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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.

[1] J.L. Tain et. al, *Acta Physica Polonica B* {49(03), 417 – 428 (2018).

[2] M. R. Mumpower et al, *Phys. Rev. C* 85, 045801 (2012).

[3] A. Arcones and G. Martinez Pinedo, *Phys. Rev. C* 83, 045809 (2011).

Primary authors: PALLAS I SOLIS, Max (Universitat Politècnica de Catalunya (UPC)); TARIFENO-SALDIVIA, Ariel (Instituto de Física Corpuscular (IFIC), CSIC-Universitat de València)

Co-authors: MARTÍNEZ-PINEDO, Gabriel (GSI Helmholtzzentrum für Schwerionenforschung); KISS, Gábor Gyula (HUN-REN Institute for Nuclear Research); TAIN, Jose L. (Instituto de Física Corpuscular (IFIC), CSIC-Universitat de València); TOLOSA-DELGADO, Alvaro (University of Jyväskylä); Dr ROBIN, C. E. P. (GSI Helmholtzzentrum für Schwerionenforschung, Planckstraße 1, 64291 Darmstadt, Germany Fakultät für Physik, Universität Bielefeld, D-33615, Bielefeld, Germany); Ms ALVEAR-TERRERO, D. (Institut für Kernphysik (Theoriezentrum), Fachbereich Physik, Technische Universität Darmstadt, Schlossgartenstraße 2, 64298 Darmstadt, Germany.); VITÉZ-SVEICZER, András (HUN-REN Institute for Nuclear Research); CALVINO, Francisco (Universitat Politècnica de Catalunya (UPC)); AGRAMUNT, Jorge (Instituto de Física Corpuscular (IFIC), CSIC-Universitat de València); Dr AGUILERA, P. (Centro de Investigación en Física Nuclear y Espectroscopía de Neutrones (CEFEN). Comisión Chilena de Energía Nuclear, Nueva Bilbao 12501, Las Condes, Santiago-Chile.); ALGORA, Alejandro (Instituto de Física Corpuscular (IFIC), CSIC-Universitat de València); Dr ALLMOND, J. M. (Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830, USA.); BABA, Hidetada (RIKEN Nishina Center); Dr BREWER, N. T. (Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996, USA.); CABALLERO-FOLCH, Roger (TRIUMF); Dr COLEMAN-SMITH, P. J. (TFC Daresbury Laboratory, Daresbury, Warrington WA4 4AD, United Kingdom.); Dr CORTES, G. (Institut de Tècniques Energètiques (INTE), Universitat Politècnica de Catalunya (UPC), 08028 Barcelona, Spain.); DAVINSON, Tom (University of Edinburgh); DILLMANN, Iris (TRIUMF); DOMINGO PARDO, Cesar (IFIC (CSIC - University of Valencia)); ESTRADA, Alfredo (Central Michigan University); FUKUDA, Naoki (RIKEN Nishina Center); GO, Shintaro (RIKEN Nishina Center, Japan); GRIFFIN, Christopher J. (TRIUMF); GRZYWACZ, Robert (University of Tennessee); HALL, Oscar (University of Edinburgh); Dr

HARKNESS-BRENNAN, L. J. (Department of Physics, University of Liverpool, Liverpool L69 7ZE, United Kingdom.); ISOBE, Tadaaki (RIKEN Nishina Center); Dr KAHL, D. (School of Physics and Astronomy, The University of Edinburgh, Edinburgh EH9 3FD, United Kingdom.); Dr KING, T. T. (Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996, USA.); Dr KORGUL, A. (Faculty of Physics, University of Warsaw, 02-093 Warsaw, Poland.); KOVÁCS, Sándor (HUN-REN Institute for Nuclear Research); KUBONO, Shigeru (RIKEN Nishina Center, Japan); Dr LABICHE, M. (STFC Daresbury Laboratory, Daresbury, Warrington WA4 4AD, United Kingdom.); LIU, JiaJian (Department of Physics, the University of Hong Kong); Dr MADURGA, M. (Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996, USA.); Dr MIERNIK, K. (Faculty of Physics, University of Warsaw, 02-093 Warsaw, Poland.); Dr MOLINA, F. (Centro de Investigación en Física Nuclear y Espectroscopía de Neutrones (CEFEN). Comisión Chilena de Energía Nuclear, Nueva Bilbao 12501, Las Condes, Santiago-Chile.); Mr MONT-GELI, N. (Institut de Tècniques Energètiques (INTE), Universitat Politècnica de Catalunya (UPC), 08028 Barcelona, Spain.); MORALES, Anabel (Instituto de Física Corpuscular (IFIC), CSIC-Universitat de València); Dr NACHER, E. (Instituto de Física Corpuscular (IFIC), CSIC-UV, E-46980 Paterna, Spain.); Dr NAVARRO, A. (Institut de Tècniques Energètiques (INTE), Universitat Politècnica de Catalunya (UPC), 08028 Barcelona, Spain.); NEPAL, Neerajan (Central Michigan University); NISHIMURA, Shunji (RIKEN Nishina Center); Dr PIERSA-SILKOWSKA, M. (Faculty of Physics, University of Warsaw, 02-093 Warsaw, Poland.); Dr PHONG, P. (RIKEN Nishina Center, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan.); RASCO, B. C. (Physics Division, Oak Ridge National Laboratory, Oak Ridge, USA); Dr ROMERO-BARRIENTOS, J. (Centro de Investigación en Física Nuclear y Espectroscopía de Neutrones (CEFEN). Comisión Chilena de Energía Nuclear, Nueva Bilbao 12501, Las Condes, Santiago-Chile.); Dr RUBIO, B. (Instituto de Física Corpuscular (IFIC), CSIC-UV, E-46980 Paterna, Spain.); RYKACZEWSKI, Krzysztof P. (Oak Ridge National Laboratory); Dr SAITO, Y. (TRIUMF, 4004 Westbrook Mall, Vancouver, BC V6T 2A3, Canada); SAKURAI, Hiroyoshi (RIKEN Nishina Center); SHIMIZU, Yohei (RIKEN Nishina Center); Dr SINGH, M. (Department of Physics and Astronomy, University of Tennessee, Knoxville, Tennessee 37996, USA.); SUMIKAMA, T. (RIKEN Nishina Center, Japan); SUZUKI, Hiroshi (RIKEN Nishina Center); SZEGEDI, Tibor Norbert (INFN-LNS); TAKEDA, Hiroyuki (RIKEN Nishina Center); Dr WANG, K. (Central Michigan University, Mt. Pleasant, MI 48859, USA); WOLINSKA-CICHOCKA, M. (Heavy Ion Laboratory, University of Warsaw, Poland); WOODS, Philip J. (University of Edinburgh); YOKOYAMA, Rin (Center for Nuclear Study (CNS), The University of Tokyo)

Presenter: PALLAS I SOLIS, Max (Universitat Politècnica de Catalunya (UPC))

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