KEY ASTROPHYSICAL RESONANCES AFFECTING THE ^{26}Al ABUNDANCE STUDIED VIA ^{26}Al(d,n)^{27}Si REACTIONS

A. Kankainen[1,2], P.J. Woods[2], C. Langer[3], H. Schatz[3] and the E12010 Collaboration
[1] University of Jyväskylä, P.O. Box 35 (YFL), FI-40014 University of Jyväskylä, Finland
email: anu.kankainen@jyu.fi
[2] University of Edinburgh, Edinburgh EH9 3JZ, United Kingdom
[3] National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, Michigan 48824, USA

^{26}Al(d,n)^{27}Si transfer reactions have been studied in inverse kinematics at the National Superconducting Cyclotron Laboratory to obtain information on the strength of key astrophysical resonances in ^{27}Si [1]. ^{26}Al(d,n)^{27}Si reaction is a surrogate to study proton captures on ^{26}Al affecting the abundance of the cosmic gamma-ray emitter ^{26}Al. A primary beam of ^{36}Ar (150 MeV/A) impinging on a Be target was used to produce the $\approx$ 30-MeV/u ^{26}Al beam, which was separated using the A1900 fragment separator [2]. The radioactive ^{26}Al beam bombarded a 10 mg/cm^2-thick CD_2 target surrounded by the Gamma-Ray Energy-Tracking In-beam Nuclear Array GRETINA [3]. The ^{27}Si ions were analyzed by the S800 spectrograph [4] and identified by energy-loss and time-of-flight measurements. The γ-rays from the decays of excited states in ^{27}Si were detected in coincidence with the recoiling ^{27}Si ions. By measuring the number of coincident events, and correcting for the angular distributions of the gamma rays, this provides an angle-integrated measurement of the (d, n) cross-section, and a measure of the proton partial widths for the key astrophysical resonances in ^{27}Si.

[1] A. Kankainen *et al.*, Eur. Phys. J. A **52**, 6 (2016).
[2] D.J. Morrissey *et al.*, Nucl. Instrum. Meth. Phys. Res. B **204**, 90 (2003).
[3] S. Paschalis *et al.*, Nucl. Instrum. Meth. Phys. Res. A 709, 44 (2013).
[4] D. Bazin *et al.*, Nucl. Instrum. Meth. Phys. Res. B 204, 629 (2003).