

First radiative proton capture cross-section measurements on $^{107,109}\text{Ag}$ and ^{112}Cd relevant to the p-process

Tuesday, 26 June 2018 19:00 (1h 30m)

One of the important, but still unsettled topics in Nuclear Astrophysics is the production of the p-nuclei [1,2]. The p-process relies on an extended reaction network, which can be described theoretically by the Hauser-Feshbach statistical model, which in turn relies strongly on experimental data. To provide reliable data for p-nuclei, an experimental campaign at the Tandem Accelerator Laboratory of NCSR "Demokritos", focusing on measurements of cross-sections in the $^{107,109}\text{Ag}(p,\gamma)^{108,110}\text{Cd}$ [3] and $^{112}\text{Cd}(p,\gamma)^{113}\text{In}$ [4] reactions was carried out. Both reactions were studied using a set of four HPGe detectors via the in-beam γ -ray spectroscopy, while for the latter the activation method was additionally employed to account for the population of a low-lying isomeric state. Total cross sections for proton beam energies lying inside the Gamow window for energies relevant to p-process nucleosynthesis were obtained for the first time. Experimental results are compared to Hauser-Feshbach calculations performed with the latest version of the TALYS code (v1.9) [5]. An overall good agreement has been achieved. These results provide important new input for the theoretical description of the p-process, but additionally for the origin of the cross-point p-nucleus ^{113}In .

References

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Session Classification: Poster session