

Modified nuclear reaction rates in dense stellar plasma

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Density and temperature conditions in many stellar core imply the presence of nonideal plasma effects with memory and long-range interactions between particles. This aspect suggests the possibility that the stellar core could not be in a global thermodynamical equilibrium but satisfies the conditions of a metastable state with a stationary (nonextensive) power law distribution function among ions. The order of magnitude of the deviation from the standard Maxwell-Boltzmann distribution can be derived microscopically by considering the presence of random electrical microfields in the stellar plasma. We show that such a nonextensive statistical effect can imply relevant modifications on the nuclear reaction rates and on the chemical composition of the stellar plasma.