

# Heavy Ion Collision Event Generator for the 3D Monte Carlo Transport Code HETC

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In order to perform 3-dimensional analyses of space radiation shielding requirements for future missions in deep space, the Monte Carlo radiation transport code HETC has been extended to include transport of energetic heavy ions, such as are found in the galactic cosmic ray spectrum in space. To carry out this extension, a heavy ion collision event generator capable of providing the necessary nuclear interaction data for use in HETC has been developed and incorporated into the transport code [1 - 3]. The event generator predicts the interaction product yields, production angles, and energies using nuclear models and Monte Carlo techniques. Testing, modification and validation of the event generator and extended transport code [4], now called HETC-HEDS (High Energy Transport Code – Human Exploration and Development of Space), is being carried out. In this work the current status of the heavy ion collision event generator is described. Also, sample results from comparisons of code validation, benchmarking, and testing against available laboratory beam data for energetic heavy ions interacting in various targets are presented.

[1] Miller, T. M. and Townsend, L. W.: Double Differential Light Ion Production Cross Sections. Radiation Protection and Dosimetry, Vol. 110, Nos. 1-4, 2004, pp. 57-60.

[2] Miller, T. M. and Townsend, L. W.: Double Differential Heavy Ion Production Cross Sections. Radiation Protection and Dosimetry, Vol 110, Nos. 1-4, 2004, pp. 53-56.

[3] Miller, T. M. and Townsend, L. W., 2004c: Comprehensive Cross Section Database Development for Generalized Three Dimensional Radiation Transport Codes. Nuclear Science and Engineering, Vol. 149, No. 1, January 2005, pp. 65-73.

[4] Townsend, L. W.; Miller, T. M.; and Gabriel, T. A.: HETC Radiation Transport Code Development for Cosmic Ray Shielding Applications in Space. Radiation Protection Dosimetry (2005, in press).