AbstractID: 6681 Title: Determination of the phase space of 6 MV / 18 MV photon beams

The photon beam "output" of a VARIAN 2300 C/D (6 MV, 18 MV) has been determined by Monte-Carlo calculations. For comparison, two different Monte-Carlo codes (GEANT-Fluka and BEAM/EGS4) have been applied to describe poly-energetic spectra in terms of mono-energetic photons, fluence distribution at water phantom surface, poly-energetic photon phase space, electron contamination resulting from flattening filter, jaws and scatter in the air (large angle scattering).
With regard to the energy phase space of a poly-energetic photon beam there are two different ways for its determination:

1. Monte-Carlo simulation of all processes occurring in the target and head scatter of a linear accelerator. This implies the production of "bremsstrahlung", (target material: W and Cu), scatter influences of the primary collimators, beam modulation by the flattening filter, influences of the dose monitors and second collimators.
2. Analysis of the depth-dose curves and transverse profiles determined in a water phantom by superposition/convolution algorithms. For this purpose, transverse profiles of some field-sizes (4 x 4 cm^2 up to 40 x 40 cm^2) are necessary in steps of 0.5 cm starting at depth z = 2.5 cm up to z = 30 cm). The measured transverse profiles are used to determine divergent depth-dose curves with the help of superposition/convolutions of divergent pencil beams.

The phase space of a photon beam is determined by the corresponding mono-energetic pencil beams resulting from Monte-Carlo calculations.
Research supported by Varian Medical Systems