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Insights to help De-mystify some Physics Mysteries

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Abstract

My first article in the GS Journal addressed the fundamental issue, "Why are there prominent particles in physics with different masses, the proton, the electron, the mesons, etc.?"[1] The present paper addresses some other fundamental issues in Physics: Are there really 'actions at a distance' and 'pull' forces?; Why does there exist in nature -- a very strong nuclear force, a weaker electric force, and a very weak gravitational force?; Roughly, what is aether's pressure, density, and its mean velocity? Since this is a long paper, readers are advised to first read its final **Summary**, and then optionally see other sections. The below condensed paper presents only the key points and an overview of each major topic, to avoid greater length. But some helpful footnotes are provided.

Key words: action at a distance, pull forces, push forces, weak force, strong force, aether to nuclear density ratio, gravity to nuclear force ratio

Topic 1: Do 'Pull' Forces and 'Action-at-a-distance' Really Exist?

I agree with Newton [2] and the vast majority of pre-Einstein 'natural philosophers' -- that two truly separated bodies cannot be 'push' or 'pulled' together unless there is a real 'somethingness' (not just a math formula) surrounding both bodies to interact with them. Now there have been a few philosophers who have argued, in short, that since reality exists only in the non-material mind – that a reality can and does happen any way the mind imagines it to. 'Nothingness' can become 'somethingness' or visa verse, and things change their travel per wandering of the mind, like dreams. Thus, in Philosophy, there exists what is termed an 'objective approach' vs. a 'subjective approach'.

Some scientists have theorized that 'space' is relative, curved or mathematically distorted by mass – thus solving the mystery of 'action-at-a-distance', and without having to hypothesize a medium between or around separated bodies. Also that "something like 'bullets' flying between bodies or into bodies" is also not needed to account for the bodies' interaction either. I.e., since we don't directly detect any obvious material in the seemingly empty space between the earth and moon, nor bullets flying between the

bodies; that, therefore, gravitation-like actions must occur without intermediary matter or bullets interacting with the bodies.

However, to be brief, it seems only logical to this writer, Newton, and many others, that we must accept a material medium in all space, and no large volume of absolute voids in that material. Thus, we accept the historical term, '**aether**', and use it to designate that medium between bodies in space. And we accept also the existence of something like bullets, wave vibrations, pulses, and likely ethereal flow in space. More details and reasons for that are described below, and at the current website of author [3].

While we don't have precise details to explain and understand how aether causes every detail in the universe to behave exactly as it seems to; I think the aether concept does help us to understand basics, and even to go well beyond basics. But if, instead, we use a pure 'no aether' approach – we cannot really understand anything, although we can still write a helpful mathematical description of a sequence of observable events!

Even if we were to use some gimmick or trick which might seem to allow us not to need an 'aether' to help explain gravity, we would just be 'kicking the can down the road', and the next problem would be, "why do two simple rod magnets attract each other even when not quite touching?" If we try to imagine each magnet merely shooting photon bullets at one-another, that would seem to cause repelling, not the attracting that we seek to explain here. And then – the problem of simple 'attraction between a positive-charged body and negative-charged body'. And why don't fast spinning particles 'fly apart' and thus disintegrate? Thus, with a '**no**-aether' approach, the number of phenomena that are intractably incomprehensible, i.e., the need to continually kick the 'tin-cans' down the road – seems to ever escalate. And, I think, the number of bizarre explanations and other dubious gimmicks attempted to avoid an aether hypothesis – also escalate!

So I think it is tragic that much of science and several other endeavors have thrown away the methodology of trying to tackle major issues by first addressing what seems most basic and fundamental vs. 'merely' the periphery, i.e., thrown away the helpful old notion of what is 'primary' vs. what is 'secondary'. Even Einstein found those old terms useful to use in an important speech he made in 1930 [4].

Now, let us try to address the subject of whether 'pull forces' actually occur in nature. Or whether the pull forces only seem to exist, but there are really hidden 'push forces' causing merely the appearance of attractive forces, instead. Thus, we propose that there is really an ethereal push, or bullet-like impulse push, but the presence of the pushing material is sometimes just **invisible** to us. If we give our 'intuition' fair and appropriate rein, I believe almost all of us will agree that we are intuitively OK with the concept of two colliding masses or bodies competing for the same turf 'and then something must give-way'. In other word, a push, i.e., one body or particle against another seems conceptually satisfying.

But contrast that to a 'pull' force. Say, a fast spinning body where we might reasonably expect the body to breakup -- because the fast moving tangential parts would be thrown

outward. Can we really imagine that the body would not 'break apart', due to spin, because of pull forces? Can the parts, without external 'push forces' on the body, just stay together by somehow just beckoning all its parts to stay together? Or that under the spinning circumstances -- it 'just happens' stay together. That notion is **not** conceptually satisfying. At least, not even close to as intuitively satisfying as the 'push force' concept for 'keeping things together'.

Now, there are philosophers who say my 'push vs. pull' remarks, above, and my other remarks, are just a matter of what I have observed so often that I have become just 'conditioned' to believe it, i.e., 'out of habit'. But that is not true! When I, or anyone else, pulls something using a string, or directly with one's hands; one gets into a simple habit of believing that pull forces really seem to exist. But I believe that an appropriate intuitive approach leads us to reject the 'pull concept', despite our long conditioning, a wise and ultimately helpful rejection. However, I realize that it will still be helpful to use the term, 'pull', in everyday conversations and in instructions as a convenient tool.

The use of a conceptually satisfying approach, or a great appreciation for that, will sometimes makes a great and helpful difference, a big step forward. We will discover that, shortly, when addressing the cause of gravity, electric action, and other physical actions -- which would otherwise remain deeply mysterious, fundamentally.

Conclusions regarding Topic 1

Suppose we accept that a real aether exists, as discussed, analyzed, and thus advocated in our 'Introduction', above? And that we agree that seemingly existent 'pull or attractive' forces don't really exist, but only seem to -- because real, but hidden, 'push forces' are causing the action. Then we open the helpful way for a more satisfying and deeper understanding of the physical behaviors, which we will discuss in our next topic, below. It is true that our hypotheses or conclusions involve accepting that subtle things exist in our universe that we cannot directly detect, nor simply or exactly detail. Yet wise and circumspect physicists and mathematicians, like Hertz, have urged us to consider and hypothesize that some material things really exist despite their remaining 'unseen' and not directly detected [5]. In fact Hertz even proposed that so-called 'potential energy' was actually just 'hidden mass in motion'.

Topic 2: What is Aether's Pressure, Density & 'typical' Velocity? (And related questions that also lead to better understanding)

Topic 2A, Introduction

In order to understand nature's very strong forces, less strong forces, and very weak forces, we will first develop crude, but reasonable, estimates of our aether's pressure, its density, and its average vibrational velocity, spinning velocity, and flow velocity. And the average angular momentum of a vortex or ball of spinning aether. These are the major characteristics of our hypothesized aether. And we will give appealing reasons to justify all our estimates. (Please remember that we are just giving very rough approximations

here. That is partly because we often do not know exactly various things -- the shapes, sizes, densities, position, and etc., of various entities in the ultra-small quantum realm, such as the proton. And we wish to avoid an ultra-long discourse and article, here.)

After calculating our rough estimates of aether characteristics, we will use those estimates to very helpfully derive the relatively very great strength of nuclear forces, the lesser strength electric forces, and the relatively very weak strength of gravitational forces. And thus likely understand better the nature and origin of those forces.

(Optional paragraph: Scientists cannot, of course, empirically measure the magnitude of all those forces simply and directly by, say, putting two protons against two neutrons, and noting the 'nuclear force' of such helium nucleus, then noting the electric repelling forces of those two protons, and then noting the gravitational force between a neutron and the other three particles. But scientists can determine most of that indirectly by using a convenient, manageable number of particles at convenient, manageable distances from one-another, and making empirical measurement on that. Then adjusting all their empirical data, using calculations and interpolations, to draw conclusions about what the relative magnitude of each force between two particles should be if each pair were about equally distant from one-another. And scientists can often carry out a simple experiment to temporarily create conditions reasonably close to the above, make appropriate measurements of what results, and calculate estimated relative magnitude for each basic force from that.)

Topic 2B, Developing Details referred to in our Topic 2A 'Introduction'

Topic 2B-1, What is the magnitude of Aether's Pressure?

We start by deriving an actual rough estimated for our 'ethereal pressure', as follows: There has long existed a model of elementary particles that, roughly speaking, allows us to imagine that they are spinning very fast, like a spinning top. And with a constant amount of angular momentum. And this allows scientists to explain a lot of particle behavior. It is rather well established, for example, that a proton has a mass of about (1.67×10^{-27} kilograms), a radius of about (10^{-15}) meters, and has a spinning angular momentum of about ($h / 4\pi$) kilogram-meter meters per sec. Here, 'h' denotes "Planck's constant" and it equals a (6.625×10^{-34} kg m m/s) amount of angular momentum. (Note regarding kg, m, m/s, we are now abbreviating and expressing the units above using the 'mks' system of units, i.e., 'meter, kilogram, second;) And π is roughly 3.14.

So the angular momentum of a spinning proton is also expressible here as about $[1/2][(6.625 \times 10^{-34}) / 2 \times (3.14)]$ kg (m/sec) m. ((The angular momentum unit (or 'dimensional' term), [kg (m/sec) m], could have been alternately expressed in the shortened form, (Joule second), or 'J sec', an (energy x time) unit or dimension. But I think that would have obfuscated a real spinning action that is going on, a helpful concept and model.)) The $[(6.625 \times 10^{-34}) / 2 \times (3.14)]$ kg (m/sec)m part of the expression above is sometimes termed "a Planck's Bar constant" worth of angular momentum.

In order for that proton particle, with its small known mass and small radius, to achieve its [1/2] [Planck's Bar Constant] worth of angular momentum, we can calculate that it must spin with a very high tangential speed of roughly (0.8×10^8) m/sec. That is an appreciable fraction of the 'speed of light', i.e., the speed of light, c. And c = (3×10^8) m/sec.

Now we can answer our main question by asking, "Roughly, how much ethereal pressure must be pressed upon that high speed spinning proton, to keep it from 'flying apart'?" I.e., from disintegrating, due to the high 'centripetal' force associated with that fast spinning proton, and assuming no so-called internal so-called 'attractive' force. (We roughly imagine the proton, here, as a loose-packed spinning sphere.) Roughly speaking, the ethereal pressure must at least slightly exceed "the proton's centripetal force, [F], divided by the relevant proton face area, [A]." Thus, that pressure must be at least equal to [(the proton's mass)x(v^2)/r] / (A)], which comes out roughly (1.3×10^{33}) Newt /m^2. So let us just estimate **our aether pressure** as **(1×10^{34}) Newt /m^2**, to more likely assure stability. (And also in view of another method of ethereal pressure calculation to be described later.)

We must remember that our estimate is based on various non-precisely known factors, such as "the proton's mass density, which varies in a complicated way with radial distance from its center". These factors motivate us to choose a somewhat higher ethereal pressure estimate that otherwise -- when we use our method of approach, above. Our abbreviation, (Newt/m^2) means 'Newton per square meter', where a 'Newton' is a unit of force. (Our estimate of ethereal pressure may seem staggeringly high, but I'm not alone in believing that the aether in our universe has, roughly, that 'order of magnitude' pressure, or perhaps even slightly greater pressure) [6].

There are other good methods to estimate ethereal pressure that also gives a high 'order of magnitude' pressure near that we calculated above.

For example, here's another method: We can note the roughly, accepted value for the volume of a proton. And imagine what would happens if that proton begins to disintegrates (due to an antiproton neighbor or whatever). Then, let us imagine that the proton's surface breaks, and highly pressurized aether comes 'crashing' into that internal proton region – doing work on the loosened and disordered proton parts. Let us imagine that that work transfers an added energy to the proton parts, helping to send those disintegrating parts moving in various directions. And that that added energy is roughly equal to (the ethereal pressure)x(former volume occupied by proton). And that that added energy is responsible for (1/2)(mc^2) worth of the (1)(mc^2) total energy that the disintegrated parts have, and that the other (1/2)(mc^2) worth was provided by the kinetic spinning energy or other hidden motions of the proton, even before the disintegration event.

Anyway, we note that the total energy, 'E', associated with the disintegrated parts, which total an 'm' worth of mass, is given by Einstein's famous formula, ($E = mc^2$). Attributing half of that 'E' to the 'imploding aether energy', '(Vol.)(Pres.)', we write:

(ethereal Pressure)(Volume vacated by disintegrated proton) = (1/2)(Proton mass)(c^2).

By roughly assuming that the 'vacated volume', above, was the proton's known former volume before it disintegrated, we can use the above equation to solve for the (ethereal Pressure). And that is an alternate method for roughly estimating ethereal pressure.

(Optional amusing comment: I sometimes wonder why all the above rough calculations, or something like them, do not commonly appear in basic college textbooks? Are they afraid of a 'class action suit, a patent infringement suit or domain infringement suit by the clergy'?)

We now have rather easily established a rough estimate for ethereal pressure: That **ethereal pressure in the universe = ($1x10^{34}$) Newt/ m^2**.

Next we tackle a more difficult challenge, estimating roughly an ethereal density for the universe, which requires a little subtlety. But I think we accomplish it satisfactorily, as now addressed below.

Topic 2B-2, What is Aether's Density?

We will discuss, below, three different ways to estimate Aether's density, but the third way is our favorite. But first we will show that although the aether density in the universe is likely thin (very rarified); it still has a **non-**trivial density, and that density is definitely **not** zero.

We will start by noting and applying some basic accepted physics principles.

If a great eruption, on earth or on the moon, heaves a projectile from either body into outer space, we note the following: Even though the initial projectile's velocity barely exceeds the 'escape velocity' required, the fast moving projectile is significantly slowed down from its initial speed as it succeeds in overcoming gravity's effect, as it travels toward outer space. So let us assume that it has eventually travelled such a long time and distance that it is, roughly speaking, no longer affected by the earth or moon's gravity. Or more precisely, no more affected by the very distant earth and moon than by any other distant body that is also very distant from the now drifting projectile.

Based on elementary physics, we say that the initial 'kinetic energy' of the projectile has been lost, (i.e., transferred) to the 'potential energy' of space, perhaps the so-called 'fields in space'. So that space has thus gained potential energy. But we seldom ask: "where is, and what is, this so-called 'gained potential energy in space?" The extremely logical and strongly compelling (at face) answer is: "The aether of the universe has gained potential energy." And if we boldly use "Hertz's approach", we conclude that that hidden energy which the aether has gained is 'kinetic energy'! And even using Einstein's old Special Theory of Relativity – 'that gained energy by outer space has an equivalent mass', so that **space has an equivalent mass**! This seemingly logical, at face, conclusion was described by Einstein as: "**Space is now eating up matter**!"

That is, Einstein addressed that paradigm in a speech in 1930, per our previous referenced fourth footnote. That speech is not widely known, nor even fully appreciated by some who know of it! Among Einstein's key remarks were these:

"The strange conclusion to which we have come is this -- it now appears that **space will have to be regarded as a primary thing** and that matter is derived from it, so to speak, as a secondary result. **Space** is now turning around and **eating up matter**. We have always regarded matter as a primary thing and space as a secondary result. **Space is now** having its revenge, so to speak, and **eating up matter**."

I believe that those Einstein's remarks clearly indicate, (contrary to most scientists), that scientific measurements and basic conservation laws strongly compel us to conclude, as extremely likely, **that there is an aether throughout space and it has a real material density**! We realize, in science, that even a 99.99% probability still leaves some tiny room to question a theory, but I think we can fairly say this: Even without other good arguments besides the above, it now becomes a great burden for 'aether deniers' to establish their case as probable, i.e., that burden of proof has shifted and is now on them, so-to-speak. ((And, of course, the 'Michelson-Morley' experiment does not change that, nor solve 'attractions between bodies' (such actions at a distance).))

(I believe that Einstein, with his 'General' Theory of Relativity, attempted to provide that great burden, or to substitute a process that would, somehow, 'diffuse' an otherwise tempting and compelling need to addressing aether's physical properties. And that Einstein even tried to counter the implications of his earlier 'Special' Theory of Relativity, to accomplish that. And worked a lot to do all the above, for the rest of his life.)

But, in fact, we are going to use Einstein's 1930 'at face' remark (that "**space is** now… **eating up matter**") – to estimate an aether density. The method, which we demonstrate below, will first be presented in its crudest form, because our first priority is just to establish a **non**-trivial minimum ethereal density in space. The method is too crude to provide a good estimate for ethereal density. But a few pages later on, the paper adds refinements to the methodology to obtain a likely better estimate! And other methodologies are presented, too.

Subtopic 2B-2a, Our Aether Density Estimation Method 1:

Our Sun is a fairly typical star, among the stars in our galaxy and among the group of galaxies that includes our galaxy. About 25% of our Sun's mass is comprised of helium nuclei. (And that is likely also true for the universe around us that is not too distant to be studied reliably.) Let us assume, roughly, that each helium nucleus was likely made by fusing together, indirectly, four hydrogen nuclei and from some much less massive electrons. And that, eventually, our Sun, etc., gave off almost all of that nuclear fusion energy, ($E=mc^2$), into outer space. In other words, for each helium nucleus formed, about an ($m=E/c^2$) worth of mass was eventually thrown into outer space", where 'm' was the very small amount of mass 'lost' during that nuclear fusion event.

So, when 4 protons (and 2 much lighter electrons) are indirectly fused together to form each helium nucleus, roughly 1% of that fused mass is lost, and that mass, or energy equivalent, is thrown into space. That sort of action implies that, roughly, about [(1%) x (25%) of the mass of our Sun, has been thrown into space, and pretty similarly for the other typical stars in the universe. ((The equivalent energy, 'E', of that mass, 'm', thrown into outer space is an ($E = mc^2$) worth of energy.))

The high 'escape velocity' needed to escape the Sun's gravity, and our Milky Way galaxy, are roughly 537 km/sec. and 617 km/sec., respectively. So the amount of kinetic energy lost, for each 1 unit of mass, m, that has escaped against gravity, is $(½)(mv^2)$ where 'v' represents a typical amount of 'escape velocity' needed to go into far outer space. And we can compare that $(½)(mv^2)$ worth of escape energy with the (mc^2) energy of 1 unit of mass, m, where c, is the speed of light, 300,000 km/sec. The resulting ratio [(escape energy 'gone missing')/(the mc^2 energy of the 1 unit mass reaching outer space)] is very small, ($4.0x10^{-6}$), but definitely **not zero**.

We should also remember that even when gamma rays and other radiation escape gravitation and travels into outer space, that that radiation energy also incurs a somewhat similar 'energy loss to gravity', i.e., roughly that much 'escape energy' is swallowed up by ethereal space. (Remember Einstein's wording, "Space is 'eating up' matter".)

So, as an indirect result of the helium nuclei produced in the universe, we conclude that roughly **(25%) x (1%) x ($4.0x10^{-6}$)** of the universe's mass has been converted to 'ethereal mass', i.e., due to the high gravitational escape velocity burdens, (the energy considerations that we have now addressed).

The density of the universe is somewhat, literally, a '*matter*' of opinion, but some estimates are roughly **($0.5x10^{-27}$) kg/cu.m**. And, for simplicity, we'll assume most of that is due to large mass stars in large galaxies – both with high escape velocities. And some scientists believe that there may be enough hidden matter, or dark matter, in the universe for it to reach a so-called critical matter density, about **(10^{-26}) kg/cu.m.** I think that latter density estimate is a closer estimate, but to obtain an initial rough estimated minimum ethereal density, we will incorporate the former [(**$0.5x10^{-27}$**)kg/cu. m], an estimate based on 'ordinary matter', and thus we have:

(25%) x (1%) x ($4.0x10^{-6}$) [(**$0.5x10^{-27}$**)kg/cu. m] = **$0.5x10^{-33}$kg/cu.m ethereal density**.

Although I think the ethereal density of the universe is actually much greater than that; the main point, here, is that that **$0.5x10^{-33}$ kg/cu.m ethereal density** is a rough **minimum** estimate even using **Einstein's 'space eating matter up'** paradigm. And, thus, that is an extremely likely **conclusion that we cannot avoid**!!

There are many considerations left out of the above over-simplified methodology, and just a few of which are these: Neutrinos often arise with great energies when free neutrons decay, but those neutrinos seem almost impossible to stop and capture. That 'lost' mass is

not addressed above. Positrons annihilate electrons, and 100% of that energy or mass is emitted as gamma rays – compared to merely only about 1% mass lost during fusions that produce helium. And when an 'anti-proton' annihilates with a proton, again, about 100% of that 'mass-energy' is emitted, not merely a 1% mass lost. Imagine the gamma rays produced, etc., losing energy to space while escaping gravity! Even a 'gravity assist' or 'sling-shot effect' may send small bodies into outer space and, again, there is some escape velocity related kinetic energy then lost, i.e., converted to ethereal 'mass-energy'. All these factors and more lead me to believe that we should at least estimate the ethereal mass density (kg/cu.m) to be equal to the following: The ethereal density that would result if the estimated density of the 'ordinary' (baryonic) matter (kg/cu.m) in the universe were converted to thin aether and spread thinly all over the vast universe.

And thus, **10^{-26} kg/cu.m** is likely a still closer estimate for ethereal density, using a refined version of our first methodology, above.

Subtopic 2B-2b, Our Aether Density Estimation Method 2:

Our second method for estimating ethereal density is based, roughly, on the following: Even using the best methods for artificially creating a laboratory vacuum on earth or even in our solar system in space -- that vacuum produced is **not** zero. It is almost as if (as quantum wave mechanics infers) -- that particles arise out of a vacuum inside our well 'evacuated vessel', i.e., as if the particles assumed to be out of the vacuumed vessel have some 'probability' of finding their way back in; as if the 'wave function' extends in there.

So we'll postulate here -- that we cannot fully evacuate the vessel because when our very 'hard vacuum' reaches, roughly, aether's density, the remaining few atoms per cubic centimeter -- mix with the aether to form a 'sticky field-like goo' or super-slick goo -- resistant to our best vacuum technique. It would seem hard to use aether and field energy to pump out aether and field energy.

The very best research vacuums we can achieve on earth are estimated to be about 100 molecules /cu cm., and even that would likely be for a short time and seldom achieved. A very good region in interplanetary space would be even better, about 10 molecules /cu cm. Although the vacuums in space between stars and galaxies are estimated to be even better vacuums, I think those estimates constitute over-speculating, and with little hope of empirically measuring those far-away vacuums soon. And I think that type of speculation is typical of the all-too-often exhibited bad habit of over-confidence. But I think science is capable of testing good regions of interplanetary space. (And, as said earlier, if the density of aether, itself, is roughly equal our best lab vacuums, that may be a major cause of our lab vacuum limitations.)

So we'll go with about (10 hydrogen molecules /cu.cm) 'worth of vacuum' as also our estimate for ethereal density in space. One hydrogen atom = 1.67×10^{-27} kg mass, and a hydrogen molecule double that. If there are 10 molecules /cu cm., there are 10.0×10^{6} times that mass in a cu m. Note, $(1.67 \times 10^{-27}$ kg$) \times (10.0 \times 10^{6}) =$ 10^{-20} kg/cu m.

Thus, **10 $^{-20}$ kg/cu m**. is our estimate for ethereal density, using our 2nd method.

At that very rarefied density of molecules in space -- a space station that would simply orbit the Sun speedily, like the earth, would **not** seem to be noticeably slowed down after hundreds of orbits, nor appreciably 'heated up' by friction. That is, any velocity change would be much greater due to even the very small radiation pressure. So we just imagine that if our aether has that low **10 $^{-20}$ kg/cu m**. density, our aether will not likely slow down that spaceship noticeably either. And, indeed, it doesn't appreciably slow down! Thus, that also seems to support the worthiness of our 2nd method for roughly estimating aether density.

Subtopic 2B-2c, our Aether Density Estimation Method **3**, our favorite:

For our third method, we start by noting the following: Our earlier discussion of ethereal pressure led, roughly, to the simple equation:

Ethereal Pressure = $(1x10^{34})$ Newt/ m^2 = (ethereal density) x (ethereal velocity)^2.

That is only one equation but it has two unknowns. So let us now try to concoct another independent equation, also involving ethereal density and velocity, by finding another relationship involving those unknowns. Perhaps one that roughly equals an average known amount of angular momentum exhibited by a spinning ball of aether, or average ethereal vortex, which we associate with regulating the angular momentums of the various particles found in nature. The particle angular momentums are well known.

We find in nature -- that nucleons have about a half Planck's Bar constant worth of spin angular momentum. Similarly for 'free' electrons and free neutrons. And an electron has a whole "1 Planck's Bar constant" amount of 'orbital angular momentum' -- as it orbits the proton in the prominent hydrogen atom, using the 'Bohr' atomic model.

Even particles with a short mean lifetime and which have no angular momentum -- break up into particles that develop a half Planck's Bar constant or a full 1 Planck's constant worth of angular momentum. These and others facts lead us to the likely proposition that ethereal whirling balls or vortices of aether also have an average angular momentum equal to roughly a Planck's Bar constant amount. And that those whirling entities of aether help impart that amount of angular momentum upon prominent particles, and also help maintain it, i.e., a half Planck's Bar constant worth for stable particles. Or as in other common cases – a simple low integer multiple of a half, or whole, Planck's Bar constant worth of angular momentum, i.e., x1, x2, or x3, i.e., also a small 'quantum' worth.

But to concoct that second equation which we now seek, we also need to roughly estimate the radius of those average ethereal spinning balls having roughly a Planck's Bar constant worth of angular momentum. If the ethereal ball were the size of a proton, the aether's density would have to be roughly the super-high density of the proton to generate that much angular momentum – i.e., by virtue of our rough equation for aether's angular momentum (based on Planck's constant) and our equation for ethereal pressure. That

super-high density for aether seems very unlikely according to Newton, many others, and myself, and would not likely lead to a world that is anything like the one we live in. If the ethereal ball were roughly the size of a 'Compton wavelength' or 'Compton electron', i.e., a free spinning electron; the ethereal density would be roughly that of water. That is a slightly more reasonable ethereal density estimate than the super-high density of the proton, but is still not reasonable, and is much too thick to likely lead to a world that is anything like what we live it.

Next, we'll consider that the spinning aether ball is roughly the radius of an atom. (Or strictly speaking, we should regard that atomic radius as also equal to the 'radius of gyration' of our imagined ethereal spinning ball.) There are many arguments roughly favoring that underlined conjecture, but too lengthy to present here. For example, note that many trillions of simple atoms can join to make big, strong, stable chunks of metal, as if that still allows enough 'breathing room' between atoms. But even a few less than 200 nucleons is still too many for a nucleus to incorporate, and yet to remain stable. It is as if that crowded nucleus becomes quickly too congested there, with too many eddies in the small volume. But the size of the 'confortable' 'Bohr' hydrogen atom may be due to the size of the most prominent spinning ball of aether -- being roughly equal to that size.

In view of the two above paragraphs, we consider that an average ethereal spinning ball might extent out a distance roughly equal to that of orbital radius of the electron's 'ground-state' orbit of the Bohr modeled simple hydrogen atom. That is 0.53×10^{-10} m. And we will assume that that ethereal vortex helps give that electron its unique and key orbital angular momentum there, a Planck's Bar constant worth. And that likely explains (even without advanced mathematics and wave mechanics) – why scientists were able to successfully address the case of the Bohr hydrogen atom, by using simple mathematics and simple modeling. And that that did not turn out to the case for more massive, complex atoms.

So we write our needed second equation, below, by equating the angular momentum of our roughly atom-sized spinning ethereal sphere to the orbital angular momentum of the election of the 'Bohr-modeled' hydrogen atom:

$$(\text{ethereal density}) \times [(4/3)(3.14)(0.53 \times 10^{-10}\ \text{m})^3] \times (\text{ethereal velocity}) \times (0.53 \times 10^{-10}\ \text{m}) = [(6.625 \times 10^{-34})/\ 2 \times (3.14)]\ \text{kg (m/sec) m.}$$

We note that the terms to the 'right side' of the 'equal sign' constitute a Planck's Bar constant worth of angular momentum, and the terms on the 'left side' constitute a rough estimate for the amount of angular momentum, [(m)(v)(r)], developed by our simple-modeled spinning ethereal sphere. Note, above we used: sphere volume = $(4/3)(3.14)(r^3)$.

Let us now use that above 'angular momentum' equation, together with our earlier equation for ethereal pressure, that we now recall is:

$$(\text{ethereal density}) \times (\text{ethereal velocity})^2 = (1 \times 10^{34})\ \text{Newt/ m}^2$$

We can now solve for the (ethereal density) and (ethereal velocity) using the two equations above. We obtain, roughly:

(using our preferred est. method #3), **ethereal density = 1x10 $^{-21}$kg/ cu m**., and thus:

our mean **Velocity of Aether**, its spin (or main motions) = **3x10^{+27}m/sec**.

Topic 3, Why Strong, Weaker, and Very Weak Forces Exist in Nature? (For example, Nuclear, Electric, and Gravitational Forces, respectively)

Topic 3A, Introduction

Having previously worked out rough estimates for aether's pressure, density, and mean velocity; we will next proceed to show why the ratio of the very weak gravitational force to the super-strong nuclear force is about (10 $^{-38}$/ 1) as noted in physics textbooks [7]. And we will discuss our model for gravitational force and nuclear force that is implied by that ratio, (10 $^{-38}$/ 1), i.e., gravitational force strength / nuclear force strength.

After that, we will discuss why the ratio of rather strong electrical forces to the somewhat stronger nuclear forces is roughly (1/100), as noted in physics textbooks [8]. That is -- we will present our model and our rough calculations by which we obtain that (1/100) ratio.

Topic 3B, Explaining the Causes of Nuclear, Electric, and Gravity Forces

We first note (as determined near the end of Subtopic 2B-2c) that our rough estimate of aether's density is: **ethereal density = 1x10 $^{-21}$kg/ cu m**. That low density contrasts with the very high **density of nuclear matter**: **2.3x10^{+17}kg/ cu m**., as estimated by physicists when modeling the proton as roughly a sphere with a radius 1.2x10 $^{-15}$m., and the proton's mass as about 1.67x10 $^{-27}$kg. (Those proton values are based on experiments.)

Thus, based on the above paragraph, our estimated "**Aether** density/**Nuclear** density = (**1x10 $^{-21}$**kg/ cu m)/(**2.3x10^{+17}**kg/ cu m)", which equals about (**10 $^{-38}$/ 1**). **Importantly, that comes out also equal to Nature's ratio of 'the weak gravitational force to the strong nuclear force', as estimated by physicists!** Further, we note this: Just as nuclear forces end rather abruptly very close to the nucleus, but gravitational forces extend far out into outer space – so does the nuclear material density ends rather abruptly near the nucleus, but aether's density extends far out into outer space. That likely gives us a strong hint regarding our search for the cause of nuclear force vs. gravitational force.

There are several forces in nature that are dependent on the density of fluid passing through or around vessels, bodies, pipes, or the like. One such major 'attraction-like' force relates to reduced relative pressure that arises from fluid flowing in pipes, where the pipe suffers a constriction and when the transition is smooth enough to maintain a smooth, laminar flow. The phenomenon of the "Venturi suction effect" arises in that flow

constriction or squeezed region, and that **Venturi suction is analogous to the attraction-like behavior that we call 'gravity' and 'nuclear force**'!

IMPORTANT, SEE FIG.1 BELOW or on next page!

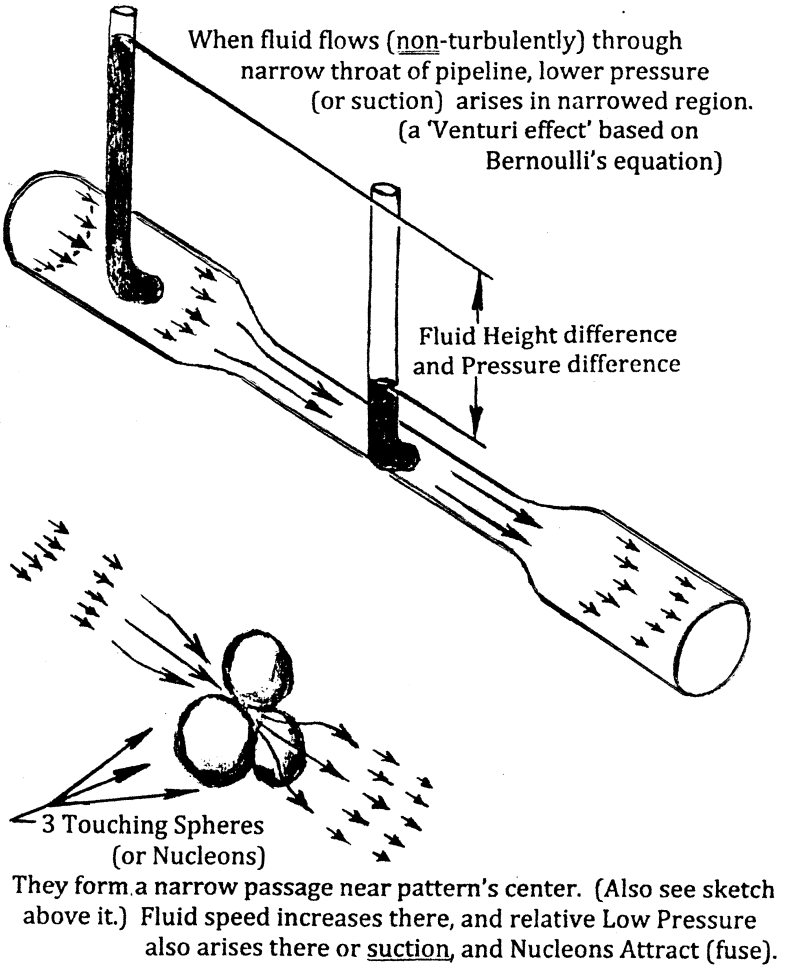

FIG. 1, Analogy between a fluid flow 'Venturi Effect', a pressure drop, (i.e., suction or 'attraction' arising) -- and Nuclear and Gravity's attractive forces (due to theorized constricted nuclear fluid flow and constricted aether flowing between bodies in space, respectively)

And three nucleons, close together, will presumably constitute a partial restriction to the flow of nuclear fluid, and that fluid will have to speed up to get through that restricted region -- to maintain constant 'volume flow per time'. So conditions are favorable for a Venturi-like suction (attraction) force to arise.

But now, let us imagine three particles, maybe one proton and two neutrons -- forming a triangular pattern somewhat like the above, but each spaced, say, a nucleon's diameter apart – enough so the nuclear forces drop to nearly zero. That is because ultra high-density nuclear fluid is no longer squeezed in an orderly flow through the 'doughnut hole' at or near the center of the pattern array. But now imagine, instead, that ultra low-density

aether is flowing through that array, say, (1/10)th as fast as the nuclear fluid used to flow, because of the slightly increased particle separations. But since ultra low-density aether is now flowing, we **don't** just get a reduction of one or two orders of magnitude 'attractive' force or pressure – but instead roughly three-dozen orders of magnitude reduction. But now let us imagine, by interpolation, that if only we could bring those three particles back to touching each other, and thus imagine an ethereal flow through that donut hole, instead of a nuclear flow. But assume that the ethereal flow speed roughly equals the former nuclear fluid flow speed, (near the speed of light). Then we could expect that the ratio of fluid density flow (ethereal density to nuclear fluid density) -- would determine the ratio strength of low force to high force. That is -- by virtue of the following:

Bernoulli's equation, below, will give us an idea of the major factors arising -- that affect the relative magnitudes of pressure reductions (i.e., suction or 'attraction'), to be expected:

In the **slightly**-constricted flow region, given the terms:
the (PRESSURE of fluid) + 1/2 (its DENSITY)x(its VELOCITY)^2;
Note that that sum will equal -- in the **greatly** constriction region:
the (PRESSURE of fluid) + 1/2 (its DENSITY)x(its VELOCITY)^2.

Importantly, from that Bernoulli's equation, we note the following applies for two events where nearly equal high pressures surround the pipes (or exist in outer space). Suppose the initial fluid flow velocities are equal, and that the equal speed-ups in the constricted region are equal: If the aether DENSITY in the space between 'comparable particles' is roughly (**10^{-38}** times) less than the DENSITY of the nuclear fluid that flowed between the nucleons; then the pressure in the restriction will increase until not much less than the pressure surrounding the pipes (or the pressure of ethereal space). Thus, regarding the relative pressure reduction, (suction, or 'attraction') -- the net gravitational force arising will be roughly only (**10^{-38}**) times as great as the nuclear force**!**

So we conclude from the last nine paragraphs, that likely the **low density** of aether between bodies in space, vs. the **high density** of nuclear fluid between nucleons, is the major **cause** of Nature's very basic ratio: the very weak gravitation force to the super-strong nuclear force, (**10^{-38}/ 1**).

Let us now comment as to why and how – two different major classes of fluid velocities arise in the universe, and the velocity of one class is not nearly as fast as the other class:

The first class is the fast velocity for nuclear fluid flow adjacent, but close to, the nucleus and perhaps partly within the high-density nucleus, and is also about the same velocity for a certain type of ethereal flow near the nucleus and in outer space. (These were relevant to our comments about nuclear forces and gravitational forces, i.e., their strength ratio.)

The second class is the ultra-fast velocity of ethereal vibrations in space.

But first, for 'gross matter', (such as protons, electrons, and gamma rays); there is roughly a 'characteristic' velocity range of about $2x10^{+6}$ up to the speed of light, $3x10^{+8}$m/sec.

((These velocities arise from the ultra-high ethereal pressure acting on the ultra-high density of nuclear matter, so that the latter may spin, or pulsate, and develop high density flow near and at the nucleus – but those speeds are just 'high'. The velocity of that flow is roughly estimable using the following equation: Ethereal Pressure, (10^{+34} newt/sq. m.), roughly equals the Density of gross matter, (10^{+17} kg/cu. m.) times (Velocity)^2 of the gross matter. For simplicity, we'll just refer to that class ('fast' velocities) as roughly **10^{+8}** m/sec.)) That miscellaneous motion of gross matter (roughly **10^{+8}** m/sec.) also acts to initiate a class of ethereal flow or pulses roughly at **10^{+8}** m/sec.

Let us assume that the above class of 'ethereal flow or ethereal pulsing currents' accumulate in all space for two reasons: First, because they are created by the drastic number of nuclei in all of space with all of their various 'fast' actions. And, secondly, it seems likely that a rather uniform density of those 'ethereal flows or pulses' will accumulated throughout space because there is initially not much balancing absorption of them until that crowded flow or pulse density is achieved.

Now, let us comment on the 'ultra fast' velocity vibrations or actions that occur in ethereal space, our Second Class of velocities (which are much faster that just 'fast'). And which likely cause the strong 'electric forces' in the universe, i.e., the forces of repelling or 'attracting' between charges. These also arise due to the ultra-high ethereal pressure in space. But, importantly, in the case of an electron or positron roughly on the surface of, say, a proton – the **ratio of the cross-sectional surface area** of the small electron vs. the larger proton is roughly **1/150**. (That statement assumes, roughly, a 'Bohr liquid drop model' of the nuclear proton and nuclear electron. That is -- the volumes of those nuclei particles are proportional to their respective masses; the radii proportional to the cubed root of their volumes; and the surface area therefore proportional to the square of their radii.) The mass of a proton is about 1836 times that of an electron.

Since force = (surface Area) x (Pressure); we can imagine that there may arise a class of actions -- forces based on the magnitude of ethereal pressure times that surface area, which in the above paragraph, comes out roughly **1/150** for the electron vs. the proton. That ratio roughly corresponds to the relative strength of electric forces vs. nuclear forces, **1/137** or **1/100**, as described in textbooks.

Regarding the case of an ultra-high velocity ethereal vibration, first imagine that a small nuclear electron has a thin, strong, shell-like surface keeping the aether out of that enclosed volume, so that its interior is a real vacuum. And that the strong surface breaks, and aether comes rushing in, and maybe partly rebounds after coming together. Roughly, the velocity of the in-flowing aether or pulse may be estimated, based on the equation: (aether Density) x (aether Velocity)^2 = (ethereal Pressure) = $1x10^{34}$ newt./m^2. And thus the ultra-high velocity of the emanating vibrational or pulse will be roughly ($3x10^{+27}$) m/sec., as explained earlier near the end of our sub-topic 2B-2c.

Note also, that if the collapsing of one electron sphere on the proton's surface would create, say, one unit of ethereal force, then the collapsing of about 150 such sized electrons, positrons, or both -- coating the proton's surface – would result in about 150

times that much total ethereal force. And similarly for a 'bulge' or expansion of 1 electron's worth vs. 150 electrons' worth -- regarding the action of entrapped excess aether pressure erupting from the surface of a proton or neutron, and the force thus available.

The author believes that interactions between aether, (or perhaps the ultra-fast spinning vortices or spheres of aether), and a (so-called) 'charged' electron, positron, or proton -- creates strong vibrating waves, with peaks and troughs. Or perhaps modifications of ethereal vortices. We theorize that, say, two distantly separated charged particles, depending on whether they have a so-called 'like' or 'unlike' charge, will be, respectively, repelled or attracted because each ones own position, vibrations, or pulses are intrinsically either in-phrase or out-of-phase, respectively, with that of the other charged particle. So like and unlike charged particles, thus, may have the ability to shift their position slightly to help them get in-phase or out-of-phase with the other charged particle's waves.

So the above, or something similar to the above, evolving from the effective relative surface areas of electron vs. the proton, (and involving super-speedy and strong aether vibrations or vortices) – is the cause of the electric-related 'strong forces' of nature.

Topic 4, SUMMARY and CONCLUSIONS of this paper

Innate so-called 'attractive forces' only seem to exist, because there are actually hidden push-forces that are pushing the so-called 'attracting' bodies together. Push forces are more intuitive than pull-forces which really do not exist. It seems intuitive that many energized real masses should not be squeezable into zero volume, and that a counter-push should eventually develop to resist such a squeeze.

In the case of gravity and separated bodies that seem to be 'attracted' -- there is actually a real, but hidden aether, doing the pushing. Or causing there to arise a net stronger push force on the far sides of the bodies, or particles, compared to the ethereal force on their near sides. Most deep physics mysteries arise because 'aether' is wrongly rejected.

When a very fast fired projectile has just enough escape velocity and kinetic energy to escape earth's gravitation and drift onward, we must ask: "Where has that projectile's former great kinetic energy gone to, (or into what has it been 'converted')? Into Gravity in space? The simple ('at face') answer, was given by Einstein in his 1930 speech: "Space is now eating up matter**"**. So it seems appropriate that we should accept that space has 'energy' and "a 'mass equivalent' of that energy" – in other words, **ethereal** space has a real 'mass density'!

Ultimately, all seemingly mysterious attractions between bodies (and between particles) arise from the actions of an aether in space. And that is ultimately more intuitive and satisfying than an ultra-complicated mathematics that is sometimes described as "arising because the mass of particles and bodies modify normal geometry and 'bend' space." (But that same complicated mathematics may still describe the main visible motions arising or 'repeatedly expected' – we leave that to mathematicians.)

The aether's main characteristics, are roughly:
Ethereal **Pressure** = **1x10^{34}** Newt/ m^2. (Discussed in topic 2B-1 of paper)
Ethereal **Density** = **1x10^{-21}** kg/ cu m. (Topic 2B-2, 2B-2a, 2B-2b, 2B-2c)
Mean **Velocity** of vibrating Aether, its spin, etc.= **3x10^{+27}** m/sec. (2B-2c-end)

But there is also a much slower common aether **flow or pulse** at roughly, 'c', the speed of light, i.e., roughly of magnitude **10^8** m/sec. Note, c = 3x10^8 m/sec. (This arises from the ultra-high pressure of aether and the ultra-high density of 'gross matter', about 10^{+17} kg/ cu. m.). Note, [(10^{+34} newt/sq.m) /(10^{+17} kg/cu.m)]$^{1/2}$ = roughly 10^8 m/sec.

Roughly speaking, the ratio of Nature's super-strong forces (nuclear forces) to the very weak forces (gravitation forces) is: **10^{+38}**/ 1. This arises because the ratio of nuclear fluid density to aether's density is also: (10^{+17}kg/cu.m) / (10^{-21}kg/cu.m) = **10^{+38}**/ 1, also. It is likely that high-density flow and low-density flows or pulses occur. And that when fluid flows in space or among nucleons – that Bernoulli's equation and the 'Venturi effect' become applicable, and thus pressure differentials arise, i.e., relative suction (or so-called 'attractions'). And that causes nuclear and gravitational forces, respectively. Other details, including **Fig. 1**, are given in the paper. Note, the rather sharp drop in nuclear forces only a slight distance from the nucleus. That should likely be attributed to the rather sharp transition between thick nuclear fluid flow and 'thin' ethereal fluid flow.

(Alternatively, but less likely, maybe a super-fast aether flows between the nucleons. But then we would assume that the energy actions and pressure differentials that would arise, there, are roughly equal to that expected for our conjectured nuclear fluid flowing at roughly 10^8 m/sec., there. We do not further pursue that alternative possibility here.)

The strong force (the 'charge-related' forces) exists as compared to the super-strong force (nuclear forces) -- and the relative strength ratio of those is roughly: **1/100**, respectively. That arises for two reasons: First, the source of each force is the same – the ultra-high pressure of the aether. Secondly, because the surface area of the proton (or neutron) is roughly **150 times** greater than the surface area of a nuclear electron, (an electron inside the nucleus or on the surface of the nucleus). In the case of the 'charged particle actions' in space, a low density aether is involved. But, for charged particles in space, the relevant ethereal vibrations (or spinning vortices) involve 'ultra-fast' motion. So the low ethereal density and the ultra-high velocity motions of the aether still result in a strong force, not a weak force. (Additional details involved are discussed and conjectured in the paper.)

When a hot star emits light or a gamma-ray, the star loses energy and mass, so light and the gamma-ray must have mass and a particle-like reality or character! But the escaping light or gamma-ray loses some energy and mass while escaping 'gravitational pull', (actually loses mass to the aether near the star). But when that light or gamma-ray gets near another similar star, the light or gamma-ray gains back an equal amount of energy and mass from the gravitation, (actually gains mass from the aether near that target star, and that star gains mass when 'hit'). Since the light and the gamma-ray lost some mass to the aether near the star it left, but regain an equal amount of mass from the aether near the

destination (star); light and gamma-rays must have a wave-like reality or character! (So much for the so-called 'mysterious' dual 'particle-wave' nature of light!)

Since one or more forces, discussed in this paper, act on a great variety of particles in the universe, the following question naturally arises: Why are there particles of very different masses in the universe, such as the proton and the electron, anyway? The author discusses that in another paper, see ref. 1 below.

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