Modifications of Polarizable Vacuum Theory For Deep Space Transport at High Speed

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Abstract

A first attempt to extend Polarizable Vacuum theory of Harold Puthoff and others to high speed in deep space quickly failed the test of special relativity for all velocities other than zero.

A modification to PV theory is proposed to be based on work by Niels Bohr in 1949 for extending the theory to high speed in deep space transport vehicles. Planck's constant is allowed to vary slowly with stress energy in the vacuum.

The modification is used to predict a polarization in the vacuum can arise from high speed of prolonged acceleration, resulting in localized stress energy curvature of space. A weakness of PV theory is removed by offering high speed as a source of vacuum polarization to supplement the previous suggestions for field effect generators of the future.

Introduction

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 a publication H. E. Puthoff [1] and S. R. Little in 2010 gave a description of PV as it relates to deep space transport, showing that a field effect propulsion generator must be very powerful, requiring technology that is far advanced beyond the present capability of space science on Earth. [2] In principle the parameter ($K < 1$) could arise from a powerful field generator, but as Puthoff pointed out in the referenced article, the power requirements are far beyond the capacity of existing equipment.

In this present work the question will be asked about how PV theory is altered locally by a fast moving deep space transport vehicle. More specifically an attempt will be made to extended PV theory with velocity terms sufficient to show the polarization parameter ($K < 1$) arising from the velocity terms. An example is the accumulated speed and kinetic energy of a deep space transport vehicle under prolonged acceleration. The accumulated kinetic energy of a deep space transport vehicle will be proposed as a substitute for the field effect generator for polarizing space, noting that both types of energy must interact with the local vacuum.

Polarizable Vacuum with Velocity Terms

First the Puthoff system of PV will be evaluated to add a velocity term using special relativity 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) $E^2/E_o^2 = (1/K)$

2) $m/m_o = K^{(3/2)}$

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

Special relativity requires additional equations.

4) $E^2/E_o^2 = (mc^2)^2 + (pc)^2$

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

Energy from (1) is restated in relativistic form using (2) and (4) for PV theory at high speed.

6) $E^2/E_o^2 = (1/K)(1 + v^2/c^2)$

Energy (6) is expressed in terms of light speed using (3).

7) $c/c_o = (1/K)(1 + v^2/c^2)$
8) $(1 + v^2/c^2) = 1$
9) $v = o$
10) $c = c_o$
11) $K = 1$ little or no polarization
12) $m = m_o$

This exercise demonstrates that the Puthoff system of PV applies only when velocities are small or zero. The limitation arises from Puthoff's assumption of invariant Planck's constant. Then a stress energy curvature ($K < 1$) does not occur from high kinetic energy in PV theory although it might occur from futuristic field generators or other methods not driven by velocity.

So far this work has used the standard equations of special relativity to show an invariant Planck's constant h is only valid for small velocities in the Puthoff system of PV. However Planck constant is a property of space and should vary when energy density changes in extreme cases.

Polarizable Vacuum Theory Modified For High Speed

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.

13) $\Delta t \sim 1/\Delta f$

13.1) $(\Delta E)(\Delta t) \leq \hbar$ Heisenberg uncertainty

14) $\Delta E/\Delta f \leq \hbar$

A limit of (14) is proposed for large scale energy interaction with the vacuum to minimize the variation of Planck's constant in a modified PV theory.[4]

15) $dE/df = \hbar$ for a large number of quantum actions

16) $E = h\,f$ on the same scale for each action

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

17) $dE = v\,dp$

Using (5) for relativistic terms,

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

By integration of (15) and (18),

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

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

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

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

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

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

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

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

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

27) $(mc^2)^2 = E^2 - (pc)^2$ from (4) giving mass

Velocity is calculated using (26) and (5).

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

giving 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.

K goes from 1.0000 to 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.

29) $v = c_w$
30) $c = c_w$ in the limit

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

This is the predicted upper limit of velocity for not violating (4) and (5). It is suggesting a worm hole is opened by the extreme interaction of the space vehicle with the vacuum, when the kinetic energy equals the vacuum energy.

$(c_w/c_o) = 3.95478087046553$

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.

Consequences for Actions in Super Saturated Space

So far a system has 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 the propulsion of the vehicle.

Summary of Methods

In summary the ordinary equations of energy momentum are used.

4) $E^2/E_o^2 = (mc^2)^2 + (pc)^2$
5) $(pc) = E(v/c)$
17) $dE = v\ dp$

From relativity and metric solutions light speed is related to frequency.

20) $c/c_o = f^2/f_o^2$

From quantum mechanics Planck's law is used.

16) $E = h\ f$

Heisenberg uncertainty is used for interchange of energy with the vacuum.

13.1) $(\Delta E)(\Delta t) \leq \hbar$

Finally a new interpretation is given to a speech of Niels Bohr.

13) $\Delta t \sim 1/\ \Delta f$
15) $dE/df = \hbar$

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.

The conclusion depends on local variation of Planck's constant under extreme bending of space.

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

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.

Special relativity has been stretched rather far for making prediction of stress energy curvature, but with special circumstances where symmetries apply to a single source 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.

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Reference 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. It was published for the first time by this author in a less formal setting of viXra: 1511.0085 on 9 November 2015.