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Neutron Star properties through Collider experiments

With the advent of multimessenger astronomy, neutron stars are studied through multiple observational methods. These observations, combined with data from collider experiments such as those at the LHC at CERN, help constrain the Equation of State (EoS) of neutron matter. The symmetry energy parameter (L_{sym}) in the EoS is of great interest due to its connection with the neutron skin thickness of heavy nuclei. The rising field of nuclear structure, -including neutron skin properties- in collider physics has emerged to improve the understanding of the initial conditions in heavy-ion collisions.

Neutron-rich and spherically symmetric nuclei such as ^{48}Ca and ^{208}Pb serve as ideal testbeds for investigating nuclear structure effects and their implications for astrophysical systems. Recent neutron skin measurements from the CREX and PREX-II experiments have revealed a significant discrepancy in the extracted L_{sym} values for ^{48}Ca and ^{208}Pb , respectively, leading to ongoing discussions about nuclear structure and the EoS. We aim to motivate the study of the neutron skin of ^{48}Ca in collider experiments by assessing its sensitivity to various observables.

Field of study

Astrophysics

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