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Equation of state of isospin-asymmetric nuclear matter in relativistic quantum hydrodynamics with chiral limits WEI-ZHOU JIANG, BAO-AN LI, Texas A&M University-Commerce, LIE-WEN CHEN, Shanghai Jiao Tong University — The Equation of State (EOS) of isospin asymmetric nuclear matter plays a crucial role in many important issues in astrophysics, the structure of exotic nuclei and the reaction dynamics of heavy-ion collisions. Using in-medium hadronic properties according to the Brown-Rho scaling due to the chiral symmetry restoration at high densities and considering naturalness of the coupling constants, we have constructed several relativistic mean-field (RMF) Lagrangians with chiral limits. The scalings and associated parameters that describe the in-medium hadronic properties are consistent with those from microscopic calculations or those extracted from recent experimental data. The resulting equations of state are used to produce a heavier maximum neutron star mass around twice solar mass consistent with recent observations. A satisfactory description for ground-state properties of finite nuclei is also achieved with these RMF models. Meanwhile, the asymmetric matter densities produced by these models are applied to calculate the in-medium NN cross sections at high energies in the relativistic impulse approximation. Furthermore, due to the importance of the Fock terms, an extension to the relativistic Hartree-Fock framework is expected for the current RMF models.

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