AbstractID: 11283 Title: Electron Monte Carlo dose calculation in Eclipse for Siemens linear accelerators

Purpose: Initially, the implementation of the macro Monte Carlo (MC) method into Eclipse (Varian Medical Systems), named eMC, was only carried out for Varian accelerators. This leads to limitations in accuracy if eMC is applied to Siemens machines. In this work eMC has been adjusted in order to allow accurate dose calculations of electron beams for Siemens accelerators.

Method and Materials: Several changes have been implemented into the eMC algorithm. First, the beam model has been modified by introducing a 2D fluence instead of a 1D radial fluence distribution for the primary electrons and by including all scrapers of the applicator. Second, the resolution of mono-energetic depth dose curves used during beam configuration has been increased to determine the initial electron energy spectrum. Furthermore, the size of the sphere within the macro MC transport has been reduced when the incident energy of the electron is below certain thresholds. Calculated and measured dose distributions are compared for Siemens machines using electron energies of 6, 7, 9, 13, 17, 20 and 21 MeV and applicators ranging from 10x10 to 25x25 cm^2.

Results: Calculated and measured absolute depth dose curves agree within 1% or 1 mm for all energy and applicator combinations investigated. Calculated and measured absolute dose profiles at depths of d_{max}, R50 and in the photon tail generally agree to within 2%. Some dose values close to the field edge show slightly larger differences.

Conclusion: In this work several improvements have been implemented into the eMC algorithm. Due to these improvements the eMC algorithm was able to successfully configure electron beams from Siemens machines. The results of the dose comparison suggest that eMC is suitable to predict dose distributions also for Siemens linear accelerators. **Conflict of Interest:** This work was supported by Varian Medical Systems.