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Dense Baryonic Matter Equation of State with Quark Pauli Blocking

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We propose a modification to the relativistic mean-field $\sigma - \omega$ model by incorporating the Pauli-blocking effect arising from quark exchange interactions between baryons. In dense baryonic matter, where nucleon wave functions exhibit finite overlap, the quark exchange effects governed by the Pauli principle become significant at high densities. A quantitative estimate for this process has been made within a harmonic oscillator confinement potential model for the nucleons as three-quark bound states. The resulting contribution is employed here as an additional Pauli-blocking shift to the baryon self-energy. Our analysis reveals that incorporating quark exchange contributions leads to an increase in the energy per baryon, resulting in a stiffening of dense baryonic matter. Furthermore, we find that the contribution from isovector meson exchange may be negligible, primarily due to the isospin asymmetry dependence of the quark exchange effect.

session

H. Equation of State and Neutron Stars

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