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Comparison of the Angular Dependence of Monte Carlo Particle Transport Modeling Software JEFF CHANCELLOR, National Space Biomedical Research Institute, STEPHEN GUETERSLOH, Texas A&M University — Modeling nuclear interactions is relevant to cancer radiotherapy, space mission dosimetry and the use of heavy ion research beams. In heavy ion radiotherapy, fragmentation of the primary ions has the unwanted effect of reducing dose localization, contributing to a non-negligible dose outside the volume of tissue being treated. Fragmentation in spaceship walls, hardware and human tissue can lead to large uncertainties in estimates of radiation risk inside the crew habitat. Radiation protection mandates very conservative dose estimations, and reduction of uncertainties is critical to avoid limitations on allowed mission duration and maximize shielding design. Though fragment production as a function of scattering angle has not been well characterized, experimental simulation with Monte Carlo particle transport models have shown good agreement with data obtained from on-axis detectors with large acceptance angles. However, agreement worsens with decreasing acceptance angle, attributable in part to incorrect transverse momentum assumptions in the models. We will show there is an unacceptable angular discrepancy in modeling off-axis fragments produced by inelastic nuclear interaction of the primary ion. The results will be compared to published measurements of 400 MeV/nucleon carbon beams interacting in C, CH2 , Al, Cu, Sn, and Pb targets.

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