

**AbstractID: 3948 Title: Comparison of the measured dose with the dose calculated with superposition/convolution and Monte Carlo algorithms from the same fluence map for IMRT fields.**

**Purpose:** To compare the doses calculated for IMRT fields from the same fluence map with superposition/convolution and Monte Carlo algorithms and the measured dose.

**Methods and Materials:** A parallel version of the PENELOPE Monte Carlo (MC) code was utilized for particle transport inside the solid water phantom without and with inhomogeneity. The energy, location and direction of each particle entering the phantom was sampled from a fluence map generated by the commercial superposition/convolution (SC) algorithm for a commissioned accelerator. The 'pyramid' and small off-axis IMRT fields were studied. The doses calculated with MC code and SC from the same fluence map were benchmarked against doses obtained by HD-810 GafChromic® film for each setup.

**Results:** For homogeneous setup the 'pyramid' field revealed close match between doses calculated by MC and SC, but the measurements at a depth of 10 cm showed some discrepancies in the penumbra regions. The presence of an airslab showed a discrepancy of up to 20 % between MC and SC dose values along the beam axis in the build-up region (up to 1.5 cm). The dose measured at 2 cm downstream from the airslab was different from the doses calculated with MC and SC. In the case of small fields all three doses: measured, and calculated with MC and SC were different.

**Conclusion:** The agreement of doses measured and calculated with MC for the regions where the dose was not perturbed by inhomogeneities validated the fact that MC algorithm with initial parameters from the fluence map works properly. The difference among the doses calculated with SC and MC algorithms from the same fluence map and the measured dose is believed to be mainly due to the approximation of particles initial direction.

Supported in part by NSF ECS 012014, NIH 2R42 CA 091688-02A1, and IN 830010403