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SYMMETRIC AND ASYMMETRIC PROPERTIES OF NEUTRON STAR

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Our approach offers a phenomenological model for investigating nuclear matter by employing the modified relativistic Dirac formalism coupled with the σ–ω and ρ mesons in the quark-meson coupling model. By considering scalar and vector linear potential for quark confinement and accounting with quantum corrections such as the centre-of-mass motion, gluonic, and pionic corrections, we establish a foundation to calculate fundamental properties of nucleons and calculate nucleon mass in a vacuum as well as in medium. Our methodology then allows for a thorough exploration of nuclear matter properties, extending into nuclear EOS, binding energy, symmetry energy, and thermodynamic instability, which are important for understanding nuclear interactions and matter under extreme conditions. The systematic exploration of the correlation between symmetry energy and its density slope provides valuable data that can help refine existing nuclear models and provide a deeper understanding of nuclear matter in beta equilibrium at finite densities. In addition, we examine the mass-radius variations of neutron stars.

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