Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

A generalized framework for nucleosynthesis calculations TREVOR SPROUSE, MATTHEW MUMPOWER, ANI APRAHAMIAN, University of Notre Dame — Simulating astrophysical events is a difficult process, requiring a detailed pairing of knowledge from both astrophysics and nuclear physics. Astrophysics guides the thermodynamic evolution of an astrophysical event. We present a nucleosynthesis framework written in Fortran that combines as inputs a thermodynamic evolution and nuclear data to time evolve the abundances of nuclear species. Through our coding practices, we have emphasized the applicability of our framework to any astrophysical event, including those involving nuclear fission. Because these calculations are often very complicated, our framework dynamically optimizes itself based on the conditions at each time step in order to greatly minimize total computation time. To highlight the power of this new approach, we demonstrate the use of our framework to simulate both Big Bang nucleosynthesis and r-process nucleosynthesis with speeds competitive with current solutions dedicated to either process alone.

Trevor Sprouse
Univ of Notre Dame

Date submitted: 25 Jul 2014 Electronic form version 1.4