

AbstractID: 7121 Title: Commissioning of the Virtual Source Model for Use in a Monte Carlo Dose Calculation for Dose QA

Purpose: A Monte Carlo Dose (MCD) engine coupled with a Virtual Source Model (VSM) will be incorporated into the IMPAC-MOSAIQ system for use as a dose QA tool. The VSM is an efficient accelerator head model that requires commissioning of the source parameters using a series of measurements. The commissioning measurements, procedures, and verification of results will be described.

Method and Materials: A series of in-air measurements is used along with a limited number of in-water measurements to determine the parameters required to characterize a particular linac. The in-air measurements are used to determine the primary source strength, primary source size, and secondary source size. In addition, the shape of the off-axis profiles is determined through use of the Padé approximation. The in-water measurements are used to determine the spectral shape and amount of electron contamination from a series of mono-energetic kernels. A series of in-water verification measurements is then used to confirm accuracy of the characterization through MCD verification calculations of in-water profiles. After verification of the commissioned parameters, the model is ready for use as a dose QA tool for comparison to 3D DICOM dose exported from the treatment planning software.

Results: Good agreement is seen between output factors and profiles for a series of field sizes for the multiple machine types studied.

Conclusion: Multiple machine types can be commissioned for use with the VSM in order to facilitate dose QA using a Monte Carlo dose engine.

Conflict of Interest: The authors are employees of Elekta.