The Importance of β-Delayed Proton Emission for the Path of the rp-Process

R.N. Boyd
The Ohio State University

In its highest temperature form, the trajectory of the rp-process passes through nuclei close to the proton drip line. Some of these nuclei can decay by β-delayed proton emission, which will shift the final abundance patterns produced by this form of stellar burning from those of its progenitors. This will also apply to other processes that can synthesize the very proton-rich nuclides. Examples include the γ-process and the repetitive rp-process, or $(\mathrm{rp})^2$-process.

The p-process nuclides, the very proton-rich nuclides above mass 74 u that cannot be synthesized by either the r- or s-processes, serve as excellent tests of the veracity of the theoretical descriptions of their nucleosynthesis. Thus they are worthy of special attention. This is especially true of the higher mass portion, 60 to 100 u, of the rp- and $(\mathrm{rp})^2$-processes, which is the mass region in which these processes overlap with the γ-process. It is also the region in which the lightest p-process nuclides exist, so can serve as benchmarks of our theoretical descriptions.