

New half-lives measurements for r-process in $A \sim 225$ Po-Fr nuclei

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The astrophysical rapid-neutron capture process (r-process) of explosive nucleosynthesis is responsible for the formation of half of the heavy nuclei above Fe. Actinides are produced towards the end of this process, when the neutron flux is expected to be minimal, and it is supported also by fission processes. Given that the r-process path runs far away from the accessible species, in this heavy region of the chart of nuclides, experimental inputs on β decay for nuclei beyond $N=126$ are particularly useful to test predictions of global nuclear models.

In this paper results from a recent experiment performed at GSI-FAIR (Darmstadt, Germany) within the HISPEC-DESPEC experimental campaign, as part of the FAIR Phase-0 program, will be discussed. The experiment populated $220 < A < 230$ Po-Fr nuclei in a relativistic fragmentation reaction induced by a 1 GeV ^{238}U beam. The species were selected and identified using the FRagment Separator (FRS) and implanted in the DEcay SPEctroscopy (DESPEC) station to study their subsequent β decay. The DESPEC station is composed of a stack of Double Sided Silicon-Strip Detectors (DSSD) sandwiched between two plastic scintillator detectors, surrounded by a hybrid γ -detection array consisting of high-resolution HPGe and fast timing LaBr₃(Ce). The extracted β -decay half-lives are discussed with the help of recent theoretical models, to assess the impact of the measured values in the predictions of the r-process. Perspectives of future measurements in the region will be provided.

Primary author(s) : BENZONI, Giovanna (INFN-Milano); Dr. POLETTINI, Marta (University of Padova and INFN sez. Padova)

Presenter(s) : BENZONI, Giovanna (INFN-Milano)

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