AbstractID: 11591 Title: Monte Carlo simulations to configure a treatment planning system for modulated scanning proton delivery

Purpose: To generate a library of data in order to configure our treatment planning system for modulated, scanned proton delivery. Method and Materials: We use Monte Carlo simulations to generate modulated scanning data for our treatment planning system. A simplified model of the treatment delivery nozzle was implemented as our simulation geometry. Primary protons were generated in the nozzle just downbeam of the last pair of focusing quadrupole magnets. The phase space for these primary protons is taken to be double-Gaussian in both spatial and angular distribution. Given the specifications of spot-size at isocenter, the beam emittance, and that the beam be focused at isocenter, the phase space for primaries was derived by back-transporting the spot-size at isocenter using Fermi-Eyges theory. Results: We find good agreement between Fermi-Eyges theory and Monte Carlo for pencil beams propagating through vacuum and air. The difference in spot size between Fermi-Eyges and Monte Carlo at isocenter is less than 100 um. We generate profiles and depth-dose curves that were used to configure our treatment planning system. Conclusions: Fermi-Eyges theory can be used to find initial phase spaces for pencils beams focused at isocenter. This work was supported by the US Army Medical Research and Materiel Command under Contract Agreement No. DAMD17-W81XWH-04-2-0022. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the US Army.