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SYMMETRIZATION OF THE UNIVERSE'S EVOLUTIONARY DEGREE WITH THE AMPLITUDE OF GRAVITATIONAL WAVE

Annotation. This article contains information about symmetrization of amplitude quantity of gravitational waves, which were registered by LIGO and about combined GW150914, GW151226 masses got by an experimental way, with index of the Universe evolutionary degree got by the theoretical way.

Key words: The Universe evolutionary degree (UED), amplitude of gravitational waves (AGW), parametric criterions (PC).

Introduction. Symmetrization of the Universe evolutionary degree (UED) – Ad, with amplitude of gravitational wave (AGW) – S_{peak} creates precondition for new tasks.

It is well known, that relativistic dynamic dominates over the dynamic which was invented by Newton. Theories of Plank, Heisenberg and etc., are overlapped by our invented UED (The Universe Evolutionary Degree) theory.

With the help of UED theory we can formularize formula of evolution, light velocity, gravitation constant and value metrics. Whatever difficult the principles of physics may be, they are confirmed directly or indirectly, by the experiments or science observations over time. Essential feature of any given scientific method are observations and experimental way. It is well known, when experimental techniques make a step ahead, unexpected phenomena suddenly appear. And there are no expected reasons to assume that future process of experimental techniques won't lead to the same results due to the laws of the Universe.

Registration of gravity waves (GW) in the Solar System is rather difficult because of their extremely weakness. After passing the long way to the Earth (~

10^{22} meter) these disturbances become minimal. During amplitude estimation generated by the surface detector, we should take into consideration that the wave loses its amplitude inversely proportional to its passed distance. Gravity waves' exposure of substances has very little effect. This type of emission is used as a telescope for testing of profound properties of matter in a newborn Universe. Any other types of emission will be absorbed by the matter thickness.

For about 100 years ago, Albert Einstein predicted by the theory, that GW appears because of two heavy bodies merging. Two black holes slowly rotating around each other, approaching and merging into a one hole. The part (~4-6%) of gross weight turns into the beams that produce gravity waves as a result. Then GW emission detaches from the source and exists independent, expanding in a vacuum with the speed of light. The same process we have in other galaxies. Because of the little gravity strength, it is very difficult to detect the “ripples in the fabric of space and time” (by the theory of Kip Stephen Thorne).

From the beginning of the third millennium, upgraded and improved LIGO gives opportunity to capture the minute movement. Secular endeavors of scientists due to direct detection of GW crowned by the experimental discovery. Let's indicate committed amplitude of GW by LIGO as $-S^*_{\text{peak}}$.

*Take into consideration that relative deformation of metrics, Planck's constant and UED are marked by h letter. In order to avoid confusion we will mark AGW as S-strain. On the 14th of September in 2015, the first signal GW150914 of gravity waves was registered $\text{GW150914} \rightarrow S_{\text{peak}}=1,0 \cdot 10^{-21}$ [1].

On the 26th of December, in 2015 the second signal GW151226 [2] $\rightarrow S_{\text{peak}}=3,4 \cdot 10^{-22}$ was picked up by the physics of two international collaboration teams: LIGO and Virgo.

Backbone of UER - Ad theory informs us, that at the beginning of the Universe birth evolution indicator is equal to the Planck's constant - h_p , anthem it increases and can function during the Universe evolution. For about 30 years ago the author of this article [3], summarized that under principal PC in normally

taken to mean the quantity indexes of basic physical quantities of the Universe in the fixed time point.

Based on the analysis of parametric criterions (PC) we may provide representative degrees, parametric, spatial and time characteristics of any objects or models and the ways of information-gathering facilities. Nowadays, PC also definite the values of object sizes all over the world.

Due to the first law of the Universe dynamics, we may see:

$$\Psi_t = F(h_t) \quad (1)$$

where Ψ_t - parametric criterions (PC), h_t - evolution degree. UED show the limits of PC changes, unguided propagation of GW which may be dimensional and indimensional. In research works [4, 5] mentioned, that Ad covers all Universe evolution and changes for about 10^{61} for metric.

Standard quantum limits (SQL) were discovered in 1967 by Braginsky Vladimir and later this term (Standard quantum limits (SQL)) was officially defined by Kip Thorn. SQL block the quantum transition of gravitons that influence on the sensitization of measurement error of PC. Consumed for surface detector generation energy is proportional to the amplitude of excitation - metrics variations. Great numbers of gravitons that cause such power, facilitate current processes. These SQL are not fundamental and may be achieved by various ways.

For example, we may minimize the SQL if we pick up the impulse instead the coordinate of new formed mass and current impulse will to be the constant for new formed mass. In few words, it is rather difficult to minimize the SQL by the experimental way. From the other hand SQL closely linked with the Heisenberg uncertainty relation. In current situation, Heisenberg uncertainty relation for new formed masses begins from the moment of two massive bodies merging and continues its evolution in the Universe.

Based on the second law of dynamics of the Universe, we may see:

$$h_{GW} \leq \Delta p_t \cdot \Delta L_t \leq h_t \quad (2)$$

Where, $\Delta p_t \cdot \Delta L_t$ considers uncertain impulse and linear dimension of new formed mass, and where h_{GW} and h_t consider UED of new formed mass.

Significant amplitude that generates distortion of space-time in the dimensionless form may be performed as time varying field due to the relative deformations. Accuracy measurement of LIGO is defined by the quantum effects. Quantum regular patterns are used not only for microcosm, but also for macrocosm and megacosm. Roger Penrose wrote that it wouldn't be a surprise if quantum regular patterns change a bit for the macroscopic objects [6-11].

In spite of difficulties, scientists had bypassed the SQL obstacle and picked up AGW of GW150914, GW151226 masses. As usual, experimenters try not to measure ΔL , but try to find quantitative estimations of representativeness degrees, parametric, time and spatial characteristics of the models. In other words - try to solve this question by the way of simulation modeling.

AGW measurement by the theoretical way will give opportunity to avoid the term of minimal detection limit and quantum confinement. Applying UED theory gives opportunity not to measure ΔL but to calculate changes of PC. Interdependency remains even if these objects are in a space beyond of any known reaction limits.

Based on the third law of dynamics of the Universe, we may show that metrics deformation and $\Delta L/L$ of new formed mass, achieved in result of GW, defines quantitative, parametric, time and spatial characteristics of objects:

$$\begin{aligned} (L/\Delta L)^2 &\approx (t/\Delta t)^2 \approx (M/\Delta M)^2 \approx (E/\Delta E)^2 \approx (\Delta f/f)^2 \approx \\ &\approx (\Delta T/T)^4 \approx h/\Delta h \approx J/\Delta J \approx \rho/\Delta \rho \approx \Delta p/p \approx Ad \end{aligned} \quad (3)$$

Where $L, \Delta L, t, \Delta t, M, \Delta M, f, \Delta f, h, \Delta h, J, \Delta J, \Delta \rho, \rho, p, \Delta p, E, \Delta E, T, \Delta T$ – radius, time, mass, energy, frequency, temperature, evolutionary index, energy flux density, dark energy and new formed matter.

From the other hand, we will write the third law of the Universe: metric deformation of parametric, time and spatial characteristics of new formed masses by means of informational-gathering facilities of LIGO. Making effect on the

space, GW causes the relative space slippage. During penetrating through the masses GW propagate, shrink and become tensile-compressive.

$$\Delta L_{GW}/L \approx S_{\text{peak}} \quad (4)$$

Measurement with maximum possible accuracy due to the metric deformation $\Delta L_{GW}/L$ (where ΔL_{GW} – measurement of distance between proof masses, placed apart on L distance), caused by penetration of GW becomes principal. Runaway quantum uncertainties appear only in a case when we hold imaginary experiment on the random short scales shorter than Planck length or longer than diameter of the Universe.

Local changes of PC values influence on the synchronism, symmetry and isotropy which in their turn changes UED of another objects. Discovery of AGW with applying of the third law of dynamics gave the opportunity to fix the time arrow of ongoing processes in the Universe and discover the connection of different characteristics of physical quantities.

Balancing of numeral values of AGW and UED has mathematical sense and shows the boundary changes for different types of PC. Physical sense of non-dimensional value of current quantity is the result of deposited AGW caused by two black holes merging. It allows getting and studying much more information from the gravitational radiation.

Let's make balancing of amplitude value of GW registered on LIGO, resultant masses GW150914, GW151226 achieved by the experimental way (4), UED value of quantity achieved by theoretical way (3), due to the formulas (1) we may easily calculate PC values. According to the formula (2) which was achieved by theoretical way, uncertainty limits are consistent with the evidence of experiments outcomes [1,2].

It is instructive to say that during getting through $S_{\text{peak}}=1,0 \cdot 10^{-61}$ signal by the experimental way, we may calculate PC after the "Big Bang". Will it be possible to develop such sets as LIGO, Virgo, GEO500, KAGRA, LIGO India or other ones - we don't know. Also we may hold the imaginary experiment of the

chains of composability of physical values and strength with the help of laws of dynamics to calculate PC for every timepoint during evolution.

Conclusions: Made symmetrizing of spatial, time and parametric characteristics of registered GW150914, GW151226 masses on LIGO, which in their turn appeared in result of registration of AGW by the experimental way; calculated the number of evolutionary index of the Universe by the theoretical way; calculated PC quantities.

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