

AbstractID: 7488 Title: Photon Spectral Characteristics of Dissimilar 6MV Linear Accelerators

Purpose: To determine and compare the energy spectra of four 6MV beams, generated from four physically different accelerators. Also, to demonstrate that the spectra of clinical photon beams can be measured as a part of the beam data collection process for input to a 3D treatment planning system.

Methods and Materials: The spectra of 6MV beams that are dosimetrically matched were studied to determine if the beam spectra are similarly matched. Each of the four accelerators examined had different physical designs. The four accelerators were two Varian 2100C/Ds (one 6MV/18MV waveguide and one 6MV/10MV waveguide), one Varian 600C with a vertically mounted waveguide and no bending magnet, and one Siemens MD 67/40 with a 6MV/10MV waveguide. All four accelerators had Percent Depth Dose curves for 6MV that were matched. Spectral measurements were performed by narrow beam transmission measurements through pure aluminum along the central axis of the accelerator, made with a graphite Farmer ion chamber with a Lucite buildup cap.

Results: Reconstructed spectra show that all four beams have similar energy distributions with only subtle differences, despite the differences in accelerator design. Comparisons of the measured spectra to the spectra found by the auto-modeling algorithm in a commercial treatment planning system also showed excellent agreement. Plots of the measured spectra are shown.

Conclusions: The measured spectra of different 6MV beams are similar, regardless of accelerator design. The measured spectra agree with those derived by the treatment planning system. Thus, beam spectra can be acquired in a clinical setting at the time of commissioning as a part of the routine beam data collection.