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[Puthoff/Sarfatti Casimir Argument](#)

[hohlraum16d Wed, 25 Jan 2006 16:13:17 -0800](#)

This might turn into one of those formatting nightmares. If so, you can read the message at:

<http://groups.yahoo.com/group/SarfattiScienceSeminars/message/8996>

Grimer might enjoy it since it discusses the three dimensional Casimir effect. BTW, I think /\ means gradient?

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From: Jack Sarfatti <>

Date: Mon Jan 23, 2006 1:45 pm

Subject: Fwd: Hal Puthoff's Misunderstanding of the Zero Point Energy & Gravity

Memorandum for the Record

Note that an undersecretary of National Directorate of Intelligence under John Negroponte is arranging with Kit Green for a debate on this very issue between me and Hal Puthoff. Hal's insistence on this wrong physics is putting our national defense planning in great jeopardy in my opinion. Therefore, it is vital to get this point understood by the decision makers in The Pentagon and the USG Intelligence Community where Hal Puthoff has significant influence because of his previous secret work. Indeed Hal held the same security clearances as Kit Green when Kit was a top officer in the CIA in the 70's & 80's - maybe even into the 90's?

No Hal is raising a complete Red Herring and completely misunderstands the physics of zero point energy. As a matter of fact everything I have said is completely consistent with Bryce DeWitt's formula. Indeed it is the same equation 12.29 p. 122 in Matt Visser's book "Lorentzian Wormholes." Hal below is throwing sand in everyone's face with those fancy quotes that are true but that are completely irrelevant to the problem.

Hal does not conceptualize the difference between the relative quantum electrodynamical influence of zero point energy in contrast to its qualitatively very different absolute gravitational influence imposed by Einstein's equivalence principle. Hal's PV theory is wrong because it is incompatible with the equivalence principle. Ask Matt Visser and Bill Unruh about that. Furthermore, the conception of zero point energy in the theory of Hal with Bernie Haisch is wrong for the same reason.

Hal's misunderstanding of this key point is highlighted by his claim that UNIFORM ZERO POINT ENERGY DENSITY has NO GRAVITY EFFECT. If you read Lenny Susskind's "Cosmic Landscape" you will see why Hal is wrong - proved wrong by observation since the essentially UNIFORM positive cosmological constant (Dark Zero Point Energy Density) is causing the expansion of the space of the universe not to slow down but to speed up! If Hal was correct this would be impossible.

The basic effect is at the scale of 300 Megaparsecs or more (from Type 1a Supernovae data of Saul Perlmutter at UCB)

$$V(zpf) = -(1/2)c^2/\(a(t)r)^2$$

Where $a(t)$ is the Hubble scale factor and "r" is the coordinate

distance between 2 galaxies for example,

The UNIVERSAL zero point energy induced cosmic field g-acceleration is then

$$g = - dV(zpf)/dr = + c^2/\lambda(t)^2r$$

When $\lambda > 0$ this is an anti-gravity repulsive universal "inertial" force per unit test mass PROPORTIONAL to the separation of the galaxies EXACTLY as written by Stanford University's Physics Professor Leonard Susskind in his book "Cosmic Landscape" that Hal needs to read cover to cover ASAP. I have given the simple equations that Lenny explains with ordinary English e.g. his chapter "The Mother of All Physics Problems". You can think of λ as the "height" of the cosmic landscape of the actual infinity of parallel pocket universes in Super Cosmos AKA "Megaverse".

Now as to Hal's "shell game" below, if you go to Matt Visser's book p. 122 everything Hal cites below is explained.

The basic point is that, the Casimir plate ZPF stress energy tensor including everything Hal cites below is eq. 12.30

$$T_{\mu\nu}(\text{Casimir}) \sim (\pi^2/720)(\hbar c/a^4) \text{Matrix}$$

a is the separation of the plates

The QED computed Matrix M is 4x4 diagonal with the nonvanishing diagonal elements

$$\begin{aligned} M_{00} &= -1 \\ M_{11} &= +1 \\ M_{22} &= +1 \\ M_{33} &= -3 \end{aligned}$$

All the off-diagonal elements like M_{23} & $M_{01} = 0$

0 is the time direction, 1 & 2 are the 2 transverse directions parallel to the plates

3 is the longitudinal direction perpendicular to the plates!

The - 3 means that the longitudinal pressure along direction 3 perpendicular to the plates is NEGATIVE and is 3x larger than the POSITIVE transverse pressures along directions 1 & 2. This assumes POSITIVE virtual photon zero point vacuum energy density that is required by the Bose-Einstein quantum statistics (commutators of creation and destruction photon operator rather than the Fermi-Dirac anticommutators).

OK, then, the ordinary electrically induced effective pressure on the plates is

$$-3(\pi^2/720)(\hbar c/a^4)$$

Therefore the TOTAL QED attractive force on the plates is simply

$$-3(\pi^2/720)(\hbar c/a^4)A$$

where A is the area of the plates.

If you made this into a closed cavity, the transverse pressures are positive causing a repulsive transverse QED force on the plates perpendicular to the 1 & 2 directions. Therefore, we have a longitudinal SQUEEZE transverse STRETCH QED effect on the box cavity from the above tensor. Above I simply work out in detail what Hal is pointing to in general in his remarks below.

However, and this is the point Hal & Co do not understand, the direct gravity effect is OPPOSITE to the QED effect. Of course, in

this experiment this direct gravity effect is relative small and ignorable to first approximation.

The DIRECT GRAVITY EFFECT of even UNIFORM ZERO POINT energy density that Hal denies comes from the different equation

$$G_{\mu\nu} + (8\pi G/c^4)t_{\mu\nu}(\text{Casimir}) = 0$$

That Hal never writes down in the proper context in relation to the problem. This is what Hal is missing and it is a completely independent effect from the above mathematics that give the QED forces.

In summary

1. Uniform zero point energy directly bends space-time and can do so strongly compared to ordinary matter.
2. The universal g-inertial forces generated by zero point energy are opposite to the electrical forces generated by this same zero point energy.
3. The trick for practical metric engineering the fabric of space-time is to get the gravity effect larger than the electrical effect.
4. Positive zero point energy density anti-gravitates with repulsive inertial forces on non-geodesic worldlines. Negative zero point energy density gravitates with attractive inertial forces on non-geodesic world lines. Of course all inertial forces vanish on geodesic worldlines by the equivalence principle that Hal & Co inconsistently ignores in reaching his wrong conclusions - in my opinion.

On Jan 23, 2006, at 9:21 AM, wrote:

Jack often attempts to draw a line in the sand between his model of, e.g., charge cluster containment by a "dark energy" mechanism vs. models of mine and others involving the Casimir Effect. Presumably this is because his understanding of the Casimir Effect is very narrow, e.g., that it concerns only a weak force attracting neutral conducting plates. Therefore, for the sake of setting the record straight with regard to the underlying physics, I quote from a paper by Bryce DeWitt, "The Casimir Effect in Field Theory," in *Physics in the Making*, ed. A. Sarlemijn and M. J. Sparnaay, pp. 247-272, NHPL, Amsterdam (1989). There, the broadened understanding of just what the Casimir effect pertains to in a curved space-time is presented.

<<Section 9B.7. Formal Description of the Quantum "Ether"

A mathematical description that effectively embodies Einstein's proposal that the vacuum be viewed as a textured "ether" was given years ago by Schwinger (1951). In the presence of an external source, a quantized field initially in the vacuum state need not stay in that state. Schwinger showed that all physical properties of the field can be derived from a knowledge of how the vacuum persistence amplitude varies as the source is changed. The ether thus contains a complete blueprint for the field dynamics.

The ether may be probed by other means than sources. One may vary boundary conditions... or one may vary external fields. For example, the vacuum-to-vacuum matrix element of the stress tensor is given by the functional derivative

$$\langle \text{out}, \text{vac} | T^{\mu\nu} | \text{in}, \text{vac} \rangle = -2i \int d^4x \delta g_{\mu\nu} \langle \text{out}, \text{vac} | \mathcal{H} | \text{in}, \text{vac} \rangle. \quad (\&$$

denotes partial derivatives)

Here, $|in,vac\rangle$ and $|out,vac\rangle$ are initial and final "vacuum" states, respectively, $\langle out,vac|in,vac\rangle$ is the vacuum persistence amplitude, and g_{uv} is an external metric field, frequently referred to as a background field. In principle, the "vacuum" states can be defined in terms of any complete sets of creation and annihilation operators constructed out of the field variables. In practice, they are based on Killing-vector fields that are assumed to exist in the "in" and "out" regions. Any combination of fields may contribute to the stress tensor appearing in the above expression, including the quantized gravitational field. When the gravitational field is included, the g_{uv} appearing in the above expression plays the role of an arbitrary zero point for the gravitational field fluctuation, and $|in,vac\rangle$ and $|out,vac\rangle$ can be shown to be coherent states. Coherent states of this kind can be viewed as relative vacuum states, i.e., vacuum states relative to the given background. Note that the choice of a given background assumes a choice of topology for the space-time manifold.

Other fields besides the gravitational field can serve as background fields. For example, in quantum electrodynamics the equation analogous to the above expression is

$$\langle out,vac|j^\mu|in,vac\rangle = -1/4\pi A_\mu \langle out,vac|in,vac\rangle.$$

Here j^μ is the charge current 4-vector and A_μ is the vector potential either for an externally imposed electromagnetic field or for a classical field serving as an arbitrary zero point for electromagnetic field fluctuations. The above expression is generally nonvanishing whenever the background field is nonvanishing - a phenomenon known as vacuum polarization. Similarly, the above expression is generally different from zero whenever the background geometry is curved. That is to say, curvature induces nonvanishing stress energy in the vacuum. We have already seen that nontrivial spatial topology, or neutral conducting surfaces, can induce nonvanishing stress-energy. This is just the Casimir effect. Curvature simply adds more to it. One may say that the first expression above embodies the most general statement of the Casimir effect. Nowadays any form of vacuum-induced energy is referred to as Casimir energy.>>

Hal Puthoff

Again, what Hal cites above is CORRECT but is completely IRRELEVANT to the point. It's simply misdirection, fancy dazzle obscuring a very simple point with arcane math that few on this list can understand.

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CONTEXT FROM ORIGINAL DOCUMENT

(PUBLIC DOMAIN) - 25 January 2006 — Physicist Jack Sarfatti claims an undersecretary for NDI John Negroponete arranged with Kit Green for a debate between he and Hal Puthoff over the physics behind vacuum energy and zero point energy projects. Sarfatti claims Hal raises a "red herring" and suggests he is involved in "misdirection" regarding the subject.

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