FRAME DRAGGING REMEDY FOR POLARIZABLE VACUUM THEORY AT HIGH SPEED IN DEEP SPACE TRANSPORT

29 April 2016
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Abstract

Frame dragging resulted from modifications of Polarizable Vacuum Theory that were done to bring high velocity terms into PV consistent with established science of energy and momentum at high speed.

It was found that velocity terms could not be brought into PV theory without formalism for exchange of kinetic energy with the vacuum space. Planck's Law in general and Heisenberg Uncertainty in a specific case were used to develop a mechanism for continual exchange of kinetic energy with the local vacuum.

The mechanism calls for incurring equal exchange of energy with space when acceleration does not occur, and unequal exchange when a physical object is accelerating. Accumulating kinetic energy in space was found to polarize the vacuum in a way equivalent to the polarizing parameter K of Harold Puthoff.(1)

Frame dragging results from the continual increase of vacuum stress energy trailing longitudinally and propagating transversely from an accelerating deep space vehicle.

Introduction

A previous attempt to extend Polarizable Vacuum theory of Harold Puthoff(2) and others to high speed in deep space led to modifications of PV for adding velocity terms in agreement with established laws of energy and momentum. The mass function was redeveloped for consistency with widely published

results of accelerator experiments. Two possible revisions were considered in making new mass functions, either invariant Planck constant or Planck constant changing gradually with vacuum stress energy.

In previous work by others Polarizable Vacuum theory has offered an alternative to geometric theories of space time curvature, with some acceptance in the scientific community as a step in the right direction, but not a final theory or replacement for General Relativity. With only one adjustable parameter K to describe the vacuum response to stress energy, PV theory is the simplest of the large scale cosmologies, and the only one to express relativity in terms of local variables that can be measured locally. As such the PV theory is an attempt to move space science forward with predictions that can be tested experimentally.

In main stream physics PV theory failed to predict frame dragging of General Relativity. Later work by others found physical evidence of frame dragging, causing PV to be discarded by a number of researchers.

The present work results from a program to advance deep space transport at high speed. While GR says little about how to achieve space propulsion, PV makes prediction about energy exchange with fields and forces. Therefore it is useful to continue the development of PV theory with addition of velocity terms in agreement with established science and experimental evidence.

Polarizable Vacuum with Velocity and Invariant Planck Constant

First the Puthoff system of PV will be evaluated to add a velocity term using relativity calculations in nearly flat space. Conventional equations of relativistic energy and momentum are used at high velocity, causing the Puthoff energy function to be modified. In this context relative velocity is compared to the reference frame in which it is measured. Velocity of the vehicle can also be related to red shifted or blue shifted background microwaves in space, making zero velocity measurable in the vehicle at 2.7 degrees Kelvin in every direction.

Calculations start with the Puthoff system.

1.0) $K = c_o/c$ where c_o is standard light speed in nearly flat space.

Results of accelerator experiments require additional equations for energy and momentum to introduce velocity into PV theory.

1.1) $E^2 = (mc^2)^2 + (pc)^2$
1.2) $(pc) = E(v/c)$

Fundamental definitions of force lead to additional relations of energy and momentum related to thrust force and propulsion.

1.3) $F = dp/dt$
1.4) $F = dE/dr$

Velocity can be defined in the same system.

1.5) $v = dr/dt$

Then combining the previous three equations, a fundamental definition is stated.

1.6) $dE = v\,dp$

The set of equations reveal much information about the possibilities for high speed transport, but the set is not complete, and an exact solution is not found, except by adding additional constraints.

Harold Puthoff preferred an invariant Planck constant, and that can be used to derive a new mass function, using frequency f for energy exchange with space.

1.7) $dE/df = h$ for a large number of quantum actions.
1.8) $E = h\,f$ on the same scale for each action.

This is the mechanism by which the deep space vehicle exchanges kinetic energy with the local vacuum. Energy and frequency are related using the previous two equations.

1.9) $E/E_o = f/f_o$

Metric solutions of others relate frequency and light speed.

1.10) $c/c_o = f^2/f_o^2$ from several relativity metric solutions

Energy and light speed are related by the previous two equations.

1.11) $c^2/c_o^2 = E^4/E_o^4$

While Planck constant and packet frequency are just devices for bringing velocity terms into PV theory, their use engages frame dragging as an essential foundation of the resulting modified PV.

Equations (1.2) and (1.6) are combined into a form that is useful in making an exact solution.

1.12) $dE^2 = c^2\, dp^2$

Integration is done using the previous two equations.

1.13) $p^2/(m_o c_o)^2 = (1 - E_o^2/E^2)$

1,14) $(pc)^2/E_o^2 = (E^4/E_o^4 - E^2/E_o^2)$

Using (1.1) for relativistic energy and momentum a mass function is derived from (1.14).

1.15) $(mc^2)^2/(m_o c_o^2)^2 = 2E_o^2/E^2 - E^4/E_o^4$

Using (1.11) the new mass function is generated, consistent with high energy physics and invariant Planck constant.

1.16) $(mc^2)^2/(m_o c_o^2)^2 = 2\, c/c_o - c^2/c_o^2$

1.17) $m^2/m_o^2 = 2(c_o^3/c^3) - (c_o^2/c^2)$

In this result for a new mass function is the discovery of a critical limit for local energy density and light speed. Then locally measured mass goes to zero as light speed goes to twice the standard value. It is a superluminal locally measured speed limit of $2c_o$ above which further acceleration gives complex numbers. Results are suggesting additional dimensions more than the usual 4 become significant and a worm hole is opened by critical stress in the vacuum derived from exchange of kinetic energy with a deep space transport vehicle.

The momentum energy at the critical speed is twice the rest mass energy expressed locally, but mass energy goes to zero locally at the critical speed.

Frame dragging has become more apparent in the new mass function, although it already occurred in the momentum solution (1.13). A major objection to PV theory is removed by the occurrence of frame dragging in the modification of the mass function.

A warp field is found in the momentum and energy of (1.14) where the vacuum ZPE frequency must be increasing with velocity of the space vehicle to account for all of the energy that has gone into acceleration.

Degenerate space is found at critical speed in the results, where all of the possible energy states are filled in the local vacuum. It is the logical limit of warp and frame dragging.

A worm hole is predicted to open at critical speed measured by the travelers. Then a crisis occurs for travelers after about two years of ordinary acceleration equivalent to Earth gravity. Additional acceleration at this critical point leads to predictions of time reversal and rapid disaster for the vehicle and travelers beyond the scope of this article. It is noted that rapid response for control will be needed at a moment when it is least available and effective.

Velocity is given using (1.0), (1.1), (1.11), and (1.14) showing that locally measured velocity approaches locally measured light speed at a critical point.

1.18) $$v^2/c^2 = c/co - 1 = 1/K - 1$$

Effective mass is predicted to decrease approaching zero at a critical speed locally measured, although an apparent increase of mass appears to a distant observer, in keeping with accelerator results. Relativistic transformations apply in the usual way to account for the difference. Critical K is one half.

This exercise demonstrates that when Planck's constant is not allowed to vary, the prolonged acceleration of a deep space transport vehicle may be sufficient to polarize the vacuum and cause ($K < 1$) to occur naturally with acceleration. New functions for energy and mass are developed for it.

So far this work has used the standard equations of relativity to show an invariant Planck's constant h can be used with high velocities in the Puthoff system of PV if a new mass function is derived. However Planck constant is a property of space and should vary when energy density changes in extreme cases. Also agreement with Heisenberg Uncertainty would be preferred for kinetic energy borrowed from or loaned to the vacuum.

Polarizable Vacuum Theory Modified For Heisenberg Uncertainty

To advance the theory on vacuum polarization Planck's constant is allowed to vary slowly with stress energy. This will produce results that disagree with Puthoff on energy and mass, but agree with Puthoff on other terms such as light speed, frequency, time, and length.

The key revision to PV theory is taken from a published speech of 1949 by Niels Bohr [3] about Einstein and Heisenberg, using time t and f frequency.

2.1)	$\Delta t \sim 1/\Delta f$	From Niels Bohr
2.2)	$(\Delta E)(\Delta t) \leq \hbar$	Heisenberg Uncertainty using hbar $\hbar$
2.3)	$\Delta E/\Delta f \leq \hbar$	From previous two equations

A limit of (2.3) is proposed for large scale energy interaction with the vacuum to minimize the variation of Planck's constant in a modified PV theory.[4]

2.4)	$dE/df = h/2\pi$	for a large number of quantum actions.
2.5)	$E = h f$	again on the same scale for each action.

Frame dragging enters the calculation with Planck constant, with only a difference of speed and energy compared to the previous section.

So far this doesn't show how ($K < 1$) arises from v/c. To do so requires integration of the fundamental equation again for energy and momentum.

2.6) $dE = v\, dp$

Using (1.12) for relativistic terms,

2.7) $dE^2 = c^2\, dp^2$

By integration of (2.4) using (2.5) energy is related to quantum frequency.

2.8) $E/E_o = (f/f_o)^{(1/2\pi)}$

2.9) $c/c_o = f^2/f_o^2$ from relativity metric solutions

2.10) $E^2/E_o^2 = (c/c_o)^{(1/2\pi)}$

2.11) $E^2/E_o^2 = (1/K)^{(1/2\pi)}$

2.12) $(\hbar/\hbar_o) = (f/f_o)^{(1/2\pi-1)}$

2.13) $(\hbar/\hbar_o)^2 = (c/c_o)^{(1/2\pi-1)}$ variable Planck's constant

2.14) $(\hbar/\hbar_o)^2 = (1/K)^{(1/2\pi-1)}$

2.15) $dp^2 = (E_o^2/c_o^2)d(E^2/E_o^2)/ (E^2/E_o^2)^{4\pi}$

2.16) $p^2 = (1/(4\pi-1))(1 - (E^2/E_o^2)^{(1-4\pi)})(E_o^2/c_o^2)$ momentum

2.17) $(mc^2)^2 = E^2 - (pc)^2$ from (1.1) giving a mass function different from (1.17).

Velocity is calculated using (2.16) and (1.2).

2.18) $(v^2/c^2) = (1/(4\pi-1))((c^2/c_o^2)^{(1-1/4\pi)} - 1)$

Results give a velocity which does not exceed c although v can exceed c_o.

This exercise demonstrates that when Planck's constant is allowed to vary, the prolonged acceleration of a deep space transport vehicle may be sufficient to polarize the vacuum and cause ($K < 1$) to occur naturally with acceleration. Different energy and mass functions occur in this section..

K goes from 1.0000 to critical 0.2529 while v goes from zero to c in the limit.

There is a predicted limit beyond which ordinary space cannot be stressed which occurs when the kinetic energy density approaches the Planck energy.

2.19) $v = c_w$

2.20) $c = c_w$ in the limit

2.21) $(c_w^2/c_o^2) = (4\pi)^{(4\pi/(4\pi-1))} = 15.6402917334001$

This is the predicted upper limit of velocity for not violating (1.1), (1.2), and (1.6). It is suggesting a worm hole is opened by the extreme interaction of the space vehicle with the vacuum, when the kinetic energy density equals the vacuum energy density. Frame dragging created warp, then a worm hole.

2.22) $(c_w/c_o) = 3.95478087046553$

Frame dragging, warp fields, and worm holes occur in these results, but at a different speed and energy than in the previous section.

In this estimate the deep space transport vehicle requires nearly 4 years of continual acceleration equivalent to standard Earth gravity to reach this energy level. The result is suggesting that travel between stars can be achieved in much less than a life time. In the previous section the invariant Planck's constant required only 2 years to reach critical speed with the same acceleration, but consumed considerably more energy to achieve critical speed than in this section. A physical test would decide which version is best, but requires a high speed deep space test vehicle or other means of testing.

Field Effect Generators

Kinetic energy of high speed has been developed in this article as a possible source of vacuum polarization, requiring 2 to 4 years of standard acceleration to reach a critical speed where vacuum energy might be no longer sufficient to enforce physical laws. This is just the first example of several technologies directed to development of deep space transport at high speed. Also the requirement for sustained acceleration has not been met by existing processes. A break through is needed in the topic of field effect propulsion. When accomplished the field effect will provide both the acceleration force and part of the polarizing energy, such that the time for reaching the critical speed may be shortened substantially. Field generation and propulsion effect are beyond the scope of this article except for making references. They are discussed in other articles by the same writer.

One of the most active writers about field effect, and a professional expert on practical power systems Todd Desiato published a recent article[(6)] suggesting Zero Point Energy can be applied to devices for generating a warp fields. It seems likely that something of that type will eventually be accomplished, but with smaller steps first and revision of the theories. Desiato retained the Puthoff PV system without modifications of mass and energy which are shown to be necessary in this article for agreement with established laws of energy and momentum.

This article is one in a series of articles[7],[8],[9],[10] by the same writer (Decker) that prefer a somewhat different field theory from Desiato. Proven science of Heisenberg Uncertainty is used to borrow and convert Zero Point Energy for field effect propulsion and polarization of the vacuum. Borrowed energy is returned to the vacuum continually but with propulsion achieved and momentum conserved. These more speculative theories are developed in reasonable extensions of existing technology, but placed in separate articles to focus this article on kinetic energy at high speed interacting with the vacuum, and sourced in more firmly established science, and demonstrating the prediction of frame dragging, leading to warp fields and worm holes.

Consequences for Actions in Super Saturated Space

So far two systems have been developed to show how relativistic space time might react to a vehicle under prolonged acceleration far from gravity of large stars and planets. It opens a great many questions about how physical laws at high speed apply to mechanical equipment and living biological organisms.

From this work it seems likely that the greatest limitations on deep space transport will not come from propulsion of the vehicle, but from unknowns about how biological organisms survive and function in space that is degenerating from supersaturation of kinetic energy, and all of the possible energy states are filled.

LIGO Published Observations and Polarized Vacuum Theories

Published data from LIGO organization was used for comparison to modified PV theory in an attempt to decide which modification is most in agreement with observed physical data.

Merger of black holes occurs from loss of orbital momentum energy and angular momentum with propagation of gravity waves expressed as stress

energy differences. Mass energy was also lost at high speed which was expected from predictions of other writers.

Figure 5.1

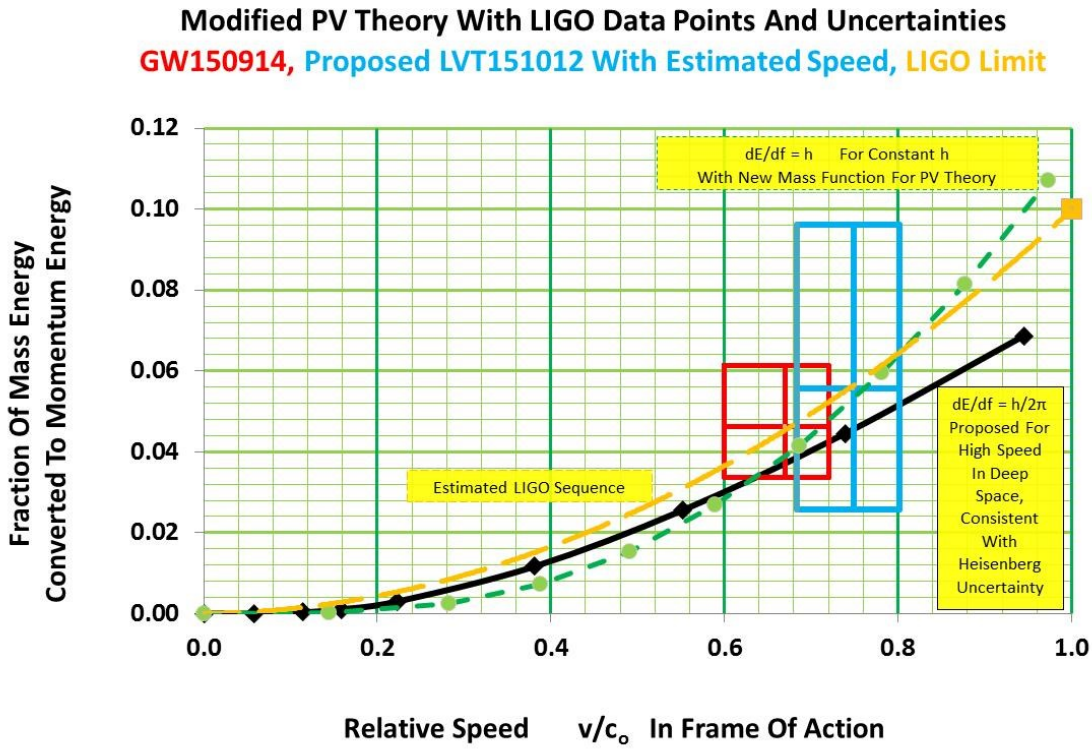

Figure (5.1) shows an approximation of how LIGO data compares to Polarizable Vacuum Theory as expressed for high speed in deep space.

Polarizable theory, modified for high speed was compared to the published data for LIGO[5] events GW150914 which is confirmed, and LVT151012 which is proposed but not confirmed. LIGO data was supplemented by estimates, of the unpublished merger speed for the second event, using standard methods of celestial mechanics.

Both PV theories modified for high speed were found to be in reasonable agreement with LIGO publications of mass loss to kinetic energy at high speed. The second event was given a slightly higher merger speed than the first, considering closer approach over compensating the smaller masses.

The figure shows reasonable agreement of LIGO data with both versions of modified Polarizable Vacuum Theory within stated limits and uncertainties. Invariant Planck's constant has slightly better agreement with the observed data, while the variable Planck's constant has better consistency with Heisenberg Uncertainty and falls within the allowable limits.

Conclusions

In conclusion there is prediction for a polarization of vacuum space arising from velocity of a deep space transport vehicle under prolonged acceleration. Required power is a reasonable extension of existing technology. Other methods like Field Effect generators may also polarize the vacuum.

The conclusion depends on a new mass function in PV theory and possibly local variation of Planck's constant under extreme bending of space.

The mass function of Puthoff and others cannot be retained at high speed, and must be modified to comply with established laws of energy and momentum.

Results are suggesting that propulsion of a deep space vehicle will become less of a limitation than human factors and design parameters.

Published LIGO observations of merging black holes are in reasonable agreement with both modified versions of Polarizable Theory.

It seems likely that locally measured mass decreases at high speed and converts to some extent into kinetic energy in a warp field. Results are suggesting there is a finite limit to local kinetic energy at which space degenerates and possibly opens a worm hole, although a distant observer may require the appearance of infinite power for such events to agree with data from accelerator experiments.

Limitations and Future Work

Certainly there are other ways to postulate polarization of the vacuum. Also there are many possibilities for variation of Planck's constant other than the ones used here. Only experimental evidence can identify the correct method.

Standard methods of accelerator relativity have been stretched rather far for making prediction of stress energy curvature, but with special circumstances where symmetries apply to single sources locally in the context of nearly flat space. The benefit is a result that is understandable to a large audience.

Advances in propulsion are needed, possibly a combination of stress energy field effect with magnetic field generators.

A more complete representation could be given in terms familiar to General Relativity with a metric derived from variable light speed in curved space.

The writer (Decker) has invited collaboration from other interested researchers for further developments of the theories and proofs.

Acknowledgements

Thanks are given to Harold Puthoff for private correspondence and all of the published work on polarizable vacuum. He has not commented on these proposed modifications of PV with different mass function and variable Planck's constant.

Michael Ibison from Earth Tech International, Inc. was helpful to point out that frame dragging has been observed and would be a requirement for any modification of PV theory.

Recognition is given to Ulla Mattfolk of Finland for help in developing the theories and recognizing the biological questions about limitations for living organisms to function under stress at the level of micro physics during high speed travel in degenerate space that is over saturated with kinetic energy.

Thanks is given to Matti Pitkänen a specialist in the competing TGD theory for assistance in reconciling the failure of General Relativity to predict a critical energy density and degeneracy of space, or vacuum polarization caused by kinetic energy, but limited by a critical high speed.

Additional thanks are given to Todd Desiato for advice on field effect generators in polarizing the vacuum.

Recognition is given to the LIGO association for published data. The LIGO data is in an early stage of development and may lead to different conclusions as the possible range is filled with observations. There is additional opportunity that some version of PV theory may become useful in evaluating LIGO candidate events, or LIGO data will become useful in choosing between competing modifications of PV theory.

References and Notes

1) puthoff@earthtech.org

2) http://arxiv.org/ftp/arxiv/papers/1012/1012.5264.pdf

3) The reference to Niels Bohr is found in the 2010 Dover reprint ATOMIC PHYSICS AND HUMAN KNOWLEDGE, first published in 1961 by Science Editions in New York, shortly before Bohr died. The speech of 1949 was first published in 1949 in Contribution to ALBERT EINSTEIN: PHILOSOPHER SCIENTIST, Library of Living Philosophers, volume 7, starting on page 199. The quoted reference was to page 44 of the Dover edition for a relation of time interval to frequency interval.

4) Interpretation of the limit { $dE/df = \hbar$ } was not endorsed by Bohr, Einstein, Heisenberg, or Planck. It makes a reasonable extension of existing science in a situation where a function something like this is needed to modify PV theory for high speed consistent with Heisenberg Uncertainty. It was published for the first time by this author (Decker) in a less formal setting of viXra: 1511.0085 on 9 November 2015.

5) https://dcc.ligo.org/public/0122/P1500218/012/GW150914_parameter_estimation_v13.pdf3)

6) Desiato, THE ELECTROMAGNETIC QUANTUM VACUUM WARP DRIVE, JBIS, Vol. 68, pp 347-353, 2015.

7) Decker, Energy From The Vacuum, http://vixra.org/abs/1511.0142

8) Decker, Deep Space Transport With Field Effect Of Vacuum Stress Energy, http://vixra.org/abs/1512.0314

9) Decker, Magnetic Engines For Low Orbit Leading to Development of Deep Space Transport, http://vixra.org/abs/1511.0129

10) Decker, Fundamentals Of Energy And Momentum At High Speed In Deep Space, http://vixra.org/abs/1512.0397.