

Abstract Submitted  
for the HAW09 Meeting of  
The American Physical Society

**Equation of State for Non-uniform Nuclear Matter by the Variational Method with Thomas-Fermi Calculations** HIROAKI KANZAWA, MASATOSHI TAKANO, Waseda University, KAZUHIRO OYAMATSU, Aichi Shukutoku University, KOHSUKE SUMIYOSHI, Numazu College of Technology — Toward a new equation of state (EOS) for supernova (SN) simulations based on the realistic nuclear forces, the EOS for non-uniform nuclear matter is constructed in the Thomas-Fermi (TF) approximation. The energy of uniform nuclear matter used in the TF calculation is obtained by a simplified variational method with the AV18 and UIX potentials. The parameters associated with the nuclear three-body force are fixed so that the TF calculation for atomic nuclei reproduces the gross behavior of their experimental masses and radii. With use of this TF method, the EOS of non-uniform nuclear matter, which is assumed to be composed of a Coulomb lattice of single species of nucleus immersed in a uniform electron gas (with neutrons dripped out of the nuclei), are calculated for various baryon densities and proton fractions at zero temperature. The obtained thermodynamic quantities of non-uniform matter are compared with those of Shen-EOS.

Hiroaki Kanzawa  
Waseda University

Date submitted: 30 Jun 2009

Electronic form version 1.4