# THE FUNDAMENTAL ROLE OF SATURN'S MAGNETOSPHERE IN THE ORIGIN OF ITS VISIBLE DENSE RINGS. DETERMINATION OF THE REPULSION FORCE BETWEEN ICE BODIES IN THE VISIBLE DENSE RINGS, PREDICTED BY J. C. MAXWELL IN 1856

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According to the conclusion of the scientists who participated in the interpretation of results of the Cassini mission to Saturn, 2004-2017, and the results of previous missions - Pioneer 11, Voyager 1, Voyager 2, scientists were unable to explain the origin of the visible dense rings of Saturn based on gravitational models (Crida A., Charnoz S. Nature. 2010. V. 468. P. 903–905; Cuzzi J.N., Burns J.A. et al. Science. 2010. V. 327. No. 5972. P. 1470–1475; Esposito L.W. Annual Review of Earth and Planetary Science. 2010. V. 38(1). P. 383–410; Crida A. et al. Nature Astron. 2019. V. 3. P. 967â€“970). There is no explanation for the stability of the visible dense rings, the process of their origin in a three-dimensional disk at the planet's equator, their fine structure and the separation of ice bodies in the rings. We proposed take into account the diamagnetism of ice bodies of the protoplanetary cloud of Saturn (Tchernyi V.V., Kapranov S.V. RNAAS. 2021. V. 5. N. 10. Article 255), and study of the influence of Saturn's magnetosphere on the origin of the visible dense rings. We have solved the problem of the mutual action of gravity and the magnetosphere of Saturn on ice bodies of a protoplanetary cloud (Tchernyi V.V., Kapranov S.V. Astrophys. Journ. 2020. 894. 1. Article 62; Tchernyi V.V. AAS Journal Author Series: Vladimir Tchernyi on 2020ApJâ€¦894...62T; https://youtu.be/La7RmcWGUTQ). It is shown that only taking into account Saturn's magnetism stabilizes ice bodies in a three-dimensional disk at the equator of the planet in the form of rings, separates the rings forming their fine structure, and separates ice bodies in the rings. For the first time, an explanation has been given for the repulsion force of ice bodies in the visible dense rings, predicted in Maxwell's theory, 1856 (J.C. Maxwell. MNRAS, 1859), and formulas are given for calculating the equilibrium distance between ice bodies in the visible dense rings (Tchernyi V.V., Kapranov S.V. Space Research Today. Letter to the Editor. April 2024. N. 219. P. 80-85; Tchernyi V.V. et al. Advances in Theoretical and Computational Physics. 2024. V. 7. No. 3. P. 1–3).