Contribution ID: **359**   Type: **Student Poster ONLY**

The IRIS Facility with Solid H2/D2 Targets at TRIUMF for Reaction Studies of Rare Isotopes

Tuesday, 20 August 2024 17:45 (1 minute)

To probe the frontiers of knowledge on the short-lived isotopes near the neutron drip line for understanding their reactions of astrophysical significance, or hitherto unknown features of nuclear shell structure, one requires novel instrumentation. The IRIS facility features solid hydrogen and deuterium targets, yielding high areal density while remaining geometrically thin (50-100 µm), providing a better-defined reaction vertex point. The poster will describe the solid H2/D2 target, its cooling and vacuum conditions that were investigated for the robust operation of the target. In order to identify the various reactions channels originating from interactions of the rare isotope beams with the H2/D2 target, the IRIS facility utilizes particle identification using a segmented silicon semiconductor detector array and a CsI(Tl) inorganic crystal array, forming a ΔE-E telescope. The energy and angle recorded by the array provides knowledge on the reaction kinematics. Precise calibration of this telescope is necessary to extract the nuclear excitation spectra. The poster will also detail current investigations into the angular, proton number, and potentially mass number dependence of the detector gains.

Funding Agency

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Session Classification: Poster Session

Track Classification: Nuclear Reactions