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A New Monte Carlo Method for Velocity-Dependent Neutrino And Photon Transport[1] ERNAZAR ABDIKAMALOV, California Institute of Technology, ADAM BURROWS, Princeton University, FRANK LOEFFLER, Louisiana State University, CHRISTIAN D. OTT, California Institute of Technology, ERIK SCHNETTER, Perimeter Institute, EVAN O'CONNOR, California Institute of Technology — Monte Carlo approaches to radiation transport have several attractive properties compared to deterministic methods. These include simplicity of implementation, high accuracy, and good parallel scaling. Moreover, Monte Carlo methods are relatively easy to extend to multiple spatial dimensions, which makes them particularly interesting in modeling complex astrophysical phenomena such as neutrino transport in core-collapse supernovae. We present a generalization of the Implicit Monte Carlo and Discrete-Diffusion Monte Carlo schemes to multi-energy and velocity-dependent neutrino transport and demonstrate that our scheme represents an attractive approach to modeling neutrino transport in core-collapse supernovae. We also show that our scheme can easily be adapted to photon transport.

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