High Speed In Deep Space Transport With Partition Of The Polarized Vacuum

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Abstract

Predictions are made for properties of space and time at increasing speed related to Deep Space Transport using a combination of Vacuum Partition with Polarizable Vacuum Theory as modified for high velocity.

Introduction

Deep Space Transport requires a new way of thinking about space travel, especially about high speed and prolonged acceleration. Two cases will be developed for travel to nearby stars.

First a prolonged acceleration similar to Earth gravity will be developed as a demonstration of the time required. A substantially shorter time will be predicted than is usually given by other writers. The difference comes from choice of technologies applied to intensity and duration of acceleration. This article takes the opinion that adequate acceleration can be provided and maintained by new technologies, mainly field effects and minor modifications of existing science.

A second case will be demonstrated for the special situation of a curl free vacuum potential field acting as induced gravity. In this case the acceleration will be multiplied by a factor of 10 considering that the thrust is weightless free fall. A much shorter travel time will be suggested.

This writer builds up a cosmology based on the opinion that the physical laws and constants reside in the vacuum, because they are nearly the same almost everywhere. It is assumed that Energy in the vacuum is fully committed for enforcing the laws, and cannot be taken for other purposes except as a short term loan governed by Heisenberg Uncertainty.

Partition Theory Applied To Vacuum Polarization

A mathematical model is presented for supplementing curvature of space in General Relativity, by a departure from equal partition of energy in the Zero Point oscillators. In this way all of the properties at a point in space are defined by local variables of things that can be measured locally. Action at a distance propagates through space by altering the partition function of the Zero Point oscillators.

Equal partition only applies in flat space where there is thermo-dynamic equilibrium. Other places where space is not flat, the partition is not equal and the Zero Point oscillators are not in thermodynamic equilibrium.

When the commonly used Z partition function is applied to vacuum energy there can be enormous energy in space with a small cosmological constant and little curvature. All that is necessary is that the zero point energy must be nearly equal in partition between electromagnetic potential and gravitational potential, giving ½(1-Z)hf energy to Gravity potential, and ½(Z)hf energy to electromagnetic potential.

A semi classical deterministic model is constructed of virtual particle pairs each of virtual mass m that may be uncharged or electrically charged with virtual $\pm$ q. This model describes an average action per oscillator over a group of 30 or more oscillators to avoid the quantum wave functions and probabilities that apply to single oscillators.

Gravitational energy in the Zero Point oscillates between two states, potential and dynamic. There is a gravitational potential energy when the virtual pair is separated by one wave length, and a dynamic energy when the pair recombines at a center point. All measurements are made in curved space.

(1.1) $m^2G/\lambda = 2mc^2 = ½(1-Z)hf$ gravitational part of Zero Point energy

(1.2) $\lambda f = c$ light speed, wavelength, and frequency

(1.3) $m^2 = ½(1-Z)(hc/G)$ virtual mass

(1.4) $h^2f^2 = (8/(1-Z))\, hc^5/G$ Planck energy

(1.5) $f^2 = (8/(1-Z))\, c^5/(hG)$ frequency

(1.6) $\lambda^2 = ((1-Z)/8)\, (hG/c^3)$ wave length

The other part of the zero point energy is represented by an LC electronic oscillator that exchanges energy between virtual static electricity and virtual magnetic fields, using the same frequency and wave lengths as the gravitational energy, considering that charged particles are always found associated with a mass, and there are no degrees of freedom in choosing a different frequency.

(1.7) $q^2/m^2 = 4\pi\, \varepsilon\, G$

(1.8) $q^2 = 2\pi\, (1-Z)(\varepsilon\, h\, c)$ virtual electric charge

The electronic capacitance C is defined.

(1.9) $½\, (q^2/C) = ½(Z)hf$ maximum capacitor energy

(1.10) $C = q^2 / Zhf = 2\pi((1-Z)/Z)\, \varepsilon\, \lambda = (2\pi)^2\, ((1-Z)/Z)\, \varepsilon\, \lambda\, /\, 2\pi$

The magnetic inductance L is given.

(1.11) $L = (1/4\pi^2)(Z/(1-Z))\, \mu\lambda\, /\, 2\pi = (Z/(1-Z))\, \mu\lambda\, /\, 8\pi^3$

Reactive impedance is given.

(1.12) $(L/C)^{1/2} = (Z/(1-Z))(\mu/\varepsilon)^{1/2} / 4\pi^2$

(1.12.a) $LC = 1/(2\pi f)^2$ in classical agreement

Energy density in vacuum space is calculated as energy U per unit volume V, with components of gravitational potential and electromagnetic potential.

(1.13) $U/V = ½hf^2 / \lambda^2 c$

(1.14) $U/V = ½(8^2/(1-Z)^2)\, c^7 / hG^2$ a very large energy field

(1.15) $U_{EM}/V = ½(8^2 Z/(1-Z)^2)\, c^7 / hG^2$

(1.16) $U_G/V = ½(8^2/(1-Z))\, c^7 / hG^2$

Poynting power S continually flows forward and backward in all four dimensions at the same time in this theory, making no net gain or loss except locally except when interacting with transient matter or imposed energy fields.

(1.17) $S = ½(8/(1-Z)^2)\, c^8 / hG^2$ a very large energy field.

(1.18) $S_{EM} = ½(8Z/(1-Z)^2)\, c^8 / hG^2$

(1.19) $S_G = \frac{1}{2}(8/(1-Z))\, c^8 / hG^2$

This method puts a limit on the vacuum energy with minor extensions of existing science, which Quantum Field Theory has not been able to do. The calculated vacuum energy is very large but not infinite. It is strong enough to hold the properties of space nearly constant everywhere except when over powered by the gravity of a black hole, neutron star, high kinetic energy accumulated in a deep space transport vehicle, or a very powerful electromagnetic energy source.

Zero point energy is governed by the Heisenberg uncertainty principle, such that a limited amount of energy can be borrowed for a limited time. Then the energy is collected again by the zero point field usually through random processes, but sometimes by specially constructed nonrandom processes that are not covered in this article. Partition function Z supports the Dirac Sea of Energy concept. Gravity and Electromagnetic radiation compete for zero point energy to support their field strengths and continuous propagation through space.

A constant acceleration will be chosen for a first case similar to Earth gravity but based on standard light speed and a year on common clocks, but measured on the transport vehicle.

(1.20) $a = c_o / yr$

This is 97% of the standard gravity on Earth, and rather surprising on first calculation. During acceleration relativistically invariant energy and momentum must be satisfied in any model of mass m, energy E and momentum p. There are five widely accepted equations for calculations of energy and momentum.

(1.21) $E^2 = (mc^2)^2 + (pc)^2$

(1.22) $pc = E(v/c)$

(1.23) $dE = vdp$

(1.24) $E = hf$ from Planck

(1.25) $dc/c = 2\, df/f$ from metrics

One fundamental equation is missing from this set, and not defined in publications until recently in a proposal from this author. A clue from Niels Bohr[(3)] discussing Heisenberg and Einstein leads to the missing link[(4)].

(1.26) $dE/df = \hbar$

The completed set of equations have been used by this author [(1)] to extend the work of Harold Puthoff [(2)] and others on Polarizable Vacuum [(3)] theory. With this equation set the partition function Z can be calculated for the theory of vacuum energy partition where Z is (1/2) in flat space.

(1.27) $4(1\text{-}Z)^2 = (mc^2)^2/E^2 = (1 - v^2/c^2)$

Moderate Acceleration For Electromagnetic Field Thrust

Using constant acceleration (1.20) in a Partitioned Vacuum Polarization model gives a fairly simple but lengthy calculation which was deferred from a previous article, and is presented here in Table (2.1)

Table 2.1 Partitioned Vacuum Polarization

Far From Large Mass Where External Gravity Is Small, Energy Is hf Per Quantum Action

Z	c/c_o	$(c/c_o)^2$	f/f_o	λ/λ_o	E/E_o	$(E/E_o)^2$	h/h_o	$(v/c_o)^2$
0.5000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
0.5087	1.2000	1.4400	1.0954	1.0954	1.0146	1.0294	0.9262	0.0497
0.5189	1.4000	1.9600	1.1832	1.1832	1.0271	1.0550	0.8681	0.1454
0.5307	1.6000	2.5600	1.2649	1.2649	1.0381	1.0777	0.8207	0.3044
0.5441	1.8000	3.2400	1.3416	1.3416	1.0479	1.0981	0.7810	0.5464
0.5593	2.0000	4.0000	1.4142	1.4142	1.0567	1.1166	0.7472	0.8930
0.5765	2.2000	4.8400	1.4832	1.4832	1.0648	1.1337	0.7179	1.3680
0.5959	2.4000	5.7600	1.5492	1.5492	1.0722	1.1495	0.6921	1.9974
0.6178	2.6000	6.7600	1.6125	1.6125	1.0790	1.1642	0.6692	2.8091
0.6426	2.8000	7.8400	1.6733	1.6733	1.0854	1.1781	0.6486	3.8331
0.6709	3.0000	9.0000	1.7321	1.7321	1.0914	1.1911	0.6301	5.1015
0.7039	3.2000	10.2400	1.7889	1.7889	1.0970	1.2034	0.6132	6.6483
0.7432	3.4000	11.5600	1.8439	1.8439	1.1023	1.2150	0.5978	8.5095
0.7923	3.6000	12.9600	1.8974	1.8974	1.1073	1.2261	0.5836	10.7229
0.8613	3.8000	14.4400	1.9494	1.9494	1.1121	1.2367	0.5705	13.3283
0.8803	3.8401	14.7463	1.9596	1.9596	1.1130	1.2388	0.5680	13.9014
1.0000	3.9548	15.6403	1.9887	1.9887	1.1156	1.2446	0.5610	15.6403

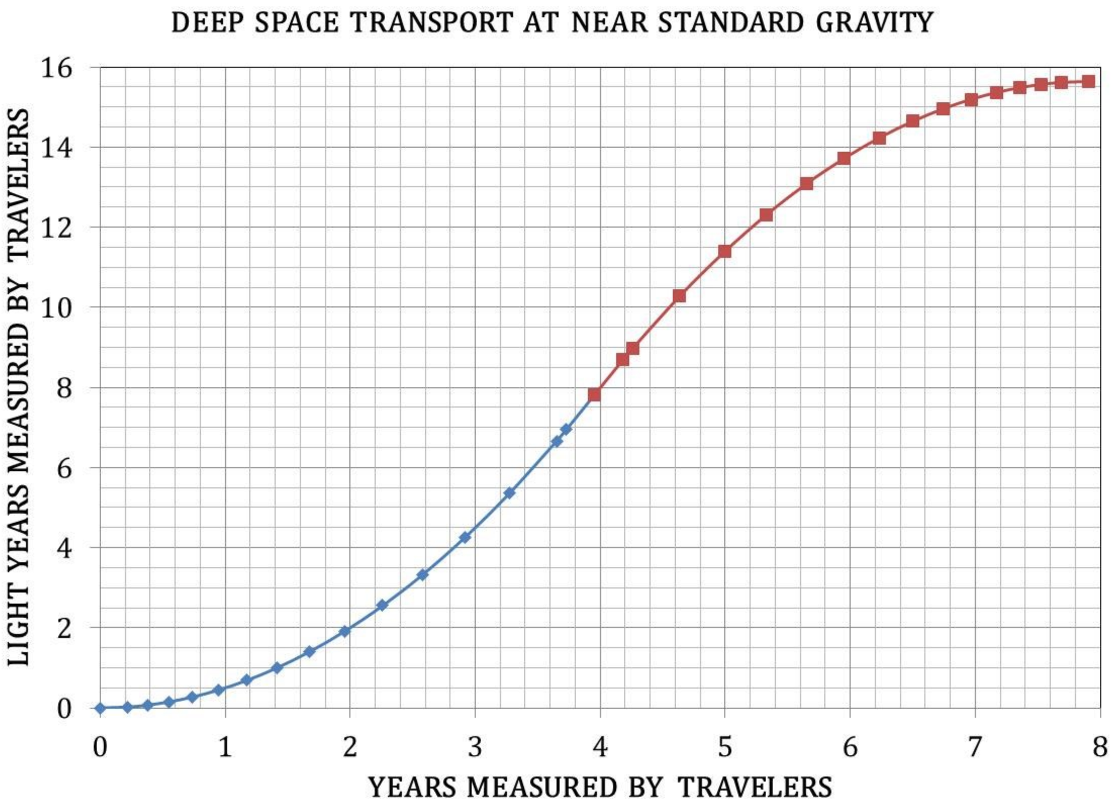
2(1-Z)	$p^2/(m_oc_o)^2$	$(pc)^2/E_o^2$	$(mc^2)^2/E_o^2$	$(v/c)^2$	$1-(v/c)^2$	$(m/m_o)^2$	(m/m_o)	$(mv/m_oc_o)^2$
1.0000	0.0000	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000	0.0000
0.9826	0.0246	0.0355	0.9939	0.0345	0.9655	0.4793	0.6923	0.0238
0.9622	0.0399	0.0782	0.9768	0.0742	0.9258	0.2543	0.5042	0.0370
0.9387	0.0501	0.1282	0.9495	0.1189	0.8811	0.1449	0.3806	0.0441
0.9118	0.0572	0.1852	0.9129	0.1686	0.8314	0.0870	0.2949	0.0475
0.8813	0.0623	0.2493	0.8673	0.2233	0.7767	0.0542	0.2328	0.0484
0.8470	0.0662	0.3204	0.8133	0.2826	0.7174	0.0347	0.1863	0.0475
0.8082	0.0692	0.3986	0.7509	0.3468	0.6532	0.0226	0.1504	0.0452
0.7645	0.0716	0.4838	0.6805	0.4155	0.5845	0.0149	0.1220	0.0418
0.7149	0.0735	0.5760	0.6021	0.4889	0.5111	0.0098	0.0990	0.0375
0.6582	0.0750	0.6751	0.5159	0.5668	0.4332	0.0064	0.0798	0.0325
0.5922	0.0763	0.7813	0.4221	0.6493	0.3507	0.0040	0.0634	0.0268
0.5137	0.0774	0.8944	0.3206	0.7361	0.2639	0.0024	0.0490	0.0204
0.4155	0.0783	1.0145	0.2117	0.8274	0.1726	0.0013	0.0355	0.0135
0.2775	0.0791	1.1415	0.0952	0.9230	0.0770	0.0005	0.0214	0.0061
0.2394	0.0792	1.1678	0.0710	0.9427	0.0573	0.0003	0.0181	0.0045
0.0000	0.0796	1.2446	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000

$Gm^2/G_om_o^2$	G/G_o	Gm/G_om_o	$\varepsilon/\varepsilon_o$	μ/μ_o	q^2/q_o^2	C/C_o	L/L_o	Puthoff K
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.0921	2.2784	1.5774	0.8333	0.8333	1.1308	0.9129	0.9129	0.8333
1.1694	4.5992	2.3191	0.7143	0.7143	1.2613	0.8452	0.8452	0.7143
1.2326	8.5073	3.2382	0.6250	0.6250	1.3937	0.7906	0.7906	0.6250
1.2819	14.7408	4.3469	0.5556	0.5556	1.5299	0.7454	0.7454	0.5556
1.3171	24.2963	5.6569	0.5000	0.5000	1.6717	0.7071	0.7071	0.5000
1.3376	38.5289	7.1789	0.4545	0.4545	1.8210	0.6742	0.6742	0.4545
1.3424	59.3144	8.9234	0.4167	0.4167	1.9795	0.6455	0.6455	0.4167
1.3301	89.3267	10.9002	0.3846	0.3846	2.1496	0.6202	0.6202	0.3846
1.2984	132.551	13.1188	0.3571	0.3571	2.3340	0.5976	0.5976	0.3571
1.2441	195.322	15.5885	0.3333	0.3333	2.5365	0.5774	0.5774	0.3333
1.1622	288.721	18.3179	0.3125	0.3125	2.7625	0.5590	0.5590	0.3125
1.0441	435.164	21.3156	0.2941	0.2941	3.0209	0.5423	0.5423	0.2941
0.8729	692.705	24.5899	0.2778	0.2778	3.3290	0.5270	0.5270	0.2778
0.6015	1317.31	28.1487	0.2632	0.2632	3.7342	0.5130	0.5130	0.2632
0.5221	1599.47	28.8970	0.2604	0.2604	3.8401	0.5103	0.5103	0.2604
0.0000	to inf	31.1033	0.2529	0.2529	4.4372	0.5029	0.5029	0.2529

a (yr/co)	t years	r lyr	a (yr/co)	t years	r lyr
1.0000	0.0000	0.0000	1.0000	7.9096	15.6403
1.0000	0.2228	0.0248	1.0000	7.6867	15.6155
1.0000	0.3813	0.0727	1.0000	7.5283	15.5676
1.0000	0.5518	0.1522	1.0000	7.3578	15.4881
1.0000	0.7392	0.2732	1.0000	7.1704	15.3671
1.0000	0.9450	0.4465	1.0000	6.9646	15.1938
1.0000	1.1696	0.6840	1.0000	6.7399	14.9563
1.0000	1.4133	0.9987	1.0000	6.4963	14.6416
1.0000	1.6760	1.4045	1.0000	6.2335	14.2358
1.0000	1.9578	1.9166	1.0000	5.9517	13.7237
1.0000	2.2587	2.5508	1.0000	5.6509	13.0895
1.0000	2.5784	3.3242	1.0000	5.3311	12.3161
1.0000	2.9171	4.2547	1.0000	4.9925	11.3856
1.0000	3.2746	5.3614	1.0000	4.6350	10.2789
1.0000	3.6508	6.6642	1.0000	4.2588	8.9761
1.0000	3.7285	6.9507	1.0000	4.1811	8.6896
1.0000	3.9548	7.8201	1.0000	3.9548	7.8201

An example is given in Figure 2.1 for distance and time measured by travelers, showing about 16 light years travel in 8 years. This is a much faster journey than other writers have suggested, because of the persistent and standard acceleration used here.

Figure 2.1



This example is for a journey where deceleration begins immediately as the kinetic worm hole is starting to open. There are many longer and shorter journeys possible in this system. Present thinking is that time stands still in the worm hole. So the journey measured by a remote observer would be considerably longer and possibly discontinuous on the time axis.

Notice that it takes nearly 4 years in this example to open a worm hole, compared to 359 days predicted in other writings for the same acceleration.

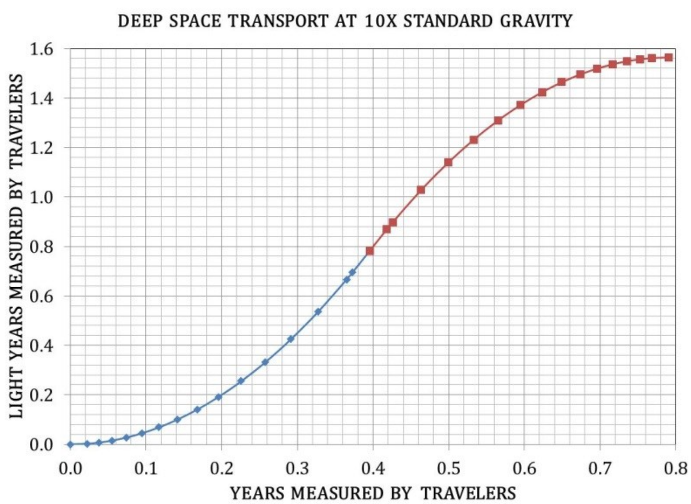
Strong Acceleration For Induced Gravity Field Thrust

When gravity is induced the vehicle and crew are able to endure much higher acceleration in a free fall mode where the reaction stress of thrust is not felt. An example can be given of 10 times the previous acceleration.

3.1) $a_2 = 10\ c_o\ /\ yr$

This is a mild form of warp. In principle much higher accelerations could occur in a fully developed warp field. Figure 3.1 gives the results in a similar calculation to the one given above. The journey is essentially scaled by one tenth in both time and distance since both are linear in acceleration.

Figure 3.1



Many other cases are possible which can only be verified by testing in space. Eventually it will be necessary to say what happens inside the worm hole and for how long. In that regard Ulla Mattfolk's preference for space time in folded sheets may be helpful. A deep space expedition is the best way to decide on a model.

Prolonged acceleration needs considerable work, but appears possible, leading to new discoveries in space time at high speed.

Conclusions

Partition of the Polarizable Vacuum theory leads to predictions of Deep Space Transport to nearby stars in years or decades instead of centuries and millennia.

Rapid advancement of science is expected to occur from testing in high speed vehicles. Prolonged acceleration is identified as a key technology required for Deep Space Transport.

Acknowledgements

Thanks are given to Harold Puthoff for private correspondence and all of the published work on polarizable vacuum. He has not commented on this proposal for deep space transport.

Recognition is given to Ulla Mattfolk of Finland for help in developing the theories and recognizing the geometric dynamics required for describing a worm hole.

Reference Notes

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