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Multi-D Full Boltzmann Neutrino Hydrodynamic Simulations in Core Collapse Supernovae and their detailed comparison with Monte Carlo method HIROKI NAGAKURA, SHERWOOD RICHERS, CHRISTIAN OTT, Caltech, WAKANA IWAKAMI, YITP, Kyoto University, SHUN FURUSAWA, Frankfurt Institute for Advanced Studies, KOHSUKE SUMIYOSHI, Numazu College of Technology, SHOICHI YAMADA, Waseda University — We have developed a multi-d radiation-hydrodynamic code which solves first-principles Boltzmann equation for neutrino transport. It is currently applicable specifically for core-collapse supernovae (CCSNe), but we will extend their applicability to further extreme phenomena such as black hole formation and coalescence of double neutron stars. In this meeting, I will discuss about two things; (1) detailed comparison with a Monte-Carlo neutrino transport (2) axisymmetric CCSNe simulations. The project (1) gives us confidence of our code. The Monte-Carlo code has been developed by Caltech group and it is specialized to obtain a steady state. Among CCSNe community, this is the first attempt to compare two different methods for multi-d neutrino transport. I will show the result of these comparison. For the project (2), I particularly focus on the property of neutrino distribution function in the semi-transparent region where only first-principle Boltzmann solver can appropriately handle the neutrino transport. In addition to these analyses, I will also discuss the "explodability" by neutrino heating mechanism.

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