

Prospects for Measurements of Production Cross Sections of Light Nuclei at RHIC

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The damage due to cosmic rays is a serious concern for astronauts, electronics, and spacecraft. The heavy ion component is important because the damage due to ionization scales as Z^2 . Moreover, the damage from the secondary particles, the damage from secondary production of p, d, t, ^3He , and ^4He is also significant. Extensive double differential measurements for light fragment production were carried out for projectile energies below 3 GeV/n. However, no light nucleus production data exist for heavy ion projectile energies from 3-50 GeV/n. Both experiments and models are needed in this energy regime. Currently the only facilities that can address the needs are the Super Proton Synchrotron (SPS) at CERN (13-200 GeV/n) and the Relativistic Heavy Ion Collider (RHIC) at BNL (3-125 GeV/n). The Solenoidal Tracker at RHIC (STAR) experiment has completed an energy scan with the Au-Au fixed target program. These measurements demonstrate the capabilities of the STAR detector to make the light nucleus production measurements using particle identification with both ionization density (dE/dx) and time-of-flight (TOF). RHIC is a flexible facility and can deliver the ion beam species (C, Al, Fe) and energies (3-125 GeV/n) of need to the Space Radiation Community. STAR has installed targets of interest (C, Al, Ni) and can make the necessary light nucleus production cross section measurements. This presentation will discuss the prospects for making these measurements during the RHIC ion beam running periods from 2023-2025.