

Proton-Neutron Ratios as Sensitive Observables of the Asymmetry Term of the Nuclear Equation-of-State

Michael A. Famiano
Western Michigan University

The characterization of the density dependence of the nuclear equation-of-state (EOS) remains a longstanding problem in nuclear astrophysics. While observations of neutron star masses have placed astronomical lower limits on the asymmetry term of the EOS, experimental constraints remain open. Recent improvements in experiment, data interpretation, and theoretical predictions have greatly reduced the constraints on what is known concerning this dependence. Future work must focus on studying the nuclear EOS at higher-density ($\rho > \rho_0$). Recent heavy-ion beam experimentation will be described, and the theoretical interpretation will be presented. Of particular importance are plans to increase the density of the explored region of the nuclear EOS. The applications of experimental results from $^{40,48}\text{Ca} + ^{112,124}\text{Sn}$ reactions at 140 MeV/A will also be covered. These reactions were studied to constrain the in-medium nucleon masses, which are a considerable unknown in model predictions of the nuclear EOS. Finally, applications of nuclear experimental results to neutron-star macroscopic structure will be presented.