

Neutrino transport for 3D supernova models

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Important features of recent core-collapse supernova models should be explored in three dimensions in order to answer the following questions: How does the emission of neutrinos interact with fluid instabilities? how does the standing accretion shock instability couple to neutron star oscillation modes? And how are magnetic fields amplified when a neutron star is born? We present the “isotropic diffusion source approximation”, a spectral neutrino transport scheme designed for three-dimensional simulations and demonstrate its accuracy in comparison with spherically symmetric Boltzmann neutrino transport. We discuss the emission of gravitational waves and the winding of magnetic field lines in preliminary three-dimensional simulations of stellar core collapse and postbounce evolution.