NEW LIGO DATA APPLIED TO POLARIZABLE VACUUM THEORY

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Abstract

New data from LIGO for event GW151226 was used to improve the modifications to Polarizable Vacuum Theory, and choose among the many possible solutions of energy and momentum at high speed for deep space transport. Heisenberg Uncertainty Limit provided the best known Modification to Polarizable Vacuum Theory. A constant coefficient was varied over the possible range and also changed to a variable, but provided no improvement over the Heisenberg Limit.

Warp and frame dragging resulted from modifications of Polarizable Vacuum, but with more than one possible solution. A choice of solutions was made eliminating invariant Planck constant and previous cases derived from conservation of energy in blue shifted microwaves near a black hole.

It was found that velocity terms could not be brought into PV theory without formalism for exchange of kinetic energy with the vacuum space. Energy changes in the local vacuum provide the driving force for relativistic frame dragging.

Accumulating kinetic energy in space was found to polarize the vacuum in a way equivalent to the polarizing parameter K of Harold Puthoff.

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

Results predict that in the LIGO observations part of the mass loss and speed increase occur during the ring down phase.

Introduction

A previous attempt to extend Polarizable Vacuum theory of Harold Puthoff[1] 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. A new mass function was developed for consistency with widely published results of accelerator experiments. A set of possible revisions was considered in making new mass functions, either invariant Planck constant or Planck constant changing gradually with vacuum stress energy.

Heisenberg Uncertainty places a limit on the possible solutions. LIGO data of merging black holes and other calculation of blue shifted cosmic microwaves approaching a black hole give indications of which revisions of PV theory are preferred.

In previous work by Puthoff[2] and others Polarizable Vacuum theory has offered as 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 complete and final theory or replacement for General Relativity. Having 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, and constructed into deep space transport vehicles operating at high speed.

In main stream physics the original PV theory failed to predict frame dragging of General Relativity. Later work by others found conclusive physical evidence of frame dragging, causing PV to be discarded by a number of researchers. Now frame dragging does occur in modified PV theory when velocity terms are added.

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 Undetermined Coefficient

A velocity term was added to Polarizable Vacuum theory using relativity calculations in nearly flat space.[3] Conventional equations of relativistic energy and momentum were used at high velocity, causing the Puthoff energy and mass functions to be redefined. 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 cosmic microwaves in space, making zero velocity measurable in the vehicle at 2.7 degrees Kelvin in every direction.

Results of accelerator experiments provide 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 which would complete the set, but interpretation of Heisenberg Uncertainty suggested a variation of Planck constant at high speed. At present there is no way to determine for sure which model is correct, although new data form LIGO merging black holes gives some indication. An undetermined coefficient is used with intent to discover the best coefficient from theories and observations.

1.7) $h = a*dE/df$ constant a for 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) $f/f_o = (E/E_o)^a$ representing frame dragging

Metric solutions of other writers relate frequency and light speed.

1.10a) $c/c_o = f_o^2/f^2$ metric solutions in gravity curved space
1.10b) $c/c_o = f^2/f_o^2$ backward curved space by analogy

Energy and light speed are related by the previous equations.

1.11) $c^2/c_o^2 = (E^4/E_o^4)^a$ in warp field

Using (1.2) for relativistic terms,

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

1.13) $dp^2 = (E_o^2/c_o^2)d(E^2/E_o^2)/\ (E^2/E_o^2)^{2a}$
1.14) $p^2 = (1/(2a-1))(1 - (E^2/E_o^2)^{(1-2a)})(E_o^2/c_o^2)$ momentum

A limit can be placed on the constant a by Heisenberg Uncertainty and conservation laws.

1.15) $2\pi \geq a > \text{zero}$

1.16) $(mc^2)^2 = E^2 - (pc)^2$ gives a mass function (1.17).

Velocity is calculated using (1.14) and (1.2).

1.17) $(v^2/c^2) = (1/(2a-1))((c^2/c_o^2)^{(1-1/2a)} - 1)$

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

This exercise demonstrates that 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.

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

1.19) $v = c_w$
1.20) $c = c_w$ in the limit
1.21) $(c_w^2/c_o^2) = (2a)^{(2a/(2a-1))}$

This is the predicted upper limit of velocity for not violating (1.1) and (1.2). 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. Warp field elongates and finally becomes a tube of great length representing a worm hole. Frame dragging created warp, then a worm hole.

The critical speed is reached in less than 4 years of ordinary acceleration equivalent to Earth surface gravity, depending on the choice of constant a.

Frame dragging, warp fields, and worm holes occur in these results, but at a different speed and energy for different values of a. The value of a can be estimated from conservation of microwave energy and gravity potential energy near a black hole, for comparison with LIGO data.

1.22) $(c/c_o)^7 = (E/E_o)^6$ for gravity curvature near black hole[4]

From (1.11)

1.23) $2a = 6/7$ in deep space transport at high speed
1.25) $a = 3/7$

These results suggest that travel between stars can be achieved in much less than a life time. A physical test would decide which value of a is best, but proof requires a high speed deep space test vehicle or other means of testing. The parameter a may be found to vary with the local energy density.

Polarizable Vacuum with Velocity and Variable Coefficient

A variable parameter q was introduced to replace the constant a, giving a more flexible set of solutions that may be more appropriate in physical situations.

2.1) Let $q = 2\pi \, \mathrm{Ln}(E/E_w)/\mathrm{Ln}(E_o/E_w)$

2.2) $h = q \, dE/df$

2.3) $E = hf$

2.4) $(f/f_w) = (E/E_w)^{(q/2)}$

2.5) $(c^2/c_w^2) = (E^2/E_w^2)^q$

2.6) $dE^2/E_w^2 = (E^2/E_w^2)^q \, dp^2/p_w^2$

This model and several other functions of q do not differ much from the Heisenberg Limit model in the range of LEGO Data.

Field Effect Generators

Kinetic energy of high speed has been developed in this article as a possible source of vacuum polarization, requiring less than 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 one 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, demonstrating the prediction of frame dragging, and leading to warp fields and worm holes.

Consequences for Actions in Super Saturated Space

So far a set of 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. Pretorius[12] predicted in 2005 a loss of about 5% in merger and ring down.

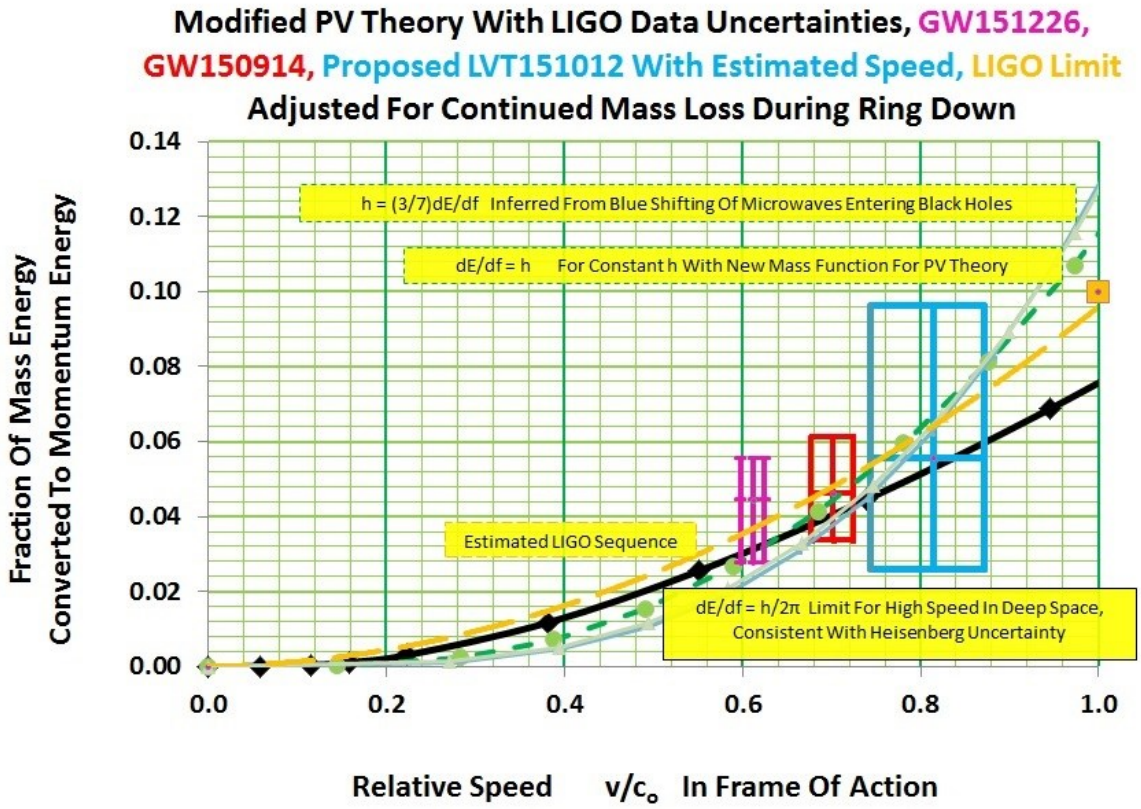
Figure (3.1) shows an approximation of how LIGO data compares to Polarizable Vacuum Theory as expressed for high speed in deep space, adjusted for mass loss continuing during ring down. The figure shows LIGO[5][11] events GW150914 and GW151226 which are confirmed, and LVT151012 which is proposed but not confirmed. LIGO data was supplemented by estimates, of the unpublished merger speed for the unconfirmed event, using standard methods of celestial mechanics. The LVT151012 event was given a slightly higher merger speed than the first event, considering closer approach over compensating the smaller masses.

Several proposed PV theories modified for high speed were found to be in reasonable agreement with some parts but not all LIGO publications of mass loss to kinetic energy at high speed.

The figure shows partial agreement of LIGO data with the several versions of modified Polarizable Vacuum Theory within stated limits and uncertainties. Blue Shifted Microwave models appear to be eliminated by GW151226,

leaving the model of Heisenberg Uncertainty or invariant Planck constant limit as the only models which fall within all of the allowable ranges.

Figure 3.1



LEGO data for GW151226 appears to eliminate the case of {h=(3/7)dE/df} but not the cases for constant h or the limit based on Heisenberg Uncertainty.

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 equipment design parameters.

Published LIGO observations of merging black holes are in reasonable agreement with two versions of Modified Polarizable Theory based on invariant Planck constant or Heisenberg Uncertainty Limit. One case is eliminated that followed from blue shifting microwaves near a black hole.

It seems likely that locally measured mass decreases at high speed and converts to some extent into kinetic energy in a warp field in agreement with LIGO observations. 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 record the relativistic 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. Independent verification is needed for the predictions of critical speed and degenerate space time. The writer (Decker) has invited collaboration from other interested researchers for further developments of the theories and proofs.

Acknowledgements

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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.

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