so organized, so subtle, so watchful, so interlocked, so complete, so pervasive that they had better not speak above their breath when they speak in condemnation of it." "(p. 257)

"Forrestal noted, "These men are not incompetent or stupid. They are crafty and brilliant." " (p.258)

"The Bavarian Illuminati was formed on May 1, 1776, by Adam Weishaupt Weishaupt also evoked a philosophy that has been used with terrible results down through the years by Hitler and many other tyrants. "Behold our secret. Remember that the end justifies the means," he wrote, "and that the wise ought to take all the means to do good which the wicked take to do evil." Thus, for the enlightened—or "illuminated"—any means to gain their ends is acceptable, whether this includes deceit, theft, murder, or war. The key to Illuminati control was secrecy. "The great strength of our Order lies in its concealment. Let it never appear in any place in its own name, but always covered by another name, and another occupation", stated Weishaupt." (p. 13)

"Why of course people don't want war. . . . That is understood. But after all it is the leaders of the country who determine the policy, and it is always a simple matter to drag the people along, whether it is a democracy, or a fascist dictatorship, or a parliament, or a communist dictatorship. . . . Voice or no voice, the people can always be brought to the bidding of the leaders. That is easy. All you have to do is to tell them they are being attacked, and denounce the pacifists for lack of patriotism and exposing the country to danger." (p. 345, said by Reichsmarschall Hermann Goering)

"While Nazi science was brought to America after World War II, so were attendant Nazi restrictions on scientific liberty. . . . Such tight inner control over scientific advances was reminiscent of the late-war Nazi SS control over technology in the Third Reich." (p.262)

Food for thought, at least. Be sure to read the Epilogue. The book has an index and a chapter-by-chapter list of sources.

See also <http://www.theoccidentalobserver.net/2012/01/age-of-the-psychopaths/>

UFOs for the 21st Century Mind: A Fresh Guide to an Ancient Mystery, Richard Dolan (2014) My review: This 486 page book is another well-written comprehensive overview of the complex, multifaceted field of UFOs by Dolan:

What we need is an up-to-date assessment of where we are in this incredible field. That is why I wrote this book. This a comprehensive overview of the UFO phenomenon for people of the 21st century. (page 3)

When assessing the full range of the UFO subject, one is struck by a richness, depth, and profundity that is nothing short of astonishing. Whether we examine it as detectives, philosophers, historians, political analysts, psychologists, intelligence experts, aviation geeks, biologists, astronomers, physicists, cynics, or utopians, we find that the subject simply gets deeper and deeper the further along we go. (page 470)

I am glad Dolan makes the last statement quoted above. Most of the UFO literature is about *reports of sightings* of UFOs, and caters to the "mystery addiction syndrome" of the public. Reading through all this stuff can get rather boring. There is virtually nothing published about what kind of physics is used by UFOs, and nothing about how to reproducibly build a "model T" version of a UFO. Still, the mainstream scientific community seems to be slightly more accommodating to "non-local physics" than it has been in the past (<http://www.universetoday.com/108044/why-einstein-will-never-be-wrong/> See comments by Brian Fraser) Dolan reminds us that this is still a rich and varied field that can keep all sorts of investigators busy for a very long time.

UFOs and the National Security State: The Cover-Up Exposed, 1973-1991, Richard M. Dolan (2009) (My review: This 638 page book is "the nearest thing to an official history of the UFO phenomenon that we've ever to see" (back cover). It is meticulously researched, documents an abundance of UFO encounters, and presents insights into the complexities of public perceptions, government secrets, obfuscation, disinformation, financing of "black" projects, the role of the military/industrial complex, and how "break-away civilizations" can come into existence. It has an extensive bibliography and a thorough index. Overall, it is a very well crafted, very informative work.)

UFOs and the National Security State: Chronology of a Cover-up 1941-1973, revised edition, Richard M. Dolan (2002) (Very similar to the above by Dolan, but covering an earlier time period.)

Flying Saucers and Science, Stanton T. Friedman, MSc. (2008) (My review: The author takes the position that flying saucers are a manifestation of visits by extraterrestrial space aliens, apparently for no better reason than the claim that the technology is so far advanced beyond ours that saucers cannot be anything manufactured on Earth. Otherwise, the author's research and reasoning are careful and thorough. His insights about secret government projects are valuable and illuminating.)

Need to Know, Timothy Good (2007) (My review: This is another good book that describes an abundance of UFO sightings and encounters mostly from military sources. Military aircraft encounters with UFOs are definitely very interesting. The author leans towards the hypothesis that some UFOs are extraterrestrial, but that the United States and other governments have (very secretly) developed comparable technology. The presentation is clear, balanced, and well documented. The book has chapter bibliographies and a thorough index.)

http://www.huffingtonpost.com/2015/04/19/ufos-during-wartime_n_7046472.html?ncid=txtlnkusaolp00000592

"You'd have an aircraft flying along, doing around 500 knots and a UFO comes alongside and does some barrel rolls around the aircraft and then flies off at three times the speed of one of the fastest jets we have in the Air Force. So, obviously, it has a technology far in advance of anything we have."

(This kind of "hot-dog show-off" behavior would almost be expected from a group of military people whose country lost WWII, but which had far superior technology, and wants to show it off.)

UFOs: Generals, Pilots, and Government Officials Go on the Record, Leslie Kean (2011) (For a review see <http://www.ufodigest.com/article/kean-eye-ufos-chris-rutkowski-leslie-keans-new-book> ; My thoughts: Leslie states that "UFOs became the focus of my professional life after the publication of my first story about them in the *Boston Globe*. . . . I naively thought this would *have* to generate some kind of news buzz, and that other journalists would eagerly jump in to pick up where I had left off Amazingly, *nothing happened*." I am sympathetic to her bewilderment. I wanted to start a group which was willing to build a "Model T" version of a flying saucer, just to prove that the technology to do so has been around for 115 years. The result: *nobody was interested*. I also wrote to probably about a thousand people about how to convert tens of thousands of tons of Spent Nuclear Fuel into valuable metals by a safe, inexpensive process—a terrific commercial opportunity for somebody. The result: *nobody was interested*. This leaves me wondering which is more of a mystery: the understanding of wondrous technology, or our utter lack of interest in the same?)

See also: *COMETA Report* (1999) <http://www.ufoevidence.org/topics/Cometa.htm>

UFO STEALTH IN THE 1940'S? <http://ufodigest.com/article/ufo-stealth-0107> ". . .He photographed the exhaust trail which apparently had no flying machine generating the exhaust vapor that was leaving a telling trail. . . ."

Russia's Roswell Incident and other Amazing UFO Cases from the Former Soviet Union, Paul Stone, Philip Mantle (2012) (My review: definitely very interesting reading. Covers the Dalnegorsk crash, the Tunguska Event, and many encounters with UFOs by scientists, pilots, military personnel, cosmonauts and astronomers. The former Soviet Union had an extensive military apparatus and so there are many reports from military sources involving UFOs interacting with nuclear weapons storage depots, ICBMs, destruction of radars, their presence during missile tests and training flights, pilots and fighter jets disappearing in flight without a trace, and so forth. There is a lot of potentially useful, specific information in this book.)

Triangular UFOs: An Estimate of the Situation, David Marler (2013) From the book: "This is the first UFO book dedicated solely to the triangular UFO phenomenon. It will examine the history of sightings; outline patterns within the data; and develop a working profile of these objects. Upon reading this book, I hope the data speaks for itself. I believe it strongly suggests we are dealing with a tangible reality that has been with us for a very long time and requires further scientific investigation." Chapter 7 documents "twenty common characteristics repeatedly described by eye witnesses which help provide a working profile of these UFOs."

Indeed, such a "working profile" would be helpful in developing insights into the scientific principles used by these machines. My own belief is that the people who have built these machines have clearly become masters of "non-local physics", and Marler's list is consistent with that conclusion. Perhaps someday people will become more interested in the *physics* implied by UFOs instead of the current "golly gee whiz" focus on the entertainment value of *sightings*. This well written, well documented book is a step in the right direction.

Some additional insights on the physics and technology:

<http://droneteam.com/drt/index.php?topic=869.0>

The white glow of many UFOs may be essentially the same thing as Tesla "[Whitefire](#)":

Kennedy's Last Stand: Eisenhower, UFOs, MJ-12 & JFK's Assassination, Michael E. Salla (2013) This was a book I did not think I would be interested in reading, but the reviews suggested otherwise, so I bought a copy. The book is very readable and very well researched and referenced. It is about Eisenhower, UFOs, the Military Industrial Complex, Kennedy, MJ-12, the CIA, and the strange deaths of James Forrestal, Marilyn Monroe, and of course Kennedy himself. A key conclusion is that the disclosure of information about UFOs (and a formerly secret base known as S4 in Nevada) is under the control of the CIA. The President, as commander in chief of the *military*, has access to *military* secrets, but not the secrets kept by the black world of the CIA. This creates "plausible deniability" by the President regarding UFO issues, and removes the topic from the vagaries of the four-year political election cycles.

I at first found it odd that the book uses the phrase "UFOs and extraterrestrial life" (or similar expressions) NUMEROUS times (sometimes thrice on a page). The author evidently believes that the two topics are intimately connected, but this theme is not developed in the book. Dr. Salla is a "pioneer in the development of 'exopolitics', the study of the main actors, institutions and political processes associated with extraterrestrial life" (p. 237; <http://exopolitics.org>) and so his use of this terminology is hardly surprising. I do not share his view however; the Bible says nothing pro or con about the existence of "space aliens" or extraterrestrial life. But if such does exist, why is God permitting them to visit Earth at this time? This supposition seems to be totally inconsistent with themes in the Bible.

Anyway, the book was worth reading, and a real eye-opener. And very disturbing . . .

"Military Witnesses of UFOs at Nuclear Sites", National Press Club (2010) http://www.youtube.com/watch?feature=player_embedded&v=3jUU4Z8QdHI (Former Air Force officers discuss UFO sightings)

"A Preliminary Study of Sixty Four Pilot Sighting Reports Involving Alleged Electromagnetic Effects on Aircraft Systems", Richard F. Haines, Dominique F. Weinstein (2001) <http://www.narcap.org/reports/emcarm.htm>

"The primary purpose of this paper is to review over fifty years of pilot reports which both authors have compiled over the years. These cases involve one or more on-board systems (navigation, guidance and control equipment, cockpit displays, circuit breakers, other electro-magnetically controlled systems) were influenced allegedly when one or more UAP [Unidentified Aerial Phenomena] were physically near the aircraft. Clearly, it is both the physical proximity of the UAP as well as the transient nature of these E-M effects that make them so interesting."

See also <http://ufologie.patrickgross.org/htm/airmiss.htm> (The effect on aircraft systems is now an even more serious concern for modern aircraft with "glass cockpits" and electrical flight controls ("fly by wire")).

; <http://www.ufoevidence.org/topics/EMEffects.htm>

"The COMETA Report" http://www.archive.org/stream/TheCometaReport/COMETA_part1_djvu.txt

"Secret Access. UFO documentary" <http://www.youtube.com/watch?v=aYsT6LxjXfo&NR=1> (My review: This is one of the best no-nonsense UFO documentaries I have seen so far).

"The Presidential UFO Libraries" <http://www.youtube.com/watch?v=yWpcJt0kyxI>

"Out of the Blue", http://www.youtube.com/watch?feature=player_detailpage&v=cYPCKIL7oVw (My review: another good documentary).

"UFO Landings And Physical Trace Cases" http://www.youtube.com/watch?v=z_n9nY0sqF8&feature=youtu.be

"Secret government 'X Files' Reveal UFO Sightings", <https://www.youtube.com/watch?v=bpWToEWdPjM>

"DOCUMENTARY 2015- UFOs Over Texas & The Smoking Gun" <http://www.youtube.com/watch?v=ZxWA7fCSa-A>

"UFOs And the cold war! Air Force hunting UFOs in Belgium - British TV - Sightings" <http://www.youtube.com/watch?v=WcibWS3MGJs&feature=youtu.be>

<https://youtu.be/E23e9cye9M> "INSANE! Best UFO Sightings Of June 2015 [Breaking News] Share This!" ("black halo" at 28:57 and 29:30)

<http://www.youtube.com/watch?v=wPPSyqtFq28> "Documentary 2015 - UFO DOCUMENTARY 2015- Cops vs UFOs & Captured Aliens"

<http://youtu.be/nbwglQItO4s> "UFO Aliens under Antarctic Ice Caps" (this is a Russian language documentary (with captions in English) about possible Nazi flying saucer bases in Antarctica) <https://youtu.be/MwUpPwyyvLw>

<http://nyufo.com/entries/general/ufo-misses-army-helicopter-1973-cleveland-oho-72315>

<http://www.youtube.com/watch?v=iezJY74GsX8> <http://www.youtube.com/watch?v=wFdpBgCbv5E> <http://www.youtube.com/watch?v=eGbfG-hG3Qw> Interviews with Bob Lazar

<http://www.youtube.com/watch?v=Ab0iUcU7kZ4> (The Kapustin Yar incident, Russia 1948)

<http://www.youtube.com/watch?v=dP9gExhKTjw> "The UFO Experience"

"The Phoenix Lights" <http://topdocumentaryfilms.com/phoenix-lights/>

Lights of varying descriptions were seen by thousands of people between 19:30 and 22:30 MST, in a space of about 300 miles, from the Nevada line, through Phoenix, to the edge of Tucson. There were two distinct events involved in the incident: a triangular formation of lights seen to pass over the state, and a series of stationary lights seen in the Phoenix area.

(Years before this, I had a very similar experience, filed at: <http://www.ufoevidence.org/sightings/report.asp?ID=13409>)

"The Portal - The Hessdalen Lights Phenomenon - UFO

Documentary", http://www.youtube.com/watch?feature=player_embedded&v=sNOBdDZPsY8 (My review: This is another good documentary involving automated multispectral observations of the Hessdalen lights. Illustrates a good scientific way of studying this phenomenon.)

"National Security Agency UFO Documents Index" http://www.nsa.gov/public_info/declass/ufo/index.shtml

"Evidence shows U.S. technology far beyond official levels", (December 2014) <http://ufodigest.com/article/far-beyond-1230>

"The Smoking Gun of Roswell - The Ramey Memo" <http://youtu.be/TNmXIXQCnvQ>

Alien abductions, crop circles, historical encounters, etc.

"Close Encounters of the Fourth Kind - Alien Abduction The Unwanted Piece of the UFO Puzzle", CE4 Research Group <http://www.alienresistance.org/ce4.htm> (My review: This is a website giving details and conclusions from about 100 personal case testimonies about "alien abduction experiences". It is not about physics, but is included here because UFOs and "alien abductions" are often linked together in the mind of the public. And the research reaches a conclusion that would be especially interesting to Christians:

"Through the research into the case testimonies it was found that some of the experiencers were able to stop or terminate the experience. There was a recognized commonality in the method that was used among the Christian experiencers."

(In that context, see also James 4:7, 1Peter 5:8-9, 1John 5:18. Satan's motive is to deny the need for The Ransom. See "[The Master Lie and its Operation](#)" In Eden, the human race, as represented in Adam, chose to deliberately reject God's sovereignty. But the only other rulership available was that of Satan. And that is the way things are today. Satan is the "God of this Age" (2Cor 4:4, Luke 4:5-6) and his sovereignty is subscribed to worldwide. People do not want the true God to govern their lives; they want to go their own way (except of course when things go really wrong, and then they wonder "where was God when . . . ?", forgetting entirely that the human race rejected Him thousands of years ago in Eden). Today, Christians are the only ones who have deliberately opted out of this corrupt system of governance, and Satan has no hold on them, no permission to 'touch' them (1John 5:18). The essence of this new 'contract' (so-to-speak) is expressed in the Lord's Prayer: the words are short and simple, but the effects are powerful and wide in scope. --Matthew 6:9-13)

Here's an additional thought from Wikipedia (http://en.wikipedia.org/wiki/Paranormal_and_occult_hypotheses_about_UFOs):

The [U.S. Government Printing Office](#) issued a publication compiled by the [Library of Congress](#) for the [Air Force Office of Scientific Research](#): "UFOs and Related Subjects: An Annotated Bibliography". In preparing this work, the senior bibliographer, Lynn E. Catoe, read thousands of UFO articles and books^{[[citation needed](#)]}. In her preface to this 400-page book she states:

A large part of the available UFO literature is closely linked with mysticism and the metaphysical. It deals with subjects like mental telepathy, automatic writing and invisible entities as well as phenomena like poltergeist (ghost) manifestations and possession. Many of the UFO reports now being published in the popular press recount alleged incidents that are strikingly similar to demonic possession and psychic phenomena.

The *perceptual* association of "alien abductions" with UFOs is problematic for the US government. Disclosing advanced secret technologies to the public is enough of a problem in itself (especially ones as revolutionary as antigravity, and all the spinoffs). But when that technology becomes associated with animal mutilations, crop

circles, destruction of property, kidnappings, unauthorized medical experiments on humans, violation of Constitutionally guaranteed rights, and even claims of "space aliens" and alternative religions, any government will realize that it is into a mess that could go far out of control very rapidly (like, in a different context, the collapse of the Soviet Union). Having become accustomed to keeping UFO matters secret for decades, it would be easy to decide just to leave it that way.

See also: "The UFO phenomenon as demonic activity?" (February 1, 2016) <https://noriohayakawa.wordpress.com/2016/02/01/ufo-phenomenon-the-only-viable-interpretation/> ; <http://ufoculture.blogspot.com/2012/01/ufo-phenomenon-as-demonic-activity.html>

Some additional thoughts from Dr. Joseph Burkes: (<http://nyufo.com/entries/ufo-sightings-news/virtual-hologram-ufo-sightings-hypothesis-21616> Joseph Burkes MD)

Many/most UFO sightings are not of physical objects but are the products of non-human intelligence employing a kind of hologram type technology to project images into the sky that all observers can see, and /or project images into the visual apparatus of selected observers in a group so that only some but not others looking at the same patch of sky are able to see the UFO. This explains what I have witnessed again and again during fieldwork. So most of so called UFOlogy which as you may understand I believe is a pseudoscience, is naturally going to reject this because it contradicts the beloved "nuts and bolts approach" that says dutifully taking down sighting reports will teach you important details about "craft." No instead it teaches about the technology of producing illusion. Perhaps it is a kind of intelligence test that most UFO fans fail miserably.

What we are left with is perhaps a basic understanding of the technology of producing illusion and how UFO Intelligence has been in the belief business for centuries. They co-create with us encounters that to a large extent match our pre-existing notions about what the phenomenon should be. So now in the space age we have flying saucers piloted by alien astronauts. Curiously this message is reinforced just as we were getting out into exploring space in the 1940s with modern rocketry. In the 1890s the airship wave recorded sightings of blimp like objects just before large hydrogen filled Zeppelins were constructed. The pilots were thought to be not spacemen but genius inventors. . . . We need to study it as a psychosocial phenomenon. How various new age belief systems, victim based "abduction" theories, and contactee cults forms with gurus all insisting that their narrow pet theories are the only ones that "make sense."

See also: "UFO Contact Creating a Belief System 22416" <http://nyufo.com/entries/ufo-disclosure/ufo-contact-creating-a-belief-system-22416> <http://mysteriousuniverse.org/2016/04/ufos-extraterrestrial-probably-not/> <http://mysteriousuniverse.org/2016/04/unidentified-flying-objects-the-great-deception/> Weird, confusing, or contradictory information makes the recipient more open to suggestion. See <http://en.wikipedia.org/wiki/Gaslighting>

A point to note here is that field reports indicate UFOs sometimes appear to some observers but not others, even though they are looking at the same patch of sky at the same time. This is credited to a "non-human intelligence" employing a "technology" to put images into the minds of the observers. However, it is also consistent with the Christian view that this is the activity of demons. The selectivity is implied by 1 John 5:18 : "We know that no one who is born of God sins; but He

who was born of God keeps him and the evil one does not touch him. We know that we are of God, and the whole world lies in the power of the evil one." In other words, Satan has no automatic permission to induce visions in Christians, but this is not generally true of the rest of humanity. (Luke 10:17)

Note that these kinds of induced visions could take place in any time period, even thousands of years ago. Satan undoubtedly anticipated the development of real advanced interstellar propulsion systems and produced counterfeit images and descriptions of real spacecraft that would actually exist in the future to deceive people into thinking that "space aliens" have been visiting Earth for thousands of years. As mentioned above, this is incompatible with the Ransom doctrine.

The believability of these lies is enhanced by the secrecy and compartmentalization surrounding UFO phenomena. If someone handed you a \$3 bill, you would immediately recognize it as fake, because no such denomination has ever been issued in the United States. Counterfeiters know this too, and so they only counterfeit real currency. But suppose you were from a foreign country and did not know that \$3 bills were fake. If someone handed you a \$3 bill, and the engraving and printing and "feel" were what you expected from a real bill, you might accept the counterfeit as real. Your lack of information has allowed you to be misled. Likewise, Satan counterfeits real things, or things that could be expected to be real. He is the "father of the lie" and his lies serve only his purposes of deception.

Researchers have noted that secrecy and censorship have aided in the belief of "space aliens" and ETs:

". . . the government's handling of censorship on UFOs has contributed to a widespread belief in the existence of extraterrestrial beings visiting the Earth. . . . any historical discussion of the UFO controversy must credit, or blame, the U. S. government for at least an assist to ET belief." (p. 133, 135) *UFOs and Government A Historical Inquiry*, Michael Swords, Robert Powell, *et al.* (2012)

Note that UFOlogists generally view UFO phenomena through two mind sets: the "spiritual" mind set and the "nuts and bolts" mind set. The former is Satanic and the latter is pure physics. **BOTH** exist in the field of UFOlogy. But often they are mingled together in reports. ("UFO Intervention - The Possibility", R. Perry Collins (1986) <http://www.ignaciodarnaude.com/ufologia/UFO%20Intervention%20in%20Earth.pdf>)

For "nuts-and-bolts" UFO propulsion systems see: [UFO Physics](#)
For the space-aliens-are-demons viewpoint, see "UFOs and the Christian Worldview" Jefferson Scott, <http://www.jeffersonscott.com/nonfiction/ufos.htm>

In a completely different context, see http://en.wikipedia.org/wiki/God_helmet)

"He who digs a pit will fall into it,
And he who rolls a stone,
it will come back on him"

Proverbs 26:27

“Only puny secrets need keeping.
The biggest secrets are kept by public incredulity.”
(Marshall McLuhan)

“The general population doesn’t even know what’s happening,
and it doesn’t even know that it doesn’t know.”
(Noam Chomsky)

"An editor is one who separates the wheat from the chaff and prints the chaff."
(Adlai Stevenson)

"We don't make the news. We just ignore it."
(Brian Fraser)

"UFOs select their witnesses their appearances are *staged!*"
(Jaques Vallee; see also <http://cufos.org/swords2.pdf>)

Pentagon Aliens, 3rd edition, William R. Lyne (1999) (My review: This book takes the position that space aliens "are actually people, whose philosophy and bizarre masquerade are alien to the American way of life, since they believe in government by anti-democratic hoax to maintain the secret power of the Trilateral commission elite, to whom our lives are very cheap." The book has a chapter on "How to Build a Flying Saucer" along with some construction tips in the Appendix, and numerous comments about Tesla technology. Unfortunately, the author's tone is frequently angry, opinionated, and resentful; the language is also a bit coarse at times.)

Messengers of Deception UFO Contacts and Cults, Jaques Vallee (2008) online
at <https://docs.google.com/file/d/0BwaXvvZmDODIZTBkOE1YSldYZG8/edit?pli=1> Some samples:

"At the time I was a student, had no access to good information, and could only wonder about government attitudes. I became seriously interested in 1961, when I saw French astronomers erase a magnetic tape on which our satellite-tracking team had recorded eleven data points on an unknown flying object which was not an airplane, a balloon, or a known orbiting craft. "People would laugh at us if we reported this!" was the answer I was given at the time. Better forget the whole thing. Let's not bring ridicule to the observatory. Let's not confess to the public that there is something we don't know.

The main argument against UFOs at the time was that "astronomers don't see anything unexplained." Well, there we were, a team of professional astronomers, seeing things we couldn't explain. Not only were we denying it, we had destroyed the data!" (p. 6)

"In my spare time, I pursued my UFO studies, trying to find some pattern in the global distribution of sightings. The most clear result was that the phenomenon behaved like a conditioning process. The logic of conditioning uses absurdity and confusion to achieve its goal while hiding its mechanism. There is a similar structure in the UFO stories." (p. 7)

"The followers of modern UFO cults are often persons who, like Gregory, have become disenchanted with science and technology. Scientific reluctance to consider valid claims of paranormal phenomena is slowly driving many people to accept *any* claim of superior or mystical contact. The voice of science has lied too often. A large fraction of the public has tuned it out completely." (p. 13)

" "Expert opinion" on any subject of policy - from energy supply to cloning, from the ban of the SST to the censorship of TV violence - has become a game in which the answers are constantly revised, not to reflect new knowledge, but to follow the trends of academic fashion. The language of each discipline has become an esoteric jargon that cannot be penetrated even by someone with an advanced education in another field." (p. 17)

"This is one of the little-recognized facts of the UFO problem that any theory has yet to explain. The theory of random visitation does not explain it. Either the UFOs select their witnesses, or they are something entirely different from space vehicles. In either case, their appearances are *staged!*" (p. 29)

"Where does this exploration lead? . . . They also suggest that our civilization may be headed for very serious trouble, with irrational forces tearing apart the old structures and replacing them by the blind institutions of inhuman beliefs." (p. 61)

This book has a lot of insightful things to say about the *social* consequences of the UFO phenomena.

Crop Circles:

"One of the most interesting recent developments involving crop circles is that they have begun responding to what is being said about them in the press! When it was hypothesized that the patterns were being done by pranksters in balloons, the patterns subsequently appeared directly under high-tension power lines, where balloons could not operate. When it was surmised that the strange geometric patterns on hillsides were the result of freak winds, the patterns moved again to flat fields.

When it was supposed that the patterns could be the result of some kind of refraction of microwaves, the patterns moved to areas where no microwave relay towers existed. When it was suggested that the patterns were the result of hoaxes perpetrated by humans, and some individuals actually claimed responsibility, the patterns were done in fields of canola, which is extremely brittle and difficult to bend. " *UFOs - Demonic Deception?*, Bob & Suzanne Hamrick <http://rense.com/general32/expose.htm>

"Rotating Jet Aircraft with Lifting Disc Wing and Centrifuging Tanks", Heinrich Fleissner (1960) <http://www.freepatentsonline.com/2939648.pdf>

"The KM-2 Rocket" http://www.bibliotecapleyades.net/ufo_aleman/rfz/rocket.htm

<http://www.history.com/videos/ufo-files-real-ufos---nazi-ufos#ufo-files-real-ufos---nazi-ufos>
<http://www.naziufos.com/>

"Resources about possible UFO physics / propulsion / technology", Dimitris Hatzopoulos (2012) <http://www.hyper.net/ufo/physics.html> , <http://www.hyper.net/ufo/overview.html>

"'Saucer' Sounded Like Diesel Engine" http://www.noufors.com/ufo_sightings_elsewhere_in_ontario.html (conventional power for levitation? Apparently, the early post World War II saucers were powered by diesel-electric power plants similar to those used in locomotives, or by flame jet generators. Later, far more sophisticated technologies were developed.)
<http://projectbluebook.theblackvault.com/documents/1950s/1955%2010%207339664%20Cheyenne%20Wyoming/1955-10-7339664-Cheyenne-Wyoming.pdf>
<http://projectbluebook.theblackvault.com/documents/1950s/1953%2007%206977929%20Middletown%20NewYork/1953-07-6977929-Middletown-NewYork.pdf>
<http://projectbluebook.theblackvault.com/documents/1960s/1961-11-8697918-Mackinaw-Illinois/1961-11-8697918-Mackinaw-Illinois.pdf>

<http://projectbluebook.theblackvault.com/documents/1960s/1964-05-8705997-Woodburn-Hubbard-Oregon/1964-05-8705997-Woodburn-Hubbard-Oregon.pdf>

<http://projectbluebook.theblackvault.com/documents/1950s/1956%2012%206786275%20Gassoway%20WestVirginia/1956-12-6786275-Gassoway-WestVirginia.pdf>

<http://projectbluebook.theblackvault.com/documents/1950s/1955%2009%207339363%20Palmdale%20Calif/1955-09-7339363-Palmdale-Calif.pdf>

http://www.nicap.org/books/aadkw/aadkw_ch2.htm (UFO encounter during Korean war; diesel engine sounds)

<http://www.amazon.com/The-UFO-Evidence-Volume-Thirty/dp/0810838818> *The UFO Evidence - Volume 2 : A Thirty Year Report*, Richard H. Hall (2001) (Click Look inside, search with "diesel", see physical page 56)

"This brings us to the engine. What kind of engine would this be? . . . It is apparently a diesel engine or uses diesel oil for fuel, hence the smell. " (*Dark Star*, Henry Stevens (2011) p. 114 ; recounts the "Incident at Karachi" as originally told by Frank J. Parker) See also: http://www.noufors.com/how_to_identify_ufos_in_thirty_minutes_or_less.html

See also [my views on UFOs](#). And my report on a UFO I witnessed: <http://www.ufoevidence.org/sightings/report.asp?ID=13409>

"One of the biggest UFO archives in the world is tucked away in Scottsdale, Arizona, USA.

" <http://www.ufoevidence.org/documents/doc1145.htm>

Others believe that this is just ordinary technology that is misunderstood or misperceived. For instance, electric battlefield illumination can show up as bright lights in the sky with no smoke trails.

"Flare munition for battlefield illumination", <http://www.freepatentsonline.com/8297161.html>

"Abstract: Flare munition for battlefield illumination is provided that includes: (a) at least one electrical flare body; (b) an electrical energy source connectable with the flare body; and (c) an electrical or electronic control device for connecting the electrical flare body with the source of energy during a specified time interval. The flare munition can be fired from a weapon or can be launched as a bomb and allows safe and simple subsequent recovery of the corresponding flare body because no pyrotechnic flare charge is used. Instead, an electrical flare body is used that emits light in the visible and/or infrared wavelength range depending on its intended purpose. "

". . . wherein the illumination means comprises a plurality of light emitting diodes arranged in an array. . . "

The Phoenix Lights [UFO Documentary / Full Movie], https://www.youtube.com/watch?v=n_VlvHKgiK0

"UFO Phoenix Lights News Analysis Of Videotaped Lights Over Phoenix", 12News (KPNX)

http://www.disclose.tv/action/viewvideo/124256/UFO_Phoenix_Lights_News_Analysis_Of_Videotaped_Lights_Over_Phoenix/ ;

<http://rense.com/general75/flares.htm>

<http://www.abovetopsecret.com/forum/thread256734/pg1>

<http://www.assap.ac.uk/newsite/htmlfiles/UFO%20gallery.html>

UFO Physics

Most of what has been written about UFOs in the open literature is about reports and sightings of UFOs. There is very little about UFO physics or about building devices to demonstrate physics proof-of-principles that could be applied to UFOs. UFOs appear to have mastered something called "non-local physics". It is not well-known because the kind of physics taught in the schools is the

"physics of locality", the exception being quantum mechanics, which has a non-local character but is limited in scope.

Non-local physics is a branch of what I call "third generation physics". The latter is not taught anywhere, and is essentially unknown. First generation physics would include Newtonian mechanics, statistical mechanics, and early electrical and chemical science. The second generation would include Special and General Relativity and Quantum Mechanics. Third generation physics goes beyond those but is inclusive of those.

Newtonian mechanics is very intuitive and is well understood by scientists and engineers. Special and General Relativity are actually somewhat intuitive and the basic concepts can be understood by anyone who has taken a few courses in highschool math and trigonometry. Quantum Mechanics is conceptually non-intuitive and bizarre to most people and the math is at the college level. Still, Quantum Mechanics can be satisfactorily understood in the context of temporal motion. Third generation physics, is (presently) "bizarreness on steroids". It has utterly astonishing—almost unbelievable—capabilities. But it is still physics, not magic. The day will come when it too can be understood in an intuitive and satisfying manner, and the math, at least at the levels of fundamental principles, will probably be fairly simple.

I have tried to encourage people to write more about the little-known "non-local physics", and to recognize the limitations of the widely known "local" physics. Example:

<http://www.universetoday.com/108044/why-einstein-will-never-be-wrong/> (See comments by Brian Fraser)

I have also tried to devise fairly specific experiments to demonstrate certain principles of non-local physics (beyond quantum mechanics) that utilize easily accessible technology:

<http://scripturalphysics.org/4v4a/ElectromagneticTestCells.html>

And I expect that over time, there will be more and more resources on the Internet which attempt to address the problem of UFO physics, and that they will gradually move away from the currently inadequate "reigning paradigm":

"Resources about possible UFO physics / propulsion / technology" <http://www.hyper.net/ufo/physics.html>

Currently, people tend to equate "UFO propulsion physics" with so-called "junk science". NASA had this problem with their Breakthrough Propulsion Physics Program (BPP). You might want to review their solution at: [NASA BPP Criteria](#). Also, the American Central Intelligence Agency (CIA) recommended a procedure, "How To Investigate a Flying Saucer", (January 2016, <https://www.cia.gov/news-information/featured-story-archive/2016-featured-story-archive/how-to-investigate-a-flying-saucer.html>) and elements of it might be adapted to investigating UFO physics. Such work can be difficult and is frequently discouraging. Keep in mind "failure is the strength of science, not its Achilles' heel." <https://www.sciencenews.org/article/failure-explores-errors%E2%80%99-upsides>

Some fun: think what lessons were learned when a gorilla flew a propeller-less airplane in 1942: <http://books.google.com/books?...1942+jet+engine+gorilla+Woolams...> Then read "[Beyond Einstein: non-local physics](#)".

In 2015 I wrote and made available a paper ("[Beyond Einstein: non-local physics](#)") which was intended to correct some progress-impeding misconceptions about Special and General Relativity. Using $E = mc^2$ I showed it was possible to rewrite the equations of physics in terms of pure space and time ratios. The concept of "unit quantities" also surfaced. I did not pursue either of these themes however.

Later, I did an internet search to see if anyone else had similar ideas. Two papers which seemed to be relevant turned up:

"The ST system of units Leading the way to unification" © Xavier Borg B.Eng.(Hons.) - Blaze Labs Research (<http://www.gsjournal.net/old/physics/borg2.pdf>)

"Abstract

This paper shows that all measurable quantities in physics can be represented as nothing more than a number of spatial dimensions differentiated by a number of temporal dimensions and vice versa. To convert between the numerical values given by the space-time system of units and the conventional SI system, one simply multiplies the results by specific dimensionless constants. . . ."

Another was:

"Space-Time Dimensions and Natural Unit Values of Physical Quantities" by Ronald W. Satz, Ph.D. (http://transpower.files.wordpress.com/2013/10/mathcad-space_time_dimensions_units.pdf)

"Abstract

This paper presents the derivation of the space-time dimensions and the natural unit values of physical quantities in the Reciprocal System. The factors include space, s, and time, t, only (with auxiliary units of cycles, revolutions, radians, and steradians). The appropriate time-space region (macroscopic) value and/or time region (microscopic) value of space is used for the various mechanical, electrical, magnetic, thermal, and photonic units. The dimensional system of the Reciprocal System is unique: no previous system compares."

The paper by Satz was especially interesting. It was a bit intimidating with 107 pages of mostly equations, but once I got into it, the development seemed to be straight-forward, logical, and methodologically sound. The value listed for unit voltage ($V_{u_SI} = 9.311435 \times 10^8$ volts) is, I believe, especially relevant for non-local propulsion systems. Tesla's experiments were approximately in this range, and as I have noted, weird things can happen at or near these unit boundary values.

Satz is the chief proponent of the "Reciprocal System of Physical Theory" proposed by Dewey B. Larson in 1959. I did a quick internet search to see who was using this theory, and if any of it was

used in propulsion systems. But apparently nobody has used the Reciprocal System for anything practical since its introduction in 1959 (!).

I then searched the text of Larson's books at the RS site (<http://www.reciprocalsystem.org>) for any statements about "antigravity" but came up with nothing there either. But apparently there is some interest in the subject ("The Interaction of Electromagnetism and Gravitation along Equipotential Lines A Prelude to Advanced Energy and Propulsion Technology", Russell Kramer <http://www.reciprocalsystem.com/isus/rec/rec27/magrav.htm>)

Another search, based on <http://www.reciprocalsystem.com> (instead of .org) turned up the following:

<http://www.reciprocalsystem.com/qp/qp04.htm>

"All of the effects of gravitation appear instantaneously, and there is no interaction time. No screening is possible because there is nothing to screen. The so-called "antigravity" devices must remain a feature of science fiction. In real life the only anti-gravity device is oppositely directed motion."

<http://www.reciprocalsystem.com/qp/qp05.htm>

The anti-matter energy generators will have to be put on the shelf along with the antigravity devices."

<http://www.reciprocalsystem.com/lec/larlect1976.htm>

"We likewise have to say no to anti-gravity devices. Superman will have to stay in the comic sections. Gravitation is a motion, and the only anti-gravity device is an opposing motion. . . . Such ad hoc concepts as black holes, quarks, the Big Bang, curved space, etc., are no more scientific than anti-gravity devices. They have no place in the new system. In fact, this system outlaws ad hoc assumptions altogether."

These appear to be earlier documents. Perhaps the RS views on antigravity have changed over the years. It would be ironic if the first use of a system that nobody has used for anything in 50 years turns out to be the basis for a scientific explanation of antigravity—something its originator thought was impossible!

A few days after this, I did another search with "Reciprocal System UFOs". A document that seems to be relevant turned up: "Electrical Effects and the Paranormal" by bperet (2008) (<http://rs2theory.org/metaphysics/paranormal-electrical-effects>) which says, in part:

"Since the charged electron neutrino behaves like electric current, everything in the vicinity that requires electric current will suddenly have electric power available, even if it is not plugged in! This effect was noted by Nikola Tesla during his experiments, as well as during UFO close encounters. Radios and TVs turn on, blenders in the kitchen start spinning . . . usually out of control, digital appliances tend to burn out.

And what other effects does the flow of charged, electron neutrinos have? The charge on a neutrino is inward, not outward, as other magnetic charges. Thus, the location of electron neutrinos in a conductor will be the inverse of its static equivalent—they will accumulate at the core of the conductor, not on its surface, forming a thin, intense stream running down the middle of a conductor, which gives us a 3rd form of electricity, and a 3rd type of behavior—cold electricity—a type of electric current with no thermal/heat properties, because its “thermal” condition is magnetic."

The concept of a neutrino current seems plausible. I have wondered about it in connection with LENR (formerly misnamed "Cold Fusion") and in the electrical behavior of nanostructures. Other than that, the terminology used here is very specialized; you will not understand it unless you are familiar with the Reciprocal System. (Note that this paper is based on a kind of "second version" of the original Reciprocal System.)

"Topological insulators" might also be related to this topic somehow. See <http://scienceblogs.com/principles/2010/07/20/whats-a-topological-insulator/>

Did Tesla encounter this odd type of electricity? Here is some food for thought:

"To summarize, Tesla accidentally discovered an electrostatic "super-charging" effect while trying to verify Hertz' discovery of electro-magnetic waves. After hundreds of experiments, he learned how to control and maximize this phenomenon. This led him to the discovery that electricity is made up of different components, that can be separated from each other, and that a pure, gaseous etheric energy can be fractionated away from the flow of electrons in a circuit designed to produce short duration, unidirectional impulses. . . .

(*The Free Energy Secrets of Cold Electricity*, Peter A. Lindemann, D.Sc
(2000) http://www.teslasociety.ch/info/NTV_2011/free.pdf p. 43 ;

Related:

"Pulsed Capacitor Discharge Electric Engine", Edwin Gray

(1975) <http://www.freepatentsonline.com/3890548.pdf> ;

"Efficient Power Supply Suitable for Inductive Loads", Edwin Gray

(1986) <http://www.freepatentsonline.com/4595975.pdf> ;

"Efficient electrical conversion switching tube suitable for inductive loads", Edwin Gray

(1987) <http://www.freepatentsonline.com/4661747.pdf>

"Elihu Thomson 1853-1937", *Science* (March 20,

1942) http://www.ieeeahn.org/wiki/images/b/b8/Thomson_-_elihu_thomson_1853_-_1937.pdf)

"Innovation as a social process Elihu Thomson and the rise of General Electric. . . ", W. Bernard Carlson

(1991) <http://books.google.com.au/books?id=KUB5KFjTHhwC&printsec=frontcover#v=snippet&q=Ruhmkorff&f=false> (go back to about p. 57+)

"Edison, Science and Artefacts", Ian Wills (2006) <http://philsci-archive.pitt.edu/3541/1/Wills-EdisonScienceAndArtefacts.pdf>

("Electricity at high pressures", Elihu Thomson 1853-1937

(2007) <http://archive.org/details/electricityathig00thomrich>)

("Biographical Memoir of Elihu Thomson 1853-1937", Karl T. Compton

(1939) <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/thomson-eliu.pdf>

("The New Phase of Electricity" *Scientific American* 25 December 1875 (1872?) 33:401)

I am not sure what to make of this. Tesla was clearly interested in monopolar pulsed electric fields with fast rise times and actively sought to improve his apparatus to this end. But how would that separate electron current from neutrino current? Or might something else be going on? According to Satz, electric field intensity (volts per meter) has the dimensions of t/s^3 . The first time derivative of that (volts per meter per second) was what Tesla was pursuing. That would have the dimensions of $1/s^3$, which is power per area, or the same dimensions as that of the Poynting vector, which may have something to do with "ether power flow". THAT seems to be more consistent with Tesla's electrostatic "super-charging" effect. Sharper pulses and higher voltages would intensify the effect. Tesla's descriptions of the effects seem to describe a gravitational pulse (unknown at that time) that can "induce powerful electrical effects at a distance" despite extensive shielding (insulators, copper sheet, etc). According to the RS, charged neutrinos are responsible for an isotopic mass effect, and so, conceivably at least, they could be shoved around by a gravitational pulse, and because they are trapped in a conductor, the effect might possibly manifest itself as a "New Phase of Electricity" or as some kind of interatomic bonding anomaly (<http://www.youtube.com/watch?v=tnBdhsXI088&feature=related>) This might also explain the residual radioactivity purportedly found at some UFO landing sites; it is probably just a side effect on the isotopic mass, which gets knocked out of its normal equilibrium with the mass that is represented by atomic number. (See: [Adventures in Energy Destruction](#))

Tesla's thoughts on this are summarized in Lindemann's book in a chapter written by Gerry Vassilatos (from *Secrets of Cold War Technology*, <http://www.scribd.com/doc/15125148/Secrets-of-Cold-War-Technology>)

"The extraordinary efficiency of the magnetic arc disrupter in developing aetheric currents derived from several principles. Tesla saw that electrical current was really a complex combination of aether and electrons. When electricity was applied to the disrupter, a primary fractioning process took place. Electrons were forcibly expelled from the gap by the strong magnetic influence. The aether streams, neutral in charge, remained flowing through the circuit however. The magnetic disrupter was his primary means for fractionating the electrons from the aether particles.

Aether particles were extremely mobile, virtually massless when compared with electrons, and could therefore pass through matter with very little effort. Electrons could not "keep up" with either the velocity or the permeability of aetheric particles. According to this view, aether particles were infinitesimals, very much smaller than electrons themselves. The aetheric carriers contained momentum. Their extreme velocity matched their nearly massless nature, the product of both becoming a sizable quantity. They moved with superluminal velocity, a result of their incompressible and massless nature. Whenever a directed radiant matter impulse begins from some point in space, an incompressible movement occurs instantly through space to all points along that path. Such movement occurs as a solid ray, an action defying modern considerations of signal

retardations in space. Incompressible raylines can move through any distance instantly. Should the path be 300,000 kilometers long, the impulse at the source end will reach that point as quickly as at all other points. This is superluminal velocity. (Lindemann, paper page 28)

For our purposes, more information is needed on the behavior of the "charged neutrino" in a monodirectional electric arc quenched by a magnetic field. Also, in Tesla's day the "ether" was thought to be filled with tiny rotating vortices (the neutrino was unknown), and so his explanations are framed in these terms. Along that line of thought "incompressible fluid" might mean "medium for instantaneous action-at-a-distance" (today called "non-local physics"). But these descriptions are still consistent with a gravitational pulse, and the observed momentum consistent with Poynting vector effects.

Whatever the explanation proves to be, it must allow for a strange phenomenon that occurred when DC voltage was initially applied to long transmission lines:

"This hazardous condition only occurred with the sudden application of high voltage DC. This crown of deadly static charge stood straight out of highly electrified conductors, often seeking ground paths which included workmen and switchboard operators. In long cables, this instantaneous charge effect produced a hedge of bluish needles, pointing straight away from the line into the surrounding space. The hazardous condition appeared briefly at the very instant of switch closure. The bluish sparking crown vanished a few milliseconds later, along with the life of any unfortunate who happened to have been so "struck". After the brief effect passed, systems behaved as designed. Such phenomena vanished as charges slowly saturated the lines and systems. After this brief surge, currents flowed smoothly and evenly as designed.

The effect was a nuisance in small systems. But in large regional power systems where voltages were excessive, it proved deadly. Men were killed by the effect, which spread its deadly electrostatic crown of sparks throughout component systems. Though generators were rated at a few thousand volts, such mysterious surges represented hundreds of thousands, even millions of volts.

Tesla knew that the strange supercharging effect was only observed at the very instant in which dynamos were applied to wire lines, just as in his explosive capacitor discharges. Though the two instances were completely different, they both produced the very same effects. The instantaneous surge supplied by dynamos briefly appeared superconcentrated in long Lines. Tesla calculated that this electrostatic concentration was several orders in magnitude greater than any voltage that the dynamo could supply. The actual supply was somehow being amplified or transformed.

" (Lindemann, paper page 16)

The oddities to be noted here are:

1. The sparks occurred on switch *closure*, not switch *opening*. It is well-known that sudden *opening* of a DC circuit that is already conducting high currents will cause a huge (and dangerous) voltage spike as the magnetic field energy collapses back into the wire. But this phenomenon occurred on switch *closure*, when the wire had no current, no magnetic field, no stored energy.

2. The sparks leapt perpendicular to the wire into the surrounding space (this has also been seen in UFO encounters). In the normal well-known case (above), the sparks would leap parallel to the wire and only at the open contacts at the switch location.

3. There was an enormous voltage multiplication effect. This occurred only on initial application of voltage.

A working hypothesis is that there may indeed be two kinds of electricity. One is "magnetic electricity" (based on the neutrino) and the other is "electrical electricity" (based on the electron). Does "magnetic electricity" need a magnetic field for conduction? The "electrical electricity" needs only a wire, and the magnetic field is only a side-effect of conduction. See [ExampleGravitationalMotionModification](#) and ask yourself what would happen with a neutrino instead of an electron. Instead of producing a radial *magnetic* field, it seems to produce a radial *electric* field. And is there some kind of "inverse inductance" (based on rate of change of voltage, instead of rate of change of current)?

"Tesla was unable to account for the enormous voltage multiplication effect." Very hypothetically this might represent an inversion at a unit boundary. If so, there could be "extra" power that could not be conventionally explained. Or it could be related to the unidirectional nature of the impulses, similar to the luminous effects:

"He had already observed how the very air near these transformers could be rendered strangely self-luminous. This was a light like no high frequency coil ever could produce, a corona of white brilliance, which expanded to ever enlarging diameters. The light from Tesla Transformers continually expands. . . . Unlike common high frequency alternations, Tesla radiant energy effects grow with time. Tesla recognized the reason for this temporal growth process. There were no reversals in the source discharges, therefore the radiant energy would never remove the work performed on any space or material so exposed. As with the unidirectional impulse discharges, the radiant electric effects were additive and accumulative. In this respect, Tesla observed energy magnifications, which seemed totally anomalous to ordinary engineering convention." (Lindemann, paper page 27)

Another possibility is that activating a "two dimensional current" (magnetic current, neutrino) is simply more powerful than activating a one-dimensional current (electrical current, electron).

As an aside, this reminds me of the relation $E = cB$, which applies to light. It does not "generate" light but describes the relationship of the E and B fields involved. In Tesla's experiments, the relationship might be reversed: the fields would be generated first, and light (among other things) would be the result. This means the "plasma" and "lighted windows or panels" seen on UFOs might not be due to electrified air (plasma or corona) but might have a more fundamental origin. Weird things can happen because these kinds of time-varying fields are not conservative:

"There is another difference between the two kinds of electric fields: *electric fields produced by charges can be represented by a potential, but potential has no meaning for electric fields produced by a changing magnetic flux. . . .* The induced electric field due to a changing magnetic

field is nonconservative and cannot be represented by a potential. (The magnetic field due to a current is also nonconservative. The lines of magnetic field form closed loops, and the magnetic field also cannot be described by a potential.)" — *Physics*, Halliday, Resnick and Krane, 5th ed.(2002) p. 785

Page 863 of this reference poses an example problem: "A parallel-plate capacitor with circular plates is being charged Derive an expression for the induced magnetic field . . . in the region between the plates." The rate of rise time of the E field is given as $dE/dt = 10^{12}$ Volts/(meter-sec). The answer turns out to be 280 nanoTesla and this comment follows:

"This shows that the induced magnetic fields in this example are so small that they can scarcely be measured with simple apparatus, in sharp contrast to induced *electric* fields (Farady's law), which can be demonstrated easily. This experimental difference is in part due to the fact that induced emfs can easily be multiplied by using a coil of many turns. No technique of comparable simplicity exists for magnetic fields. In experiments involving oscillations at very high frequencies, dE/dt can be very large, resulting in significantly larger values of the induced magnetic field."

In these normal circumstances the B field is so small that it has to be multiplied by the speed of light to make for an easily measurable E field. But maybe Tesla inadvertently ran this backwards. This "New Phase of Electricity" (neutrino based) may have generated a small but significant B field which, when multiplied by the speed of light, resulted in an enormous Electric field. (UFOs, incidentally, apparently use microwaves in their propulsion systems, and so the " dE/dt can be very large.")

Along that line of thought, suppose Tesla switched 100 million volts across a 1 centimeter spark gap in 100 nanoseconds. That is $10^8/(10^{-2} \times 10^{-7})$ or 10^{17} volts/(meter-sec). With those numbers, the above example would be 280×10^{-4} Tesla or 280 Gauss. The magnetic field of the Earth is roughly 0.5 Gauss and is easily detected by a hand-held compass. UFOs have been noted to cause an aircraft compass to either spin or give erratic indications (http://www.cobeps.org/pdf/meessen_evidence.pdf ; <http://www.hyper.net/ufo/physics.html> http://www.nicap.org/detection/compass/Herr_Incidents_Update.pdf). As would be expected, the effect is strong, but short range. Possibly, UFOs are using fast-switched intense electric fields to generate *magnetic field*pulses with fast rise-times. As far as I know, this is very difficult to do with any other kind of technology applicable to aircraft.

There is also a trap for the unwary here. Tesla's method of separating "etheric carriers" from electron current used powerful magnetic fields from *electromagnets*. Experimenters today would likely attempt the same by using powerful fields from neodymium *permanent* magnets, which are much more convenient to use. The field from the former is non-conservative (according to Halliday, Resnick and Krane) and the latter is conservative. In this particular application, the difference could be important and should be given some consideration.

Another potential trap can be seen in Piggott's experiments ([PiggottLinks](#)) Did his corona switch have anything to do with electron/neutrino separation? Was the *length* of his antenna wire a crucial parameter (as per Tesla's transmission line effect) or could it have been *loop area* (with the ground plate) ? The effect, whatever its source was, required a focusing plate. Note that Piggott did NOT

use magnetic spark suppression, but did use extremely thin wire at the corona switch (Figs. 4 and 5). Note that the switch shuts OFF a *leak*, rather than connecting to a conductor.

Links:

"On the Difference Between Spinning Electromagnets And Spinning Permanent Magnets",

G.R.Dixon

(2004) <http://www.maxwellsociety.net/PhysicsCorner/CurrentLoopPolarization/ElectroAndPermanentMagnets.html>

A perspective on neutrinos: "About 65 billion neutrinos . . . pass through every square centimetre of area on Earth, every second . . . without doing anything." <http://phys.org/news/2015-10-neutrino-great-cosmic-mysteries-nobel.html#jCp> (Compare: one Coulomb of charge is about 6.24×10^{18} electrons, and one ampere is 1 coulomb per second.) Flux of bright sunlight is about 10^{14} photons/cm²-sec and twilight is about 10^{10} . Neutrino flux at Earth is comparable to photon flux at twilight, but neutrinos are generally a thousand to a billion times more energetic than visible photons. There are commercial attempts to harness this energy source (neutrino-energy.com ; [http://peswiki.com/index.php/Directory:Elemental Rod Generator](http://peswiki.com/index.php/Directory:Elemental_Rod_Generator) ;) . If neutrinos are central to UFO propulsion systems, then we can bet that UFO designers have mastered both neutrino science and neutrino technology. UFOs could make good use of neutrinos for communication (Earth and oceans are virtually transparent to neutrinos). UFOs could also use them for reconnaissance (besides already having non-local reconnaissance capability, [as above](#)) . Neutrinos can be used for "X-raying" the Earth to locate mineral deposits, oil deposits, geological formations, and caverns big enough to hide UFOs. Neutrino technology could also be used for remote surveying of nuclear weapons production facilities, and remote examination of actual nuclear weapons (amount and type of fissile material). <http://www.businessinsider.com/why-you-should-care-about-neutrinos-2013-12>

There are indications that this technology could even be used to remotely convert fissile material into non-fissile material (turn a nuclear bomb into a dud while the missile is still in flight). The neutrino flux is strongest near the Sun, which seems to be another hang-out for UFOs.

The planetary neutrino flux would be an ideal energy source. It is very energetic, abundant and completely ignorable when not needed (unlike light, X-rays, gamma rays) . When needed, it could, with the right technology, supply reliable, robust energy at the flick of a switch. It would be available *anywhere* --outer space, under the ocean, or deep within the Earth.

UFOs may be a "source" of neutrinos: <http://aether.lbl.gov/www/projects/neutrino/UFO.html> (lbl = Lawrence Berkeley (National) Laboratory) Also: <http://phys.org/news/2016-01-moonthe-ultra-high-energy-neutrinos.html>

Links:

"Tesla's Discovery of Radiant/Dark Energy" http://nrgnair.com/MPT/zdi_tech/tesla/common/radiant/TRE1.htm

'Donald Lee Smith's documents and reference material' <http://www.overunityresearch.com/index.php?topic=2.0>

"Elusive particle appears in 'semimetal' Weyl fermions detected in tantalum arsenide" , . *Science News*; August 22, 2015. Andrew Grant, p. 11 "resembles a massless electron that darts around and through the material in unusual and exciting ways . . . High energy X-rays that pierced deep into the material revealed the signature of massless particles that fit the profile of Weyl fermions." See also <http://www.highbeam.com/doc/1G1-423904448.html> : "Their basic nature means that Weyl fermions could provide a much more stable and efficient transport of particles than electrons, which are the principle particle behind modern electronics." <http://physicsworld.com/cws/article/news/2015/jul/23/weyl-fermions-are-spotted-at-long-last> : "Another solution of the Dirac equation – this time for massless particles – was derived in 1929 by the German mathematician Hermann Weyl. For some time it was thought that neutrinos were Weyl fermions, but now it looks almost certain that neutrinos have mass and are therefore not Weyl particles." <http://phys.org/news/2015-07-year-massless-particle-next-generation-electronics.html> : "Unlike electrons, Weyl fermions are massless and possess a high degree of mobility; the particle's spin is both in the same direction as its motion—which is known as being right-handed—and in the opposite direction in which it moves, or left-handed. "The physics of the Weyl fermion are so strange, there could be many things that arise from this particle that we're just not capable of imagining now,""

"New hints of fourth neutrino found" *Science News*, March 19, 2016, Ron Cowen, p.14

Neutrino properties from the standpoint of the Reciprocal System:

"In this uncharged condition, the neutrino has a net displacement of zero. Thus it is able to move freely in either space or time. Furthermore, it is not affected by gravitation or by electrical or magnetic forces, since it has neither mass nor charge. . . Although the neutrino as a whole is neutral, from the space-time standpoint, because the displacements of its separate motions add up to zero, it actually has effective displacements in both the electric and magnetic dimensions. It is therefore capable of taking either a magnetic or an electric charge. Probability considerations favor the primary two-dimensional motion, and the charge acquired by a neutrino is therefore magnetic. . . This charged neutrino is thus, in effect, a rotating unit of space, similar in this respect to the uncharged electron, and, as matters now stand, indistinguishable from it." (*Basic Properties of Matter*, Dewey B. Larson, Vol. 2 (1988) <http://reciprocalsystem.com/bpm/bpm24.htm> (my gut feeling is that Tesla's "beam weapon" somehow utilized neutrinos; they are apparently quite versatile particles. See [PoyntingVectorInsights](#))

Behavior of a conventional circuit (http://en.wikipedia.org/wiki/RL_circuit) :

"The delay in the rise/fall time of the circuit is in this case caused by the [back-EMF](#) from the inductor which, as the current flowing through it tries to change, prevents the current (and hence the voltage across the resistor) from rising or falling much faster than the time-constant of the circuit. Since all

wires have some [self-inductance](#) and resistance, all circuits have a time constant. As a result, when the power supply is switched on, the current does not instantaneously reach its steady-state value, . The rise instead takes several time-constants to complete. If this were not the case, and the current were to reach steady-state immediately, extremely strong inductive electric fields would be generated by the sharp change in the magnetic field — this would lead to breakdown of the air in the circuit and [electric arcing](#), probably damaging components (and users)."

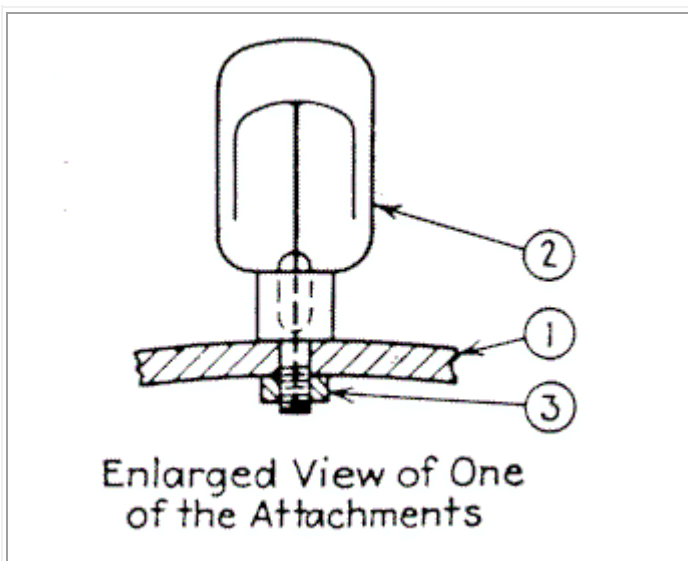
(Note the last sentence. This raises a question: Do neutrino or Weyl fermion currents generate a back-EMF? Do the effects on a long straight wire change if the same length of wire is coiled? If neutrinos move to the center of mass of the wire (instead of the surface), then is there an effect proportional to the cross-sectional area and overall mass of the wire? This distribution changes at high frequencies (or sudden impulses). The center of the wire has the most flux linkages at high frequencies; it therefore has the most resistance to electron flow at high frequencies and this forces the electrons to flow more readily near the surface of the wire, a phenomenon known as the [Skin Effect](#). But what happens to neutrino currents, which normally prefer the center of the wire.

Also, non-inductive windings are well-known to the electronics industry. These "bifilar windings" are used in non-inductive wire-wound resistors. They also happen to be favorites of the "free energy" crowd. Hmm . . .

. (See <http://scripturalphysics.org/4v4a/ElectromagneticTestCells.html#PancakeWinding>)

According to the Reciprocal System, the "charged neutrino is thus, in effect, a rotating unit of space, similar in this respect to the uncharged electron, and, as matters now stand, indistinguishable from it." Could neutrino current be separated from electron current by some sort of electromagnetic process, say a different form of the Stern-Gerlach experiment (perhaps involving rotation somehow)?)

<http://physicsworld.com/cws/article/news/2007/sep/26/quantum-spin-hall-effect-glimpsed-in-mercury-telluride>



This was Tesla's "New terminal for exceedingly high potentials consisting of spherical frame

attachments". Several were to be attached to the upper spherical terminal of a special air-as-a-belt van de Graaff generator. "Thus, it is made possible to raise the potential of the terminal to any value desired, so to speak, without limit . . . confident that as much as one hundred million volts will be reached . .

." <http://www.teslaradio.com/pages/teleforce.htm>

It is not obvious how or why this device would create an enormous multiplication of potential.

There are various Internet sites that publish detailed and explicit case studies of various UFO effects. I expect these would be useful in piecing together the jigsaw puzzle of UFO physics. Some samples:

National Investigations Committee on Aerial

Phenomena <http://www.nicap.org/index.htm> (there is a huge amount of useful, detailed information at this site)

UFOLOGY A Major Breakthrough in the Scientific Understanding of Unidentified Flying Objects, James M. McCampbell

http://www.nicap.org/ufology/preface.htm	Preface
http://www.nicap.org/ufology/ufochap1.htm	Certified UFOs
http://www.nicap.org/ufology/ufochap2.htm	The Vehicles (See also Poynting Vector Insights ; http://www.cufos.org/rullan.pdf)
http://www.nicap.org/ufology/ufochap3.htm	Composition & Luminosity
http://www.nicap.org/ufology/ufochap4.htm	Sounds
http://www.nicap.org/ufology/ufochap5.htm	Electrical Interference
http://www.nicap.org/ufology/ufochap6.htm	Physiological Effects
http://www.nicap.org/ufology/ufochap7.htm	Flight & Propulsion
http://www.nicap.org/ufology/ufochap8.htm	Pilots & Passengers
http://www.nicap.org/ufology/ufochap9.htm	Activities On Earth
http://www.nicap.org/ufology/ufochap10.htm	Some Concluding Remarks

Advanced aerial devices reported during the Korean war, Richard F. Haines (1990) detailed UFO sightings during the Korean War

<http://www.nicap.org/books/aadkw/aadkw-chapters.htm>

Report on the UFO wave of 1947, Ted

Bloecher (1967) http://nicap.org/waves/Wave47Rpt/ReportUFOWave1947_Cover.htm

***The UFO Evidence A thirty Year Report*, Richard H. Hall (2001)** This is an excellent book filled with authoritative, detailed, factual information

about UFOs. I highly recommend it to anyone seriously trying to understand UFO propulsion systems or non-local physics. A sample:

"An equally extraordinary, and puzzling, performance feature is the frequently reported ability of UFOs to disappear abruptly from one point and suddenly reappear at another (here termed *instant relocation*). Perhaps they move too fast for the human eye to follow, or this feature may indicate a relativistic effect. The *hummingbird-like motions* may be a comparatively slower version of *instant relocation* that remains perceptible to our vision and brain. . . . The apparent ability to move instantaneously (or extraordinarily rapidly) from one point to another suggests a propulsion system that, if we consider potential applications of relativity physics, may not be all that far beyond our current conceptual understanding. . . . Here, as in many other instances of extraordinary UFO data, careful scientific study of UFOs could lead to important scientific breakthroughs." (p. 425)

Compare that statement with this from [Beyond Einstein: non-local physics](#) , page 21, 22:

Example: there are two kinds of position and two kinds of velocity. Remember those two terms in the non-local form of gamma? We are using only one of them for propulsion—the spatial velocity one that depends on Newtonian mechanics. The other possibility, that of non-local motion, has been left unexplored. Using that, an aircraft could move from one position in the sky to another without traversing the intervening space. It would appear at one location, then disappear, then reappear at another location. It could move at extremely high speeds without generating a sonic boom. It would use “field propulsion” based on the non-local characteristics of electric and magnetic fields. It would be completely self-contained because there is no action/reaction (exhaust) as in conventional propulsion (in this case, the reaction forces are radial, and cancel out within the structure of the aircraft, making the preferred shape one of something with radial symmetry, like a saucer or cigar). . . .

Control of gravity and control of locality, would give us the ability to travel to the stars without traversing the intervening space. It would give us new forms of energy, and new ways of shaping our world, as well as many other astonishing things. But, clearly, there is a lot of work to do before we get there. At a minimum the currently “reigning paradigm” in physics must change and include things that are Beyond Einstein.

Again, I highly recommend *UFO Evidence* as a required book for the serious UFO researcher. I wish I had a copy years ago! (See also: <http://www.youtube.com/watch?v=0drMT6bOpGY> ; <http://www.ufoskeptic.org/light.html> ;

The 1st edition (1964) of this book can be viewed at: <https://www.cia.gov/library/readingroom/docs/CIA-RDP81R00560R000100010001-0.pdf> Interestingly, it offers this cautionary note (Section XIV, p. 179):

If there is deliberate secrecy being practiced by authorities (rather than a semi-conscious failure to face up to facts), this would appear to be inexcusable. Secrecy breeds fear and paves the way for panic, by introducing false fears and causing people to substitute imagination for reality. The danger of continuing such a policy was pointed out by NICAP Adviser Morton Gerla, a professional engineer: "This shortsighted policy results in delaying the solution of the UFO mystery, leaving both military and civilian populations unprepared for whatever steps may eventually have to be taken, whether peaceful or hostile. In the event of action being forced upon our government or people by UFO initiative, public confidence in a government following a policy of secrecy prior to being forced into action would be shattered, perhaps with catastrophic results to morale."

Another excellent work is *UFOs and Government A Historical Inquiry*, Michael Swords, Robert Powell, *et al.* (2012). It is an authoritative book about how governments and the military have responded to the UFO question, especially since 1947. It is not about UFOs per se, and little can be learned about propulsion systems from this book. A sample:

"What sort of mindset allows one to dump immediately into the analytical trash bin incidents witnessed by the Air Force's best technologists and its own pilots? There is something about this subject, some barrier to its believability, some challenge of an emotional kind, which produces the most inexplicable responses by otherwise reasonable, highly functional, people. (p.115)

"The motivation for the "disclosure stage" shows a concern based in the ignorance of the nature of the UFO phenomenon and the understanding that it posed a potential threat to national security. The motivation for the "disclosure stage" mirrored the conduct of other governments, and it recognized the evidence that no real threat had become apparent since 1947, coupled with the acknowledgement that the UFO problem really belonged to scientists, not to the military.

This contemporary vision is shared by many governments that are declassifying and releasing their UFO archives, all clearly implying that "this is not our cup of tea" (UK, Australia, Canada, New Zealand, Brazil, Denmark, Sweden, Italy, and Spain.). . . . From this perspective the situation in the United States seems to be unique." (p. 437)

UFO Evidence <http://www.ufoevidence.org/topics/topicshome.asp>

<http://www.ufoevidence.org/topics/VehicleInterference.htm>

[UFO Interference with Vehicles and Self-Starting Engines](#)

James M. McCampbell (MUFON 1983 UFO Symposium Proceedings / NICAP)

Disruption of automobile engines by UFOs is a familiar phenomenon. Less well known are instances where an engine that had been killed comes back to life again when the UFO departs, that is, the engine restarts itself without assistance from the driver. Twenty-seven such cases are summarized. A key observation by a mechanic whose engine had been stopped by a UFO suggests

a mechanism by which self-starting might be understood. [The explanation offered is ordinary physics in an unusual situation. Another possibility (not mentioned) involves a hypothetical effect of high time displacement in the vicinity of a UFO. The UFO time and the gravitational reference system time become skewed. When the UFO leaves, the ordinary reference system time resumes in the local environment. An engine could "continue" with its normal running; insects, frogs, birds, etc., could resume their normal noisemaking "as though someone flipped a switch". See *UFO Evidence*, Vol 2, p. 260, "Environmental Effects" Some supporting evidence follows --BF]

"my timepiece in the Police vehicle and my mechanical wrist watch were both lacking 14 minutes of time to the minute." <http://www.ufocasebook.com/mag/072913.html> ;

". . . October 18, John Struble of Columbia Falls, Montana, was driving his truck in the area of Fleisher PassStruble also noticed that his *nonelectric* watch had stopped for five minutes, the duration of the UFO's appearance." (*Clear Intent The Government Coverup of the UFO Experience*, Lawrence Fawcett, Barry J. Greenwood (1984) p. 33 <http://books.google.com/books> ;

"A senior Kuwait Oil Company (KOC) official told us the UFO which first appeared over the northern oil fields seemingly did strange things to KOC's automatic pumping equipment. This equipment is designed to shut itself down when there is some failure which may seriously damage the petroleum gathering and transmission system, and it can only be restarted manually. At the time of the UFO's appearance, the pumping system automatically shut itself down and when the UFO vanished, the system started itself up again." (*Ibid.* p 90)

"Everything went super silent while the object passed by – no bird sounds, no wind sound, no car sounds, nothing. Just silence and this effect of sound cancelling was only when the object was passing over the house and everything went back to normal once the object left." <http://www.openminds.tv/shape-shifting-ufo-reportedly-deadens-sound-around-witness/39617> (also, see comments)

"Some UFO reports aver that the presence of luminous phenomena (interpreted as alien vehicles) have stalled automobile engines. Here follows an unsensational report, sans UFOs, but with identical consequences.

July 20, 1992. Near Valognes, France. A. Lunt and O. Whalley were driving a Citroen 2CV in heavy rain. Lightning in the distance only.


"While the car was four to five metres from the approaching halt sign with the gears still engaged, the engine cut out. The car was brought to a stop at the halt sign and when the puzzled men found that the car would not restart they spent some 10-15 seconds wondering what to do. Then suddenly there was a huge flash, described as an 'explosion', only two metres behind and to their right as lightning went to ground in a triangular, gravelled area which formed part of the road junction

system. The inside of the car and the surrounding countryside lit up brightly and, simultaneously, there was a terrific crash of thunder. Startled, the occupants stayed in the car for a minute longer without trying to restart the engine before stepping outside to raise the bonnet of the car. The engine appeared dry and there was no discernible reason for its failure. Then, upon getting back into the car, the engine started at once, since when the vehicle has given no further trouble." Of course this single incident cannot prove that the powerful electrical field preceding a lightning stroke interfered with the car's ignition system. This report is suggestive only. (Meaden, G.T.; "Impending Lightning Stroke Stalls Car Engine?" *Weather*, 48:29, 1993.) From *Science Frontiers* #90, NOV-DEC 1993. © 1993-2000 William R. Corliss

(the "lost time" phenomenon appears to be an environmental side-effect; a more purposeful use of high time displacement might explain the "solid light" phenomenon. *UFO Evidence*, Vol 2, p. 379)

<http://www.ufoevidence.org/topics/EMEffects.htm> (see also <http://www.nicap.org/madar-1.htm> ; <http://www.hyper.net/ufo/physics.html>)

<http://www.ufoevidence.org/topics/PhysicalEvidence.htm>

[Estimates of Optical Power Output in Six Cases of Unexplained Aerial Objects with Defined Luminosity Characteristics \(PDF\)](#) 

Jacques F. Vallee, Journal of Scientific Exploration

An analysis of six cases of unexplained aerial phenomena observed by qualified observers over a twenty-year period in various parts of the Earth and in known physical conditions yields estimates of optical power output ranging from a few kilowatts to thousands of megawatts.

<http://www.ufoevidence.org/topics/PhysicalTraceCases.htm>

(various historical cases, with skeptical remarks offered)

<http://www.ufoevidence.org/topics/PhysiologicalEffects.htm>

"The available evidence (that is admittedly sparse) seems to be indicative of microwave, infrared, visible, and ultraviolet radiation, although a few cases seem to point towards high doses of ionizing radiation such as X-rays or gamma rays. Most of the reported eye problems (sometimes long lasting) may be attributed to strong UV radiation. Superficial burns may be due to UV radiation, but deeper burns may be due to microwaves. It may be noted that injuries to vegetation (see Section 11), that include desiccation and "aging," also may be due in part to microwave radiation."

<http://www.ufoevidence.org/topics/RadarCases.htm>

"Radar sightings of UFO's are remarkably common, and also the most authentic. The word of expertly trained operators, backed up by tangible echo returns from unidentified intruders is hard

to deny. In many cases these bizarre blips that suddenly invade military and civil radar screens are seen to execute manoeuvres completely beyond the abilities of any known aircraft. Ground speeds of up six thousand m.p.h are nothing unusual, and as if to add further credence to these incidents, many of these 'radar visuals' as they are called, have been simultaneously witnessed by naked eye observers, both on the ground and in the air!"

<http://ufodata.net>

"Physics from UFO Data", Massimo Teodorani, Ph.D.

(2001) http://www.itacomm.net/ph/phdata_e.pdf <http://www.ufodata.net/scientific.html#ResourceCatH>

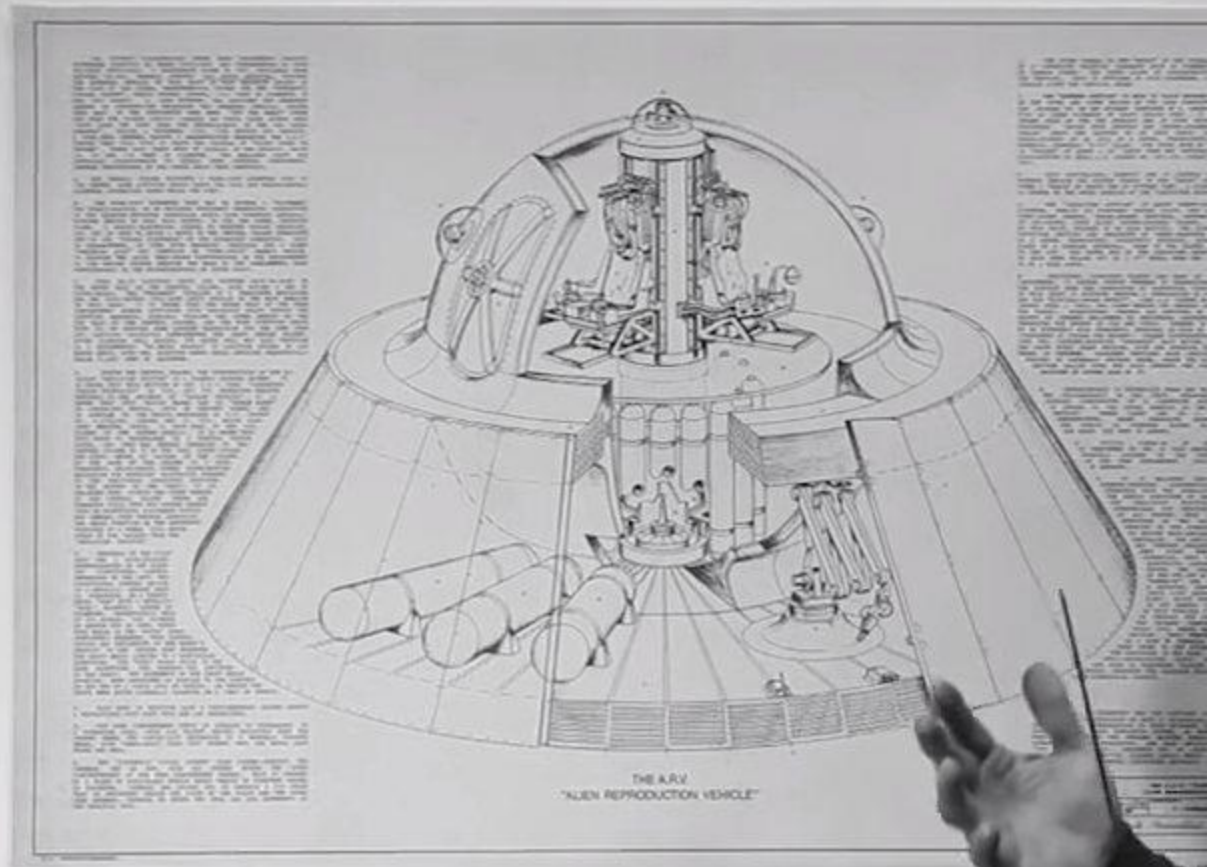
<https://vault.fbi.gov/UFO>

"In 1947, a rash of sightings of unexplained flying objects (UFOs) swept America. Although the newly formed U.S. Air Force was the primary investigator of these sightings, the FBI received many reports and worked for a time with the Air Force to investigate these matters. This release details the FBI's role in investigating such reports between 1947 and 1954."

Get out the popcorn and watch this movie:

Zero Point - The Story of Mark McCandlish and the Free Energy Fluxliner Space Craft

<http://youtu.be/CkVNv7PbeH8?list=PLf01VYJU5IQJ1NWhfRCGIaW4Krl2G4XIw>



1:02:02 / 1:32:50

Viewers who have a technical or scientific background should first read:

["Beyond Einstein: non-local physics"](#)

[Motion Cancellers and Poynting vector](#)

[Biefeld-Brown Effect](#) (probably does not apply to this machine; the thick copper conductors imply heavy current rather than high voltage)

[../qm/qmconcept.htm#SymmetryProblem](#)

Especially intriguing in the video is the portion starting at **1:04:45**. It concerns the central column, mercury, and counter rotation. It may provoke some thoughts about Tesla's magnification effect, separation of his "etheric carrier" current from electron current, and subsequent conversion to an increase in voltage or energy. This could be related to the [Weyl fermion](#) and its peculiar spin

polarization, and/or the neutrino of the Reciprocal System which can exist in three forms: electrically charged, magnetically charged, or uncharged (massless).

Also, mercury could conceivably play a role in the separation of "etheric carriers" from electron current. Mercury is only a fair conductor of electron current, but should be a good conductor of "cold electricity" (possibly the magnetically charged neutrino of the Reciprocal System). It is also denser than lead, which may be a trait in its favor, because these kinds of neutrinos seek the center of mass of a conductor, rather than the surface, as noted above.)

The mercury could also have a more mundane use. As noted, the thick copper conductors (at the bottom) imply a machine that uses high currents instead of high voltage. The copper winding and the spinning disc at the midsection of the machine could form an "[improved Faraday disk generator](#)", which would be capable of delivering high currents at useable voltages. Electrical commutation in such a machine is usually done with a contact at the shaft and multiple brush contacts around the periphery of the disc. But with a large disk running at high speed, brush wear would definitely be a problem. This could be circumvented by using multiple rolling contacts and using mercury as a slip ring on the rolling contact shafts. Tesla suggested an arrangement that could use one magnetic field, and two counter-rotating discs with the final output commutation taken from the shafts, instead of the disc periphery. See "Dynamo Electric Machine", Nikola Tesla, <http://www.freepatentsonline.com/0304498.pdf>, lines 70-79 (a different arrangement could use two coaxial but counter rotating stacked discs; the peripheries of the stacked discs would be electrically connected by a mercury-wetted Lazy Susan ball bearing arrangement, instead of a metal belt; The final output connections would be made at the shaft ends)

[The patent by John Schnurer \(cited below\) implies some alternative possibilities for the use of mercury, even though his device does not use mercury: <edit in progress>](#)

There seems to be no microwave generator in this machine. However, high voltage or high current pulses with fast risetimes can have a similar effect.

See also:

[../qm/qmconcpt.htm#EffectsOfOrdinarySpin](#)

"Flywheel coupling defies Newton's laws", Harold Aspden
(1998) http://www.padrak.com/ine/NEN_5_11_9.html

"Nonlinear electromagnetic propulsion system and method",
Schlicher (1992) <http://www.freepatentsonline.com/5142861.pdf>

"An electromagnetic propulsion system based on an extremely low frequency (elf) radiating antenna structure driven by a matched high current pulsed power supply is described. The elf antenna structure resembles a modified three dimensional multiple-turn loop antenna whose geometry is optimized for the production of reaction thrust rather than the radiation of electromagnetic energy into space. The antenna structure is current driven rather than voltage drive. Rigid three dimensional geometric asymmetry, made up of flat electrical conductors that form a partially closed volume in the loop antenna structure, trap magnetic flux thereby causing a

magnetic field density gradient along a single axis. This magnetic field density gradient then causes an imbalance in the magneto-mechanical forces that normally result from the interactions of the loop antenna's internal magnetic field with the current in the conductors of the loop antenna structure, as described by the Lorentz Force Law. The pulsed power supply is designed to provide the proper waveform to the antenna structure at an impedance matching the load impedance of the antenna. The rise time and shape of the input current waveform is crucial to maximizing the production of reaction thrust. Input voltage is at a nominal value sufficient to allow the desired high input current."

"Evidence of Very Strong Low Frequency Magnetic Fields". A. Meessen (2012) *PIERS Proceedings*, Moscow, Russia, August 19-23, 2012. http://www.cobeps.org/pdf/meessen_evidence.pdf :

Abstract— We have shown *why* the propulsion of Unconventional Flying Objects of unknown origin can result from very intense low-frequency magnetic fields and an adequately pulsed ionization of the ambient medium. We also found *how* these fields could be produced, if the surface of these objects were superconducting. Now, we present *evidence of the existence of these fields*. It results from traces left on the ground by induced currents, rotating compass needles, direct magnetometer recordings and very remarkable magneto-optical effects. They provide even proof of the required pulsed ionization.

A different implementation uses rotating pulsed (high frequency) magnetic fields with a stationary superconductor. Note that the pulsation rate and the field rotation rate are two different things::

"Improved apparatus and method for gravitational modification", John Schnurer <http://www.freepatentsonline.com/WO1998023976A2.pdf>

. . . Instead of requiring mechanical rotation a field is produced which in effect rotates. This is done by sequentially actuating a nominal 3 electromagnets. . . .

By the discovery that the gravity shielding effect occurs during a transition state between superconducting and non- superconducting, the present invention allows the effect to be both controlled and maximized by controlling the various parameters to maintain the superconductor material in that state. Similarly, by maximizing the mashing of the field created by the supercurrent, that is, by changing, or moving, the field instead of the superconductor material, and by controlling the other parameters discovered to be key to the gravity-altering effect, higher levels of gravity shielding can be achieved without mechanical rotation of the superconductor material. . . .

Each core has a winding of 140 turns of Litz wire, equivalent to # 27 AWG comprised of # 44 AWG individually insulated wires. . . .

4. The pass elements can be solid state types and the pass elements may also be mechanical. In the reduction to practice the pass elements are electro mechanical switches actuated by power transistors. For the sake of simplicity in the drawing FIG. 4 the pass elements are shown as the electrical symbols of MOS FET transistors.

The important aspects of this are described below and include fields of broad band frequency qualities which were produced by using an isolated mechanical method. This results in a nearly instantaneous establishment of current to the solenoid. The method uses a magnetically controlled switch called a reed switch. These switches comprise two thin metal reeds with precious metal plating in the contact area. The reeds also tend to have a natural resonant mechanical moment.

When the reed switch is exposed to a magnetic field the two reed-like members are mutually attracted. This can be done with a permanent magnet or with a solenoidal winding, which is what is used in the reduction to practice.

The solenoidal winding completely surrounds the reed switch. In the latest device 3 reed switches connected in parallel are enclosed within one solenoid. When energized this winding creates a magnetic field and the reed members are mutually attracted. The reed members tend to accelerate toward one another and "bounce" or rebound several times before sustained contact is made. This is a drawback in some systems, particularly digital systems.

In our realization this is a benefit. The multiple "make-and-break" switching action produces wide band and high frequency excitation.

When the solenoid is energization is removed the reeds snap apart and there is a brief time interval of arcing or plasma between the contacts and this too is rich in high frequency components. An additional benefit is fields with abrupt rise and collapse times.

... Effect is not specifically dependent on shape, not specifically dependent on material, and not specifically dependent on excitations, in other words the excitations can be realized as magnetic, electric, electromagnetic, charge and-or motion and-or combination or change in any of the above. .

..

Related: [Poynting Vector Insights](#) and [Strange Flying Machines](#)

Relevant?:

"Apparatus and method for generating and using multi-direction DC and AC electrical currents", John Timothy Sullivan (2010) <http://www.freepatentsonline.com/7736771.pdf>

"Electromagnetic energy propulsion engine", James R. Taylor (1993) <http://www.freepatentsonline.com/5197279.pdf>

"Propulsion Device and Method Employing Electric Fields for Producing Thrust", Hector L. Serrano (2002) <http://www.freepatentsonline.com/6492784.pdf> (http://www.oocities.org/warpcore91/jlnlabs_sfptv1.pdf)

Jonathan W. Campbell patents:

"Apparatus and method for generating thrust using a two dimensional, asymmetrical capacitor module" (2001) <http://www.freepatentsonline.com/6317310.pdf>

Apparatus for generating thrust using a two dimensional, asymmetrical capacitor module (2002) <http://www.freepatentsonline.com/6411493.pdf>

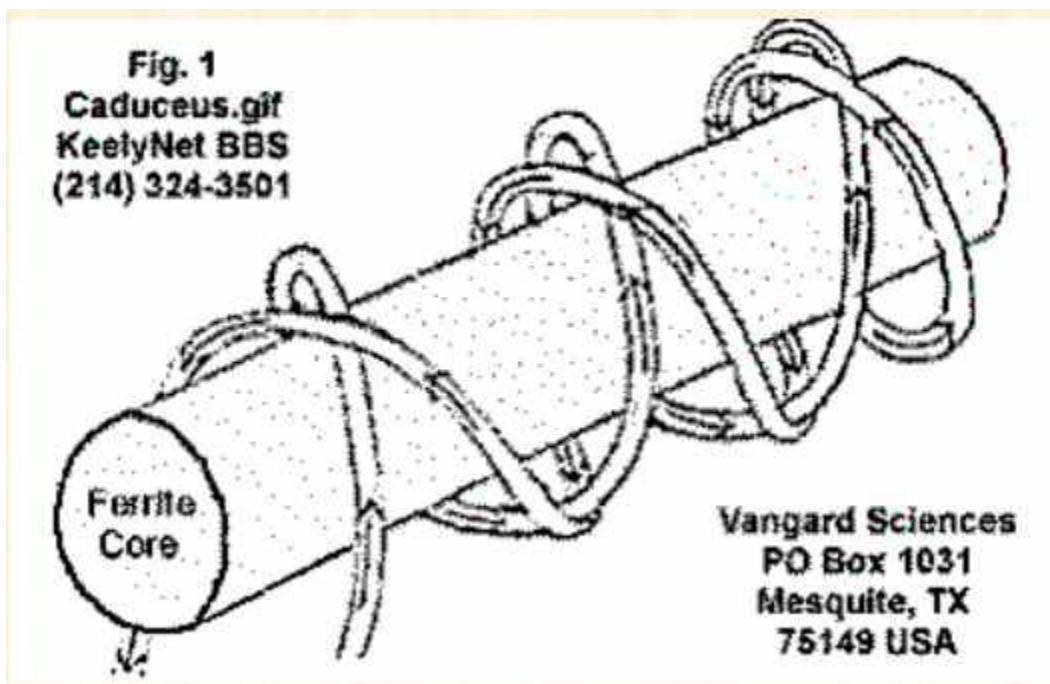
"Cylindrical asymmetrical capacitor devices for space applications" (2004) <http://www.freepatentsonline.com/6775123.pdf>

James F. Woodward patents:

"Method for transiently altering the mass of objects to facilitate their transport or change their stationary apparent weights" (1994) <http://www.freepatentsonline.com/5280864.pdf>

"Method and apparatus for generating propulsive forces without the ejection of propellant" (2000) <http://www.freepatentsonline.com/6098924.pdf>

"Method and apparatus for generating propulsive forces without the ejection of propellant" (2002) <http://www.freepatentsonline.com/6347766.pdf>



http://www.stealthskater.com/Documents/Caduceus_03.pdf

"Certain experiments . . . were carried out by independent researchers with caduceus-wound coils (1). This was also called a "Tensor" coil by its main proponent, Wilbert Smith.

The caduceus coil, illustrated in fig. #1, basically consists of ordinary insulated copper wire wound in a double-helix around a ferrite core. THIS COIL HAS REPEATEDLY BEEN FOUND TO VIOLATE ESTABLISHED LAWS OF ELECTROMAGNETICS AND HERTZIAN WAVE THEORY WHEN A HIGH FREQUENCY CURRENT IS INJECTED INTO IT. . . .

This apparatus has zero impedance, unlike an ordinary coil. When fed electrical energy, the wire in the Tensor coil does not get hot. . . .

A few investigators have also reported unexpected bizarre inertial effects in conjunction with these coils. One researcher activated his caduceus coil with pulsed bursts of microwave frequency whereupon it appeared to lift itself up by its own bootstraps executing a periodic series of little hops off the ground. Why the coil would jump like this or exhibit the other weird effects noted above, has no explanation under standard electromagnetic theory, and must be attributed to the field effect produced by the unique coil winding."

I am skeptical of the claims made for Caduceus coils. As shown, the coil is simply one wound with an open helix rather than a closed or "tighter" helix as is common with ordinary solenoid coils. A second layer is wound on top of the first, just as in ordinary coils.. This construction (only a few turns, widely spaced) will result in low inductance, and the wires crossing at 90 degrees will result in low interwinding capacitance. The impedance will be mostly resistive, except at radio frequencies. I don't see any special physics in operation here.

See also: <http://nextexx.com/the-caduceus-coil/> ; <http://www.keelynet.com/time/cadsmith.htm> ;

Picture Gallery

https://www.google.com/search?q=free+energy+tesla&tbm=isch&imgil=jP7zvQd-eMYB-M%253A%253BD7ZQI91F5mBIBM%253Bhttp%25253A%25252F%25252Fwww.freeenergyplanet.biz%25252Ffree-energy-devices%25252Fside-view-1.html&source=iu&pf=m&tbs=simg:CAESygEaxwELEKjU2AQaAggKDAAsQsIynCBpiCmAIAxIolQiaCPcfrROvE6YTqweZCqgUtROtPq8-rj6sPtQ28j-wPqg-tT7xPxowkqRe-P8h6aSzq8zh8x4wNQyFm0Pt4J0e9yw4M8hlor8by0mN19CjU-Msmvh46gzaIAIMCxCOrv4IGgoKCAgBEgTPRMUCDAsQne3BCRo1CgkKB3Byb2R1Y3QKCoHZGhZ3JhbQoKCghsaWdodGluZwoGCgRsaW5lCgkKB2RyYXdpbmcm&fir=jP7zvQd-eMYB-M%253A%252CD7ZQI91F5mBIBM%252C&biw=1640&bih=971&usg=__LH8BMS_5BkPfbj-61KiSYEinQcI%3D&ved=0CEAQyjdqFQoTCLa_qozk9cgCFUMqiAodGRIBQg&ei=hnU5VrbkGsPUoASZpISQBA#imgrc=yYDt_qtEl5MZqM%3A&usg=__LH8BMS_5BkPfbj-61KiSYEinQcI%3D

(html 3/14g)

"Examine everything carefully . . ."
1Thessalonians 5:21

How can UFOs make right-angle turns at high speed?

How can UFOs make right angle turns at high speed without smashing the occupants against the walls of the ship? This problem has been noted by the UFO community:

"There are some definite flight type characteristics that are seen now that I would say represent genuine UFOs...ie: instant acceleration; instant stop; vertical acceleration -up into the air and down to the ground; reverses in direction; right angle turns - all in silence - multiple objects sometimes separating and then going back into each other.

They are classic, what I would call, genuine UFO characteristics - things that we can not do in a conventional sense".

British Detective Police Constable Gary Heseltine - Police UFO reporting organisation, [PRUFOS](http://www.theblackvault.com/phpBB3/topic8667.html) (<http://www.theblackvault.com/phpBB3/topic8667.html>)

Such maneuvers are estimated to involve g forces that are 100 to 1000 times the force of gravity. Such forces would be lethal to humans, and as noted, are done silently in midair, seemingly effortlessly.

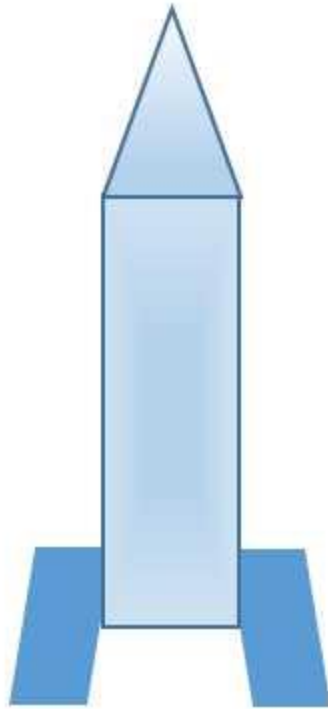
Many scientists say that such maneuvers are only possible if a way has been found to cancel out inertia. But this is not necessarily true. The same thing can be accomplished by a volumetrically uniform, non-contact acceleration. Consider what happens to astronauts when flying to the moon.

The astronauts are first accelerated upwards by a powerful rocket. When the rocket engines are shut off, the spacecraft begins coasting to the moon. The astronauts are then in a "weightless" or "free float" state. But Earth is still near. Aren't they affected by Earth's gravity? Yes, they are, and so is the spacecraft. Both are being decelerated by the pull of Earth's gravity. The effect is a gradual reduction in speed, for both the astronauts and the spacecraft. As the spacecraft nears the Moon, the Moon's gravitational influence becomes stronger than that of Earth's. The result is an acceleration that increases the speed of both the astronauts and the spacecraft. All the while the astronauts remain in "free float". If they had no windows and no instruments, they would not even be aware of the speed changes, even *extreme* speed (or direction) changes.

Hence, we see what is necessary for a UFO type of propulsion system. It must be able to produce a spatially uniform acceleration throughout the ship, and the acceleration must be of the "non-contact" or "action-at-a-distance" type. This kind of acceleration has no Newtonian "back reaction" and is therefore capable of accelerating the machine that generates the acceleration—an effect popularly known as "[bootstrapping](#)". The effect is as though the ship could generate its own gravity, and aim it in any direction. Only an electro/magnetic "field propulsion" system is capable of doing this.

See [motion cancellers](#), [radial reaction](#), and [Why is gravity so weak?](#) for further insights. <http://www.freepatentsonline.com/WO1998023976A2.pdf>

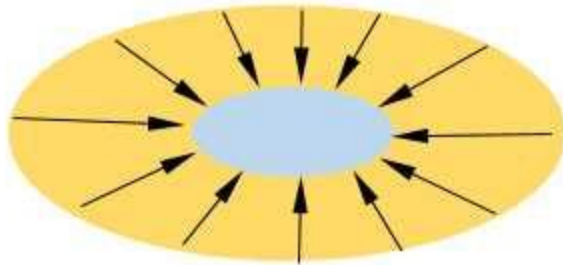
Newtonian Reaction Propulsion



Reaction:
upward. Acceleration applies *directly* to the ship, and the ship then accelerates the occupants. The occupants are NOT in “free float”.

Action:
downward thrusting
(external) rocket exhaust.

“Bootstrap Field Propulsion”



Action:

upward. Non-contact acceleration *directly* and uniformly to both the ship and its occupants. Occupants are effectively “free float”, regardless of the intensity of acceleration.

Reaction:

radially inward (or outward).

There is no external reaction. The reaction components all cancel out within the structure of the ship.

<http://scripturalphysics.org/4v4a/ADVPROP.html#Declassify>

Please sign the White House petition to declassify secret MILITARY reports on UFOs that are more than 25 years old (petition closes on Jan 13, 2013 <http://wh.gov/RIZI>):

WE PETITION THE OBAMA ADMINISTRATION TO:

declassify secret military reports of UFO sightings that are more than 25 years old.

There continue to be numerous UFO sightings classified as UNKNOWN by the military. The military has sophisticated equipment and trained observers to detect various aircraft and ICBM launches, and so the military can certainly detect UFOs that are a mile wide and in USA airspace. These secret MILITARY reports must contain detailed, high quality information. We-the-people want to have access to this information. We especially want to know about those objects:

1. described as "flying saucers" or "flying triangles";
2. described as extremely large or which display characteristics of extreme maneuverability, speed, or intelligent control;
3. which possibly suggest an enabling propulsion technology that has been accessible for the past 115 years.

Created: Dec 13, 2012

Issues: Science and Space Policy, Technology and Telecommunications, Transportation and Infrastructure

[Learn about Petition Thresholds](#)

SIGNATURES NEEDED BY
JANUARY 13, 2013 TO
REACH GOAL OF 25,000

24,998

TOTAL SIGNATURES ON
THIS PETITION

2

A whitehouse.gov account is required to sign Petitions. WHY?

✓ SIGN THIS PETITION

SIGN IN

OR

CREATE AN ACCOUNT

Update: This petition "expired" January 13, 2013. It did not come anywhere close to obtaining the required number of signatures. I submitted it just to see what would happen, and I thank all who participated.

An observation: There is already PLENTY of material on UFOs that has been declassified and published by the CIA at <https://www.cia.gov/library/readingroom/search/site/UFO> . A noteworthy example, *The UFO Evidence*, can be found at: <https://www.cia.gov/library/readingroom/docs/CIA-RDP81R00560R000100010001-0.pdf>

There are people in high government positions who believe Americans would have an adverse response to the truth about UFOs. One of these is former president George Bush.

Says <http://www.pressexaminer.com/americans-cant-handle-the-truth-george-bush-senior-on-ufos/76219> :

An activist/journalist asked Bush when the US government is going to reveal the truth about UFO's to the Americans.

George Sr. responded by saying, "Americans can't handle the truth". The crowd and reporters were stunned into silence with this answer. They were taken completely by surprise. Everyone in the large crowd was clearly feeling uneasy with Bush's answer. Organizers of the event even had to briefly halt the questioning.

Of all the Presidents that have been faced with the UFO problem, George Bush is probably the best qualified to have been given the secret. He spent a year as Director of Central Intelligence, the head of the entire United States Intelligence Community for President Ford. Then as DCI, he was in

charge of giving intelligence briefings to Jimmy Carter during his transition to the Presidency in 1976.

It has often been said that the United States knows a lot more about the UFO's than what it tells the public. Information is classified as those in the government believe that Americans cannot handle the truth.

(Unfortunately, I have to agree with this assessment. Our society's thinking is inverted: foolishness is disguised as wisdom, debt is regarded as wealth, violence is offered as entertainment, . . . etc. It seems as though the government these days in some cases does not even bother with "spin doctoring" but just outright lies. Example: [CDC Testimony](#) . If truth is treated as rubbish, why should it be offered?)

Although I wish secret military reports of UFO encounters would be declassified, it is not much of a handicap if they are not. *Non*-classified military encounters have been documented in *Need to Know* by Timothy Good (2007) and various other publications. These point to fairly consistent commonalities that may be used to tease out the operational principles behind these machines.

For the most part, the topic of "UFOs" is regarded largely as "entertainment" by the news media. In fact, it is often listed in the Entertainment section, not the News section. Even when engineers talk about them, it is mostly a curiosity topic at a dinner party—nothing anybody takes seriously. If you wanted to "build a real flying saucer", or at least demonstrate the physical principles, you would be hard pressed to find anyone who is seriously interested.

I believe that the "flying saucer" and "flying triangle" UFOs are probably man-made. I believe the technology to build them has been accessible for at least 115 years. Far more sophisticated technology has been developed since the 1940s. Hence, I am not so interested in the *technology*, as I am in the *science*. The latter is not in the textbooks, and we seem to be missing a lot, especially about electromagnetics and "special cases" of electromagnetic momentum.

These "real UFOs" deserve a name. I am going to call them *Field Propulsion Objects* (FPOs). This is a *category* that has the following typical characteristics:

- they have no visible reaction propulsion system (jet engines, propellers, rockets, etc.) nor reaction control surfaces (ailerons, rudders, fins, etc.)
- they can hover silently (or nearly so) in the sky and maintain their position over time (unlike a balloon)
- they can accelerate suddenly or make sudden sharp turns at high speed with no sonic booms or turbulent wake. (Sometimes a faint luminescent wake is visible at night). Turns may be flat rather than banked.
- they usually emit bright light at night, with gold-white being the most common. Some, however, are black.
- they often fly as a formation of lights; the lights can "wink out" individually or disappear suddenly ("delocalize" ?)
- they may or may not reflect radar (related: *Area 51 An Uncensored History of Americas's Top Secret Military Base*, Annie Jacobsen (2011) p. 239)
- unwanted, anomalous electrical and magnetic effects may be associated with their presence
- they can operate in outer space, in the atmosphere, or in bodies of water
- they show characteristics suggesting intelligent control

Another category could be called *Black Field Propulsion Objects* (BFPOs). These are FPOs that are black in color and have bizarre, weird, aerodynamically ludicrous shapes.

The term "Field Propulsion", is of course a presumption, but one that I think will ultimately prove accurate.

What did those guys know back then?

A Weapon of Mass Destruction in Victorian Times: The Coal-Dust Flame-Thrower (with sideways references to an atom bomb (October 1862) from <http://www.lateralscience.co.uk/wmd/index.html>)

I ask you Faraday, what manner of mental disorder would induce a person to believe a lump of metal the size of a bull's heart, could explode with the force and energy of half a million hundredweight of triply nitrated phenol?

...

Hodges uranium experiments have been extremely interesting, not least to see at first hand how delusional madness can destroy the ability for rational thought. Poor Hodges, he sees these small white tracks in his mist-chamber and declares they represent the unleashing of titanic energies!

...

Hodges mental derangement then became most apparent Faraday. He suggested that the uranium has within it an admixture of a different uranium, having identical properties upon chemical analysis. But differing in being able to produce the anomalous tracks when exposed to the influence of the platinum wrap of mixed glowing baryte and emerald powders. The uranium from Africa has had, he maintains, the special uranium burned out because of what he terms "an exponential growth of linked expulsions of highly energetic corpuscular effluvia." He calls this a link-reaction. One expulsion, he maintains, has the ability to influence other particles of the special uranium, causing them to similarly eject effluvia. Just as the admixture of minerals was able to induce these expulsions. But if the particles of special uranium within the metal were more closely spaced, one expulsion could cause two or three more, which would induce expulsion in more and more in an exponential runaway! He thinks some particular arrangement within the ore body enabled a link-reaction to take place, probably thousands of years ago, when primary mineralisation of the deposits was taking place.

...

At this point I asked Hodges to come to his point, and not waffle using unsubstantiated speculative theories. This was when his madness reached it's apex, and only his fever and obvious frailness prevented me from slapping some sense into his diseased body! He said that if the special uranium could be extracted from the non link-reacting uranium, (the dolt suggested gaseous diffusion of halogenated uranium!), the metal would be the most explosive substance known!

...

Well, as you are perfectly aware Faraday, uranium is an element, and not an admixture of inflammatory and oxidising substances. Nor is it a highly nitrated organic compound, nor an unstable combination of elements. Elemental metal cannot explode! Hodges saw my disbelief, shewed me diagrams of the electrostatic and magnetic deflection of his mist-chamber tracks, fruitlessly trying to demonstrate that these feeble mist-tracks represent immense energies. He finally said, that the mere accumulation of enough of this uranium, to the size of a beasts blood-pump, would cause the metal to spontaneously explode, with the explosive effect I mentioned at the beginning of this communication. I have instructed Hodges to cease all his private experimentation until he regains his sanity.

"Victorian Tesla Coil, with reference to a possible medieval coil" <http://lateralscience.blogspot.co.uk/2012/07/victorian-tesla-coil-with-reference-to.html>

<http://www.tuc.nrao.edu/~demerson/bose/bose.html> (microwave experiments prior to 1900)

<http://www.rexresearch.com/rogers/1rogers.htm> (underground radio)

http://en.wikipedia.org/wiki/Magnetic_detector (Marconi magnetic detector used moving iron wire)

The Piri Reis Map <http://www.nicap.org/ancient/peri.htm> (unusually accurate ancient maps)

"More Revelations At Puma Punku In

Bolivia", <http://www.youtube.com/watch?list=PLf01VYJU5IQJ1NWWhfRCGIaW4Krl2G4XIw&v=yaaokEldXPI>

<https://www.youtube.com/watch?list=PLf01VYJU5IQJ1NWWhfRCGIaW4Krl2G4XIw&v=yaaokEldXPI>

". . . in much wisdom there is much grief, and increasing knowledge results in increasing pain".

(Ecclesiastes 1:18)

[Return to Home Page](#)

"Stuff"

"Unconventional Science", RL Jones, 2005:

". . . in order to identify disruptive technologies it is prudent to "look outside the box", and it is only here that the high-risk high-gain developments will be found." (several examples are given)

<http://newenergytimes.com/Library/2005JonesR-UnconventionalScience.pdf>

"The Dark Matters of Dark Energy: American Military Pursues Antigravity Weapons", Gary S. Bekkum, 2006, http://www.starstreamresearch.com/dark_matter_of_dark_energy.htm

"Towards a new test of general relativity?," European Space Agency, 23 March 2006,

". . . a superconductive gyroscope is capable of generating a powerful gravitomagnetic field, and is therefore the gravitational counterpart of the magnetic coil. Depending on further confirmation, this effect could form the basis for a new technological domain, which would have numerous applications in space and other high-tech sectors" says ESA study manager Clovis de Matos. Although just 100 millionths of the acceleration due to the Earth's gravitational field, the measured field is a surprising one hundred million trillion times larger than Einstein's General Relativity predicts."

http://www.esa.int/SPECIALS/GSP/SEM0L6OVGJE_2.html

<http://xxx.lanl.gov/pdf/gr-qc/0603033>

<http://xxx.lanl.gov/pdf/gr-qc/0603032>

"Take a leap into hyperspace", New Scientist Print Edition, 05 January 2006, Haiko Lietz

This is an article about the work of Burkhard Heim in quantum mechanics and general relativity with a possible application to antigravity technology.

<http://www.newscientist.com/channel/fundamentals/mg18925331.200.html>

[Return to Home Page](#)

<http://scripturalphysics.org/4v4a/ADVPROP.html#GravitationalLensing>