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The equilibrium configuration of rotating neutron stars

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Abstract

Using the density-dependent equation of states to describe the matter of rotating neutron stars, we construct equilibrium configurations of rotating neutron stars. The interaction between baryons is described by exchanging the scalar and vector mesons in the relativistic mean-field theory. The mesons coupling coefficients are functions of the environmental density. The sequence of equilibrium states is calculated for the four frequencies observed for rotating neutron stars namely, 25, 317, 716, and 1122 Hz. These sequences are constrained by static, Keplerian (mass-shedding sequence), and secular axisymmetric instability sequences. This allows the radius and mass range of the stars will be obtained in each of the models. We can also calculate the parameters of the fastest rotating star described by each model.

Keywords: rotating neutron stars, mean field approximation, equation of state, density-dependent interaction, Einstein field equations

For full article, refer to the Persian section