

AbstractID: 2973 Title: The effects of scattering foil parameters on Monte Carlo calculations of the initial phase-space data for a clinical electron beam

**Purpose:** To study the effects of the scattering foil geometry on the dose characteristics of a clinical electron beam using Monte Carlo simulation and discuss the feasibility of different modifications on the scattering foil for generating the electron beam phase-space data.

**Method and Materials:** This work focuses on the calculation of phase-space data using BEAMnrc for a Varian Clinac 2100EX accelerator with a Type-III dual scattering foil system. To minimize the influences of other components in the system, we used a 'bare' beam (a beam without the applicator and with the jaws fully retracted) for our investigation. Using the manufacturer's specifications for the scattering foil assembly, the calculated depth doses agreed well with the measured data. The cross-beam profiles, however, showed discrepancies up to 10%. Reducing the thickness of the upper foil by 25% or doubling the thickness of the aluminum support of the lower foil led to good agreement with measured profiles. The properties of the phase-space data generated by these two different modifications of the scattering foil geometry were compared in terms of fluence, mean energy, spectrum, and angular distribution.

**Results:** The two different modifications led to good agreements between calculation and measurement both in depth doses and in cross-beam dose profiles. The differences in the mean energy and angular distribution using the original manufacturer's specification and the two modifications were small (within 2%). The properties of the phase-space data generated using these two modifications were very similar.

**Conclusion:** The precise scattering foil geometry is often not known. In order to obtain good agreement between Monte Carlo calculation and measured data, one may adjust the scattering foil geometry from the manufacturer's original specifications. This modified scattering foil geometry can be used to generate the phase-space data for further applications such as dose calculation in patient.