

# Electromagnetic Excitations in Nuclei: from Photon Scattering to Photodisintegration

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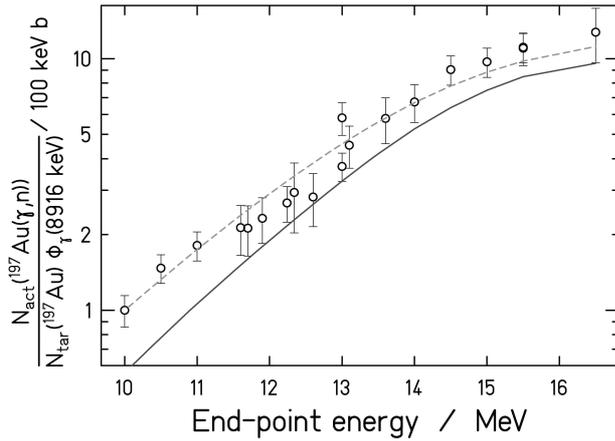
Part of PhD thesis M. Erhard

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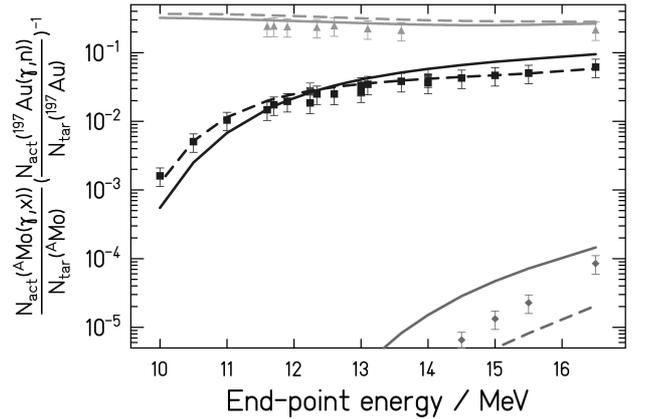
In explosive nucleosynthesis temperatures are high enough for photodisintegration reactions to occur, e.g. leading to the production of p-process nuclei. In order to understand the reaction rates of element production and element disruption we started an experimental program at the new bremsstrahlung facility of the superconducting electron accelerator ELBE of FZ Dresden-Rossendorf. The bremsstrahlung facility and the detector setup are designed such that the scattering of photons from nuclei and the photodisintegration of nuclei around the particle separation energies can be studied under optimized background conditions. In

activation measurements with bremsstrahlung at end-point energy from 10.0 to 16.5 MeV ( $\gamma, p$ ), ( $\gamma, n$ ) and ( $\gamma, \alpha$ ) reactions of  $^{92,100}\text{Mo}$  have been studied. Our activation yields can be described within a factor 2-3 or better with calculations using the cross sections from recent Hauser-Feshbach models.

- [1] A.J. Koning, S. Hillaire et al., *Proc. Int. Conf. Nucl. Data for Science and Technology, ND2004*, Santa Fe, USA, 2004, AIP Conference proceedings 769 (2005) 177  
[2] T. Rauscher and F.-K. Thielemann, *At. Data and Nucl. Data Tables* 88 (2004) 1



**Fig. 1** Preliminary activation yield of  $^{197}\text{Au}(\gamma, n)$  measured at the target position. The experimental yield is normalized to the number of  $^{197}\text{Au}$  atoms and to the absolute photon flux at the energy  $E_\gamma = 8916$  keV. The data are compared to yield integrals computed with the cross sections from TALYS [1] and NON-SMOKER [2] using the absolute photon flux determined from known transitions in a sample containing  $^{11}\text{B}$ .



**Fig. 2** Measured activation yields at the photoactivation site for different Mo-Isotopes normalized to the activation yield from  $^{197}\text{Au}(\gamma, n)$  irradiated simultaneously and to the number of the respective target atoms as a function of the bremsstrahlung end-point energy. The full symbols denote experimental yields from  $^{100}\text{Mo}(\gamma, n)$  (triangles),  $^{92}\text{Mo}(\gamma, p) + (\gamma, n)$  (squares), and  $^{92}\text{Mo}(\gamma, \alpha)$  (diamond). The lines are calculated with photodisintegration cross sections from NON-SMOKER (full) and TALYS (dashed).

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