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The Rare Earth Peak: An Overlooked r-Process Diagnostic

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The potential of an astrophysical environment for making r-process elements has been typically characterized by the neutron-to-seed ratio. We consider the rare earth peak as a new and independent tool for understanding the astrophysical conditions favorable for the main r-process. In the context of a high entropy r-process we discuss rare earth peak formation. We use features of a successful rare earth region to explore the types of astrophysical conditions that produce abundance patterns that best match data. This analysis allows for tighter constraints on the astrophysical conditions even after uncertainties in nuclear physics inputs such as separation energies and neutron captures are taken into account. The efficacy of this tool depends on the nuclear physics inputs and so we point out important rates in the region which have the most influence on the final abundance pattern.

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