

## AbstractID: 7287 Title: Validation of the Monte Carlo Model of the Passive Scattering Nozzles at the Proton Therapy Center Houston

**Purpose:** To validate a Monte Carlo calculation model, simulating the passive scattering nozzles in the Proton Therapy Center Houston (PTCH).

**Methods and Materials:** The passive scattering beam lines at the PTCH use three different snouts for small, medium and large treatment fields. Each snout is used with eight different range modulator wheels to produce flat spread out Bragg peaks (SOBPs) at various proton energies. MCNPX is currently used to simulate the passive scattered proton beams at the PTCH for various research and clinical projects. The validity of the model is crucial and it has to be demonstrated, that the simulations are in agreement with measured data. Proton beam data, measured for commissioning purposes, were compared with the results of Monte Carlo simulations. Tolerance criteria for acceptable agreement was chosen to be 3% dose difference in high dose regions and 2.5 mm distance in high gradient regions.

**Results:** 32 SOBPs and 79 lateral profiles have been compared so far. In three cases, maximum dose differences (in high dose regions) were found to be 3.0 % and one simulated penumbra was found to differ by 2.1 mm when compared to the measurement. Differences for all other cases are below the tolerance level.

**Conclusion:** The Monte Carlo simulation model of the passive scattering nozzles of the PTCH is found to be accurate for the investigated energies and field sizes.

**Conflict of Interest:** None.