MEASUREMENT OF THE $^{25}Mg(\alpha,n)^{28}Si$ REACTION CROSS SECTION AT LNL

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The detection of the 1809 keV emission line associated with the decay of ^{26}Al ($T_{1/2} \sim 7.2 \cdot 10^5$ years) in the interstellar medium provides a direct evidence that nucleosynthesis is ongoing in our galaxy. ^{26}Al is thought to be mainly produced in massive stars, but in order to have a quantitative understanding of the ^{26}Al distribution, the cross section of all the nuclear reactions involved in its production should be accurately known.

$^{25}Mg(\alpha,n)^{28}Si$ is one of the reactions with the strongest impact on the synthesis of ^{26}Al during explosive neon and carbon burning [1]. Its cross section has been measured by many authors ([2] - [6]), but below 3 MeV, the literature data are still characterized by large uncertainties due to beam-induced background. The reaction rate reported by NACRE [7] is based on unpublished data and, at higher energies, on Hauser-Feshbach calculations, disregarding other experimental cross section datasets.

In order to improve the experimental knowledge of the $^{25}Mg(\alpha,n)^{28}Si$ cross section, a new direct measurement has been performed at Legnaro National Laboratories. A pulsed alpha beam with energies E = 3-5 MeV was provided by the CN accelerator. The neutrons were detected with 10 liquid scintillators BC501 from the RIPEN array, positioned at different angles. γ-n discrimination is achieved applying the Pulse Shape Analysis technique. Furthermore, measuring the neutron energy with the Time Of Flight method it is possible to disentangle the contribution to the cross section of different ^{28}Si excited states, and to identify the background neutrons produced by (α,n) reactions with light contaminants in the setup. The angular distributions measured with this experimental system will be presented.

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