



Beitrag ID: 33

Typ: Talk

Role of isospin asymmetry in the onset of quark matter in neutron stars

Mittwoch, 17. September 2025 18:10 (15 Minuten)

While symmetric nuclear matter has been studied in laboratories, neutron star matter is characterized by high asymmetry. Therefore, by examining the strongly interacting matter properties in a wide range of densities and isospin asymmetry we confront two regimes to understand how the enforced electric neutrality and beta equilibrium alter the onset density of quark matter. Particularly, we demonstrate the dependence of the onset density of deconfined quarks in the electrically neutral beta-equilibrated matter on the onset density for symmetric matter. This allows us to map the phase diagram of cold strongly interacting matter in the plane of baryon density vs isospin asymmetry which is important in modeling hybrid stars based on the nuclear and low-energy heavy-ion collision experiments.

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Sitzung Einordnung: Talks