

APR14-2014-000686

Abstract for an Invited Paper
for the APR14 Meeting of
the American Physical Society

The sensitivity of r -process nucleosynthesis to individual nuclear properties¹

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Calculations of rapid neutron capture, or r -process, nucleosynthesis require nuclear data for thousands of nuclei far from stability. We currently have experimental information for only a handful of these nuclei, though many more neutron-rich species are within the reach of current and next generation experimental facilities. Sensitivity studies are one way to get at which of these thousands of nuclear properties are the most crucial to measure for the r process. Our r -process sensitivity studies examine the roles of individual nuclear masses, beta decay rates, neutron capture rates, and beta-delayed neutron emission probabilities in r -process simulations in a variety of potential astrophysical environments. Here we will point out the pieces of nuclear data with the greatest impact on the final r -process abundance pattern and describe the mechanisms by which this influence occurs.

¹This work was supported in part by the Department of Energy under contract DE-FG02-05ER41398 and the National Science Foundation through the Joint Institute for Nuclear Astrophysics grant number PHY0822648.