Study of low-lying resonances in ^{26}Si relevant for understanding the nucleosynthesis of Galactic ^{26}Al

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The $^{25}Al(p,\gamma)^{26}Si$ reaction is critical in understanding the emission of radioactive ^{26}Al in the Galaxy. The $^{25}Al(p,\gamma)^{26}Si$ reaction plays a crucial role in re-directing the flux of nuclear material away from the $^{26}Al^{g}$, observable via its 1.8 MeV gamma-ray line, in favor of its short-lived isomeric state $^{26}Al^{m}$, which bypasses the gamma-ray emission but it is observed in excesses of ^{26}Mg isotopic abundances in meteorites and presolar grains. Uncertainties in the $^{25}Al(p,\gamma)^{26}Si$ reaction are dominated by the nuclear properties of low-lying proton-unbound states in ^{26}Si, which determine the reaction rate in a range of astrophysical scenarios.
A high-sensitivity spectroscopy study of the radioactive nucleus ^{26}Si was performed at Florida State University using a neutron/gamma-ray (n/γ) coincidence measurement of the $^{24}Mg(^{3}He,n/\gamma)$ reaction. The experiment was carried out at the John D. Fox laboratory at FSU using the newly developed CATRiNA neutron detector system, an array of 16 deuterated liquid scintillators with excellent pulse-shape-discrimination capabilities as well as a structured pulse-height spectrum that allows to perform neutron spectroscopy complementary to the traditional time-of-flight technique. States in ^{26}Si are 'tagged' by the CATRiNA neutron detectors while the subsequent γ-rays are measured using the FSU HPGe Clovers detectors. Results of this measurement will be discussed as well as its astrophysical implications.