## Abstract Submitted for the DNP19 Meeting of The American Physical Society

Actinide-Rich or Actinide-Poor, Same r-Process Progenitor ERIKA HOLMBECK, University of Notre Dame, ANNA FREBEL, Massachusetts Institute of Technology, G. C. MCLAUGHLIN, North Carolina State University, MATTHEW R. MUMPOWER, Los Alamos National Laboratory, TREVOR M. SPROUSE, REBECCA SURMAN, University of Notre Dame — The astrophysical production site of the heaviest elements in the universe remains a mystery. Incorporating heavy element signatures of metal-poor, r-process enhanced stars into theoretical studies of r-process production can offer crucial constraints on the origin of heavy elements. In this study, we introduce and apply the "Actinide-Dilution with Matching" model to a variety of stellar groups ranging from actinide-deficient to actinide-enhanced to empirically characterize r-process ejecta mass as a function of electron fraction. We find that actinide-boost stars do not indicate the need for a unique and separate r-process progenitor. Rather, small variations of neutron richness within the same type of r-process event can account for all observed levels of actinide enhancements. The very low- $Y_e$ , fission-cycling ejecta of an r-process event need only constitute 10-30% of the total ejecta mass to accommodate most actinide abundances of metal-poor stars. We find that our empirical  $Y_e$  distributions of ejecta are similar to those inferred from studies of GW170817 mass ejecta ratios, which is consistent with neutron-star mergers being a source of the heavy elements in metal-poor, *r*-process enhanced stars.

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