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The Equation of State of Hot, Dense Matter and Neutron Stars

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Abstract

Recent developments in the theory of pure neutron matter and experiments concerning the symmetry energy of nuclear matter, coupled with recent measurements of high-mass neutron stars, now allow for relatively tight constraints on the equation of state of dense matter. We review how these constraints are formulated and describe the implications they have for neutron stars and core-collapse supernovae. We also examine thermal properties of dense matter, which are important for supernovae and neutron star mergers, but which cannot be nearly as well constrained at this time by experiment. In addition, we consider the role of the equation of state in medium-energy heavy-ion collisions.

Keywords: Neutron stars; Dense matter in equilibrium; Thermal effects; Heavy-ions; Dense matter off-equilibrium; Equation of state of dense matter

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