AbstractID: 1772 Title: Developing a robust blur kernel for Varian's aS500 electronic portal imaging device

Amorphous silicon electronic portal imaging devices (a-Si EPIDs) exhibit a linear response to absorbed dose. As such, it has been recognised that they have the potential to produce a two-dimensional pixel map of dose and/or energy fluence within a given therapeutic field. The image formed by the detector is however subject to multiple blurring processes. Thus in order to produce an accurate energy fluence map, it is necessary to model the blur in order to deconvolve it from the image. This study examines the blur kernel of Varian's aS500 EPID, a typical a-Si portal imager. The overall blur kernel is a convolution of two processes: a) the spread of dose deposited in the scintillation screen, and b) the spread of optical photons created in the screen and detected by the amorphous silicon photodiodes. We modelled dose deposition in the aS500 using the EGSnrc Monte Carlo code, which simulates transport of high-energy (MeV) photons and electrons, and optical spreading using the DETECT2000 Monte Carlo code, which tracks optical photon propagation. Convolving these results yielded a robust overall blur kernel for both 6 and 15 MV beams. We found that EPID images deconvolved using this kernel resulted in fluence profiles matching those measured by a diamond detector across a range of standard clinical fields: 4×4 cm^2, 10×10 cm^2, 20×20 cm^2, and a 10×10 cm^2 45° wedged field.