

The bodies of the zodiacal light: Their origin, evolution, and fallout

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Zodiacal light is a white cone of light that is visible in the west a few hours after sunset or in the east before dawn. Its location coincides with the ecliptic, the visible path of the Sun and planets against the background of stars. My article [1] considers the assumption that bodies of zodiacal light (BoZL) slowly drift along a set of horseshoe orbits, which were calculated by solving the three-body problem. Gravitational and centrifugal forces push the bodies away from the Lagrange points L1 and L2, so BoZL avoiding a collision with the Earth start the reverse motion along the horseshoe orbit. When BoZL cross the Earth's orbit their velocities reach their minimum values about 1 km/s, and their spatial density reach its maximum. This fact made it possible to estimate the total cross section of the set of these bodies about $(3-7) \times 10^{10} \text{ m}^2$. However, we failed to find out their distribution by sizes and masses. The article [1] considers two hypotheses. The first one suggested that the appearance of BoZL in the horseshoe orbits results from the scattering of fragments of the Giant collision [2]. Further evolution of BoZL in these orbits occurred due to their mutual collisions at velocities about several km/s. Multiple fragmentation of the BoZL occurred leading to the ionization of the environment by run-away electrons. Specification of their composition as well as the distribution by masses and sizes is possible by the means a space expedition along the Earth's orbit. This idea was first expressed by academician V E Fortov during my report at his seminar on 20 January 2020. The second hypothesis about BoZL fallout to the Earth was confirmed by magnetic studies of Antarctic dust [3].

[1] Byalko A V 2020 *Priroda* 22–31

[2] Byalko A V and Kuzmin M I 2019 *J. Exp. Theor. Phys.* **129** 511–520

[3] Lanci L *et al* 2020 *Frontiers in Earth Science* **8** 1–13