



## Implicit Monte Carlo Calculations of Supernova Light-Curves

PI: Aimee Hungerford, [aimee@lanl.gov](mailto:aimee@lanl.gov)

Abstract: Since the initial discovery of dark energy through the use of supernova observations, a wealth of new supernova surveys have been undertaken. The amount of data from these surveys is substantial and there has been a dramatic increase in demand for accurate calculations of these explosions with an emphasis on their observational properties. We propose to calculate a 2-dimensional radiation-hydrodynamics supernova light-curve of an asymmetric explosion using the higher-order transport scheme: implicit Monte-Carlo (IMC). This calculation represents a number of firsts: the first radiation- hydrodynamics calculation of a supernova light-curve using a higher-order transport scheme and the first multi-dimensional radiation-hydrodynamics calculation of a supernova light-curve. This project will also take advantage of the detailed opacities produced at LANL and an extensive experimental program studying radiation flows. The IMC code has already been ported to hybrid cell accelerated architecture like Roadrunner and shows a factor of  $\sim 5$  speed-up. In this proposal, we will couple this transport scheme to the RAGE hydrodynamics code and optimize this combined code for Roadrunner and the supernova light-curve problem.