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## Effective mass of a nucleus interacting with neutron superfluid

Neutron stars are among the most exotic and extreme objects in the universe, consisting primarily of neutrons packed together at incredibly high densities. In the inner crust of these stars, the neutrons are believed to form a superfluid. In this superfluid, the nuclei (clusters of protons and neutrons) are thought to be immersed and interact with the surrounding neutrons. The study of these nuclei has important implications for understanding the properties and behavior of neutron stars and advancing our comprehension of the fundamental laws of physics. A critical aspect of studying the behavior of nuclei immersed in superfluid neutrons is understanding their effective mass. It is affected by strong interactions with the surrounding particles.

I will present our recent findings on nonequilibrium dynamics in the deep layers of a neutron star. Our research employs cutting-edge numerical techniques based on density functional theory, utilizing a Brussels-Montreal functional specifically designed for astrophysical problems.

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