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Monte Carlo Neutrino Transport in Core-Collapse Supernovae[1]
SHERWOOD RICHERS, Caltech, JOSHUA DOLENCE, Los Alamos National Lab, CHRISTIAN OTT, Caltech — Neutrino interactions dominate the energetics of core-collapse supernovae (CCSNe) and determine the composition of the matter ejected from CCSNe and gamma-ray bursts (GRBs). Three dimensional (3D) CCSN and neutron star merger simulations are rapidly improving, but still suffer from approximate treatments of neutrino transport that cripple their reliability and realism. I use my relativistic time-independent Monte Carlo neutrino transport code SEDONU to evaluate the effectiveness of leakage, moment, and discrete ordinate schemes in the context of core-collapse supernovae. I also developed a relativistic extension to the Random Walk approximation that greatly accelerates convergence in diffusive regimes, making full-domain simulations possible.

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