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Neutron star structure in QMC with hyperons and high-density repulsion

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Observations of neutron stars place the upper mass limit at above 2 solar masses. Since the matter in neutron stars is stable long term, then to the extent that the cores of such stars are hadronic, one must satisfy the conditions of beta equilibrium and hyperons must be present. The initial appearance of hyperons carries low momentum and thus slows the increase in pressure in comparison to the nucleon only equation of state. In turn, the maximum mass is lowered when hyperons are present. Neutron stars are thought to have a central density between 4-10 times saturation density. At high densities there is good justification for the addition of extra repulsion stemming from the Pauli-exclusion principle, reconfiguration to a multi-quark environment, or even physics beyond the standard model. Here we examine the effects of phenomenological high-density repulsion within the framework of QMC and describe the composition, mass, radii, and tidal deformability from the resulting equation of state.

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