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# Measurement of the 140Ce(n,γ) cross section at n_TOF

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Among the nucleosynthesis mechanism involving the heavy nuclei, the so-called slow (s-)process is responsible of about half of the element heavier than iron. Being one of the better known, many models were built in order to describe the process and the final element abundances.
The main component of the s-process take place in the outer layer of the AGB stars, where the heavy elements are produced through a succession of neutron captures and beta decays. In last decades great efforts have been undertaken in order to improve the quality of neutron cross section data, because of the strong implications on the s-process models accuracy.

An accurate measurement of the 140Ce(n,γ) energy dependent cross section has been performed at the n_TOF facility at CERN. This measurement was motivated by the significant discrepancy in the cerium abundance observed in the globular cluster M22 and the value predicted by theoretical stellar models[1]. This measurement was characterized by an unprecedented combination of the high energy resolution of the n_TOF neutron beam and a highly enriched 140Ce sample. The experimental apparatus was based on four gamma detectors based on C6D6 liquid scintillators, which are characterized by a very low neutron sensitivity.

In total, 81 resonances were measured and fitted. For each, the capture and neutron widths were determined, highlighting the large discrepancies respect to the major nuclear libraries. These new data allowed to calculate the 140Ce(n,γ) MACS with an uncertainty lower than 5%, significantly improving the experimental data available for the libraries update.

[1] O. Straniero, S. Cristallo, L. Piersanti. Heavy elements in globular clusters: the role of asymptotic giant branch stars, ApJ 785 (2014) 77.

## Session

Experimental Nuclear Astrophysics

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