AbstractID: 14153 Title: Feasibility of an independent dose calculation for VMAT with Monte Carlo

Purpose: To investigate the feasibility of a Monte Carlo based independent dose calculation for VMAT in a Novalis Tx linear accelerator equipped with high definition MLC.

Method and Materials: Percent depth dose curves were calculated and compared against measured ones in water to commissioning the linear accelerator built on BEAMNRC. From the DICOM containing the information of the VMAT plan all the parameters needed for the simulation were extracted using a MATLAB in-house software, which with this data create the files for the Monte Carlo simulation and is exported to a LINUX environment where the simulation is done in MCSim egs4 Monte Carlo code. MCSim egs4 software was used to simulate the VMAT treatment plans, in which a cylindrical phantom (15 cm radius and 18 cm depth) is used to compute the dose. In-house software using a MATLAB platform was utilized to convert the 3D dose file obtained from the Monte Carlo simulation to a file which can be read using commercially-available software for dose visualization (RIT software), in which can be compared with the treatment plan exported form the TPS.

Results: Several simulations in the MCSim egs4 platform were performed and good results have been observed. The accuracy of the calculation is still low but the main purpose of this preliminary work is just for demonstrating the feasibility of the VMAT calculation in Monte Carlo software.

Conclusion: Based on the results, the Monte Carlo based NovalisTx linear accelerator and the MCSim simulations of treatment on a cylindrical phantom it was demonstrate the feasibility of VMAT independent dose calculation in Monte Carlo.