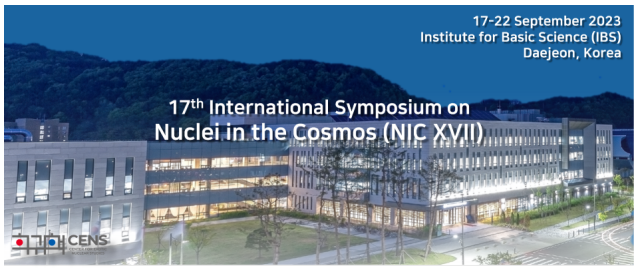

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Building relativistic mean-field models for neutron stars in light of the PREX-2 and CREX results

Thursday, September 21, 2023 11:30 AM (15 minutes)

We construct new effective interactions using the relativistic mean-field model with the isoscalar- and isovector-meson mixing. Taking into account the results of neutron skin thickness of ^{208}Pb and ^{48}Ca by the PREX-2 and CREX experiments as well as the particle flow data in heavy-ion collisions, the observed mass of PSR J0740+6620, and the tidal deformability of a neutron star from binary merger events, we study the ground-state properties of finite nuclei and the characteristics of nuclear matter and neutron stars. It is found that the σ-δ mixing is very important to understand the terrestrial experiments and astrophysical observations of neutron stars self-consistently. Especially, we present that the equation of state for neutron stars exhibits the rapid stiffening around twice the nuclear saturation density, which is caused by the soft nuclear symmetry energy due to the σ-δ mixing. It is also noticeable that the small dimensionless tidal deformability of a canonical neutron star observed from GW170817 can be explained within the current relativistic mean-field models.

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