

AbstractID: 3775 Title: Design Characteristics of a MLC for Proton Therapy

**Purpose:** To determine the leaf design characteristics (separation between leaves, leaf width, step size, and divergent vs. non-divergent leaves) and the optimal distance-from-patient of a multileaf collimator (MLC) used in a proton therapy facility. These parameters have a significant effect on the penumbra width and leakage dose.

**Material and Methods:** The GEANT4.7 Monte-Carlo code was used to simulate the various design parameters for the MLC. The geometry included a representative double-scattered beam incident on the MLC spaced at variable distances from a water phantom. Modifications were made to the code to input the leaf geometry from an external file so the many variations of leaf design could be tested without recompiling the code.

**Results:** The output of the Monte-Carlo scored (1) the dose deposition in the water phantom, from which a measure of lateral penumbra as a function of depth and/or conformation to an pseudo-PTV could be determined, and (2) the number of secondary particles, e.g. neutrons, that were incident on the phantom and whether these secondary particles came through the MLC or in the gaps between the leaves.

**Conclusion:** These results, along with mechanical-design, electrical-design, and cost considerations, are being used to design the proton therapy MLC to provide good dose conformation to the target while minimizing the normal tissue dose caused by leakage.