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Possible role of the Type Ia Supernova in formation of the Solar system

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Attention is drawn to the key role of the last supernova in the origin of the solar system. Indeed, according to the absence of the r-process products among the extinct radionuclides with the short intervals of generation, the last supernova before the formation of the solar system was a Type Ia Supernova, which could not survive the carbon explosive burning and was fully disrupted. The injection of its specific matter (especially, large amounts of iron) into the protosolar nebula created the initial large-scale chemical heterogeneity of the accreting matter, which led to the initial metal-silicate separation of the matter in the conditions of the supersonic turbulence in the collapsing nebula. Both the factors are responsible for many further important regularities of formation of the solar system, and, firstly, just they have ranged the consequence of events in the formation of the solar system bodies, which is recently derived with Hf-W data.

The current accretion thermodynamic models are essentially hydrostatic ones: the constant accretion flux of matter onto the protosun through the disk is considered. They presented wide comprehension of the thermodynamic processes in the accretion disk and revealed many important factors of differentiation of matter in the early solar system. However, the contemporary level of knowledge, especially, in astrophysics and cosmochemistry, strongly requests the development of new accretion thermodynamic models, namely, magneto-hydrodynamic ones. The remarkable evidence of Hf-W systematics that the core formation in the parent asteroids of iron meteorites predates the accretion of the chondrite parent bodies, being unexpected for the standard models, reaffirm such a necessity.