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. In addition to the damage due to the primary ionization, the damage from secondary production of p, d, t, ^{3}He, and ^{4}He 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. The Space Radiation Protection community has identified both cross section data and models as needed. Although several facilities that could produce heavy ion beams in this high energy range are planned, 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). Although RHIC is a collider, the Solenoidal Tracker at RHIC (STAR) experiment has installed a fixed target and the Collider Accelerator Division (CAD) has developed an efficient conduct of operations to deliver ion beams to the target. The RHIC/STAR fixed target program has completed an energy scan with gold projectiles. 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-fight (TOF). RHIC is a flexible facility and can deliver the ion beam species (He, C, Si, Fe) and energies (3-125 GeV/n) of need to the Space Radiation Community. STAR can install the targets of interest (C, Al, Fe) and can make the necessary light nucleus production cross section measurements. This talk will discuss the prospects for making these measurements during the RHIC ion beam running period from 2023-2025.