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On the Application of a Hybrid Monte Carlo Technique to Radiation Transfer in the Post-Explosion Phase of Type IA Supernovae RYAN WOLLAEGER, University of Wisconsin, Madison, DANIEL VAN ROSSUM, CARLO GRAZIANI, Flash Center for Computational Science, University of Chicago, SEAN COUCH, Flash Center for Computational Science, University of Chicago; Hubble Fellow, GEORGE JORDAN, DONALD LAMB, Flash Center for Computational Science, University of Chicago, GREGORY MOSES, University of Wisconsin, Madison — We apply Implicit Monte Carlo (IMC) and Discrete Diffusion Monte Carlo (DDMC) to Nomoto's W7 model of Type Ia Supernovae (SNe Ia). IMC is a stochastic method for solving the nonlinear radiation transport equations. DDMC is a stochastic radiation diffusion method that is generally used to accelerate IMC for Monte Carlo (MC) particle histories in optically thick regions of space. The hybrid IMC-DDMC method has recently been extended to account for multifrequency and velocity effects. SNe Ia are thermonuclear explosions of white dwarf stars that produce characteristic light curves and spectra sourced by radioactive decay of ^{56}Ni. We exhibit the advantages of the hybrid MC approach relative to pure IMC for the W7 model. These results shed light on the viability of IMC-DDMC in more sophisticated, multi-dimensional simulations of SNe Ia. This work was supported in part by the University of Chicago and the National Science Foundation under grant AST-0909132.

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