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Investigating near the N=20 island of inversion with the 32Si(t,p)34Si reaction using SOLARIS

Tuesday, 25 June 2024 11:00 (20 minutes)

The ^{32}Si(t,p)^{34}Si reaction was measured in inverse kinematics at a 6.3 MeV/u incident energy using the SOLARIS spectrometer at FRIB in order to study the structure of nuclei around the "island of inversion". Outgoing protons were measured over an angular range of ~20-40 degrees (center-of-mass) and populated excited states of ^{34}Si were identified at energies up to 7 MeV. Additionally, the ^{32}Si(^{3}He,d)^{33}P reaction was simultaneously measured, where populated excited states in ^{33}P were identified at energies up to 5 MeV. Due to the nature of the data taken, several machine learning methods were utilized for event identification, including multi-class classification predictive modeling and anomaly detection. Analysis is ongoing; measured proton angular distributions from the (t,p) reaction for most states will be used in comparison with distorted wave Born approximations (DWBA) calculations to make tentative spin assignments, and the deduced spectroscopic amplitudes will be compared with occupation numbers from shell-model calculations. In addition, a complementary experiment, the ^{34}S(t,$p\gamma$)^{36}S reaction to be carried out with the HELIOS spectrometer at the ATLAS facility at Argonne National Lab, will be discussed in terms of a more complete systematic study in the region.

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