The Next Force

The Josephson Effect in Metric Engineering of Weightless Warp Drive
And
Star Gate Time Machines

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Making Star Trek Real

"Almost 100 years after Jules Verne another medium enriched the dream of spaceflight. The 3- year run of the initial TV series Star Trek, created by Gene Roddenberry, took us "where no man had gone before." Star Trek represented space flight in a way that became almost believable to the average person. Consequently, a whole generation was raised on the notion that Starfleet would make it possible for us to live and work in space in the not too distant future. This series became a true cultural phenomena with spin-offs of more TV series, established fan clubs, international conventions, and several major motion

pictures. In later years, computer enhanced special effects allowed for the production of the Star Wars Trilogy, Close Encounters of the Third Kind, E.T., and Independence Day nourished the dreams of this generation and continue to build expectations of the promise of space travel.

"Where there is no vision, the people perish."

Proverbs 29:18

… Likewise, some future event will cause the dreams of the space cadets to be actualized into a new operational organization whose immediate focus is threat based, either from deep space or from a space faring nation in Earth's orbit.

… In all the space studies over the past 5 years, only three possible threat sources have been postulated: extraterrestrial aliens, hazards from asteroids and comets, and the WMD threat posed by rogue nations on Earth. Of these, the second is perhaps the most threatening to our existence as a nation and as a species.

"In our obsessions with antagonisms of the moment we often forget how much unites all the members of humanity. Perhaps we need some outside, universal threat to recognize this common bond. I occasionally think how quickly our differences would vanish if we were facing an alien threat from outside this world."

President Reagan,
21 September 1987

The "great communicator" made this remark[1] in context of a speech given to the UN General Assembly on the subject of arms control and world peace. This was the third public quote where the President wondered aloud about a threat external to our planet. If this ***significant emotional event*** were to emerge would we be forced to call on Astronauts like Bruce Willis or Robert Duvall? Hopefully we would be better prepared, but then all Titan II missiles have been dismantled. "

Col Victor P. Budura , Jr.

http://www.airpower.maxwell.af.mil/airchronicles/cc/budura.html

[1]The late United Artist Theaters motion picture billionaire who co-financed the James Bond films, Marshall Naify, and I had a significant role in this event. See Kim Burrafato's article in this book.

Thanks to Gary Bekkum for sending me this link.

The Equation of State for Zero Point Fluctuations of Gauge Fields

Quantum field theory is based on Einstein's theory of special relativity for a globally flat space-time.[2] For simplicity of explanation I only consider the quantum electrodynamics of electrons and photons. The spin ½ Dirac electron fermion spinor gauge source field has negative zero point energy density vacuum fluctuations $\rho_{zpe}c^2$ from a completely ionized neutral plasma of equal numbers of virtual off mass shell unbound polarized vacuum (PV) pairs of electrons and positrons. The spin 1 vector boson gauge force field has positive zero point energy density. Relativistic invariance requires that the zero point pressure p_{zpe} is always equal, though opposite in sign, to the zero point energy density for both fermions and bosons. That is, the zero point fluctuation equation of state for any quantum gauge source or force field is

$$\rho_{zpe}c^2 + p_{zpe} = 0 \tag{1.1}$$

The general relativity extension of Newton's gravity Poisson equation is Einstein's 1915 geometrodynamic field equation that can be written as

$$R_{\mu\nu} = -\frac{8\pi G}{c^4}\left(T_{\mu\nu} - \frac{1}{2} g_{\mu\nu} T^{\lambda}_{\lambda} \right) \tag{1.2}$$

(1.2) is equivalent to the usual form

$$G_{\mu\nu} \equiv R_{\mu\nu} - \frac{1}{2} R^{\lambda}_{\lambda} g_{\mu\nu} = -\frac{8\pi G}{c^4} T_{\mu\nu} \tag{1.3}$$

The stress-energy tensor for a relativistic fluid is

$$T_{\mu\nu} = \left(\rho + \frac{p}{c^2} \right) \frac{dx_{\mu}}{d\tau} \frac{dx_{\nu}}{d\tau} - p g_{\mu\nu} \tag{1.4}$$

Use (1.1) for the zero point fluctuations in (1.4). Therefore

$$T_{\mu\nu} \to t_{(zpe)\mu\nu} = -p_{zpe} g_{\mu\nu} = \rho_{zpe} c^2 g_{\mu\nu} \tag{1.5}$$

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[2] Flat World , "Cosmological Physics" by John Peacock has these basic equations and GR sign conventions, e.g. pp. 25, 26. See also Peter Milonni's "Quantum Vacuum" for background information on positive and negative zero point energy densities for boson and fermion (respectively) special relativistic fields.

$$T_{\lambda}^{\lambda} = \rho c^2 - 3p \to t_{(zpe)\lambda}^{\lambda} = 4\rho_{zpe}c^2 \tag{1.6}$$

$$\begin{aligned} R_{\mu\nu} &= -\frac{8\pi G}{c^4}\left(T_{\mu\nu} - \frac{1}{2}g_{\mu\nu}T_{\lambda}^{\lambda}\right) \to R_{(zpe)\mu\nu} = -\frac{8\pi G}{c^4}\left(t_{(zpe)\mu\nu} - \frac{1}{2}g_{\mu\nu}t_{(zpe)\lambda}^{\lambda}\right) \\ &= -\frac{8\pi G}{c^4}g_{\mu\nu}\left(\rho_{zpe}c^2 - \frac{1}{2}4\rho_{zpe}c^2\right) = \frac{8\pi G\rho_{zpe}}{c^2}g_{\mu\nu} \end{aligned} \tag{1.7}$$

$$\frac{G_{00}}{2} = R_{00} \to \nabla^2\frac{U}{c^2} \tag{1.8}$$

$$T_{00} = \rho c^2 \tag{1.9}$$

$$T_{\lambda}^{\lambda} = \rho c^2 - 3p \tag{1.10}$$

$$\begin{aligned} R_{00} &= -\frac{8\pi G}{c^4}\left(T_{00} - \frac{1}{2}g_{00}T_{\lambda}^{\lambda}\right) \\ &= -\frac{8\pi G}{c^4}\left(\rho c^2 - \frac{1}{2}(\rho c^2 - 3p\right) = -\frac{4\pi G}{c^4}\left(\rho c^2 + 3p\right) \end{aligned} \tag{1.11}$$

$$\nabla^2\left(\frac{U}{c^2}\right) = -\frac{4\pi G}{c^2}\left(\rho + \frac{3p}{c^2}\right) \tag{1.12}$$

Therefore, local classical field equation (1.2) in the weak curvature limit is Newton's Poisson equation with the relativistic pressure correction[3] Note the all-important factor of 3 in front of the pressure term. U is Newton's gravity potential energy per unit test mass with the dimensions of velocity squared. Hence the equation is one for *curvature* in the usual dimensions 1/Area. Therefore, in the special case of the quantum vacuum, substitute (1.1) into (1.12) to get

$$\nabla^2 U_{zpe} = 8\pi G\rho_{zpe} \tag{1.13}$$

Local Diff(4) covariance[4] plus the Einstein Equivalence Principle demands

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[3] Note that a positive $\rho + 3p/c^2$ gravitates, but a negative one anti -gravitates, e.g. "Foundations of Potential Theory", O.D. Kellog (1953) p. 156.

[4] That is the form of the local field equations remains invariant under arbitrary relative motions of local frames of reference that are momentarily coincident in a neighborhood of point space-time event P. Einstein's Equivalence Principle (EEP) is a stronger requirement on top of covariance, i.e., that there is a local tetrad transformation from a Locally Non-Inertial Frame (LNIF) at event P to a Locally Inertial Frame (LIF) at the same event P. Special relativity works in the LIF to a good approximation because the inhomogeneous curvature tidal forces of stretch-squeeze can be made small by making the space-time region of the LIF small. You need two test particles to measure the tensor tidal curvature force. You only need one test particle to measure the LNIF gravity pseudo-force that vanishes in an LIF like the Space

$$t_{(zpe)\mu\nu} = \frac{\Lambda c^4}{8\pi G} g_{\mu\nu} \tag{1.14}$$

Where Einstein's local geometrodynamic field equation is now

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = -\frac{G}{c^4} T_{\mu\nu} \tag{1.15}$$

Or, equivalently

$$G_{\mu\nu} = -\frac{8\pi G}{c^4}\left(T_{\mu\nu} + t_{(zpe)\mu\nu}\right) \tag{1.16}$$

Assuming zero torsion and metricity, the Bianchi identity for local momenergy[5] current conservation is

$$G_{\mu\nu}{}^{;\nu} = 0 \tag{1.17}$$

This allows the transfer of momenergy current between the off mass shell random noise zero point fluctuations of virtual quanta and the on mass shell quanta as well as huge

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Shuttle in orbit round the Earth with its rockets off. This single test particle pseudo-gravity force does depend on the local curvature in a static metric in the LNIF rest frame relative to the stress-energy source of that curvature. The pseudo-gravity force also depends on the distance of P to the source. The precise definition of this distance depends on the space-like symmetry of the source. The EEP approximation breaks down in the collapse of space-time to a singularity behind an event horizon of a black hole. The radii of curvature shrink to zero in the collapse to the singularity. "Same" and "momentarily coincident" mean a separation small compared to local radii of curvature. A big radius of curvature means weak curvature since the local curvature at event P associated with two directions is the reciprocal product of the two radii of curvature associated with those two directions. That is, curvature has the dimensions of 1/Area. Test objects in an LIF are weightless in free float. The test objects are on time-like geodesics. The time-like geodesic is the straightest path or "world line" in 4 dimensions that a material test particle can take in curved space-time. Time-like means inside the local light cone at P. The light cones at neighboring points tilt relative to each other in curved space-time leading to the Penrose diagram. A test particle is passive. It does not back-act on the geometry that pilots its motion. A test particle is not a source. This is a lesson that Bernie Haisch & Co have not yet learned. There is no such thing as "gravity force" as in Newton's theory. This is the meaning of "geometrodynamics", i.e. the elimination of force. Einstein considered "force" as part of the "wood" to be replaced with the "marble" of pure Platonic geometry. Objects in a LNIF are on time-like non-geodesics and they register weight on strain gauges from the non-gravity electrical reaction forces that pull the test objects off time-like geodesics. Given a bundle of neighboring time-like world lines that start from P_1 and end at P_2, the time-like geodesic has the longest frame invariant proper time between those points compared to time-like non-geodesics that intersect it at those points. This is the twin effect of differential aging depending on the path. This "critical point" in the functional space of world lines is a special case of the Action Principle of the calculus of variations out of which all the laws of physics local in space-time, or in its hyperspace generalization, come and must obey.

[5] Components of the stress-energy tensor $T_{\mu\nu}$ of on mass shell real gauge source and force quanta as well as virtual gauge force quanta in macro-quantum coherent states forming non-radiating near induction fields.

numbers of virtual quanta in macro-quantum Glauber coherent states[6] that are non-radiating external near fields. This is only for the gauge source and force quanta.

Vacuum Propeller Weightless Warp Drive

Note that for zero torsion

$$G_{\mu\nu}{}^{;\nu} \equiv \frac{\partial}{\partial x^{\nu}} G_{\mu\nu} + \Gamma_{\mu}^{\lambda\sigma} G_{\lambda\sigma} + \Gamma_{\nu}^{\nu\sigma} G_{\mu\sigma} \tag{1.18}$$

However, if there is also torsion[7], but still metricity[8], then (1.17) is violated and the momenergy current density conservation equation is more generally

$$G_{\mu\nu}{}^{;\nu} + \frac{8\pi G}{c^4}\left(T_{\mu\nu}{}^{;\nu} + t_{(zpe)\mu\nu}{}^{;\nu}\right) = 0 \tag{1.19}$$

The vacuum propeller warp drive equation is a piece of (1.19) when we can neglect the stress-energy density of both on mass shell gauge field matter and induction near fields to a good approximation, i.e.,

$$G_{\mu\nu}{}^{;\nu} + \Lambda^{,\nu} g_{\mu\nu} \approx 0 \tag{1.20}$$

This is a direct transfer of momenergy current density from geometry to and from virtual zero point gauge quanta vacuum fluctuations bypassing the space-time stiffness barrier $G/c^4 \sim 10^{-33}$ cm per 10^{19} Gev.

IT FROM BIT? Wheeler's Self-Organizing Universe.

We shall see that Λ is strongly coupled to the gauge force fields via the macroscopic vacuum coherence order parameter $\Psi(x)$ that is a complex scalar field in curved space-time. Yet, its phase $\arg\Psi$ determines curved space-time $g_{\mu\nu}$ in a self-organizing feedback loop between geometry (Wheeler's "IT") and Bohm giant pilot wave (Wheeler's "BIT"). That is John Archibald Wheeler's "self-excited universe" is "IT

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[6] Possibly squeezed into a displaced ellipse in the Wigner density phase space of the field harmonic oscillator.

[7] Torsion $S_{\mu\nu}^{\lambda}$ is an antisymmetric 3rd rank tensor piece of the connection field $\Gamma_{\mu\nu}^{\lambda}$. Torsion does not vanish locally in the EEP tetrad map from an LNIF to a LIF. Torsion comes from topological dislocation gap defects in Hagen Kleinert's "world crystal lattice" model of GR. The lattice scale is the Planck scale $L_p = \sqrt{\hbar G/c^3}$. Curvature is from disclination topological lattice defects. These defects are singularities in the phase $\arg\Psi$ of the cohered virtual electron-positron bound state Bose-Einstein condensate.

[8] Metricity is vanishing covariant divergence of the geometrodynamic field $g_{\mu\nu}$. This can be destroyed from extra dimensions of hyperspace.

FROM BIT" + "BIT FROM IT". Wheeler was missing the "BIT FROM IT" part of the equation.

The Two Faces of Janus - Dark Energy and Dark Matter

Returning to (1.4), in general for the relativistic fluid

$$T_{\mu\nu} = \left(\rho + \frac{p}{c^2} \right) \frac{dx_\mu}{d\tau} \frac{dx_\nu}{d\tau} - p g_{\mu\nu} \tag{1.21}$$

Therefore, for the local random zero point fluctuations in particular from (1.1)

$$t_{(zpe)\mu\nu} = -p_{zpe} g_{\mu\nu} = \rho c^2 g_{\mu\nu} \tag{1.22}$$

The metric signature with the present sign conventions is +---. Therefore

$$t_{(zpe)00} = \rho c^2 \equiv \frac{\Lambda c^4}{8\pi G} \tag{1.23}$$

Consequently (1.13) is

$$\nabla^2 U_{zpe} = 8\pi G \rho_{zpe} = c^2 \Lambda \tag{1.24}$$

Where $\Lambda > 0$ is a local universally repulsive anti-gravitating "dark energy" vacuum region of positive zero point fluctuation virtual boson energy density. Furthermore, $\Lambda < 0$ is a local universally attracting gravitating "dark matter" polarized vacuum region of negative zero point fluctuation energy density made out of virtual fermion-antifermion pairs that are ionized not in a bound state.

Unconventional Flying Objects

Think of the zero point Λ field as a new kind of *virtual* spin 2 charge. Two opposite Λ charges rigidly connected to each other will self-accelerate. The energy comes from the vacuum. This is the Bondi vacuum propeller[9] effect. This is very different from opposite spin 1 electrical charges that attract and like electrical charges that mutually repel conserving the center of mass motion. Imagine a flat high T_c superconducting circular plate with $\Lambda > 0$ on bottom and $\Lambda < 0$ on top. The plate will accelerate vertically upward. Strain gauges imbedded in the plate will show no g-force. The conjectured electromagnetically controlled local Λ field configuration generates its own free float

[9] The term "vacuum propeller" was coined by Roger Coolidge's laboratory assistant Igor Kelvin at the secret laboratory in the mountains of the Duchy of Grand Fenwick. See "Tuxedo Park" by Jennett Conant and "Gravity's Rainbow" by my Cornell Classmate Tom Pynchon. I attended lectures at Cornell in ~1960 by Herman Bondi, Chief Scientist of the British Ministry of Defense on this self-acceleration idea with "negative mass" 42 years before I discovered its connection to the Λ field.

time-like geodesic warp drive. You can get it to hover or do anything you like in principle. Sounds like a flying saucer, eh? – like Paul Hill's[10] "acceleration field"? You got it Harry Potter! No engines, everything is done at the micro-nano engineered level inside the skin of the fuselage like Colonel Phillip J. Corso reported.

More Is Different: Vacuum Instability

The Dirac electron *micro-quantum false vacuum* is a filled Fermi sphere of closely packed negative energy electrons in globally flat 3-momentum space complementary to globally flat 3D space. *There is no gravity at all in this Flat World.* The momentum at the surface of the Fermi sphere is of order $\hbar/L_p \sim 3\times10^{-5}\times10^{10}\ gm\times cm/\sec$. The Heisenberg uncertainty principle fuzzes out the sharp edge of this Fermi sphere over a region of order $2mc \sim 6\times10^{-27}\times10^{10}\ gm\times cm/\sec$. The ratio of fuzzy thickness of the surface to the radius of the Fermi sphere is ~ 10^{-22}. Therefore, as in BCS superconductor theory, the binding energy of a single virtual electron-positron (hole) pair in the Heisenberg fuzzy edge under their mutual Coulomb attraction of unlike electrical spin 1 charges, is of order $\alpha m_p c^2 \sim 10^{17}$Gev. The photon rest mass is 10-65 gm with Meissner penetration depth 10^{28} cm. Therefore this is a hard superconductor with a huge varying penetration to coherence ration and quantized vortex string singularities in the phase field. The Bose-Einstein condensation energy density for the creation of the universe is ~ 10^{17}Gev L_p^{-3} (m/mp) ~ $10^{26}\ 10^{99}\ 10^{-22}$ ev/cc. That's big Bhubba! However, the pair is off mass shell. Therefore, the Flat World *micro-quantum* false vacuum[11] is unstable to the formation of the Curve World paired *macro-quantum* vacuum. That is, this *single pair* bound state wavepacket $\psi(x)$ is macroscopically occupied by virtual electron-positron pairs with a superfluid number density $|\Psi(x)|^2$. There is a negative effective Bose-Einstein condensation energy density in the "More is different"[12] phase transition from the micro-quantum false flat world vacuum of completely ionized virtual electron-positron plasma at the fuzzy edge of the Fermi sphere surface to the macro-quantum true curve world vacuum consisting of a huge number of bound virtual positronium pairs all in the same wave packet $\psi(x)$ in their *center of mass* coordinates x.[13] Thus, the metastable macro-quantum curve world vacuum is lower in energy density relative to the unstable micro-quantum flat world false

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[10] "Unconventional Flying Objects"

[11] The vacuum of Haisch-Rueda-Puthoff in SED ZPE origin of inertia model is this false Flat World vacuum which gives the wrong Λ too big and positive (anti-gravitating) by 122 powers of ten. Similarly for Puthoff's PV gravity model which is, in addition, wrong for other reasons such as the infinite set of isotropic radial coordinates he needs going complex when the unique curvature coordinate is inside the gravity radius. Puthoff's "PV without PV" suffers from excess mathematical baggage and ill-posed fragmentary mutually inconsistent conceptualizations of the physical picture of reality.

[12] P. W. Anderson, "A Career in Theoretical Physics" (World Scientific)

[13] Note that the virtual electron and virtual positron 3-current densities add constructively under an applied electric field. Indeed, these PV 3-currents may be Maxwell's vacuum displacement 3-current from the rate of change of the mixed space-time components of the dual Hodge star electromagnetic Cartan 2-form *F (field tensor in engineering language). That is, Maxwell's equations are topologically dF = 0 and *d*F = J. The virtual electron-positron pairs are in the * part of the field equations. This is an example of Wheeler's "the boundary of a boundary is zero".

vacuum by an amount ~ $\left|\Psi(x)\right|^2 2m_e c^2 \sim 10^{99} \times 10^{-3}\ Gev/cm^3$ for the Einstein $\Lambda = 0$ nongravitating phase of vacuum that we are used to here on Earth under ordinary physical conditions. This smooth coherent "signal" superfluid curve world vacuum has zero thermodynamic entropy. This explains the zero entropy initial condition on the universe that leads to the Arrow of Time in which we, in our consciousness, experience a forward flow of subjective time in which we objectively grow old and die as the universe expands keeping the sky dark and space cold. You can think of the macro-quantum vacuum $\Psi(x)$ as a generally locally covariant spin 0 scalar zero rank tensor field in the complex plane. Einstein's local geometrodynamic curve world metric field is simply, in the absence of external gauge force fields

$$g_{\mu\nu}(x) = \eta_{\mu\nu} + \frac{L_p^2}{2}\left(\frac{\partial}{\partial x^\mu}\frac{\partial}{\partial x^\nu} + \frac{\partial}{\partial x^\nu}\frac{\partial}{\partial x^\mu}\right)\arg\Psi(x) \tag{1.25}$$

Where $\eta_{\mu\nu}$ is the globally flat spacetime Minkowski metric. The phase dependent second term in RHS of (1.25) need not be small. This is not a linearized theory. The quintessent locally variable Λ(x) field is simply

$$\Lambda(x) = \frac{1}{L_p^2}\left(1 - L_p^3\left|\Psi(x)\right|^2\right) \tag{1.26}$$

Wavelet Scale Dependence & Wigner Densities

Everything is scale-dependent in the sense of adaptive window wavelet transforms replacing the rigid Fourier transform that is only good in global flat world. I suppress that detail here for simplicity of pedagogical exposition. The Wigner phase space density[14] is replaced by a Wigner scale space density[15] in which a wavelet kernel replaces the Fourier kernel $e^{ip_\mu x^\mu}$.[16]

$$\psi_{s,x}(u) = |s|^{-\eta}\,\psi\left(\frac{u-x}{s}\right) \tag{1.27}$$

The scale is s, and you can think of ψ as the bound state wave packet of a single virtual electron-positron pair. The residual Heisenberg uncertainty random noise field has a Wigner scale space density

$$\rho_n(x,s) \equiv \frac{\Lambda(x,s)}{L_p} \tag{1.28}$$

[14] "Phase Space Picture of Quantum Mechanics", Kim & Noz (World Scientific)
[15] The Wigner density is real but unlike a classical probability density it can go negative from quantum superposition. This happens on a cosmic scale in the dark matter!
[16] p. 63 eq. (3.6) "A Friendly Guide to Wavelets", Gerald Kaiser, Birkhauser

Just as in the two-fluid theory of Helium II, the thermodynamic entropy density is carried only by this residual random micro-quantum noise field. This entropy density of the macro-quantum vacuum may be, *I conjecture* something like

$$S \overset{?}{=} kL_p^3 \rho_n \ln\left(1 + L_p^3 \rho_n\right) = kL_p^2 \Lambda \ln\left(1 + \left|L_p^2 \Lambda\right|\right) \tag{1.29}$$

Note, that if equation (1.29) is true, then gravitating $\Lambda < 0$ dark matter has *complexity-generating negative entropy* consistent with the clumping needed to form galaxies and stars.

The Josephson Effect in Metric Engineering

Now imagine a weak Josephson link[17] between the Bondi capacitor real electron pair superconductor and the vacuum virtual positronium superconductor. P W Anderson points out that the micro-quantum dynamics, in this case virtual electron-positron pairs binding from their Coulomb attraction inside the vacuum on the one hand, real electron pairs bound by phonons on the other hand, are not important to the emergent collective "More is different" macro-quantum order parameter Ψ acquiring a life of its own on the larger scale. Therefore, we do not think of a literal propagation of either virtual electron-positron pairs or real electron positron pairs through the conjectured weak link between vacuum and superconductor, rather we think of a nonlocal reach of the macro-quantum version of Bohm's quantum potential Q to ensure conservation of momenergy currents between vacuum and superconductor. This means a nonlocally correlated mutually compensating adjustment in the $|\Psi|^2$ on both sides of the weak link. You need virtual positronium vacuum superconductor, *not* "dilithium crystals", to Make Star Trek Real and to make the curved space-time without which nothing material is possible. The effective quintessent field is then

[17] Josephson Effect, Vol III Feynman's Lectures on Physics, Ch. 21. Oddly Dennis Schmidt in "A Satori Trilogy" written maybe 20 years ago writes of a Sarfatti-Josephson Star Drive. Kim Burrafato witnessed this strange incident finding the Schmidt story in a bookstore in the SF Marina. He may have read about Brian visiting me in 1976 that was in the San Francisco Chronicle. But my idea was still 25 years in the future. I have not communicated with Brian Josephson for 5 years now.

$$\Lambda = \frac{1}{L_p^2}\left(1 - L_p^3 \left|\Psi_{vac} + \Psi_{sc}\right|^2\right)$$
$$\left|\Psi_{vac}\right| >> \left|\Psi_{sc}\right|$$
$$\therefore \tag{2.1}$$
$$\Lambda = \frac{1}{L_p^2}\left(1 - L_p^3 \left|\Psi_{vac}\right|^2 \left|1 + \frac{\Psi_{sc}}{\Psi_{vac}}\right|^2\right)$$
$$\approx -2L_p \left|\Psi_{vac}\Psi_{sc}\right| \cos\left(\arg\Psi_{vac} - \arg\Psi_{sc} - \frac{2e}{\hbar c}\oint A_\mu dx^\mu\right)$$

Plugging in the numbers gives

$$\Lambda \approx -2\times 10^{-33}\times 10^{45.5}\times 10^{11.5}\times\cos\Theta$$
$$\to 10^{24}\cos\Theta cm^{-2} \tag{2.2}$$

Where the gauge invariant Josephson weak link relative phase difference connecting vacuum geometrodynamics to the real superconductor disk is

$$\Theta \equiv \arg\Psi_{vac} - \arg\Psi_{sc} - \frac{2e}{\hbar c}\oint A_\mu dx^\mu \tag{2.3}$$

There will also be a Chiao "gravity radio" gravimagnetic-magnetic coupling in the space-like 3-vector part of the phase. Note that the cosine function has a nonlinear Taylor power series expansion. Apply an AC voltage at resonance to get a DC momenergy current transfer between vacuum and superconducting matter. There are several interesting effects here to be worked out later.

Note that the effective scale of variable Λ field radius of curvature is

$$r_\Lambda \approx \frac{10^{-12}}{\sqrt{\left|\cos\Theta\right|}} cm \tag{2.4}$$

This is enormously strong when the cosine is near 1. The corresponding curvature radius from the mass of the Earth at the surface of the Earth is about 1 AU ~ 10^{13} cm. Therefore, the Λ field is effectively at least 25 powers of ten stronger in warp power than gravity at the surface of the Earth. The aerospace weapons potential of my discovery here dwarves that of nuclear fusion and may explain the real physics of ultra-violent astrophysical events including gamma bursters.[18] One peaceful use of my Λ field "metric

[18] The large extra space dimensions brane idea of Dvali et-al in "Scales of Gravity" with a larger scale quantum gravity cutoff $L_p^* >> L_p$ make this effect weaker by a factor $(L_p^*/L_p)^{1/2}$ multiplying 10^{-12} in (1.33).

engineering"[19] "Making Star Trek Real"[20] will be to divert huge asteroids on a collision course with Earth.

Gravity Radio C^3?

Ray Chiao[21], distinguished professor of physics at UC Berkeley, has an intriguing idea for the efficient practical conversion of gravity waves to electromagnetic waves and vice versa inside Type II superconductors[22] that support vortices of quantized magnetic flux

$$\Phi_0 \equiv \frac{h}{2e} = 10^{-7}\, Gauss \times cm^2 \tag{3.1}$$

rather than the complete Meissner effect expulsion of magnetic field in an ideal Type I superconductor. Chiao needs to impedance match the lowest order quadrupole gravity wave to a quadrupole electromagnetic wave.

This would be perfect for the underwater nuclear submarine and aerospace forces since gravity waves cannot be stopped by any barrier at least when $\Lambda = 0$.

Far field radiation is generally weak compared to near induction fields. That's a good thing too. "God is subtle but not malicious."[23] As metric engineers we are interested in the stronger non-radiating near induction fields. Radiation is bad for virtual vacuum state metric engineering of warp drives and Star Gates because it leaks away energy like a hole in a water pipe or a badly dripping faucet. Einstein always said he would be a plumber if he had to do it all over again. Indeed, Lenny Susskind was a plumber before Peter Carruthers got him into Cornell in 1963 when I first met him and turned him on to the time-phase quantum operator problem.

Look at the Josephson phase in (2.3). It is both gauge invariant and space-time invariant. Ray Chiao gravimagnetic-magnetic coupling is non-relativistic but gauge invariant in the sense of minimal coupling. It is not however 4-dimensionally relativistic invariant. Therefore I add an extra term to what Ray Chiao did in order to use "gravity warp induction" in the Josephson weak link between the real superconducting high T_c Bondi vacuum propeller and the macro-quantum vacuum. Chiao's interaction Hamiltonian density is

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[19] Coined by Hal Puthoff.
[20] Coined by me.
[21] "Superconductors as transducers and antennas for gravitational and electromagnetic radiation" http://xxx.lanl.gov/abs/gr-qc/0204012
[22] There are two length scales in a superconductor, the coherence length ξ over which Ψ varies and the London penetration depth λ over which the magnetic flux varies in the Meissner effect. This is an exponential decay in the case of a real superconductor. Type II has $\xi < \lambda$. The vacuum will have these as variable local fields themselves scale-dependent in the sense of wavelet transforms.
[23] Albert Einstein

$$H_{\text{int}} = \left|\Psi(x)\right|^2 2e\vec{A}\cdot\vec{\mathrm{H}} = \left|\Psi(x)\right|^2 2eA^i g_{0i} \qquad i = 1,2,3 \tag{3.2}$$

I change this to

$$H_{\text{int}} = \left|\Psi(x)\right|^2 2eA^\mu \mathrm{H}_\mu = \left|\Psi(x)\right|^2 2e\left[A^i g_{0i} - A^0\left(g_{00} - \eta_{00}\right)\right] \tag{3.3}$$

Note, that in the static weak field limit in the quasi-uniform gravity field at the surface of the Earth.

$$H_{\text{int}} \to -\left|\Psi(x)\right|^2 2eA^0 \frac{gz}{c^2} \tag{3.4}$$

I may be off by a minus sign. ☺ Of course A^0 is an electrical voltage. Therefore, I predict on the basis of making Chiao's gravity radio locally covariant, consistent with curved space-time, not the Haisch-Puthoff-Firmage "Flat World", a direct superconducting amplified voltage-gravity coupling that avoids the G/c^4 space-time stiffness barrier.[24] This is not directly the same as my Josephson effect however, but it is related to it. Let's go back to that.

$$\Theta \to \arg\Psi_{vac} - \arg\Psi_{sc} - \frac{2e}{\hbar c}\oint A_\mu dx^\mu - \frac{mc}{\hbar}\oint \mathrm{H}_\mu dx^\mu \tag{3.5}$$

with nonlinear gravity-electromagnetic couplings inside the cosine that is a Taylor power series expansion.

A note on the meaning of "virtual off mass shell" and "real on mass shell" in perturbative quantum field theory.

Given a spin 0 massive[25] scalar boson quantum field ϕ for simplicity. We can use the Fourier transform in flat space-time. We need to use wavelet transforms in curved space-time. Forget that complication for now. The perturbative response of the field $\phi(x)$ at field point P with coordinates x to a an arbitrary source distribution $J(x)$ is the 4-D Fourier integral

$$\delta\phi(x) = \int d^3k e^{i\vec{k}\cdot\vec{x}} \int d\omega e^{-i\omega t} \frac{J\left(\vec{k},\omega\right)}{\vec{k}^2 + \left(\frac{mc}{\hbar}\right)^2 - \left(\frac{\omega}{c}\right)^2} \tag{4.1}$$

[24] G is still hidden in g of course, but this new Modanese type macro-quantum amplified direct gravity-gauge force coupling is not a direct stress-energy bending of space-time that is limited by the barrier.

[25] The rest mass of a real quantum of the field on mass shell is m. If m is imaginary we have a real tachyon.

The Green's function propagator in 4-momentum space is

$$\tilde{G}\left(\vec{k},\omega\right)=\frac{1}{\vec{k}^2+\left(\frac{mc}{\hbar}\right)^2-\left(\frac{\omega}{c}\right)^2} \tag{4.2}$$

The mass shell is the pole of this propagator, i.e. where the denominator vanishes

$$\begin{aligned}\vec{k}^2+\left(\frac{mc}{\hbar}\right)^2-\left(\frac{\omega}{c}\right)^2&=0\\ \omega_{\pm}&=\pm c\sqrt{\vec{k}^2+\left(\frac{mc}{\hbar}\right)^2}\end{aligned} \tag{4.3}$$

The integral (4.1) has two parts: the "real on mass shell" part from the pole and the "virtual off mass shell" part from everything else. In the case of the Maxwell spin 1 four vector[26] potential field A_μ, the pole is the Fourier transform of the light cone and its contribution is far field transverse polarized radiation leaking energy to infinity. The virtual off mass shell non-pole part are virtual photons of all three independent polarizations including the longitudinal polarization in the direction of the 3-momentum vector $\vec{k}$. The two transverse polarizations for each $\vec{k}$ mode (quantum harmonic field oscillator) are in the plane perpendicular to $\vec{k}$. This plane wave decomposition into modes is not good inside waveguides and cavities like in the old microwave klystron et-al. The fourth time-like polarization is not independent of the longitudinal polarization. They are connected by the Lorentz gauge constraint since a quantum spin 1 field must have only 3 independent spin polarization projections relative to an arbitrary space direction. Since the photon has zero rest mass, the inductive longitudinal part of the field cannot leak energy to infinity in the form of radiation. The photon gets some rest mass inside a superconductor. This is part of the Meissner effect.

Look at the time-frequency integral in (4.1)

[26] This is a first rank tensor equivalent to a second rank Penrose spinor of the 10 parameter Poincare Lie group for the globally flat space-time of special relativity. When the 4-parameter translation group generating total energy and total linear momentum conservation (Emmy Noether's theorem) is locally-gauged away, like in non-Abelian Yang-Mills internal gauge symmetry fields of the electro-weak-strong force, we get the full nonlinear curved space-time of Einstein's general relativity. This was first done by Kibble at Imperial College, London during Abdus Salam's era ~ 1966. I was there as a visitor down from UKAERE, Harwell. The tensors and spinors are then those of the Diff(4) local group. The idea of Bernie Haisch and Hal Puthoff, promoted by Joe Firmage, that curved space-time is not a good idea is pure Cargo Cult pseudo-physics in the sense of Richard Feynman's famous Cal Tech Lecture that warned of the dangers of New Age psychobabble coming from est and Esalen in Big Sur, California. He visited there because John Lilly was his friend and Esalen was full of friendly scantily dressed pretty women.

$$\int d\omega e^{-i\omega t} \frac{J\left(\vec{k},\omega\right)}{\vec{k}^2 + \left(\frac{mc}{\hbar}\right)^2 - \left(\frac{\omega}{c}\right)^2} \tag{4.4}$$

This integral is not well defined without boundary conditions that are closed paths or contours in the complex frequency plane $\omega = \omega_r + i\omega_i, i^2 = -1$, or complex energy plane since $E = \hbar\omega$. There are now choices. The contour used is Feynman's. Since there are actually two complex ω poles or zeros of the denominator (1.41) on the real ω axis on equally distant opposite sides of the imaginary ω axis[27], Feynman circles around the two poles with two opposite infinitesimal half circles and closes the contour with a big half circle of radius $\to \infty$ in such a way that, for the spin 1 photon field with $m \to 0$, positive real energy is a far field transverse radiation retarded wave along the forward in time future light cone, and negative real energy is an advanced wave along the backward in time past light cone. You actually need advanced waves from the future to get the correct very accurate answers in the perturbation expansion of Feynman diagrams made out the Green's function propagators for quantum electrodynamic phenomena like the Lamb shift, anomalous magnetic moment of the electron et-al. Indeed, for all $m \neq 0$ quantum fields of any spin, real on mass shell retarded antiparticles of positive energy forward in time are *equivalent to* advanced particles of negative energy and opposite charges backward in time using the particular Feynman contour in the complex energy plane of the integral (4.1).

More Is Different

The actual equations here are for a massive spin 0 scalar boson field. The basic idea works for all spins including the spin ½ Dirac electron, the spin 1 vector gauge bosons of the electro-weak-strong forces of nuclear physics, the spin 3/2 field and the spin 2 graviton field. The spin 2-graviton field is a concept of limited usefulness. Penrose[28] calls it the "linear graviton" as distinct from his "nonlinear graviton" connected with the non-perturbative background independent attempts at quantum gravity involving twistors and instantons in imaginary time, spin networks et-al. The key point for us at the moment, is that you cannot get Curve World from Flat World by taking a finite number of spin 2 linear gravitons propagating in Flat World anymore than you can get a superconducting

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[27] As the rest mass control parameter $m \to 0$, the two distinct frequency roots $\omega_\pm \to \pm c\left|\vec{k}\right|$ correspond to advanced and retarded electromagnetic waves for the spin 1 Maxwell field with gauge invariant minimal coupling to the electron-positron 4-component Dirac spinor field and the longitudinal spin-polarization does not propagate as a far field.

[28] "The Geometric Universe" (Oxford, 1998), ed. Huggett et-al. " the … twistor programme in which sheaf cohomology groups … corresponded precisely to the solutions of the zero rest mass field equations … a complexification of the Radon transform … for application to tomography … twistors …solve the self-dual Yang-Mills equations … this stimulated work on instantons and … led to Donaldson's … work on 4-manifolds … and … led to a deep understanding of the self-dual Einstein equations in which the Riemannian geometry gets encoded entirely into the holomorphic geometry of a complex 3-manifold…hyper-Kahler manifolds are the natural generalizations of self-dual Einstein manifolds … which …arise … in supersymmetric gauge theories." M. Atiyah

macro-quantum Bose-Einstein condensate of paired electrons[29] from the micro-quantum Dirac-Fermi Heisenberg fuzzy sphere densely packed with negative energy virtual electrons[30] with a finite number of attractive electron-phonon perturbation Feynman diagrams. In both cases you need to sum an infinite series of Feynman diagrams. This is beyond perturbation theory. This is P.W. Anderson's "More is different" of emergent collective order in action. The formation of complex macro-quantum local order parameters $\Psi(x)$ with long-range phase coherent hologram interference patterns is essentially non-perturbative. You can think of micro-quantum random gravitons as normal fluid fluctuations from a macro-quantum graviton superfluid Bose-Einstein condensate that is curved space-time. However, that graviton condensate is itself a kind of Goldstone collective boson coherent phase mode of the virtual electron-positron vacuum condensate.

"if we remove life from Einstein's beautiful theory by steam-rollering it first to flatness and linearity, then we shall learn nothing from attempting to wave the magic wand of quantum theory over the resulting corpse." Roger Penrose [31]

Harnessing The Cosmic Energy of The World Hologram

-----Original Message-----
From: Black Ops Agent X
Sent: Friday, September 06, 2002 7:59 AM
To: sarfatti@well.com
Subject: Next Force Question

"Jack, In Next Force after equation (1.24) you explain: "Where $\Lambda > 0$ is a locally universally repulsive antigravity "dark energy" vacuum region of positive zero point fluctuation virtual boson energy density. $\Lambda < 0$ is a locally universally attracting gravitating "dark matter" polarized vacuum region of negative zero point fluctuation energy density made out of virtual fermion-antifermion pairs that are ionized not in a bound state." Are you saying that the superconducting rotating disks of the Bondi capacitor or vacuum propeller are to be designed and engineered so that the antigravity "dark energy" portion of VACPROP *engages near fields of virtual photons, thus /\ > 0, and the gravitating "dark matter" portion engages the ionized virtual positronium BEC in a macro quantum superfluid state, thus /\ < 0? The result being that upon engagement, the dark matter portion attracts and the dark energy portion repels causing* VACPROP *to self propel?"*

Jack: No. Do not think in terms of something engaging something else. It just is. The dark energy has a preponderance of virtual photons compared to virtual electron-positron

[29] Or paired virtual electrons and positrons exchanging attractive space-like virtual photons in the real PV vacuum case not Hal Puthoff's Mickey Mouse Cargo Cult version.
[30] One per Fermi field oscillator mode required by Pauli exclusion antisymmetry permutation principle.
[31] In Abhay Ashtekar's paper in "Geometric Universe" that shows why the Haisch-Puthoff-Firmage Flat World theory is simpler than is possible.

plasma. The dark matter is the opposite. It's a matter of tipping the balance one way or the other. One balance dish is virtual bosons. The other balance dish is virtual electron-positron plasma. Where you put the pivot point of Archimedes Lever is the macro-quantum coherent order parameter $\Psi(x)$. The point is that the deep structure of physical vacuum in my theory is variable and controllable in principle.

It is standard micro-quantum field physics that the random virtual zero point bosons naturally universally anti-gravitate repulsively and that the random virtual unbound fermion-antifermion plasma universally gravitate. The physical micro-quantum false vacuum is this alphabet soup of randomly fluctuating virtual bosons and virtual fermion-antifermion pairs. That's what micro-quantum vacuum is!

The Λ local field is the net effect of all of these random zero point vacuum fluctuations. We see the possibility that $\Lambda = 0$ since bosons of spin 0, 1 and fermions of spin ½ & 3/2 pull Λ in opposite directions. Hence $\Lambda = 0$ is plausible. $\Lambda = 0$ is what we normally think of the vacuum as gravitationally neutral.

Note I left out spin 2 gravitons for a deliberate reason! They come in much later after the vacuum phase transition from Flat World to Curve World that spontaneously breaks symmetry. Which symmetry? Why Poincare symmetry of course! I mean the translational symmetry subgroup of the Poincare group that is locally gauged away! What does that mean? That means that space-time is no longer a rigid playing field that pilots or grips matter, causing its motion, without any direct back-action on it from matter.[32] Space-time is now an active participant a source and sink of energy and linear momentum via the space-time stiffness valve G/c^4. This stiffness valve is very asymmetric. Gravity from a huge mass has a much stronger effect on matter in motion than matter in motion has on gravity. You can see that when you climb the stairs or fall off a ladder. In comparison it takes an enormous amount of electrical energy to directly deform the gravity tidal force curvature field! Indeed it takes 4 billion tons of mass energy equivalent to make a 1-fermi change in the local radius of curvature! That's space-time stiffness Bhubba!

What is real? The Looking Glass PSI WARS

Fortunately for the Army, the Navy and the Marines, I have found a way to leap frog over this space-time stiffness barrier with the Λ -field. I have found a way, a Tao of Thought as it were, to quantitatively begin to do the R&D needed to obey General Douglas

[32] Source matter, including all electromagnetic fields, by definition, back-acts on space-time geometry via the stress energy density tensor $T_{\mu\nu}$ channeled through the tiny G/c^4 space-time stiffness reciprocal super string tension valve transforming stress-energy density into curvature by the direct brute force process Einstein discovered in 1915 as a generalization of Newton's 17th Century gravity theory. In contrast, a test particle with nonzero real rest mass, by definition, does not back-act directly on the space-time that is piloting its motion along a time-like geodesic along the straightest paths in 4D-curved space-time. The flying saucer, *I conjecture*, is a new breed that shapes its own time-like geodesic path manipulating the Λ field with on board electromagnetic nonradiating induction near field generators made out of high Tc superconducting smart nano-materials.

MacArthur's final order to the cadets at West Point "Harness the cosmic energy" in "Duty, Honor, Country". The Λ field is precisely the "cosmic energy" our eloquent General was alluding to. The UFO writer Colonel Phillip J. Corso was on Mac Arthur's Staff and rumor is that Mac Arthur and CIA's James Jesus Angleton were both alarmed about invasion from flying saucers. I have no idea if there is any truth to that of course, but those stories are "Out There" in Cyber Space. The case of Edward Teller is enigmatic. Stephen Schwartz, who has worked with Robert Conquest at the Hoover Institution[33] and with Donald Rumsfeld[34] at the Institute for Contemporary Studies, America's leading USG expert on Soviet espionage in America with access to the Venona File, reports that Teller said that the UFO craze in this country was started years ago by the Soviet KGB "to weaken American Science" using phony Majestic 12 papers[35] and New Age organizations like est and Esalen. Also I heard Teller debunk UFOs at a fundraiser for the Hebrew Academy in San Francisco and I spent several hours with Teller and Itzak Rabin at the home of Rabbi Pincus Lipner. On the other hand, in a recent 2002 meeting I had in North Beach with a high-ranking CIA officer I will call "Deep Throat", I was told that indeed Teller was quite concerned with a UFO threat in the early 80's when he was lobbying the Reagan White House for the Strategic Defense Initiative that I also, with Marshall Naify, played a role in.

Flat World is an unstable false vacuum!

This micro-quantum vacuum lives in globally flat space-time, i.e. the Flat World of Haisch-Puthoff-Firmage Yilmaz theory. But there is no gravity as yet! This is the Andre Sakharov idea of 1967 that gravity is an emergent collective order, a "lumped parameter" like inductance and capacitance, or like temperature in kinetic theory of gases etc, out of the gauge source and force global special relativity quantum fields.

This Flat World is Gauge World.

According to Dirac, the spinor electron part of the micro-quantum vacuum is a filled Fermi sphere of negative energy electrons one per mode in phase space in accord with the Pauli exclusion principle of complete finite permutation group antisymmetry of the thought like pilot quantum information wave of several identical fermions. The radius of this Fermi sphere in the momentum subspace of phase space is ~ h/(Planck length) since the Planck length 10^{-33} cm is the smallest length because of Heisenberg's uncertainty principle. Heisenberg's principle also demands that the Fermi sphere not be classically sharp like a marble. It has a fuzzy edge of thickness ~ twice the Compton momentum of the electron. This thin spherical fuzzy shell is where you find the virtual electron-positron completely ionized plasma isre called the polarized vacuum (PV) zero point fluctuations. Of course Hal Puthoff's theory does not have this. There is no PV in his PV theory!

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[33] See paperback "Special Tasks" by Sudoplatov with the forward by Robert Conquest.
[34] Secretary of Defense in the second Bush Administration.
[35] Joe Firmage supported new publicity on MJ 12 in 1999 in the work of Dr. Robert Wood that Stephen Schwartz says is the same old rehashed Soviet KGB disinformation. Another former high CIA official confirmed the phoniness of MJ 12 to me by email in September 2002.

But Flat World is an unstable false vacuum!

Opposite electric charges attract. Therefore, the virtual electron-positron pairs in this thin Heisenberg uncertain fuzzy edge of the Fermi sphere form a macro-quantum Bose-Einstein condensate with a local giant thought like pilot wave of information $\Psi(x)$ exactly like in the BCS picture of superconductivity. In the latter, real electron pairs form because of an attractive sound wave (phonon) coupling. We don't need that here.

This is the **"More is different"** vacuum phase transition from Flat World to Curve World in which Einstein's local geometrodynamic field is simply a "world hologram" from the phase interference of the thought like giant Ψ field. The residual random zero point quintessent Λ field is a simple function of the intensity of the world hologram!

Curve World = World Hologram[36]

Now to answer your question of how to make our own flying saucer to defend ourselves against any possible alien ET threat, or even from an asteroid on a collision course with Earth, $\Lambda > 0$ phase of vacuum is the universally repulsive anti-gravity phase which happens when the quintessent local intensity of the world hologram is too weak relative to the critical value that makes $\Lambda = 0$. Obviously then, $\Lambda < 0$, the universally attractive phase happens when the local intensity of the world hologram is too strong. Since virtual random zero point bosons make $\Lambda > 0$ and virtual random (ionized plasma) zero point fermion-antifermion pairs make $\Lambda < 0$, I call the weak intensity region of the hologram "boson dominated" and the strong intensity regions "fermion dominated".

Think of the world hologram as a landscape of hills and valleys. The valleys are $\Lambda < 0$ dark matter, the hills are $\Lambda > 0$ dark energy. The actual pattern of the world hologram is the geometrodynamic field. This is The Beauty in the Pattern.

Since $\Lambda > 0$ universally repels and $\Lambda < 0$ universally attracts we have the Bondi vacuum propeller in which the center of mass of the rigid device self-accelerates without any g-force, i.e. a self-generating time-like geodesic with on board Λ-field generators.

Flying Saucers, Black Ops, Hunt For The Zero Point Farce

-----Original Message-----
From: web62299@stardrive.org [mailto:web62299@stardrive.org]
Sent: Friday, September 06, 2002 11:53 AM

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[36] Lenny Susskind means something slightly different by the term "world hologram". However the two meanings are connected. Each Planck area L_p^2 is a c-bit of information in the thermodynamics of black holes. Given a 3D volume of space, Lenny's conjecture is that the maximum information that can be packed in that space is $\sim V^{2/3}/L_p^2$. This means our visible universe has perhaps roughly (Hubble Radius)^2/(Planck Area) = 10^{122} c-bits of Shannon information. This increase of information/entropy as the space of the universe expands is related to The Arrow of Time. More precisely take $R(t)^2/L_p^2$ in the FRW cosmic metric with cosmic time dependent scale factor R(t) in length units.

To: Jack Sarfatti;
Subject: Latest Haisch, Rueda, et al paper

http://xxx.lanl.gov/abs/gr-qc/0209016

"A possible connection between the electromagnetic quantum vacuum and inertia was first published by Haisch, Rueda and Puthoff (1994). If correct, this would imply that mass may be an electromagnetic phenomenon and thus in principle subject to modification, with possible technological implications for propulsion. A multiyear NASA-funded study at the Lockheed Martin Advanced Technology Center further developed this concept, resulting in an independent theoretical validation of the fundamental approach (Rueda and Haisch, 1998ab). Distortion of the quantum vacuum in accelerated reference frames results in a force that appears to account for inertia. We have now shown that the same effect occurs in a region of curved space-time, thus elucidating the origin of the principle of equivalence (Rueda, Haisch and Tung, 2001). A further connection with general relativity has been drawn by Nickisch and Mollere (2002): zero-point fluctuations give rise to space-time micro-curvature effects yielding a complementary perspective on the origin of inertia. Numerical simulations of this effect demonstrate the manner in which a massless fundamental particle, e.g. an electron, acquires inertial properties; this also shows the apparent origin of particle spin along lines originally proposed by Schroedinger. Finally, we suggest that the heavier leptons (muon and tau) may be explainable as spatial-harmonic resonances of the (fundamental) electron. They would carry the same overall charge, but with the charge now having spatially lobed structure, each lobe of which would respond to higher frequency components of the electromagnetic quantum vacuum, thereby increasing the inertia and thus manifesting a heavier mass."

It's not a good paper IMO. It is definitely badly written to say the least. I already read it.[37] What do you think I have been alluding to this past week?

Bill Unruh already trashed a similar paper of theirs on the "Rindler flux".

This paper makes many claims without detailed justification and their physical model is ill-posed, fragmentary and apparently self-contradictory though its hard to tell because their discussion is badly written and vague. Their theory appears to violate local covariance. They make an interesting mass spectrum claim but do not provide enough detail to judge it.

"We have now shown that the same effect occurs in a region of curved space-time, thus elucidating the origin of the principle of equivalence"

[37] Indeed Bernie sent me a copy of his paper. When I told him candidly what I thought of it, his feathers were understandably ruffled and he wrote back to me on 8/21/02 about this book (excerpts from the less nasty parts ☺) "You are living in an electronic fiction based on nothing but arrogance and bombast. No one takes you seriously, your influence is zero, you have published nothing in years (if ever), … and that not-even-a-joke book of yours (to paraphrase Pauli) will never be foisted on the public by any publisher."

That sentence is misleading. The initial promise, the whole idea of Haisch and Puthoff was motivated by the Andre Sakharov 1967 conjecture that somehow gravity is a collective electromagnetic phenomenon. Indeed Joe Firmage[38] gave Bernie Haisch several million dollars to set up CIPA in Palo Alto as a kind of pseudo respectable front organization to seduce traditional physicists into UFO research. Bernie finagled a respectable Board including my old Cornell math professor Wolfgang Rindler and a Canadian cosmologist-astrophysicist named Paul Wesson. Bernie actually made a fairly good website on UFOs that may still be up there. Bernie also edited the fringe paranormal UFO New Age healing Journal of Scientific Exploration and is quite chummy with Jacques Vallee the French UFO researcher, turned Silicon Valley investment banker, who worked closely with Ira Einhorn in the late 70's in the early days of the ARPA pre-internet. This was when Ira had ATT in Philly in his back pocket to help Jacques at "The Institute for the Future".

Joe gave Bernie a lot more money than to us at ISSO, which obviously created bad feelings at ISSO. Biases must be admitted.[39] The feeling was that ISSO was really doing what Joe wanted whilst Bernie was playing a silly subterfuge no-win pseudo-academic game trying to make UFO breakthrough propellantless propulsion (BPP) respectable in the mainstream physics community. Mark Millis of the NASA BPP team who Joe also funded bent over backwards not to mention UFOs, but the simple fact was many of their key people, like Al Holt, were prominent in UFO research and we insiders at ISSO knew what was really going on. The only relevant BPP person at CIPA was Giovanni Modanese for a short while.

But getting back to the physics, such as it is, in this paper: If one is to have a zero point vacuum energy electromagnetic theory of gravity with a view of getting a practical vacuum propeller[40] then one must show how Einstein's field equations emerge out of the SED[41] EM ZPE (zero point random noise). Of course they do not do that. I do. One must also show how to avoid the huge anti-gravity that the SED EM ZPE must make. This is the Λ problem. They do not do that either. I do. They do not even know this is a problem!

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[38] A mover-shaker in the Dot.Com Bubble founding US Web who had a close encounter with Beings of Light, like the Mormon "Moroni" I am told, and who also read one of Bernie Haisch's zero point inertia papers that got him all fired up like Don Quixote reading books on Chivalry. Joe is also a direct descendent of the Mormon Guru, Brigham Young. Joe has his eyes on The White House. He is still in his 30's.

[39] I arranged for Creon Levit from NASA Ames to meet with Joe in 1999 who was looking for a science director for ISSO. Creon took the job and I was de-facto senior theoretical physicist. Joe promised us that ISSO "came first". Creon would not have taken on the job otherwise. Joe consistently broke his word on this, and other matters, secretly funding several parallel groups including Mark Millis of NASA BPP, mostly crackpot, like an "Ormus Powder" Lab in Budapest, not only in the eyes of ISSO, but even in the eyes of Bernie Haisch and Hal Puthoff. Joe also did not clear his public remarks on physics with any of us leading to embarrassment as when Brian Greene ("Elegant Universe") berated me at State of the World Forum in 1999 for letting Joe make crackpot remarks on Einstein's relativity and spiral dynamics to the audience. Joe continues with the same silly rap even in 2002.

[40] That is Hal Puthoff's obsessive dream for more than 25 years since his tenure at the National Security Agency with microwave engineering genius Ken Shoulders who had to tell Hal to shut up about flying saucers at least till after lunch!

[41] Stochastic electrodynamics, a failed scheme to avoid quantizing the electromagnetic field directly which is part of Haisch's theory that does not, in my opinion, have the slightest chance of ever working as advertised.

Or, at least they never discuss it. Yet it is the key problem that invalidates their whole idea before they even get off home plate.

Hal Puthoff was a US Naval Officer before NSA and he had very high security clearances, as high as Kit Green's, (the psychiatrist bio-weapons expert in "Remote Viewers: The Secret History of America's Psychic Spies" by Jim Schnabel) at CIA and National Security Council at the time. Hal is also basically a straight arrow and probably has good reason to believe that flying saucers are really out there and that they have advanced technology that can kick our asses out of the sky if they wished to do so. The physics I am coming up with now seems to be confirming that. Indeed, that is why I have focused in on this problem since 1999 and especially now post 911 since the basically microwave technology may not be that difficult. Indeed the people at SARA we worked with at ISSO not only think that the 1943 Philadelphia Experiment was real in a significant sense but also, consistent with Nick Cook's generally technically silly "Hunt For The Zero Point", the SARA people have evidence that the Nazis really may have stumbled into something important in regard to propellantless propulsion. I cannot evaluate their beliefs really. What is important is that the former SARA Chief Scientist James Corum went to the Institute of Software Research in Fairmount, West Virginia to work on electromagnetic stress propulsion. ISR is a pet project of Senator Robert Byrd. The latest ISR webpage has been completely changed hiding the photo of Dr. Corum and his EM Stress Propulsion Project that was on the original. Dr. Corum is also an expert on Nicola Tesla and Gabriel Kron and has had access to the complete Tesla Archive in Beograd even under the former Serbian government that committed war crimes. Corum has published on the Philadelphia Experiment and thinks Jacques Vallee is way off base in his article on that alleged incident published by Bernie Haisch in the Journal of Scientific Exploration. Cal State Professor James Woodward and independently Hal Puthoff have shot down Corum's particular proposal which may explain why it is not on the new ISR web page? Woodward is a strong opponent to Bernie Haisch's theory[42] even though he and Puthoff agree about Corum's proposal. Indeed the ISSO million dollar project with SARA on essentially the Corum idea proved negative. Creon Levit found an experimental error in the engineering we paid for that gave false positive results. That is not the only "quasi-Black" project we at ISSO had down there. The other one was apparently partly successful, but is dead in the water since Joe Firmage lost his money.

"Distortion of the quantum vacuum in accelerated reference frames results in a force that appears to account for inertia. We have now shown that the same effect occurs in a region of curved space-time, thus elucidating the origin of the principle of equivalence (Rueda, Haisch and Tung, 2001). A further connection with general relativity has been drawn by Nickisch and Mollere (2002): zero-point fluctuations give rise to space-time micro-curvature effects yielding a complementary perspective on the origin of inertia."

These claims are not justified IMO. Indeed, I think Bill Unruh wrote a refutation on Usenet on the "Rindler flux" claim as violating the equivalence + tensor covariance principles.

[42] Bernie calls both me and Woodward "nasty" for giving our honest opinions on his shoddy theory.

"we suggest that the heavier leptons (muon and tau) may be explainable as spatial-harmonic resonances of the (fundamental) electron"

They never explain this in any detail. What is resonating? -- the quantum wave function? What? How does it self-trap? They also never explain what the massless electron actually is. They do not use wave functions of the electron in their math. They appeal to de Broglie and presumably his assistant of 30 years J. P. Vigier[43] which need a pilot wave and a particle but do not explain their physical picture here at all relying only on formalism without informal definitions. That goes against the de Broglie idea and since they have no electron wave functions, they really do not have a coherent theory in this paper. Haisch's equation (11) is

$$\Gamma^{\mu}_{\nu\rho} p^{\nu} p^{\rho} = -\frac{q}{c} F^{\mu}_{\nu} p^{\nu} n^{0} \tag{5.1}$$

where Haisch's equation (10) is

$$n^{\mu} = \left(n^{0}, \vec{n}\right) \tag{5.2}$$

is not covariant as shown below in detail. Haisch's equation (15)

$$g = C \cdot \eta \cdot C \tag{5.3}$$

is not explained adequately. It is not a local tetrad map from LNIF to LIF at point event P that it formally resembles. It pretends to be a kind of Yilmaz transformation from a variable Curve World to a global Flat World. In contrast, the local tetrad map at P has the same local form but the map is from a point in the base space manifold of the tangent bundle to the local flat tangent space. In addition they never face up to the space-time stiffness problem or to the Λ problem.

Local Covariance as Form Invariance of The Laws of Physics

What does it mean? Let's take an example – Einstein's 1915 local geometrodynamic field equation of the gravitational field as space-time curved by source mass-energy density. Local means at a point P in space-time, i.e. where and when. Einstein's tensor equation is

$$G_{\mu\nu} = -\frac{G}{c^{4}} T_{\mu\nu} \tag{6.1}$$

[43] Bernie basically finagled Professor Vigier, over 80 years old, to sign his name to one of his papers that Vigier did not really have much, if anything, to do with. This happened in the summer of 1999 when Vigier was living closely with ISSO Staff for two months in a Telegraph Hill Apartment I arranged for. Vigier was very uneasy at his first meeting with Joe Firmage. Joe did not listen but only spouted his crackpot views on Einstein's relativity. Vigier considered flying back to Paris the next day but Jagdish Mann calmed him down.

Define the local 1-1 reversible holonomic coordinate chart transformation symbols in a neighborhood of a fixed space-time point event P as[44]

$$x^{\mu'} = x^{\mu'}\left(x^{\mu}\right)_P$$
$$x^{\mu} = x^{\mu}\left(x^{\mu'}\right)_P \qquad (6.2)$$
$$\mu'\&\mu=0,1,2,3$$

$$X^{\mu'}_{\mu}(P) \equiv \frac{\partial x^{\mu'}}{\partial x^{\mu}}_P$$
$$X^{\mu}_{\mu'}(P) \equiv \frac{\partial x^{\mu}}{\partial x^{\mu'}}_P \qquad (6.3)$$

$$X^{\mu'}_{\lambda} X^{\lambda}_{\nu'} = \delta^{\mu'}_{\nu'}$$
$$X^{\mu}_{\lambda'} X^{\lambda'}_{\nu} = \delta^{\mu}_{\nu} \qquad (6.4)$$

Note also the inhomogenous term in the parallel transport non-tensor connection field $\Gamma^{\lambda}_{\mu\nu}$ Diff(4) transform

$$X^{\mu}_{\nu'\lambda'}(P) \equiv \frac{\partial^2 x^{\mu}}{\partial x^{\nu'}\partial x^{\lambda'}}_P \qquad (6.5)$$

These Diff(4) local transformations connect the observations of locally coincident observers Alice and Bob at P in arbitrary motion relative to each other. The term "locally coincident" is an approximate term meaning that the momentary space-time separation between Alice and Bob are small compared to the local radii of curvature at P. For example, the scale of the four radii of curvature of the Earth's source mass at a point P is of the order of 1 AU ~ 10^{13} cm ~ 10^3 seconds. Therefore, Alice and Bob should not take their measurements more than 1000 seconds apart, but they can be quite far away from each other and still be coincident in the approximate sense meant here. The Earth's curvature at its surface is ~ 10^{-26} $cm^{-2.}$ This scale of curvature corresponds to ~ 10^{92} Bekenstein-Hawking c-bits of black hole entropy. If a single electron is modeled as a sphere whose radius of curvature is h/mc ~ 10^{-11} cm. Its black hole entropy is ~ 10^{44} bits an Eddington number.[45] This requires an enormously strong short range Abdus Salam gravity constant G* in which

$$\frac{e^2}{mc^2} = \left(L^{*2}_p \lambda_c\right)^{1/3} \qquad (6.6)$$

---

[44] Sum over repeated pairs of upper and lower tensor component indices. The Kronecker δ^{μ}_{ν} symbols are 1 for equal upper and lower indices (no summing) and 0 for different upper and lower indices.

[45] This is an unexpected digression that emerged in my stream of consciousness ~ 7:40 PM PST, Sept 7, 2002 in San Francisco. A message from ET? Is this whole book a message from ET? ☺ You tell me.

The M-theorists are playing with these much larger Planck lengths L_p^* from the unseen extra large curled up dimensions of hyperspace in modeling the many material brane worlds[46] of Super Cosmos all connected perhaps by Star Gate Time Travel Portals known as the "Underground Stream" to the Cabalist Alchemists. In modern jargon this is the Subway to the Stars and Beyond.

Einstein's field equation locally transforms as

$$G_{\mu\nu} = -\frac{G}{c^4} T_{\mu\nu} \to G_{\mu'\nu'} = -\frac{G}{c^4} T_{\mu'\nu'} \tag{6.7}$$

Where

$$\begin{aligned} T_{\mu'\nu'} &\equiv X^{\mu}_{\mu'} X^{\nu}_{\nu'} T_{\mu\nu} \\ G_{\mu'\nu'} &\equiv X^{\mu}_{\mu'} X^{\nu}_{\nu'} G_{\mu\nu} \end{aligned} \tag{6.8}$$

Therefore

$$G_{\mu'\nu'} = -\frac{G}{c^4} T_{\mu'\nu'} \to X^{\mu}_{\mu'} X^{\nu}_{\nu'} G_{\mu\nu} = -\frac{G}{c^4} X^{\mu}_{\mu'} X^{\nu}_{\nu'} T_{\mu\nu} \tag{6.9}$$

Use (6.4) Kronecker orthonormality

$$G_{\mu\nu} = -\frac{G}{c^4} X^{\mu'}_{\mu} X^{\mu}_{\mu'} X^{\nu'}_{\nu} X^{\nu}_{\nu'} T_{\mu\nu} = -\frac{G}{c^4} \delta^{\mu}_{\mu} \delta^{\nu}_{\nu} T_{\mu\nu} = -\frac{G}{c^4} T_{\mu\nu} \tag{6.10}$$

Therefore the forms of the laws of nature are invariant under Einstein's local transformations between momentarily coincident observers Alice and Bob in arbitrary relative motion. They can have any order of relative accelerations of accelerations. Einstein's Equivalence Principle (EEP) is an additional natural condition that Bob is on a free float weightless time-like geodesic LIF whilst Alice is on a time-like non-geodesic LNIF[47] that approximately intersect narrowly missing a direct collision between Alice and Bob. This is the tetrad transformation $\xi^{\mu}_{a}(P)$ from the LNIF locally curved metric field $g_{\mu\nu}(P)$ to the locally flat tangent space metric η_{ab} where

$$\begin{aligned} g_{\mu\nu}(P) &= \xi^{a}_{\mu}(P) \xi^{b}_{\nu}(P) \eta_{ab} \\ \eta_{ab} &= \xi^{\mu}_{a}(P) \xi^{\nu}_{b}(P) g_{\mu\nu}(P) \end{aligned} \tag{6.11}$$

[46] Piloted by the cosmic thoughts of Hawking's Mind of God.

[47] Alice feels weight from the electrical reaction forces that keep her off a time-like geodesic path. Haisch et-al claim that this effect is a drag force through the virtual photons, but only the transverse polarized ones. Their equations however are inconsistent not obeying local covariance.

Note whilst the flat metric η_{ab} has no local P dependence, the tetrad coefficients $\xi(P)$. This is precisely what Haisch & Co do not seem to understand in their eq. (15). They never indicate if their C is a local function or not? Indeed this so-called Nickisch-Mollere Connectivity theory is a patent Cargo Cult simulacrum, a Golem, of the well-known tetrad method that they do not mention.

Mathematical Inconsistencies in the Haisch Zero Point Inertia Theory

"For the record, in lectures I have given I always state that Rueda deserves most of the credit for the analysis. He is an expert in SED, got a Ph. D. from Cornell doing that, and has spent three decades doing SED-based research. He is a brilliant physicist; I'm really an astronomer (as you know). But I have initiated some of the basic concepts, such as the notion that the ZPF-matter interactions take place at a resonance rather than at some cutoff, the association of that resonance with the Compton frequency and the tie in of that to the origin of the de Broglie wave (inspired by Geoff Hunter by the way). I have often stated that I see myself as a catalyst for some potentially important ideas. I am satisfied with that role.

Are we right in our physics? Time will tell. To me it looks like a beautiful and elegant confluence of connections -- especially given the new work by Nickisch and Mollere. But who knows? Not being the level of genius that you fancy yourself to be, I can't know yet.

Now, my friend, lets consider a couple of your claimed contributions to civilization's intellectual heritage. In your previous email you wrote:

Jack: The books I helped write did pretty well commercially. Space-Time and Beyond sold several hundred thousand copies. Dancing Wu Li Masters sold millions of copies and still is selling well - even though I was cheated out of my share of the royalties by Zukav.

Bernie: That's quite a claim since according to the book covers the author of Space-Time and Beyond was Bob Toben and the author of Dancing Wu-Li Masters was Gary Zukav. Are you claiming credit for their books? Are you accusing them of plagiarism? Was Jack Sarfatti the true author of both?

Better not to hurl accusations when you are in a China shop... especially one full of other people's china.

Bernie"

Dr. Bernard Haisch
519 Cringle Drive
Redwood Shores, CA 94065

Chief Science Officer, ManyOne Networks, Inc.
Director, California Institute for Physics and Astrophysics

Scientific Editor, The Astrophysical Journal
phone: 650-593-8581, fax: 650-595-4466
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http://www.calphysics.org

8/22/02 sent to an open public e-mail list.

Incompetent Error in "Update on an Electromagnetic Basis for Inertia, Gravitation, the Principle of Equivalence, Spin and Particle Mass Ratios" by Bernard Haisch, Alfonso Rueda, L. J. Nickish, Jules Mollere accepted for publication in AIP Conference on Space Technology (STAIF-2003) "Expanding the Frontiers of Space" Feb 2-6, 2003 Albuquerque

Peer Review by Jack Sarfatti, Ph.D. (Physics UC)

Incompetent Error "Update on an Electromagnetic Basis for Inertia, Gravitation, the Principle of Equivalence, Spin and Particle Mass Ratios" by Bernard Haisch, Alfonso Rueda, L. J. Nickish, Jules Mollere accepted for publication in AIP Conference on Space Technology (STAIF-2003) "Expanding the Frontiers of Space" Feb 2-6, 2003 Albuquerque

Their eq. (11), p. 5 is

$$\Gamma^{\mu}_{\nu\rho} p^{\nu} p^{\rho} = -\frac{q}{c} F^{\mu}_{\nu} p^{\nu} n^{0} \tag{7.1}$$

It is manifestly not locally covariant under Diff(4) general coordinate transformations. Therefore it violates Einstein's general theory of relativity and is not of the caliber of papers that should be published by the American Institute of Physics since the authors mistakenly think their calculations agree with Einstein's theory. Bill Unruh has raised a similar objection against another Haisch paper on "Rindler flux". For example, make a local Diff(4) transformation.

$$\Gamma^{\mu}_{\nu\rho} \to \Gamma^{\mu'}_{\nu'\rho'} = \Gamma^{\mu}_{\nu\rho} X^{\rho}_{\rho'} X^{\nu}_{\nu'} X^{\mu'}_{\mu} + X^{\lambda}_{\nu'\rho'} X^{\mu'}_{\lambda} \tag{7.2}$$

$$n^{0} \to n^{0'} \overset{?}{=} n^{0} X^{0'}_{0} \tag{7.3}$$

(7.3) violates local covariance. We have in general

$$n^{\mu} \to n^{\mu'} = n^{\mu} X^{\mu'}_{\mu} = n^{0} X^{\mu'}_{0} + n^{1} X^{\mu'}_{1} + n^{2} X^{\mu'}_{2} + n^{3} X^{\mu'}_{3} \tag{7.4}$$

Therefore

$$n^{0} \to n^{0'} = n^{\mu} X^{0'}_{\mu} = n^{0} X^{0'}_{0} + n^{1} X^{0'}_{1} + n^{2} X^{0'}_{2} + n^{3} X^{0'}_{3} \tag{7.5}$$

The LHS of Haisch equation (11) (our 7.1) transforms as

$$\Gamma^{\mu}_{\nu\rho}p^{\nu}p^{\rho}\to\Gamma^{\mu'}_{\nu'\rho'}p^{\nu'}p^{\rho'}=\left(\Gamma^{\mu}_{\nu\rho}X^{\rho}_{\rho'}X^{\nu}_{\nu'}X^{\mu'}_{\mu}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}\right)X^{\nu'}_{\nu}p^{\nu}X^{\rho'}_{\rho}p^{\rho} \tag{7.6}$$

The RHS of equation (11) transforms as

$$\begin{aligned}
&-\frac{q}{c}F^{\mu}_{\nu}p^{\nu}n^{0}\overset{?}{\to}-\frac{q}{c}F^{\mu'}_{\nu'}p^{\nu'}n^{0'}\\
&=-\frac{q}{c}F^{\mu}_{\nu}X^{\nu}_{\nu'}X^{\mu'}_{\mu}p^{\lambda}X^{\nu'}_{\lambda}\left(n^{0}X^{0'}_{0}+n^{1}X^{0'}_{1}+n^{2}X^{0'}_{2}+n^{3}X^{0'}_{3}\right)\\
&=-\frac{q}{c}F^{\mu}_{\nu}X^{\nu}_{\nu'}X^{\nu'}_{\lambda}X^{\mu'}_{\mu}p^{\lambda}\left(n^{0}X^{0'}_{0}+n^{1}X^{0'}_{1}+n^{2}X^{0'}_{2}+n^{3}X^{0'}_{3}\right)\\
&=-\frac{q}{c}F^{\mu}_{\nu}\delta^{\nu}_{\lambda}X^{\mu'}_{\mu}p^{\lambda}\left(n^{0}X^{0'}_{0}+n^{1}X^{0'}_{1}+n^{2}X^{0'}_{2}+n^{3}X^{0'}_{3}\right)\\
&=-\frac{q}{c}F^{\mu}_{\nu}X^{\mu'}_{\mu}p^{\nu}\left(n^{0}X^{0'}_{0}+n^{1}X^{0'}_{1}+n^{2}X^{0'}_{2}+n^{3}X^{0'}_{3}\right)
\end{aligned} \tag{7.7}$$

If Haisch's (11) is to be covariant, then (7.6) and (7.7) must be equated. Note that I have used

$$\begin{aligned}
X^{\alpha}_{\beta'}X^{\beta'}_{\gamma}&=\delta^{\alpha}_{\gamma}\\
X^{\alpha'}_{\beta}X^{\beta}_{\gamma'}&=\delta^{\alpha'}_{\gamma'}
\end{aligned} \tag{7.8}$$

on the RHS. Using it again on the LHS gives

$$\begin{aligned}
&\left(\Gamma^{\mu}_{\nu\rho}X^{\rho}_{\rho'}X^{\nu}_{\nu'}X^{\mu'}_{\mu}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}\right)X^{\nu'}_{\sigma}p^{\sigma}X^{\rho'}_{\kappa}p^{\kappa}\\
&=\left(\Gamma^{\mu}_{\nu\rho}X^{\rho}_{\rho'}X^{\nu}_{\nu'}X^{\mu'}_{\mu}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}\right)p^{\sigma}p^{\kappa}\\
&=\left(\Gamma^{\mu}_{\nu\rho}X^{\rho}_{\rho'}X^{\rho'}_{\kappa}X^{\nu}_{\nu'}X^{\nu'}_{\sigma}X^{\mu'}_{\mu}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}\right)p^{\sigma}p^{\kappa}\\
&=\left(\Gamma^{\mu}_{\nu\rho}\delta^{\rho}_{\kappa}\delta^{\nu}_{\sigma}X^{\mu'}_{\mu}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}\right)p^{\sigma}p^{\kappa}\\
&=\Gamma^{\mu}_{\nu\rho}\delta^{\rho}_{\kappa}\delta^{\nu}_{\sigma}X^{\mu'}_{\mu}p^{\sigma}p^{\kappa}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}p^{\sigma}p^{\kappa}\\
&=\Gamma^{\mu}_{\nu\rho}X^{\mu'}_{\mu}p^{\nu}p^{\rho}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}p^{\sigma}p^{\kappa}
\end{aligned} \tag{7.9}$$

Therefore

$$\begin{aligned}
&\Gamma^{\mu}_{\nu\rho}X^{\mu'}_{\mu}p^{\nu}p^{\rho}+X^{\lambda}_{\nu'\rho'}X^{\mu'}_{\lambda}X^{\nu'}_{\sigma}X^{\rho'}_{\kappa}p^{\sigma}p^{\kappa}\\
&=-\frac{q}{c}F^{\mu}_{\nu}X^{\mu'}_{\mu}p^{\nu}\left(n^{0}X^{0'}_{0}+n^{1}X^{0'}_{1}+n^{2}X^{0'}_{2}+n^{3}X^{0'}_{3}\right)
\end{aligned} \tag{7.10}$$

This consequence of the Haisch paper is obvious nonsense. That is, the form of their (11) is not invariant. In other words (7.1) above does not transform to

$$\Gamma^{\mu'}_{\nu'\rho'} p^{\nu'} p^{\rho'} = -\frac{q}{c} F^{\mu'}_{\nu'} p^{\nu'} n^{0'} \tag{7.11}$$

Conceptual Inconsistencies in Puthoff's Challenge to Einstein's Curved Space-Time Explanation of Gravity

In a message dated 9/06/02 5:41:50 PM to an *open list*, sarfatti@well.com writes:

<< Dicke did it 42 years ago. You simply copied Dicke's work on this. >>

Though not yet published, I've gone way, way beyond Dicke. Application to cosmology, application to charge cluster phenomena[48], application to energy/propulsion, application to .....

Collegially,
Hal

In a message dated 9/04/02 3:29:48 PM, sarfatti@well.com writes:

<< I am also sending this to Hal Puthoff in case he is smart enough to jump on my Band Wagon >>

Sorry, but the tune is discordant with my melodious Lagrangian! :-) I realize you can't hear my tune from inside the middle of your band, so no blame, it's a no-fault condition!

Hal

In a message dated 8/30/02 10:13:38 AM, sarfatti@pacbell.net writes:

<< Now Hal Puthoff claims that his real K PV theory is secret and what he publishes is not really it. >>

What I actually claim is that what I've published is only part of it, not that it's not really it. There is a difference. It's just that there is a lot of unpublished material and its implications, not yet published.[49]

Hal Puthoff

---

[48] Experimental work of Ken Shoulders that Ron Pandolfi thinks is a spurious effect of charged mercury liquid drops. This is out of my field of expertise.

[49] Promises, promises. Talk is cheap, it's the equations that count here. God is in the details.

In a message dated 8/28/02 11:07:22 PM, sarfatti@pacbell.net writes:

<< However, I added that summing an infinite number of diagrams is a qualitative phase transition and you can no longer use a flat background picture..... In any case it has nothing to do with your PV which is completely classical. You are not summing an infinite number of spin 2 graviton Feynman diagrams >>

Puthoff: You missed the point.

The point is that one can begin with a flat background and carry out a quantum sum to result in nonlinear GR equations with the flat background unobservable (as you describe above);

Or one can begin with variable vacuum refractive index parameters and carry out a classical derivation to result in nonlinear GR equations with the flat background unobservable.

As in Kittel and other standard texts, one can treat material properties such as permittivity either classically or quantum mechanically, depending on the purpose of the derivation.

To paraphrase Paul Zielinski's quote, "Einstein's cat can be skinned many ways." MTW gives six in Box 17.2 ("Six routes to Einstein's Geometrodynamic Law ....." PV is a variation on this theme.

<<Jack: Not only that, I get the new vacuum propeller $g_{\mu\nu}\,\partial\Lambda/\partial x^{\nu}$ zero point term[50] without which you cannot do anything >>

The corresponding Λ - type term in PV is of course a function of the vacuum dielectric constant K.

Collegially,
Hal Puthoff

In a message dated 8/29/02 5:11:14 PM, sarfatti@pacbell.net writes:

<<Jack: Do you agree for the record that this is my original idea?>>

Hal: Yes, the double boundary layer of dark energy/dark matter is definitely your idea. I'm glad to tell anyone that.

Jack: Do you have anything better? I will eat my hat if you do.

[50] In the generalized Bianchi identity for local momenergy current density conservation.

Hal: Better as a theoretical construct? Mmmm, probably not. Better as an implementable, engineering strategy? Possibly, it's too early to tell. Since the mechanics I am looking at derive from the PV approach, you don't have to worry about it as competition since it is clearly "not even wrong!"

Jack: Do you agree that Iranian, Iraqi and mainland Chinese physicists are quite competent in this arena and are able to develop this with relatively small budgets?

Hal: Absolutely.

Jack: OK that is something we agree on 100%. That's important.

Hal: We're (hopefully!) on the same team. Think back to our collaborative discussion of Wesson's "gravitational fine structure constant" and Gray's Navy material, etc.

Jack: .....In any case you admitted you had no clue how to cohere the zero point -- that's the key and that's what I have solved.

Hal: To my way of thinking, changing vacuum parameters (i.e., modulating K) is a form of modifying the underlying ZPE (which could be seen as a form of

In a message dated 8/27/02 6:22:32 PM, sarfatti@well.com writes:

<< Jack: No Tony you are wrong about your last statement. You are way behind the times. See the book "The Geometric Universe" for example. Perturbation theory is only in weak field limit. >>

Puthoff: No, Jack. Read MTW. The "perturbative" approach sums to the full nonlinear Einstein equations.[51]

Hal

Thanks for the references, Tony. And of course you make a good point!

And, as with one of the quotes, the "flat-space background" is non-observable[52] in our PV theory (because of rod and clock distortions) as is the case in the example you quote. Same, same.

Best regards,
Hal Puthoff

---

[51] This is a Red Herring since I never denied that. Indeed, just the opposite. I made that point initially.

[52] Therefore “excess metaphysical baggage” violating Einstein’s Equivalence Principle in which the LIF local flat tangent space-time is observable. The global Yilmaz flat space time is simply not there. It was destroyed in the vacuum phase transition from Flat World to Curve World in forming each “Champagne bubble” brane world in Super Cosmos of hyperspace with hidden curled up extra dimensions. Note that Rabbi Solomon ha-Zarfati was a vintner in Champagne, France (1040 – 1105) at the time of The First Crusade to find The Temple in Jerusalem.

In a message dated 9/06/02 1:22:41 AM, sarfatti@well.com writes:

<< What does Hal actually have?>>

Hal: A terrific engineering approach (metric engineering) for applications of GR. :-)

<<He has a K.>>

Hal: Placeholder for metric tensor components

Jack: Nonsense. Only for SSS[53] case and even then it gives stupid answers. Even if so, so what? What's your point? Who do you think will be convinced? Convinced about what?

<<He has a classical differential equation for it....>>

Hal: As did Einstein.

Jack: So what? The point is that I have a macro-quantum correction term that explains new observations. Also I derive Einstein's equation from the macro-quantum theory. Hal, surely you are joking here? You do not seem to take your own ideas seriously enough to mount an even plausible to the point defense.

<<...that comes from a dubious action.....>>

Hal: that leads to the results of the standard classical tests of GR. BTW, where is your action principle? - - I haven't seen any Lagrangian in your work lately.

Jack: Formulating the action is not necessary for the validity of the dynamics. Newton did not have an action for his 3 laws. All that came much later. One can point to the Modanese action as a first step. My theory is more complicated as it has the feedback loop in which Ψ creates $g_{\mu\nu}$ & Λ, which in turn shapes Ψ. Some smart mathematician will figure out the action. Where is my David Hilbert? Einstein did not figure out his own action either. That is only a formalistic nicety. My theory is so nonlinear it is hard to write the action off the top of one's head. My current inability do so does not impact on the physical explanation and predictions I am getting any more than Newton's not having an action in sense of modern calculus of variations did not come until what 100 years after his death? You have an action, which you stole from Dicke, and what good has it done you in 15 years? Not much. When I have time I will probably figure out the action. I have not worked on it seriously yet. I am too busy with the physical ideas that are very superficial in your own approach. Getting agreement with 3 classic tests of GR is no big achievement on your part BTW. I trivially get that since I derive $G\mu\nu + \Lambda g\mu\nu = -8\pi(G/c^4)T\mu\nu$ from Ψ using Kleinert's method!

---

[53] Spherically Symmetric Static Space-time in which a global set of LNIF rest frames relative to the source mass bending space-time into curve world can be used..

<<.... with the variable c. >>

Hal: as in Einsteinian theory, c' = c[1 + 2 phi/c^2] for weak fields.

Jack: Big deal. Besides you did not really do it at all. Dicke did it 42 years ago. You simply copied Dicke's work on this.

Collegially,
Hal

From: Paul Zielinski [mailto:pzielins@ix.netcom.com]
Sent: Thursday, September 05, 2002 10:21 PM
To: sarfatti@well.com
Subject: Re: Hal Puthoff & USAF Next Force

Jack,

Yes, you're right. I didn't understand that you were recovering the GR metric field out of a 2-fluid BE condensate.

I am looking at your papers carefully now to see if I can get a grip on this.

Paul

"if we remove life from Einstein's beautiful theory by steam-rollering it first to flatness and linearity, then we shall learn nothing from attempting to wave the magic wand of quantum theory over the resulting corpse." Roger Penrose, FRS, Professor of Mathematics at Oxford University

Bernie Haisch, Hal Puthoff and Joe Firmage have not yet learned that the world is not fundamentally "flat, stale and unprofitable."

For more details see Abhay Ashtekar's "Geometric Issues in Quantum Gravity" in "The Geometric Universe" Oxford, 1998.

What does Hal actually have?

PV without PV is to Einstein's curved space-time what Hollow Earth theory is to space science.

He has a K.

He has a classical differential equation for it that comes from a dubious action with the variable c.

In the SSS he shows, actually Dicke showed 42 years ago, that

$K = \exp[2GM/c^2r]$

Formally solves the differential equation.

However, a real PV theory must have some quantum physics in it or else it is false advertising.

I see no h in Hal's papers on K.

In contrast I have a macro-quantum coherence theory for both Einstein's geometrodynamic field $g_{\mu\nu}$ and the new quintessent field Λ now actually observed.

Hal is not even close. Look closer at his K. It's like the end of The Wizard of Oz, move the veil aside, what do you see?

Smoke and Mirrors in the Hunt for the Zero Point Farce.

Some useful links

On Dirac's ideas:

http://www.pparc.ac.uk/frontiers/current/feature4.asp

http://www.stardrive.org/Jack/dirac.pdf

(primitive ideas of mine in 1999-2000 at ISSO with J. P. Vigier with us for 2 months in San Francisco's North Beach).

http://arxiv.org/PS_cache/quant-ph/pdf/9608/9608024.pdf

This paper by David Finkelstein also independently has "vacuum as condensates". I just found it now for first time. Of course I brought Fink to Esalen in 1976. I knew him from Yeshiva University in the mid 60's with Lenny Susskind. I edited in Fink's "quantum logic of non-Boolean lattices of yes-no quantum propositions for Gary Zukav in Dancing Wu Li Masters. Gary could not pass a course in elementary algebra. About binomial theorem Gary was not exactly teeming with a lot of news and he knew nothing much about the square of the hypotenuse (Einstein's relativity).[54] ;-)

Fermi sphere micro-quantum vacuum:
http://www.physik.unistuttgart.de/ExPhys/2.Phys.Inst./official/m.mehring/CondMat/densityofst.htm
http://www-user.tu-chemnitz.de/~sol/md/stab/node4.html

[54] Major General's Song, Pirates of Penzance, Gilbert and Sullivan.

http://www.physics.wustl.edu/~visser/Analog/CollectiveModes.eps

Energy density of the micro-quantum vacuum, i.e. the Λ problem of "The Unbearable Lightness of Being":

Read this by John Baez and see how lame Hal's explanation is for this. He doesn't even have a fig leaf to hide behind!

http://math.ucr.edu/home/baez/vacuum.html

http://www.lns.cornell.edu/spr/2002-02/msg0039483.html

Quantum field theory

http://www.mit.edu/people/kerson/c0ntents.htm

Nonlocality vs macro-quantum superfluids

http://www.fdavidpeat.com/bibliography/essays/healtech.htm

Bose-Einstein condensates

http://amo.mit.edu/~bec/intro/whatbec/whtisbec.html

PPS Paul - also you are way off the mark. I have a really detailed theory of the physical vacuum Hal has nothing but a classical black box K with no theory explaining K! I have the details inside the box! You obviously did not understand my idea of the unstable random noisy high entropy choppy pre-gravity micro-quantum Dirac Fermi Sphere Flat World Vacuum of Hal and Bernie collapsing into the partially coherent (two-fluid) stable smooth quieted non-random zero initial entropy macro-quantum BCS paired virtual electron-positron pairs in bound state Bose-Einstein condensate whose coherent phase modulation IS Einstein's Curve World $g_{\mu\nu}$ and whose amplitude is $\sim \Lambda$ the quintessent zero point random residual field left over After The Fall.

$\Lambda > 0$ = dark energy macro-quantum vacuum region with universal repulsion
(residual random virtual boson dominated)

$\Lambda < 0$ = dark matter macro-quantum vacuum region with universal attraction
(residual random virtual unbound ionized plasma electron-positron pairs)

Ergo, Bondi Vacuum Propeller Weightless Warp Drive on small scale + Star Gate Time Travel.

What does Hal Puthoff have to compare as a fundamental theory and heuristic for physical vacuum? Simple he's got nothing! From nothing comes nothing!

Therefore Paul your remark:

Z: *"but I also see the value of physical vacuum approaches such as Hal's version of Dicke's PV in the longer term, since they have the *potential* to lead to heuristically more powerful theories at a deeper level of physical understanding"*

Is completely unjustified by the facts of Hal's dilute disquisitions.

Furthermore your remarks:

Z: "and may eventually trigger a fundamental shift out of the GR metric field paradigm if coupled with a parallel return to concrete models in QM. ... . My own view, for what it's worth, is that GR (notwithstanding all the pseudo-positivistic curved-space PR) is really a physical field theory dressed up in metric clothing, with real physical gravitational fields and forces -- which IMO lends considerable plausibility to Yilmaz's basic idea."

Jack: Yilmaz is to Einstein, what David Irving is to Stephen Schwartz! -- or what Nick Herbert is to me. This reminds me of Nick Herbert talking about Israel and Palestine citing Max Weiss and David Irving.
:)
http://www.ladyofthecake.com/mel/prod/sounds/springti.wav

http://www.tmbhs.com/tmbhs/movies/theproducers/theproducers.asp

http://qedcorp.com/book/psi/hitweapon.html

The Yilmaz theory is not the SSS theory, it is the SS Einstein-bashing theory from Himmler's Boys in the 1930's. So is that Ormus Powder with supposedly anti-gravity powers that Joe put so much moolah into in Transylvania! ☺

Finally your remark

Z: "Whether his proposed modification of the GR field equations is actually viable is another question."

Jack: I show below in detail why PV is not viable. It's simply more smoke and mirrors on the level of Nick Cook's tome of disinformation "The Hunt for the Zero Point" Farce that will rank with "Majestic 12 UFO Papers", "Elders of the Protocols of Zion", and Gary Zukav's shabby New Age self-help Me-Generation psycho-babble est-speak "De Seat of Da Sold" as classic cases of dis and mis information. ☺

On 9/5/02 9:22 AM, "Puthoff@aol.com" <Puthoff@aol.com> wrote:

"I told you that before, but you missed it. You want and need to see what I'm doing as "not even wrong." Too bad, our insights might very well complement each other if dialog could replace polemics. But your dismissive approach towards my approach does

not inspire me to share beyond what I've already done. You've insisted that I at least share with Paul or Creon. I have shared with Paul, he does get it, and you trash his attempt to get you to see the infrastructure forest, not just a few trees that have your name on them. Too bad."

Jack: I think you are fooling yourself. I have seen nothing from Paul, which fits what you just said.

Paul Z: "For the record, I see the force of Jack's general arguments on behalf of his theory in terms of shorter term progress, but I also see the value of physical vacuum approaches such as Hal's version of Dicke's PV in the longer term, since they have the *potential* to lead to heuristically more powerful theories at a deeper level of physical understanding, and may eventually trigger a fundamental shift out of the GR metric field paradigm if coupled with a parallel return to concrete models in QM."

Jack says: i.e. http://stardrive.org/Jack/PT81502.pdf
http://stardrive.org/Jack/nextforce.pdf

Are my latest expositions of my fast developing surprisingly rich fertile creative original theory with I think vital immediate implications for US Space Weapons Strategic Planning. If you think that, then explain what you think is right with Hal's PV that is 90% lifted from an old obsolete ~ 1960 Dicke paper in the period of GR Feynman, per his pattern of outrageous theatrics, called stupid whilst hissing like a rattle snake jumping up and down on the top of a table in the Cal Tech Cafeteria with hundreds of students spellbound. No one has addressed my several particular objections. Some of them are:

* He needs an infinite number of isotropic radial coordinates for each unique curvature coordinate! What's the Penrose diagram for that?

* All of his isotropic coordinates are complex when curvature coordinate $r_c < GM/c^2$ in his PV SSS model.

* In comparison, Einstein's GR has only 2 isotropic coordinates and they both have physical meaning in the Penrose diagram. Also they go complex when $r_c < 2GM/c^2$

* Hal's Tables I & II are inconsistent with his own math! In fact the rulers do shrink anisotropically in PV when you do it correctly - just like in Einstein's GR (different radial dependence of course - the shrinkage is not isotropic like in the Tables). Hal did not do his own math correctly here!

* This is why I say in my book http://stardrive.org/Jack/cover.jpg that Hal does not know strong field from weak field. Hal has been out so long it looks like in to him.

* Hal's action is inconsistent with Flat World SR, which is a global theory.

* Hal's equations are in violation of EEP + local covariance. He can force the latter on them, but it is artificial and he loses the whole point of PV-Yilmaz in that case.

* Hal cannot solve the rotating disk problem. He hand waves it's easy - for years he hand waves.

* Hal cannot solve the Λ problem - he hand waves and his lame explanation is so bad I am embarrassed for him. Definitely not up to Cornell Physics standards ~ late 50's.

* Hal admits he is clueless about how to cohere the ZPE - that's the baby in the bathwater!

Paul Z: "Also, Hal's positioning of PV as a heuristic model for engineering purposes is orthogonal to Jack's positioning of his theory as fundamental theoretical physics.

Jack: Hogwash Paul. You have not understood http://stardrive.org/Jack/nextforce.pdf - redownload it maybe you have older version. My theory is superior to Hal's here on both fronts. Fundamental theory and emerging gedankenexperiments to develop into real experimental tests as well as explaining:

* Dark energy

* Dark matter

* Unbearable lightness of being, i.e. Λ paradox that is like the black body UV infinity in 1900 that led Max Planck reluctantly to his quantum of action h.

* Arrow of Time

* Bondi Vacuum Propeller

* Star Gate Time Travel To The Past, i.e. Back *from* the Future. That's the hard part.

Paul Z: "At the same time, however, Jack is claiming a number of specific lab-testable novel predictions, which IMHNPO is for now the bottom-line nub of the whole matter: heuristic power and heuristic potential."

Jack: You got that right Bhubba. We have no time to spare. I am like Evariste Galois[55] the night before The Duel. No time for Laputan Pedants[56] peering at the twigs on the ground when the "Tyger Tyger eyes burning bright in the darkness of the night"[57] is

[55] A Mozartian Prodigy, the creator of finite group theory limits of solvability that anticipates Godel's incompleteness theorem and the Turing halting theorem. Killed at 19 in 1832 by Napoleon II's Secret Police for his communist politics.
[56] Gulliver's Travels by Jonathan Swift parodied in Princess Ida by Gilbert and Sullivan..
[57] William Blake allusion.

about to leap down from the highest branch of Dan Smith's Eschaton[58] and gobble them up for a Midnight Nosh!

Z: "As far as I can see the jury is still out on Yilmaz. My own view, for what it's worth, is that GR (notwithstanding all the pseudo-positivistic curved-space PR) is really a physical field theory dressed up in metric clothing, with real physical gravitational fields and forces -- which IMO lends considerable plausibility to Yilmaz's basic idea. Whether his proposed modification of the GR field equations is actually viable is another question."

Jack: Paul you do not understand the ideas of differential geometry very well. Also you do not understand EEP as explained for example by Stephen Hawking on page 17, Fig 1.11 of "The Universe in a Nutshell". Sure you can say shrinking rods - but that IS curved space time expressed informally (Bohm) as Kip Thorne says - no significant difference.

The basic error Hal and Bernie make, seized by Joe Firmage like Joan of Arc seizing the Fleur-de-lis on her way to The Burning Woman Festival, is trying to make a tempest out of a teapot. The mad see distinctions that are not there and fail to see distinctions that really are there.

This is partly Niels Bohr's fault, i.e. "create your own reality" from a too simplified rendition of his Smoky Dragon[59] from his Foggy Philosofawzy.[60]

I want results. I want them fast. And, surprisingly, I am getting them!

Mathematical Inconsistencies in Hal Puthoff's Plagarizable Vacuum Approach to General Relativity.

The Hal Puthoff paper I refer to is online at
http://arxiv.org/abs/gr-qc/9909037 "Plagarizable Vacuum Approach to General Relativity". Oops that was a typo, it should be "Polarizable"! ☺

Dr. Eric Davis, formerly at Robert Bigelow's Las Vegas NIDS UFO R&D Think Tank[61] promotes Puthoff's theory as UFO-Star Gate Physics in

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[58] Dan Smith, an eccentric Blue Blood millionaire member of the legendary UFO Aviary of Black Ops Urban Legend that includes Hal Puthoff. See Erik Davis's book Techgnosis for background. Dan's family included the Pasadena Throops who created Cal Tech. Dan is like the character in "The Ruling Class" who, like Joe Firmage, cuts a Messianic figure for The Second Coming. Unlike Joe, Dan has physics degrees from Princeton and Stanford. Dan blames his madness on me because he read Space-Time and Beyond as an impressionable young man. Joe has not offered any similar excuse. ☺

[59] Image used by John Archibald Wheeler to describe the Copenhagen Fairy Tale of wave without particle, or BIT WITHOUT IT saved by the Deux Ex Machina miracle of the Marxist-inspired Von Neumann "collapse" of the quantum state.

[60] Feynman's derogatory term for the Cornell Philosophy Department when he was there. A Laputan Pedant does Philosofawzy and is in John Nash's favorite put-down a "hack". ☺

[61] The NIDS Science Advisory Board included Hal Puthoff, Jacques Vallee, and Army Colonel retired John Alexander, a noted paranormal expert and at one time head of the nonlethal weapons at Los Alamos. Colonel Alexander wrote a famous paper in the 1980 Military Review on military uses of the paranormal.

http://198.63.56.18/pdf/davis_mufon2001.pdf

See also "The Star Gate Conspiracy" by Picknett & Prince.

Hal's SSS vacuum metric is

$$ds^2 = \frac{1}{K}c^2dt^2 - K\left[dr_i^2 + r_i^2\left(d\theta^2 + \sin^2\theta d\phi^2\right)\right]$$
$$K \equiv e^{2GM/c^2 r_i} \tag{8.1}$$

Hal is using the isotropic radial coordinate r_i with the usual spherical polar angle coordinates polar latitude and azimuthal longitude $\theta \& \phi$ respectively. This is for a special LNIF observer Alice on a time-like non-geodesic at point P that is at rest relative to the source mass M bending space-time. This can be done in a stationary metric but not so easily in non-stationary metrics from rotating masses and when gravity waves wiggling space-time are passing through. One must be more careful in those cases. Hal does not appear to really understand Einstein's Equivalence Principle (EEP) when he writes down

$$ds^2 = c^2dt_0^{\,2} - \left(dx_0^{\,2} + dy_0^{\,2} + dz_0^{\,2}\right) \tag{8.2}$$

because when you look at his not even wrong Tables I & II he thinks of this flat metric nonlocally as only at space-like asymptotic infinity. Hal does not appear to understand that this metric applies the LIF observer Bob whose time-like geodesic path intersects Alice's LNIF time-like non-geodesic path at the point P with a given r_i. This terrible ambiguity is a fatal infection of Hal's model. One never sees the general coordinate transformations $X_\mu^{\mu'}(P)$ explicit in any of Hal's explanations. That is, his theory is neither locally covariant nor does it obey EEP. Hal never explains how it can be that Bob in free float through the dielectric vacuum has undistorted rods and clocks whilst Alice's rods and clocks at the same time and place distort!

Einstein's SSS vacuum metric[62] in the same local isotropic coordinates for LNIF Alice at rest relative to the source mass M is

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His most recent book is Future War. Bigelow, in effect the successor to Howard Hughes, has taken most of the money out of NIDS to use for Bigelow Aerospace to build space stations in the private sector. Puthoff did the CIA Remote Viewing work at Stanford Research Institute on Uri Geller, Pat Price and Ingo Swann in the early 70's with Russell Targ where I first met the both of them. See Martin Gardner's "Magic and Paraphysics" in "Science, Good, Bad and Bogus".

[62] The Riemann curvature tensor reduces to the conformal invariant Weyl tensor in Einstein vacuum with $\Lambda = 0$. We have Wheeler's mass without mass in which the source mass M is really a topological wormhole or Einstein-Rosen Bridge with event horizons at which time stops for the outside observers.

$$ds^2 = \left(\frac{1-\frac{GM}{2c^2 r_i}}{1+\frac{GM}{2c^2 r_i}} \right)^2 c^2 dt^2 - \left(1+\frac{GM}{2c^2 r_i} \right)^4 \left[dr_i^2 + r_i^2 \left(d\theta^2 + \sin^2\theta d\phi^2 \right) \right] \tag{8.3}$$

This same metric field in the more usual curvature radial coordinate r_c is

$$ds^2 = \left(1-\frac{2GM}{c^2 r_c} \right) c^2 dt^2 - \frac{dr_c^2}{\left(1-\frac{2GM}{c^2 r_c} \right)} - r_c^2 \left(d\theta^2 + \sin^2\theta d\phi^2 \right) \tag{8.4}$$

A metric theory by definition is a curved space-time theory, which is built up on the idea of the geodesic as the straightest path in a curved space-time. The curvature coordinate in any SSS vacuum theory is defined such that the area of a concentric sphere is the flat Euclidean area $4\pi r_c^2$. Hal inconsistently claims he has a metric theory that obeys EEP yet he says he does not need the idea of curved space-time. This is nonsense. Thinking of Hal's formal math as a metric theory nevertheless, the relation between the two kinds of radial coordinates, as shown by Hal's assistant, Michael Ibison, is for PV

$$r_c = \sqrt{K} r_i = e^{GM/c^2 r_i} r_i \tag{8.5}$$

This is in contrast to Einstein's simpler theory in which

$$r_c = r_i \left(1+\frac{GM}{2c^2 r_i} \right)^2 \tag{8.6}$$

This is a simple quadratic equation giving two isotropic roots $r_{i\pm}$ for a fixed curvature r_c. These two isotropic roots have important topological meaning for the complete curved vacuum manifold forming the singular non-traversable wormhole Einstein-Rosen bridge.[63] Hal seems blissfully ignorant of this kind of mathematics in his self-described "metric engineering approach" – so like an engineer![64] ☺ Hal's theory over-hyped by Nick Cook in "The Hunt for the Zero Point" is simpler than is possible. Brian O Leary's similar book is even worse as a source of disinformation and misinformation on zero point energy technology, which does not yet exist. It is easy to see that Hal's theory has an infinite number of isotropic roots for the same curvature radial coordinate, yet Hal irrationally insists that the isotropic coordinates are superior even though they go complex in the interesting "strong field" region. Hal is seemingly unaware that he has an infinite number of his precious coordinates that are complex, hence unphysical, in the

[63] Indeed the two isotropic roots in Einstein's theory are coordinate patches that only partially cover the whole curved manifold outside the two wormhole mouth event horizons in parallel brane worlds of the Einstein-Rosen bridge. This is why Hal thinks mistakenly that he has no black holes in his theory.
[64] Says the snooty theoretical physicist! ☺

"strong field". What Hal thinks of as "strong field" is actually "weak field". Hal has been out on his PV limb so long that it looks like in to him. The limb is breaking.[65] ☺

In more formal detail:

First note the limits in Einstein's theory

$$\begin{aligned} r_i \to \infty &\Rightarrow r_c \to \infty \\ r_i \to 0 &\Rightarrow r_c \to \infty \end{aligned} \tag{8.7}$$

Where a vanishing isotropic radial coordinate is not the strong field Hal thinks it is, but is simply space-like asymptotic infinity in the parallel brane universe next door of the Einstein-Rosen Bridge. It is not a bridge really because you cannot cross it. The space-time singularity will stretch and squeeze you to death as long as you are on any time-like or lightlike world line.

Next solve the quadratic equation for GR.

$$\begin{aligned} r_c &= r_i\left(1+\frac{GM}{c^2 r_i}+\left(\frac{GM}{2c^2 r_i}\right)^2\right) = r_i + \frac{GM}{c^2} + \left(\frac{GM}{2c^2}\right)^2 \frac{1}{r_i} \\ r_c r_i &= r_i^2 + \frac{GM}{c^2} r_i + \left(\frac{GM}{2c^2}\right)^2 \\ r_i^2 &+ \left(\frac{GM}{c^2} - r_c\right) r_i + \left(\frac{GM}{2c^2}\right)^2 = 0 \end{aligned} \tag{8.8}$$

$$\begin{aligned} r_i^2 &+ \left(\frac{GM}{c^2} - r_c\right) r_i + \left(\frac{GM}{2c^2}\right)^2 = 0 \\ r_{i\pm} &= \frac{\left(r_c - \frac{GM}{c^2}\right) \pm \sqrt{\left(\frac{GM}{c^2} - r_c\right)^2 - \left(\frac{GM}{c^2}\right)^2}}{2} \\ \sqrt{\left(\frac{GM}{c^2} - r_c\right)^2 - \left(\frac{GM}{c^2}\right)^2} &= \sqrt{\left(\frac{GM}{c^2}\right)^2 - \left(\frac{GM}{c^2}\right)^2 + r_c^2 - \frac{2GM}{c^2} r_c} = r_c \sqrt{1 - \frac{2GM}{c^2 r_c}} \\ r_{i\pm} &= \frac{\left(r_c - \frac{GM}{c^2}\right) \pm r_c \sqrt{1 - \frac{2GM}{c^2 r_c}}}{2} \end{aligned} \tag{8.9}$$

[65] Shirley MacLaine's New Age books "Out on a Limb", "Dancing in The Light". In this case Hal is "Dancing in The Dark" with the other Laputan Pundits not in The Light. ☺

Therefore, in Einstein's theory, the two isotropic roots are complex inside the singular event horizon when

$$r_c < \frac{2GM}{c^2} \tag{8.10}$$

The situation is even worse in Hal's PV theory. The exponential K is a nonanalytic Taylor power series as $r_i \to 0$.

$$e^{GM/c^2 r_i} = \sum_{n=0}^{\infty} \frac{1}{n!}\left(\frac{GM}{c^2 r_i}\right)^n \tag{8.11}$$

Therefore it has an infinite number of isotropic roots. Note that Hal's theory still obeys (8.7) just like Einstein's. It is easy to see that his infinite set of isotropic roots will also go complex when r_c starts increasing in the region of (8.11) as $r_i \to 0$.

$$\frac{GM}{c^2 r_i} > 1 \tag{8.12}$$

that Hal mistakenly thinks is the strong field limit.

Suppose the opposite that

$$\frac{GM}{c^2 r_i} << 1 \tag{8.13}$$

Truncate the series at n = 2 and we *almost* get Einstein's quadratic equation above for two isotropic roots for one curvature coordinate that is a control parameter. It is still a quadratic equation, but the coefficients are not exactly the same. That is for PV:

$$\begin{aligned}
r_c = r_i e^{GM/c^2 r_i} &\approx \frac{r_i}{0!}\left(\frac{GM}{c^2 r_i}\right)^0 + \frac{r_i}{1!}\left(\frac{GM}{c^2 r_i}\right)^1 + \frac{r_i}{2!}\left(\frac{GM}{c^2 r_i}\right)^2 \\
r_c &\approx r_i + \frac{GM}{c^2} + \frac{1}{2r_i}\left(\frac{GM}{c^2}\right)^2 \\
r_c r_i &\approx r_i^2 + \frac{GM}{c^2} r_i + \frac{1}{2}\left(\frac{GM}{c^2}\right)^2 \\
r_i^2 &+ \left(\frac{GM}{c^2} - r_c\right) r_i + \frac{1}{2}\left(\frac{GM}{c^2}\right)^2 = 0
\end{aligned} \tag{8.14}$$

$$
\begin{aligned}
r_{i\pm} &= \frac{\left(r_c - \frac{GM}{c^2}\right) \pm \sqrt{\left(\frac{GM}{c^2} - r_c\right)^2 - 2\left(\frac{GM}{c^2}\right)^2}}{2} \\
&= \frac{\left(r_c - \frac{GM}{c^2}\right) \pm \sqrt{-\frac{2GMr_c}{c^2} + r_c^{\,2} - \left(\frac{GM}{c^2}\right)^2}}{2} \\
r_{i\pm} &= \frac{\left(r_c - \frac{GM}{c^2}\right) \pm r_c\sqrt{1 - \frac{2GM}{c^2 r_c} - \left(\frac{GM}{c^2 r_c}\right)^2}}{2} \\
r_{i\pm} &\approx \frac{\left(r_c - \frac{GM}{c^2}\right) \pm r_c\sqrt{1 - \frac{2GM}{c^2 r_c}}}{2}
\end{aligned}
\tag{8.15}
$$

So the net PV result in this weak field limit is approximately the same as Einstein's except Einstein's result is not only for the weak field. We can see in the PV case as we truncate at higher and higher n we get more isotropic roots for a fixed r_c. I conjecture that as $r_c \to 0$ all the r_i are complex. It any case it is obvious that this non-covariant PV model is an ugly mess compared to Einstein's.

Therefore, Hal is in the absurd position that he has an infinite number complex radial isotropic coordinates in what he wants his strong field to be for a single fixed curvature radial coordinate r_c!

Finally, looking at his Tables I & II it is clear that Hal erroneously thinks his rest LNIF rods shrink locally isotropically and that the non-Euclidean radius R has $2\pi R >$ circumference C of a concentric circle is a global effect from integrating rather than a local differential effect. In fact, Hal's theory is spatially *locally* anisotropic just like Einstein's theory though with a different radial dependence. This is because his PV metric can be written as

$$
ds^2 = \frac{1}{K}c^2dt^2 - Kdr_i^2 - r_c^{\,2}\left(d\theta^2 + \sin^2\theta d\phi^2\right) \tag{8.16}
$$

Finally Hal offers no reason at all to think that K < 1 is good for propellantless propulsion. Indeed, IMO it is worse.

“You’ve Got Mail!”- Rants and Raves with Hal Puthoff

On 9/11/02 5:32 PM, "Puthoff@aol.com" <Puthoff@aol.com wrote:

In a message dated 9/11/02 5:22:35 PM, sarfatti@pacbell.net writes:

“The exponential solution is wrong it gives a singularity at spacelike infinity. Hal and Ibison and Davies are completely confused on this...”

Hal Puthoff: Jack is the one who is completely confused about this, as the following demonstrates.

Jack says: This is a matter of physical interpretation of the formal symbols.

You have an infinite set of isotropic radial coordinate branches for only one curvature radial coordinate.

Furthermore, when radial coordinate < GM/c^2 your infinite set of isotropic radial coordinates go complex.

Einstein's GR in contrast has only two isotropic radial coordinates for each curvature radial coordinate. They go complex when radial coordinate < $2GM/c^2$.

These two branches of the isotropic radial coordinate have physical meaning as different pieces of the curved manifold.

You claim EEP. That only works if PV is treated as a metric theory with geodesic structure. What is the meaning of your infinite set of isotropic radial coordinates? What is the Penrose diagram for this Monster? It is an interesting monstrosity and I continue to study it mathematically. Your PV solution is from the Island of Dr. Moreau. Dicke had no idea of Penrose diagrams and global methods when he came up with your mishugannah metric 40 + years ago. GR has come a long way since then Rip Van Winkle. It's time you awaken from your dogmatic slumbers.

Your claims are clearly absurd.

Hal says: Jack introduces an oft-used definition that size of area $4 \pi r_c^2$ (as used in standard Schwarzschild models) defines where one is.

Jack says: As I thought you do not even understand what your assistant Ibison showed. He correctly showed this result works not only for Einstein's GR but for Dicke's metric that you take as the corner stone of your new Temple of The Golden Calf.

Hal says: (The subscript stands for what one measures). If area is large, r is large, therefore one -> infinity; if area is small, r is small and one is closer to the mass. Simple, straightforward, seemingly unassailable.

Jack says: Yes unassailable in view of two embarrassing mathematical truths of your ridiculous proposal.

1. You have an infinite set of isotropic r for one unique curvature r.

Which one do you choose and why?

2. What does it mean when your infinite set of isotropic r go complex for real curvature r?

Your model here is so mathematically ugly, how you could wish to elevate isotropic r to a preferred status shows an egregious lack of theoretical insight IMO.

Hal says: However, in the PV modeling (with vacuum-distorted malleable rods)

Jack says: Balderdash as GR also has distorted rods. That is not an essential difference.

Hal says: as one approaches the mass it turns out that, indeed, the initial trend is for the measured area to shrink as in the Schwarzschild case. However, as one approaches the mass the *measured* area reaches a minimum and then begins to increase because the rods are beginning to shrink relatively rapidly compared to their length further out.

Jack says: I call this The Laputan solution. Again I ask.

Infinity of isotropic r for one unique curvature r -- which one and why?

Complex isotropic r for real curvature r means what?

This same thing happens in GR -- this boomerang and it means different regions of the curved manifold outside the horizon!

Hal, your topsy turvy Orwellian inversion is what I mean that you have been out so long it looks like in to you. ☺

Hal says: No problemo (except for Jack). He insists that the Schwarzschild modeling be overlaid on the PV modeling,

Jack says: That is a Red Herring Hal. You do not even understand what Ibison did! He showed that PV metric in rest LNIF of static source M is

$$ds^2 = (1/K)(cdt)^2 - Kdr\_i^2 - r\_c^2(d\theta^2 + \sin^2\theta d\phi^2)$$

Hal, you do not even understand the math of your own model!

Ibison showed

$$r\_c = r\_iK^{1/2}$$

Hal says: and thus the increasing *measured* area (in PV) as one approaches the mass "must mean that one has turned around" and is heading back to 00 and therefore isn't approaching the mass.

Jack: Indeed, that's the well known boomerang effect in GR that leads to the two coordinate patches of the Penrose diagram outside the event horizon in the GR SSS vacuum Einstein bridge. The two isotropic r signal two parallel universes connected by a singular non-traversable wormhole! This is where Penrose's global topology of overlapping charts making an atlas to cover the curved manifold comes into its own. You obviously have not the slightest inkling of the great global revolution in GR post Dicke 1961.

Hal, you are like the Laputans Bunthorne[66] sings about:

"For art stopped short in the cultivated court of the Empress Josephine".

For the meaning doesn't matter for PV is only idle chatter of a transcendental kind .... ☺

Hal says: He can't think in terms of the PV modeling approach

Jack says: Correct, it requires a level of idiocy I have not yet descended to.

Hal says: whereby the area as measured by malleable rods can decrease then increase as one approaches the mass.

Jack says: The infinity and complexity of the isotropic r in the light of one unique real curvature r should give you pause in making such a proposal if you had any sense.

Now in fact your non-analytic monster metric has an infinity of parallel universes connect by some kind of topological Medusa of an infinitely branching wormhole that I am not mathematically equipped to decode as yet.

Hal says: PV may be incomplete; PV may be wrong; PV may be too "physical."

Jack says: Yes, yes and no. An infinity of complex isotropic r for one real curvature r Hal. What about that?

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[66] "Patience", Gilbert & Sullivan parody on Oscar Wilde.

Hal says: Whatever.

Jack says: Were you a Valley Girl in one of your previous reincarnations? Next you will want to go shopping at The Mall on my credit card! ☺

Hal says: But PV is free to define its variables and their significance in whatever way it chooses.

Jack says: That is another predictable New Age "Create your own reality" remark. Did you get that listening to Gary Zukav on Oprah? ☺ Sure you can do that, but if you do then you cannot cite Lightman, Lee and Pope Dicke that your abortion of a theory obeys EEP. EEP assumes a metric theory with local covariance and geodesic structure and the Penrose global topology of manifold theory, which your Cargo Cult "toxic cosmology"[67] runs roughshod over like a wild boar in a china shop. You theory Hal is not even wrong not only for reasons you have not imagined, but probably also for reasons you cannot ever imagine. Can an old dog be taught new tricks? ☺

Hal says: What counts is what it predicts in terms of its defined variables and what the consequences are empirically. (Just as in GR generally, one can choose different coordinates to describe the same phenomenon - - physics does not depend on human choice of coordinate systems to describe it!)

Jack says: While we are on that subject. What do you claim to predict?

Hal says: So, on the above issue ("The exponential solution is wrong it gives a singularity at spacelike infinity"), Jack's misstatement is a misstatement in logic;

Jack says: The only miss here is your pretense at a theory worthy of replacing Einstein's. It is clear you do not understand modern mathematical methods in GR post-1961 in particular global methods in manifold theory as started by Roger Penrose.

Hal says: it has nothing to do with math or physics. It has to do with not having the ability to think in terms of an alternatively defined system of coordinates (i.e., alternative to what he is familiar with).

Jack says: It has everything to do with math and physics and with my refusal to think like a New Age airhead. I have studied this ridiculous creature now for more than 25 years starting with est and Esalen. That Gary Zukav has made it to Oprah means this country is in deep doo doo in addition to Al Qaeda and Saddam, Hamas et-al. I am even more alarmed here because of Nick Herbert's support of Nazi apologist "historian", David Irving, since Nick for years was Dr. Physics at Esalen, the center of New Age Cargo Cultism. http://qedcorp.com/book/psi/hitweapon.html

[67] Coined by Richard (Dick) Farley.

Time Travel to the Past?

Stephen Hawking poses the "chronology protection conjecture". Very incomplete not quite quantum gravity calculations suggest that as soon as time travel to the past through a traversable wormhole Star Gate is about to click in, there is an infinite blue shift of light through the wannabe time machine that fries everything to a crisp. However, in my new theory we should not directly quantize the classical geometrodynamic Einstein field at all. This geometrodynamic field for Curve World is an emergent broken symmetry collective macro-quantum "More is different" mode of the quantum gauge source and force fields in the unstable Dirac-Fermi Sea micro-quantum globally flat false vacuum that disappears in the phase transition from Flat World to Curve World. Therefore, it's a new ball game for time travel to the past as in the "Satori Trilogy" incident ~ 1980 and the "Spectra Contact" in 1953. The Fat Lady has not sung on this issue. Indeed there is empirical folklore that time travelers from our future have been here and are here affecting our Destiny Matrix. Indeed, I may have been in contact with them. I cannot prove that of course unless this new physics of mine turns out to be correct. Too soon to say. Definitely the dark energy $\Lambda > 0$ is what we need to make Star Gates even if we cannot use them to time travel to the past. My bet is that we can time travel to the past and will![68]

[68] We cannot use a traversable wormhole Star Gate to travel to a time before the Star Gate was built. However, there may be very old Star Gates around from ancient extra terrestrial advanced civilizations in this universe and from the parallel brane universes next door in Super Cosmos across a thin hyperspace "weak link" in still another potential application of the Josephson Effect?

Index of key words