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Constraint of the Astrophysical ^{26g}Al(p,γ)^{27}Si Destruction Rate at Stellar Temperatures[1] S.D. PAIN, Oak Ridge National Laboratory, ORRUBA COLLABORATION — The 1809-keV γ ray from the beta decay of ^{26}Al provides an unsurpassed opportunity for studying the ongoing nucleosynthesis within our Galaxy. A detailed understanding of the production and destruction rates for ^{26}Al are required to quantitatively understand the ^{26}Al signature; the ^{26}Al(p,γ)^{27}Si reaction is a major destruction pathway at progenitor stellar temperatures. This reaction rate is determined by the properties of states near the proton threshold in ^{27}Si, some of which are too low in energy for direct measurements of the ^{26}Al(p,γ)^{27}Si rate with current beam intensities. We have measured mirror states in ^{27}Al to inform the ^{27}Si structure, via the ^{26}Al(d,p)^{27}Al reaction in inverse kinematics using the ORRUBA and SIDAR arrays of silicon detectors. Spectroscopic information on the states populated in ^{27}Al have been extracted and spectroscopic factors for the ^{27}Si states have been determined by comparisons with shell-model-embedded-in-the-continuum calculations. Experimental results and the constrained reaction rate for massive-star nucleosynthesis will be presented.

[1]. S.D. Pain et al., PRL 114, 212501 (2015).

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