AbstractID: 8614 Title: Modeling the increased scatter from tertiary collimators

Purpose: The tertiary multileaf collimators in certain linear accelerators add to the amount of scatter produced. This scatter is often ignored at the time of commissioning and beam data collection, i.e. the collimator and phantom scatter factors are measured with the MLCs retracted. This increased scatter contributes to skin dose and affects the accuracy of the dosimeter readings when placed on the skin. For majority of conventional radiotherapy portals, the jaws are set to conform to MLCs as closely as possible. In the case of IMRT treatments, the jaw is often set at a fixed size, and the MLCs form the segments, or control points, of each beam. Thus the difference between MLC and jaw settings may be significant. **Method and Materials:** We have quantified the magnitude of this scatter for various field sizes defined by MLCs and jaws and have characterized the variation of this scatter with MLC and jaw settings. We have measured collimator scatter factors in air for MLC-defined square fields of different sizes (2 cm^2 and up to the jaw size) for jaw settings of 10, 15, 20, 25, 30, and 36 cm^2. **Results:** Our data indicates that the larger the difference between MLC and jaw settings, the greater the difference between the scatter factors and, as the size of the MLC setting approaches that of the jaw, the scatter values converge into a single value at the point of equal MLC/jaw setting. We have also fitted curves to the MLC scatter for any given jaw setting, which can be used for estimation of the increased dose as a function of jaw and MLC sizes. **Conclusion:** The quantification of increased scatter due to MLCs can potentially be used to get more accurate skin dose estimates in treatment planning and to correct diode readings for IMRT treatments.