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New half-lives and β-delayed neutron branchings for Ba to Nd nuclei (A$\sim$160) for r-process rare-earth nucleosynthesis

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The rapid neutron capture process (r-process) is a key mechanism responsible for producing nearly half of the nuclei heavier than iron in explosive scenarios. In the solar-system abundance pattern, the Rare-Earth Peak (REP) around mass number $A = 160$ represents a significant feature resulting from freeze-out during the final stages of neutron exposure. The BRIKEN collaboration [1] conducted extensive measurements of β-decay properties of nuclei of interest to better understand the r-process at the Radioactive Isotope Beam Factory (RIBF), RIKEN Nishina Center, Japan. Our study focuses on the Barium to Neodymium region crucial for REP r-process nucleosynthesis [2,3]. In this contribution, we present the final experimental results from the BRIKEN-REP experiment, which yielded new $T_{1/2}$ and P_{1n} branching ratios. Furthermore, we discuss the implications of these findings for global models of nuclear structure, aiming to refine theoretical predictions and enhance our understanding of REP r-process nucleosynthesis.

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