

Investigation of radiative proton-capture reactions using high-resolution γ -ray spectroscopy

P. Scholz¹, F. Heim¹, J. Mayer¹, M. Müller¹, M. Körschgen¹, J. Wilhelmy¹, and A. Zilges¹

¹ *Institute for Nuclear Physics, University of Cologne, Cologne, Germany*

Reaction cross sections are one of the main nuclear physics ingredients for nucleosynthesis processes in stellar environments. For isotopes heavier than iron, cross sections are often calculated using the Hauser-Feshbach statistical model. The accuracy of these calculations strongly depends on the uncertainties of three nuclear physics input-parameters: nuclear level densities, γ -strength functions, and particle+nucleus optical-model potentials.

Precision measurements of cross sections and systematic investigations help to improve these models. This talk will present recent radiative proton-capture experiments performed at the Cologne 10 MV FN-Tandem accelerator and the high-efficiency γ -ray spectrometer HORUS [1]. Besides total and partial cross sections, a method will be presented which allows the determination of primary γ -ray intensities via the technique of two-step γ -ray cascades [2]. Moreover, it will be shown how information on the γ -strength in the reaction product can be extracted in a model-independent way via the ratios of primary γ -rays.

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[1] L. Netterdon *et al.*, Nucl. Inst. Meth. A **754** (2014) 94.

[2] F. Bečvář *et al.*, Nucl. Inst. Meth. B **261** (2007) 930.