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Decision Theory for the Mass Measurements at the Facility for Rare Isotope Beams JESSE FARR, University of Tennessee — Nuclear physics facilities, like the Facility for Rare Isotopic Beams (FRIB), have access to thousands of isotopes ready to be researched. Like the name FRIB suggests, rare isotopes are of significant interest, especially ones that have not yet been experimentally observed. However, creating these rare isotopes comes with a cost, both monetary costs and time. Thus, it is advantageous to quantify the amount of information gained by studying a specific isotope in comparison with its beam time, cost, and human effort that will go into the experiment. Decision theory can achieve this goal by maximizing a utility function. We are choosing to analyze only nuclear mass measurements at FRIB, and are assuming that the most costly element is the beam time required to perform the mass measurement. In the simplest form, the information gained by a mass measurement is the change in the information content of the probability distribution of all nuclear masses. In this work, we model the information gain obtained by nuclear mass measurements from two perspectives: first from the perspective of theoretical mass models as understood by mass tabulations, and the second from the perspective of r-process nucleosynthesis.

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