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A Phenomenological Equation of State for Hot and Dense Homogeneous Nucleonic Matter[1] XINGFU DU, ANDREW W. STEINER, Univ of Tennessee, Knoxville, JEREMY W. HOLT, Texas AM University — The equation of state (EOS) of matter is a central microphysical input required for numerical simulations of core-collapse supernovae and neutron star mergers. These simulations probe a wide range of baryon densities (n_B), temperatures (T) and electron fractions (Y_e). We construct new set of EOSs for homogeneous nucleonic matter including protons and neutrons. These EOSs independently implement quantification of uncertainties in different regimes. For non-degenerate nuclear matter, we employ the virial expansion taking inputs from nucleon-nucleon scattering phase shift. For zero temperature neutron matter, we employ quantum Monte Carlo up to saturation densities and Neutron star EOS above saturation densities. For zero temperature nuclear matter, we employ Skyrme models parametrized by experimentally-measured nuclear data. For hot matter near the saturation density, we describe finite temperature corrections with a Skyrme model designed to fit results obtained from chiral effective theory. We enforce causality at high density for the full combined EOS. Our final EOSs are compared with several other models at representative densities and temperatures.

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