Additional material

Fig. 1 shows the lateral dose profiles and fitted kernel for the 120 keV monoenergetic at 1cm, 5cm and 10 cm depths. The fitted profiles demonstrated a triple exponential decay function with an offset as described in the following equation

\[ EDK(x, z, E) = y_0(x) + A_1(x)e^{-\alpha_1(x)z} + B_1(x)e^{-\beta_1(x)z} + C_1(x)e^{-\gamma_1(x)z} \]

where \( y_0 \) is the offset parameter. \( A, B \) and \( C \) are the amplitude coefficient and \( \alpha, \beta \) and \( \gamma \) are the decay constant, \( z \) is the depth in the medium and \( x \) is the off axis distance. The numerical values of all the parameters of the energy deposition kernel depend on the depth, off axis distance as well as on the nominal energy of the x-ray beam. Each of the parameters is plotted against the depth in the medium and fitted with an appropriate analytical function to represents their behavior relative to depth and photon energy. This is shown in fig. 2 and 3. These fitted functions can be used for the interpolation of the kernel parameters in dependence upon the arbitrary depth in the water phantom.

Figure 1: The lateral dose profiles and the kernel fit in water for the 120 keV monoenergetic beam at three depths 1cm, 5 cm and 10 cm are illustrated. All the curves are normalized to the maximal value at the center of the kernel.

Figure 2: The coefficients \( y_0, A, B, C \) as a function of depth for the 80(*) 100(○) and 120 keV(□) mono-energetic beams is illustrated.

Figure 3: The coefficients \( \alpha, \beta, \gamma \) as a function of depth for the 80(*) 100(○) and 120 keV(□) mono-energetic beams is illustrated.