ON THE POSSIBILITY OF THE PERMANENT EXISTENCE OF ANTIMATTER IN THE UNIVERSE

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Antimatter can permanently exist in the Universe generally inside astronomical formations that have a non-zero value of the minimum possible Schwarzschild radius, and therefore have a mirror-symmetrical intrinsic space.

These are primarily hollow solid astronomical bodies in which the antimatter is separated from the matter by a median singular surface on which the value of the coordinate speed of light is close to zero and which has an arbitrarily large minimum possible value of the Schwarzschild radius in the mirror-symmetrical intrinsic space of the body. Due to this, the internal antimatter cannot annihilate with the external matter in arbitrarily massive hollow neutron stars or antimatter annihilates with matter gradually and for a long time in suchlike continuous quasars. The unusual topology of such hollow astronomical bodies is shown in the figure below.

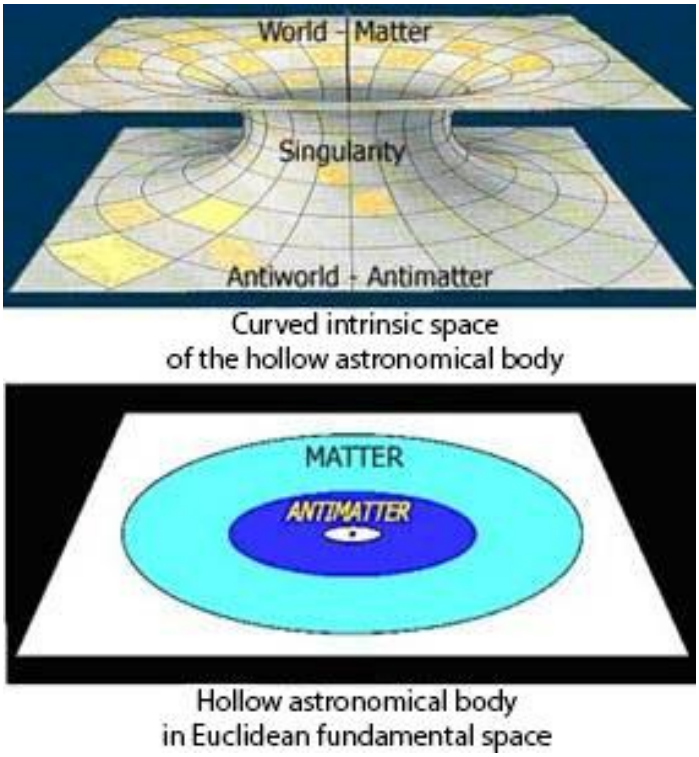

Fig. Curved intrinsic space of the hollow astronomical body and this body in Euclidean fundamental space of CFREU.

The possibility of existence of such unusual bilayered topology of astronomical bodies is confirmed by the solutions of equations of GR gravitational field. This is confirmed not only in frames of references of coordinates and time (FR) that is comoving only with continuous matter, but also in comoving with

expanding Universe FR (CFREU) [1, 2]. Internal surface of hollow astronomical body is convex in its space-time continuum. At the same time the phenomenon of contraction of "internal Universe" takes place in internal intrinsic "empty" space covered by that internal surface. The "lost" Fuller-Wheeler antiworld [3, 4] is located in the inner half-space of the hollow body. After all, unlike the outer half-space, it contains antimatter, not matter. Only such phenomenon is acceptable for the long-lived existence of antimatter (diverging spiral wave formations) [1, 2, 4 – 10]. Universe expansion phenomenon is acceptable only for the long-lived existence of matter (converging spiral wave formations).

In a galaxy that is not a continuous astronomical self-formation the coordinate velocity of light v_{ce} can be significantly greater than zero on the median surface with the minimum possible value of the Schwarzschild radius r_e. After all, the prevention of the annihilation of stars containing antimatter with stars containing matter is ensured by their rotation around the median surface, which does not allow them to fall onto this surface, and even more so to cross it.

Therefore, it is possible that most quasars are "loose nuclei" of galaxies that have the loose structure and the topology of a hollow "loose body" in the background Euclidean space of CFREU and the mirror symmetry of their intrinsic space. Then, precisely, near the median spherical surface of the galaxy with the minimum possible value of the Schwarzschild radius r_e in the matter-antimatter intrinsic FR, the maximum rotation speed of both the outer stars consisting of matter and the inner stars consisting of antimatter takes place. Catastrophic annihilation of these stars does not occur only due to the fact that they do not cross the median spherical surface of the galaxy, which, due to the constant renormalization of the size of the length standard in CFREU, has a constant radius $R_{t/e}=r_e$ in it at any proper time t.

If the value of radius $r_e=R_{t/e}$ of the surface of "loose nucleus" of the galaxy is the minimum possible in mirror symmetric configuration of intrinsic space of the galaxy then its "loose nucleus" will de facto be the antiquasar. And this will take place when in CFREU $(dr/dR)_e=0$ and $(dv_c/dR)_e=0$, where:

$$r = r_e(1+\tilde{R}/R_e)(1+R_e/\tilde{R})/4 = [r_e+\tilde{R}_t(\tau)][1+r_e/\tilde{R}_t(\tau)]/4\,,$$

$\tilde{R}=\tilde{R}_t(\tau)R_e/r_e$ and $\tilde{R}_t(\tau)$ are the values of the radial coordinate R in CFREU;

$$\tilde{R}_{t/inside}(\tau) = \psi R(t) + r_c(1-\sqrt{1-r_e/r_c})^2 = r\left(1-\sqrt{1-r_e/r}\right)^2,$$

$$r_e^2/\tilde{R}_{t/outside}(\tau) = \psi r_e^2/R(t) + r_c(1-\sqrt{1-r_e/r_c})^2 = r\left(1-\sqrt{1-r_e/r}\right)^2 = \tilde{R}_{t/inside}(\tau),$$

$$\psi = 1-\left(1-\sqrt{1-r_e/r_c}\right)^2 r_c/r_e, \quad r_c = c/H_E, \quad R_{inside}(t,r)R_{outside}(t,r) = r_e^2,$$

$$R_{inside}(t) = r\left(1-\sqrt{1-r_e/r}\right)^2/\psi - r_c\left(1-\sqrt{1-r_e/r_c}\right)^2/\psi,$$

$$\frac{1}{R_{outside}(t)} = \left[\left(1+\sqrt{1-r_e/r}\right)^{-2}/r - \left(1+\sqrt{1-r_e/r_c}\right)^{-2}/r_c\right]\frac{1}{\psi} = r_e^{-2}\left[r\left(1-\sqrt{1-r_e/r}\right)^2 - r_c\left(1-\sqrt{1-r_e/r_c}\right)^2\right]\frac{1}{\psi} = R_{inside}(t)r_e^{-2},$$

$H_E=c(\Lambda/3)^{1/2}$ is Hubble constant; Λ is cosmological constant; τ is the cosmological time measured in CFREU.

And, consequently, all stars of "loose nucleus" of galaxy will consist of only antimatter. The solution of equations of gravitational field of GR in background Euclidean space [11] confirms the principal possibility of existence of such "loose" structure of galaxies [1, 2, 5, 12, 13].

Due to the low strength of gravitational field outside the loose nuclei of galaxies they can indeed be considered as "island Universes" [14 – 16] (non-isolated island systems [17]) that have individual intrinsic values of gravitational constant.

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