Nuclear Structure: Sensitivity of the r-process to masses, decay rates, and cross-sections

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The rapid neutron capture process (r-process) is thought to be responsible for the creation of more than half of all elements beyond iron. The scientific challenges to understanding the origin of the heavy elements beyond iron lie in both the uncertainties associated with astrophysical conditions that are needed to allow an r-process to occur and a vast lack of knowledge about the properties of nuclei far from stability. There is great global competition to access and measure the most exotic nuclei that existing facilities can reach, while simultaneously building new, more powerful accelerators to make even more exotic nuclei.

I will talk about an attempt to determine the most crucial nuclei to measure using an r-process simulation codes, various nuclear mass models, beta-decay rates, cross-sections, and various astrophysical conditions.

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