

A string solution in quantum gravity

Oricchio Domenico

February 12, 2011

Abstract

I hypothesize that each elementary particle is a wave function in a spacetime bubble, and I hypothesize the existence of infinite types of interaction forces, fermions and bosons. I suppose that the Landau-Lifšitz pseudotensor is the general relativity differential equation, the Scheibe operator, over the relativistic wave function that are arbitrary function of the metric density, the square root of the negative determinant of the metric tensor .

Theory

The elementary particles - and the interaction gauge bosons - are energies, but the energy is equivalent to a curvature in the Einstein equations, then the elementary particles are curvatures.

The method to obtain elementary particles is through local creation of a closed gravitational field because of the energy: each particle is a gravitational bubble in the spacetime, and each gauge boson a spatial distortion.

The quantum description of a closed sphere (Friedman space) can be made using the cosmologic quantum gravity solutions, for a simple space with constant positive curvature (particles), or a constant negative curvature (antiparticles): the canonical quantization can be made in this space.

The more simple quantum description - that is obtained historically in two independent ways - is the quantum equation of Wheeler-DeWitt (WDW); this equation permit to obtain the wave function in a curved space with numerical method, and there are some analytic cosmologic solution.

I obtain some simple analytic solutions in a Friedman space where the metric tensor is diagonal - so that the WDW equation can be simplified - and

the curvature is constant; the solution is a wave function that is a serie of the metric density; the volume of an antiparticle is negative (constant negative curvature), and I think that must exist particles with positive and negative curvature (interaction gauge bosons) that are obtained from a collision of two curvature particles.

The Friedman solution is a quantum solution (it is possible to obtain a discrete number of solution), but all the solutions have the same energy (the curvature is constant, then the energy of the bubble is constant); it is possible to obtain different energy particles using a modified Friedman metric (an isotrope space with a variable curvature that is a function of the radius), so if the square of WDW wave function is a probability of curvature, then it is possible obtain different density of energy for different points, and the integration in the modified Friedman space is the energy of the particle: the curvature function is arbitrary, so it is possible to use the experimental data to adapt the metric tensor to obtain the mass spectrum of the elementary particles.

The particle-antiparticle collision is a four-dimensional collision between spherical membrane (bubble) that form new particles and interaction: the aligned-collision between equal spin particle-antiparticle lead to an integer spin or a null spin; it is possible obtain for aligned-collision iterations each spin values for particles and interaction gauge bosons (for example each half integer spin values for leptons, and each integer spin values for interaction bosons): it is possible to verify the existence of infinite gauge boson using a balanced 4-momentum (like in Compton effect) for a collision with a single product (boson).

It is possible a trasformation of each particles in an other with the same spin for tunnelling between curvature wave functions: it is possible to obtain a particle with lower energy (neutrinos oscillation, and spontaneous neutron decay); the neutrinos tunnelling can be verified measuring the infrared transversal emission in a shell around the sun, this can measure the inner reaction of the sun. Tend the Universe to a state with only gauge boson and leptons, because of tunnelling ?

If the Universe have negative curvature, and the particles have positive curvature, then the Universe is like a great antiparticle (Dirac sea) that compensates the particle curvatures: the whole Universe-curvature and particles-curvatures can have null total energy or null total curvature, and the particles can be created in a curvature negative event like a primordial explosion.

There are the possibility of an experimental check of the tunnelling de-

cay, measuring the light emission of galaxy near the Big Bang, and comparing the isotopes: if there is tunnelling, than there is a difference in the emission spectrum; moreover if the boson tunnelling decay exist, then there is a gravitational force reduction after the Big Bang.

An elementary particle have a synchronized membrane because each massless boson cannot be used to obtain simultaneity, this is a confirmation that the WDW differential equation is an appropriate candidate to particle description because WDW have not time coordinate; each elementary particles is a singularity in the spacetime for the same reason, because a little surface must be simultaneous.

All is geometry

Updates

I studied the WDW equation, but the solutions of the equation are not a 4-momentum: there is not a conservation of the momentum in a Noether form, but the WDW solution inspired me to obtain the correct differential equation in the general relativity.

The WDW solutions have a form that is similar to Landau-Lifšitz pseudotensor, if one try the Landau proof of the pseudotensor then one see that there is an arbitrary choice for the power of the metric density, then each elementary function with argument the metric density is a bubble in the gravitational space that give the energy of the particles. The Landau-Lifšitz operator (in the cartesian form the Scheibe operator) can be applied to a wave function in the space to obtain an invariant (the energy of the particles), and it is possible to obtain the invariant angular momentum.

The Scheibe operator give the energy density in the four-dimensional space, and it make the same function of the Schrödinger equation, if we consider the wave function over the four-dimensional space a distortion obtained by the Einstein equation (the couple of Einstein equation and Scheibe operator give the complete description in cosmology and particle physics).

In this moment I am studing a class of infinite metrics that are in the Friedmann form, or in the Schwarzschild form, to obtain the mass spectrum with Mathematica, and C, programs; until now I obtain half particles spectrum (relative error less of one per cent) in the optimal approximation and using the Particles Data Group review.

There are two interesting results, the dimension of the bubble in each metric is $\sim 10^{-54}$ cm and a strange result for the Schwarzschild-metric energy that is null using the Landau-Lifšitz pseudotensor because the space curvature is null like the galileian space.

- [1] Teoria dei campi - L.D.Landau, E.M.Lifšitz - Editori Riuniti, 1985
- [2] Quantum gravity Mathematical models and experimental bound - Bertfried Fauser, Jürgen Tolksdorf, Eberhard Zeidler, Max-Planck-Institut für Mathematik in der Naturwissenschaften - Birkhäuser Verlag, 2007 (detailed bibliographic data is available in <http://dnb.ddb.de>)