# Relativistic EOS for Supernova Simulations

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We construct the relativistic equation of state (EOS) of dense matter covering a wide range of temperature, proton fraction, and baryon density for the use of supernova simulations. The study is based on the relativistic mean-field theory (RMF) [1] and the Thomas-Fermi approximation [2]. The Thomas-Fermi approximation in combination with assumed nucleon distribution functions and a free energy minimization is adopted to describe the non-uniform matter, which is composed of a lattice of heavy nuclei. We treat the uniform matter and non-uniform matter consistently using the same RMF theory. We present two sets of EOS tables [3]. The first one takes into account only the nucleon degree of freedom, while the second one considers additional contributions from Lambda hyperons. We tabulate the resulting EOS with an improved design of ranges and grids comparing with our earlier work used as Shen-EOS [4,5].

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