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Role of hyperon–scalar-meson couplings on the EoS

We study the equation of state and composition of hypernuclear matter within a relativistic density functional theory with density-dependent couplings. The parameter space of hyperon–scalar-meson couplings is explored by allowing for mixing and breaking of SU(6) symmetry, while keeping the nucleonic couplings constant fixed. The subset of equations of state, which corresponds to small values of hyperon–scalar-meson couplings allows for massive M < 2.25 M_solar compact stars; the radii of hypernuclear stars are within the range 12–14 km. We also study the equation of state of hot neutrino-rich and neutrinoless hypernuclear matter and confirm that neutrinos stiffen the equation of state and dramatically change the composition of matter by keeping the fractions of charged leptons nearly independent of the density prior to the onset of neutrino transparency. We provide piecewise polytropic fits to six representative equations of state of hypernuclear matter, which are suitable for applications in numerical astrophysics.

Primary author: COLUCCI, Giuseppe (Frankfurt University)

Presenter: COLUCCI, Giuseppe (Frankfurt University)