

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

A. Psaltis*, A. Khaliel, E.-M. Assimakopoulou[†], A. Babounis[‡], A. Kanellakopoulos[#], V. Lagaki^{**}, E.-M. Lykiardopoulou^{††}, E. Malami^{‡‡}, I. Psyrra and T.J. Mertzimekis

Department of Physics, University of Athens, Zografou Campus, GR-15784, Greece

* *Present address: Department of Physics and Astronomy, McMaster University, Hamilton, ON L8S 4M1, Canada*, [†] *Present address: Department of Physics and Astronomy, Uppsala University, SE-751 20 Uppsala, Sweden*, [‡] *Present address: Institut für Kernphysik, Universität zu Köln, Zulpicher Str 77, D 5093-7 Köln, Germany*, [#] *Present address: Instituut voor Kern- en Stralingsfysica, KU Leuven, B-3001 Leuven, Belgium*, ^{**} *Present address: University of Greifswald, Domstrae 11, 17489 Greifswald, Germany & CERN, Route de Meyrin, 1211 Genève, Switzerland*, ^{††} *Present address: Department of Physics and Astronomy, University of British Columbia, Vancouver, British Columbia V6T 1Z4, Canada*, ^{‡‡} *Present address: Nikhef, Science Park 105, NL-1098 XG Amsterdam, The Netherlands*

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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