Gravity as a result quantum vacuum energy density

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Planck density is: $\rho_p = \frac{m_p}{l_p^3}$ (1). Planck energy is: $E_p = m_p * c^2$ (2). Planck energy density is: $\rho_{pE} = \frac{m_p * c^2}{l_p^3}$ (3).

Out of (3) follows in empty cosmic space without mass density of energy of a given volume of quantum vacuum V_{qv} is: $\rho_{qvE} = \frac{\sum_1^n m_p * c^2}{\sum_1^n l_p^3}$ (4), where $V_{qv} = \sum_1^n l_p^3$ (5).

Out of (4) and (5) follows: $\rho_{qvE} = \rho_{pE}$ (6).

By the presence of a given massive particle or massive object m in a given volume V_{qv} of quantum vacuum its energy density will diminish respectively to the amount of mass m :

$\rho_{qvE} = \rho_{pE} - \frac{m * c^2}{V_{qv}}$ (7).

Out of (7) follows: $\Delta \rho_{qvE} = \frac{m * c^2}{V_{qv}}$ (8).

Mass m of massive particle or object is inseparable from diminishing of energy density of quantum vacuum in the area where mass m exists for the $\Delta \rho_{qvE}$ (8).

This understanding of relation between mass and density of quantum vacuum energy is giving an alternative interpretation of diminishing of orbital velocity of neutron binary stars. It seems stability of elementary particles requires certain energy density ρ_{qvE} of quantum vacuum. Where energy density ρ_{qvE} is extremely low as for example on the surface or inside of binary stars, elementary particles in this area are not stable and neutrons disintegrate into quantum vacuum energy. This is an alternative interpretation for diminishing of orbital velocity of binary neutron stars PSR B1913+16 which is caused by mass transforming into quantum vacuum energy. This interpretation does not predict that mass can have emission of gravitational waves which have not been observer experimentally yet.

Gravity as a result of dynamics between mass and energy density of quantum vacuum

Massive objects diminish density of quantum vacuum in the area where massive object exists: $\rho_{qv} \prec \rho_p$ according to the formalism (8).

In an ideal quantum vacuum empty of massive objects a given massive object will not move; it will remain still. Around the given mass m energy density of quantum vacuum is diminished. When this mass m is in an area where energy density of quantum vacuum is stable, means there is no other mass around, mass m will not move.

Motion due to the gravity will happen where close to the mass m_1 will be another mass m_2 ; between two (or many) local areas of quantum vacuum with lower energy density works attraction force; this is the only actual gravity force that exists in the material universe.

Mass itself is not producing gravity, gravity is a result of lower energy density (in GR described as higher curvature of space) of local areas of quantum vacuum.

In the universe there is a general law of homogeneous distribution of energy (second law of thermodynamics). Because if this law quantum vacuum energy density ρ_{qvE} has a tendency to have an average constant density all over the universe which is Planck energy density ρ_{pE}. Areas with lover energy density with masses $m_1, m_2, m_3 \ldots\ldots$ have tendency to merge in order to increase quantum vacuum energy density to the $\rho_{qvE=}\rho_{pE}$. Masses m_1, m_2, m_3........are braking average energy density of quantum vacuum ρ_{pE} of a given areas and so this areas have tendency to establish average energy density with their motion into a given directions which would lead to the increasing of quantum vacuum energy density of this areas to the $\rho_{qvE=}\rho_{pE}$.

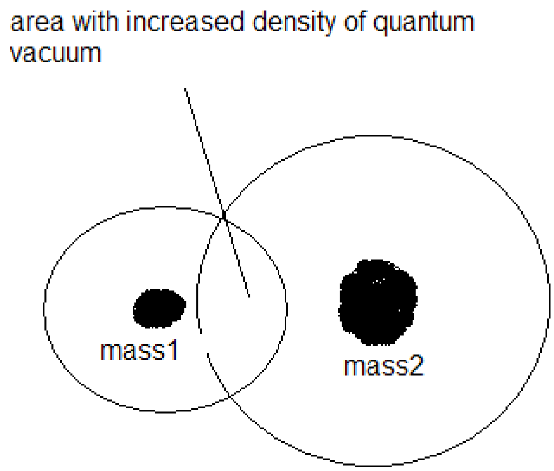

FIG. 1. Attraction force between two areas of quantum vacuum with diminished energy densities

Universe is a system in continuous dynamic equilibrium

In outer space where energy density of quantum vacuum is $\rho_{qvE=}\rho_{pE}$ quantum vacuum is continuously transforming into massive particles that build up atoms. About this there is a good book: Michael W. Friedlander (2000), A Thin Cosmic Rain: Particles from Outer Space, Harvard University Press

Inside super massive objects as black holes and neutron stars energy density of quantum vacuum ρ_{qvE} is at minimum: $\rho_{qvE} = \min$. In this area massive particles cannot exist because stability of massive particles requires certain level of energy density of quantum vacuum. At $\rho_{qvE} = \min$ massive particles disintegrate back into the energy of quantum vacuum.

Creation of mass particles in areas with $\rho_{qvE} = \rho_{pE}$ is continuous. Disintegration of mass particles in areas with $\rho_{qvE} = \min$ is continuous. Universe is a system in a permanent dynamic equilibrium without beginning or and end.