

Measurements of capture cross sections for the γ -process using HECTOR

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The γ -process is a nucleosynthesis scenario that occurs during an explosion of a supernova and produces the proton-rich isotopes of elements between Se and Hg. The γ -process involves series of (γ,n) , (γ,p) and (γ,α) reactions on pre-existing s-process seed nuclei. The reactions relevant for the γ -process can be studied in the laboratory via the inverse ones: the capture of protons or α -particles. For these measurements, the High Efficiency Total Absorption SpectrometeR (HECTOR) was developed at the University of Notre Dame.

HECTOR is a NaI(Tl) summing detector comprised of 16 separate NaI(Tl) crystals, each read by 2 photomultipliers. The array is designed for precision cross section measurements for (p,γ) and (α,γ) reactions across the γ -process Gamow window. The summing efficiency is a function of the total γ -ray energy and the average γ -ray multiplicity: for the ^{60}Co , source it is 52.7(2.0)% and for typical cross section measurements it ranges between 20-30%.

Here, an overview of the recent results obtained with HECTOR for $A \sim 100$ mass region will be presented. The experimental data will be compared to the Hauser-Feshbach model calculations using the Talys code and will be used to constrain the inputs for Talys to best reproduce the experimental data in the $A \sim 100$ mass region.

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