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Supernova simulations with variational principle EOS, consistent treatment of nuclear electron capture rates and Boltzmann neutrino transport HIROKI NAGAKURA, Caltech, SHUN FURUSAWA, HAJIME TOGASHI, Interdisciplinary Theoretical Science (iTHES) Research Group, RIKEN, KOHSUKE SUMIYOSHI, Numazu College of Technology, SHOICHI YAMADA, Department of Science and Engineering, Waseda University — The roles of weak interactions, EOS, neutrino transport in core-collapse supernova are still matters of debate. In this talk, I report our latest results of axisymmetric supernova simulations with multi-energy, multi-angle and multi-species neutrino transport. In these simulations, we update mainly two input physics. (1) Nuclear equation-of-state (EOS) based on a realistic two- and three- body nuclear force in uniform matter employing variational principle method. The obtained EOS also satisfies the current observational constraint. (2) Electron and positron capture rates on heavy and light nuclei based on multi-species nuclear-statistical-equilibrium (NSE) abundances. The NSE nuclear abundance is also consistent with our multi-nuclear species EOS. This improvement is an important step toward getting rid of uncertainties of role of nuclear-weak interactions. I will discuss how these improvements give impacts on the supernova dynamics.

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