AbstractID: 11668 Title: Commissioning the 3D-Line microMLC controller in the Pinnacle TPS

Purpose: To prepare and commission a parametric Collapsed Cone Convolution Superposition model in the Pinnacle Treatment Planning System in order to accurately describe the output of an Elekta Precise series Linear Accelerator fitted with the 3D-Line micro MLC controller at two clinical photon energies of 6MV and 10MV. The model is intended to be used for clinical treatment planning purposes for Stereotactic RadioSurgury, Fractionated SRS, and IMAT/VMAT.

Method and Materials: Data was collected using an Exradin A16 0.007cc microChamber in a 3D water phantom. Scans of the In-plane and Cross-plane dose profiles at Dmax, 5, 10, and 15cm, and depth dose curves, were acquired for field sizes from 0.581x0.581 cm^2 to the maximum open field size, and two rectangular fields; all at 90cm and 100cm SSD. The data were used, along with custom optimization sequence, to adjust model parameters in the TPS. Output factor measurements were made with an ADCL traceable Electrometer and the microchamber, with a final cross calibration from open field mMLC to 10x10cm^2 using a 0.1cc Farmer Chamber, all at 10cm depth.

Results: Comparison between the measurements and the model output for the measured field geometries indicates good agreement at field edges, and for depth dose curves, with larger error apparent at the smallest field sizes. The output factors computed for the model were within 6% for all field sizes, indicating no large discrepancies with the model. Monitor unit comparisons for several field sizes also demonstrated agreement with the previously commissioned Ergo TPS.

Conclusion: These results demonstrate the feasibility of commissioning the 3D-Line mMLC in a TPS other than the Ergo TPS, which provides for the opportunity to maintain a single TPS in sites using Pinnacle. Future research will directly compare plans generated in both Pinnacle, and Ergo, to delivered machine fluence measurements.