The basic physical principles of unification of gravity and quantum mechanics
Part I

Abstract

In this paper the basic physical principles of unification of gravity and quantum mechanics in lay terms is explained.

Special theory of relativity (STR) (1905) considers that particles of matter have their inner energy and that this huge amount of energy is compressed in these particles, but does not provide any physical mechanism for how this energy in a mass is held, where this energy come from and how this amount of energy get into matter.

General theory of relativity (GTR) (1915) provided us with a relationship between the amount of matter and the size of the forces of the gravitational field, however, has no idea about the physical mechanism of the relationship between the amount of matter and the size of the gravitational field. By Einstein's gravitational constant GTR has introduced the concept of non-zero value for the size of the energy density of the void space of the universe. In the GTR, the origin of the gravitational field is attributed to a compression of this basic non-zero value of the void space energy and the size of this compression is equal to the size of the matter embedded in this space.

Quantum mechanics (QM)(1919-1927) introduced the concept of non-zero values of the energy of the vacuum of empty space, introduced Planck's constant (up today without a satisfactory explanation of its physical meaning) and at the same time QM introduced the concept of the wave functions (their sense is to present unexplained) associated with dimensionless point particles. By using the Planck constants and wavelengths of the wave functions QM provided us to get the energies of the dimensionless particles and photons from non-zero values of the vacuum energy.

An Anderson major discovery (1932) brought knowledge about creation of mass particles by compression of the vacuum energy in the photons, and then stopping these photons.

This work brings new knowledge, about equality between the concepts of the size of the internal energy of the particles of matter introduced in STR and the size of the energy of photons, from which these particles are created. This equality allows us to connect the compression of the vacuum energy with the internal energy of the particles and for proton particle the internal momentum $5.02\times10^{-19} kgm/s$ is derived. The work brings new knowledge that the origin and essence of all matter can be attributed to the compression of the energy of the vacuum.

This work brings new knowledge that along with creation of the material particles from the photons at the same time the gravitational field around these particles of matter must necessarily arise.

This work consequently brings new knowledge of the equality between a non-zero value of the space energy of the void universe, by compression of which the gravitational field arise from and a non-zero value of the vacuum energy by compression of which the particles and internal energy of particles of matter arise from.
This work presents new knowledge about the identity $h / c = \kappa = 8\pi G / c^4 = 2.21 \times 10^{-42}$ of the concepts of non-zero values of the space energy of the void universe which is expressed in Einstein's gravitational constant and non-zero value of the vacuum energy, which is assigned to the Planck constant.

Of the new recognition of the equality of the these constants this work presents a new understanding that the gravitational force has its opposite force in the internal momentum of atomic particles of matter and this internal momentum of particles is reversely oriented force to own force-field in the surroundings of these particles.

This work maintains that the essence of the composition of the mass of all atomic particles, as well as all force fields in the universe, is the same and is created by the compression of density of the energy of the void space of the universe.

New knowledge of this work allow us to explain the physical mechanism between the quantity of matter and sizes of the gravitational field in its surroundings, provide an opportunity to explain the origin of gravitational fields and internal energy of particles of mass bodies, to explain where the energy in the particles of mass body come from, how energy get into the particles and how is this huge energy in the mass held, to explain the nature of the wave functions associated with dimensionless point particles by assigning the wavelengths of the wave of the fields to the actual dimensions of these particles $\lambda_o = h / m_o c$, to lay the basic platform for the unification of quantum mechanics and gravity, to arrive at a new understanding of the nature of gravity and mass.

References

[1] P. Sujak, Big Crash of Basic Concepts of Physics of the 20th Century?
Proc. of the 20th Ann. Conf. of the NPA, July 2013, College Park, Maryland, ISBN 978-1-304-19506-7

[2] P. Sujak, On the General Reality of Gravity, as Well as Other Forces in Nature and the Creation of Material Particles and Force Fields in the Universe
Proc. of the 20th Ann. Conf. of the NPA, July 2013, College Park, Maryland, ISBN 978-1-304-19506-7