Vacuum Partition Theory Putting A Limit On Energy In Space

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Abstract

A theory is published for partition of vacuum energy into different types of energy that oppose each other in control of curvature in space. Both general relativity and quantum field theory are accommodated by allowing the energy in space to be large, but finite while the cosmological constant is small.

Partition puts a limit on the energy in vacuum space, large enough for quantum mechanics, but not infinite. An argument is made that part of the energy can be borrowed according to Heisenberg Uncertainty, but must be repaid promptly one way or another.

The result leads to modification of polarizable vacuum theory.

Introduction

A long standing debate between specialist in Quantum Mechanics and General Relativity has delayed the progress of science related energy conversion and especially to Deep Space Transport technologies. This article proposes a way to resolve the issue by minor extensions of existing science, without violating fundamental principles or ignoring extensive research by others supported by decades of experimental results.

It is proposed to partition vacuum energy much as has been done to other systems in science like kinetic theory where equal partition of energy invokes symmetry and simplifies the solutions to problems. In the case of vacuum energy the partition is said to be equal in flat space, but unequal during stress related curvature of gravity, electromagnetic fields, and transient events.

Vacuum Partition of Energy and Momentum

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.

The only known way to have large energy that does not curve space was published by Reissner in 1916 and Nordström in 1918. Peter Bergmann published it again it in his book (1) a solution to Einstein's field equations predicts that static electric energy counteracts gravity in curvature of space g_{rs} and curvature of time g_{44}. Albert Einstein wrote a foreword for Bergmann's book, recommending it for college studies. Tolman published the same work in his book (2) under a topic of conserving electric charge in a gravity field. Other published work suggests magnetic energy also curves space backward if monopoles exist or magnetic diploes have sufficient distance between the poles.

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

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

(1.3) $m^2 = \frac{1}{2}(1-Z)(hc/G)$ 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) $\frac{1}{2}(q^2/C) = \frac{1}{2}(Z)hf$ 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) $U/V = \frac{1}{2}hf^2/\lambda^2 c$

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

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

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

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

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

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

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. Calculations of this type have been done since the time of Paul Dirac, with the addition in this model of the partition function between electromagnetic and gravitational potential to give a nearly flat space.

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 em radiation compete for zero point energy to support their field strengths and continuous propagation through space.

The Dirac Sea of Energy in this theory is equal to the potential energy density at the event horizon of a black hole. It is the vacuum energy that caries the physical laws everywhere, and governs the physical constants. Unification of the four forces must occur in the Zero Point. The Vacuum Energy has to contain all of the physical laws and constants, because they are nearly the same almost everywhere.

Grand Unification usually fails because it doesn't embrace the Dirac Sea of Energy or the partition of the Zero Point. Both the energy of entropy $\mathbb{S}$ and the information of entropy are contained in the Zero Point. So the temperature is defined.

(1.20) $T = d\,\mathbb{S}/dQ^*$ where dQ^* is the thermalized energy in a widely published inexact differential that is path dependent.

Using this equation as a starting point, all of thermodynamic functions can be derived from the Zero Point provided the vacuum energy is regarded as internal energy instead of free energy. This article does not say much about nuclear forces, but they must also arise from Zero Point, in actions that do not propagate very far in space. Grand Unification should be expressed as a partition of energy, not necessarily the equality of forces. In QCD theory forces are not usually equal, only at some very high temperature that doesn't often occur anywhere on the macro scale.

Energy partition in flat space is in equilibrium when all the four forces have equal amounts of energy assigned to them. This is the meaning of Grand Unification. The LC model only shows the potential gravity and the potential electromagnetic fields. The nuclear forces are always present as a potential. So this model actually only shows the half of Zero Point energy, the half that is relevant to long range forces and curvature of space.

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.

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

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

$$(1.23) \qquad dE = vdp$$

$$(1.24) \qquad E = hf \qquad \text{from Planck}$$

$$(1.25) \qquad dc/c = 2\, df/f \qquad \text{from metrics}$$

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).

$$(1.26) \qquad dE/df = \hbar$$

The completed set of equations have been used by this author (5) to extend the work of Harold Puthoff (6) and others on Polarizable Vacuum (7) 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.

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

Conclusions

In conclusion there is prediction partition of energy in vacuum space arising from classical averages of quantum events. This theory is a reasonable extension of existing technology, and helpful to unite general relativity with quantum field theory.

The conclusion leads to assistance for other theories, such as modification of polarizable vacuum theory by adding 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 partition of the vacuum energy. 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.

Averaging methods used in this article have overlooked a large and unpredictable variation from one quantum event to another. The benefit is a result that is understandable to a large audience.

A more complete evaluation could be done by specialists in quantum wave functions and other specialists in terms of general relativity for the local curvature in gravity fields. Further development is needed to test the theories and apply the results to make reasonable choices in design and staffing of a vehicle for deep space transport.

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Reference Notes

1) Peter Bergmann; Introduction to the Theory of Relativity, first published Prentice Hall, 1942; Reference Dover, New York, 1976. Page 206, equation set (13.34)

2) Richard Tolman; Relativity Thermo-dynamics And Cosmology, Oxford Clarendon Press, Oxford, 1934; Reference 1958 edition. Page 266, equation (107.5)

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.

5) Jerry L. Decker, Polarizable Vacuum Theory In Deep Space Transport At High Speed , https://www.researchgate.net/publication/285404064_Polarizable_Vacuum_Theory_In_Deep_Space_Transport_At_High_Speed , 2015.

6) puthoff@earthtech.org

7) H. E. Puthoff and S. R. Little, http://arxiv.org/ftp/arxiv/papers/1012/1012.5264.pdf , 2010.