

Partial cross sections of $^{181}\text{Ta}(n,\gamma)$ using BEGe detectors

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Heavy nuclei are mainly synthesised by a sequence of neutron captures and beta decays - the s-process. The corresponding neutron energies in the different astrophysical sites range from 1 keV to 1 MeV. By using the activation technique, neutron capture reactions of small samples can be studied. A sample is irradiated by quasi stellar neutrons in order to produce radioactive isotopes. The decay of the radioactive nuclei can be detected by their characteristic gamma rays. For this purpose, sensitive experimental equipment is needed.

A 4π -setup consisting of two Broad Energy Germanium Detectors (BEGe) was recently built at the Goethe University Frankfurt. It will be used to detect gamma rays emitted by the radioactive sample with high efficiency over a broad energy range. The observation of the time-dependence of the freshly produced activity allows the additional disentanglement of the partial cross sections populating isomeric states or the ground state. The partial cross sections have so far not been resolved in the keV-regime for this isotope. A corresponding activation measurement of the neutron capture on $^{181}\text{Ta}(n,\gamma)$ was performed.