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New experimental measurement of the 24,25,26Mg neutron capture cross section at n_TOF

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The slow neutron capture process (s process) in stars is responsible for the production of about half of the elemental abundances beyond iron that we observe today. Most of the s-process isotopes between iron and strontium (60 < A < 90) are produced in massive stars (M > 10-12 Msun) where the 22Ne(alpha,n)25Mg reaction is the main neutron source. Beyond strontium, the s-process abundances are mostly produced in low mass Asymptotic Giant Branch stars (AGB stars, 1.2 Msun < M < 3 Msun), where the neutrons are provided by the 13C(alpha, n)16O reaction and by the partial activation of the 22Ne(alpha ,n)25Mg reaction. In stars with an initial metal content similar to solar, 25Mg is the most important neutron poison via neutron capture on 25Mg in competition with neutron capture on 56Fe that is the basic s-process seed for the production of the heavier isotopes. For this reason, a precise knowledge of the 25Mg(n, gamma)26Mg is required to properly simulate s-process nucleosynthesis in stars.

We will show the results from a combination of neutron total and capture cross section measurement on 25Mg in order to determine the resonance parameters and the Maxwellian averaged cross section.
Capture data come from a recent (n, gamma) measurement at the neutron time-of-flight facility n_TOF at CERN. On the other hand transmission data come from an experiment performed at the electron linear accelerator in Oak Ridge. These results constitute the only available neutron resonance data on Mg isotopes.

Author: Dr MASSIMI, Cristian (Istituto Nazionale di Fisica Nucleare (INFN))

Presenter: Dr MASSIMI, Cristian (Istituto Nazionale di Fisica Nucleare (INFN))

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