Critical Comments on Emission of Gravitational Potential Energy

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Abstract: Here, within the Scale-Symmetric Theory, the critical remarks about luminal gravitational waves and luminal gravitons are presented. The mechanism of emission of the potential gravitational energy differs very much from the mechanism described within the General Theory of Relativity.

According to the Scale-Symmetric Theory (SST), [1], during the inflation, the superluminal non-gravitating Higgs field (it consists of the superluminal pieces-of-space/tachyons and their size is about 10^{-64} m) partially transformed into the luminal gravitating Einstein spacetime composed of the neutrino-antineutrino pairs [1A]. The pairs consist of the superluminal binary systems of closed strings (entanglons) which are responsible for the superluminal quantum entanglement of the luminal Einstein-spacetime components. The entanglons have internal helicities and in their interactions with the Higgs field, they transform the chaotic motions of the Higgs-field components (i.e. the chaotic motions of the non-gravitating tachyons) into the divergent motions. The collisions of the chaotically and divergently moving superluminal tachyons produce the gradients in the Higgs field – they are the gravitational fields of the neutrinos i.e. the neutrinos carry the smallest gravitational masses. Such is the true Higgs mechanism. SST shows that there are the two species of stable neutrinos (the word "stable" means that today the neutrino-antineutrino pairs composed of the stable neutrinos cannot annihilate) and the unstable tau-neutrino composed of three different stable neutrinos.

Emphasize once more that neutrinos are the smallest gravitational masses. Neutrinos, due to their internal structure, produce the weakest gravitational fields. Such gravitational fields consist not of luminal gravitons or luminal gravitational waves – they consist of the superluminal non-gravitating tachyons the Higgs field consists of.

We can see that potential gravitational energy consists of the superluminal non-gravitating tachyons.

So what is the mechanism of emission of the potential gravitational energy?

Consider a merger of the modified black holes (MBHs). SST shows that there are not in existence black holes with central singularity but there are the MBHs containing a circle with spin speed equal to the speed of light in "vacuum" c. [1A], [1B]. The MBHs consist of the

modified neutron black holes (MNBHs) built of entangled and/or confined neutrino-antineutrino pairs and neutrinos [1B]. Mass of MNBH is quantized – it is 24.81 solar masses [1B].

Assume that distance between two neutron stars decreases so gravitational potential energy should be emitted. There are possible two different phenomena. SST shows that closer and closer to a gravitational mass, number density of free tachyons decreases. On the other hand, the Higgs mechanism described within SST, [1A], shows that gravitational mass of an object depends on number density of tachyons in a region the object is placed. It leads to conclusion that masses of the two neutron stars approaching each other decrease. But SST shows as well that the changes in mass are infinitesimal so there must be in existence another mechanism of emission of gravitational potential energy. Today there cannot appear virtual pairs created from the Higgs-field components (it was possible only at the beginning of the inflation [1B], [1A]) so density of the gravitational fields cannot decrease due to production of such pairs – such pairs could decay to virtual particles moving in opposite directions so they could carry the gravitational potential energy. It suggests that in one-component spacetime (i.e. the superluminal non-gravitating Higgs field only) the two neutron stars cannot approach each other. But it is possible in the two-component spacetime (i.e. the Higgs field plus the luminal gravitating Einstein spacetime). Just in strong gravitational fields can be created pairs composed of the entangled and/or confined neutrino-antineutrino pairs (the Einstein spacetime consists of them) and neutrinos. Since the stable neutrinos are the lightest gravitational masses so virtual particles composed of them carry the gravitational potential energy. We can say that the binary system of neutron stars gets rid of the gravitational potential energy by emission of virtual particles composed of the Einstein-spacetime components which carry gravitational fields (so gravitational potential energy as well) because of their gravitational mass. Such mechanism decreases mass density of the local Einstein spacetime (in a cosmic scale) and has nothing with gravitational waves or gravitons – it looks as a local volumetric flow in the Einstein spacetime that causes that between the stars mass density of the Einstein spacetime is lower than the mean value whereas outside such region is higher. The region composed of the additional Einstein-spacetime components with mass density higher than the mean value, behaves as the dark matter. But SST shows that there are in existence the other dark-matter structures also [2], [1B].

The described here mechanism shows that luminal gravitational waves and luminal gravitons are not in existence.

Consider creation of a mass. New mass appears due to an increase in local gravitational-mass density of the Einstein spacetime i.e. there must be flows in the Einstein spacetime. It leads to conclusion that besides the new mass there are produced mass holes in the Einstein spacetime. The speed of light in "vacuum" c is the characteristic speed for disappearance of the mass holes. The gravitational field produced by the new mass propagates with superluminal speed but due to the existence of the expanding mass holes, which expand with luminal speed, a very distant observer cannot see the new mass immediately. It follows from the fact that the resultant gravitational field of the new mass and the expanding mass holes is for the very distant observer equal to zero. To see the whole new mass, the mass holes must disappear. It leads to conclusion that we cannot detect the superluminal propagation of a new gravitational field.

The Scale-Symmetric Theory shows that the gravitational fields are not associated directly with the luminal Einstein spacetime. They are directly associated with the superluminal non-gravitating Higgs field. During the inflation, there were produced the Einstein-spacetime components so associated with them the new gradients (potential gravitational energy) as well. The new gradients expanded in the Higgs field with superluminal speed. But notice that during the inflation, the Higgs field expanded as well. Today, probability of production of

new neutrinos is practically equal to zero – it follows from the present-day very low number density of the Higgs field. New neutrino can be produced only due to some phase transition of big fluctuation of the Einstein spacetime [1B].

Due to the confinement (to the confinement leads the Mexican-hat mechanism), in the Einstein spacetime with increased mass density (for example, outside but near to the MBHs where appears the dark matter) can be produced condensates composed of the neutrino-antineutrino pairs. Decays of such condensates produce the unidentified emission line approximately $3.56\ \mathrm{keV}$ [3]. Such photons are not directly associated with dark matter but they are produced more frequently in the dark matter with higher mass density so they point such regions.

The present-day densities of the modified Higgs field and Einstein spacetime are very different. The "Einstein-to-Higgs ratio" is about $4{\cdot}10^{42}$ and it is the reason that the gravity is so weak in comparison with the electromagnetic, weak and nuclear strong interactions [1A].

The very different properties of the Higgs field and Einstein spacetime cause that unification of gravity and Standard Model within the same methods is impossible.

Consider a single photon moving towards a MBH. Its frequency should increase due to gravitational field. How the superluminal non-gravitating Higgs field transfers energy to such photon? SST shows that we can say only about a mean angular speed of the tachyons. It suggests that the increase in the angular speed of the single photon can be due to a decrease in mean angular speed of tachyons interacting with such photon (SST shows that the photons are the rotational energies of the neutrino-antineutrino pairs). Due to the superluminal speed of the tachyons, such decrease in mean angular speed is non-local. It means that the "stolen" energy by the single photon can be gotten back by the tachyons in arbitrary regions of the Cosmos.

References

[1] Sylwester Kornowski (2015). *Scale-Symmetric Theory*
[1A]: http://vixra.org/abs/1511.0188 (Particle Physics)
[1B]: http://vixra.org/abs/1511.0223 (Cosmology)
[1C]: http://vixra.org/abs/1511.0284 (Chaos Theory)
[1D]: http://vixra.org/abs/1512.0020 (Reformulated QCD)

[2] Sylwester Kornowski (2015). "The Dark-Matter Mechanism and Orbital Speeds of Stars in Galaxies"
http://vixra.org/abs/1410.0031

[3] Sylwester Kornowski (2016). "The Origin of the Unidentified Emission Line Wrongly Being Associated with the Dark Matter"
http://vixra.org/abs/1407.0047