

AbstractID: 11058 Title: Development of a Software for Integrating the Medical Accelerator Model with Patient Phantoms into Monte Carlo Based Dosimetry Platform

Purpose: To develop a new software package that integrates the detailed medical accelerator model with anatomically-realistic phantoms in the Monte Carlo engine, MCNPX, for the determination of secondary organ doses from secondary photons and neutrons during the treatment. **Method and Materials:** The accelerator models were developed include 80 MLC leaves, two pairs of tungsten jaws operating at 6 and 18 MV, respectively. The Pregnant Women, Adult Male and Adult Female phantoms were utilized. The software was designed in the Visual C#.NET and the preliminary effort was on the graphic user interface (GUI) to automatically generate the MCNPX input deck consisting of accelerator and patient according to user-defined treatment plans. The MLC configuration files were parsed to collect positions of the jaws and MLCs before they were exported into MCNPX by using the "TRCL" with the "LIKE BUT" card. **Results:** A number of user-friendly GUI features have been developed for a user to select treatment parameters: selection of an accelerator type, a type of phantom, specify the phantom origin position and the field numbers, parse in the MLC configuration files and save the MLC leaf positions. According to the positions of the jaws and MLCs, the software can automatically output the MCNPX deck files, classified per field, per segment and per MLC leaf position with the accelerator model and computational phantoms. **Conclusion:** A new software has been demonstrated. The preliminary results indicate that the GUI design and integration features are feasible and versatile. This software is designed to help a user to carry out organ dose studies using the MCNPX input deck without having to handle complex accelerator and phantom information. Such a tool can facilitate the study for assessing and for comparing various new modalities in terms the likelihood for secondary cancer induction.