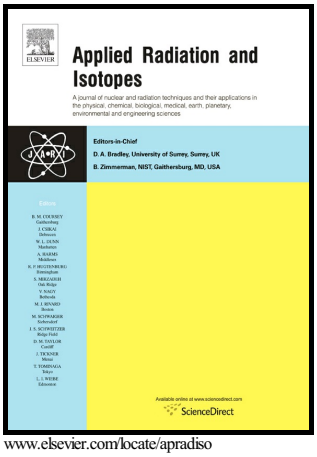

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Abstract

A bimodal tomographic system with a RTW MCBM 65B-50Mo X-ray tube and a XPAD3s semiconductor camera that contains 8 bars, each one with 67200 hybrid pixels are modeled in GEANT4 simulation code. Several conical X-ray spectra were simulated, particularly a spectrum with a peak energy of 17.4 keV used in tomography on small animals. Three phantoms located in the tomographic center were added to the simulation to evaluate the image quality and its magnification based on the simulation of different photon fluences and the rotation effect of the tomographic system with an average angular velocity of 360o per minute. The images were recorded and analyzed in 2D through ROOT software toolkit in virtual XPAD3 detector. The quantitative method 20%-80% of the maximum intensity of radiation was used for obtain the contouring of the phantoms, this method is used in radiotherapy and radiodiagnosis imaging. For this purpose, the images were taken to DICOM format in order to estimate the optical density of the contours and to evaluate the optimum and minimum photon fluence to be used in the tomographic system in order to reduce the absorbed doses in the individuals. This study allowed to determine the optimal fluence to validate it with realistic fluences used in the tomographic prototype ClearPET /XPAD-CT and to make an intercomparison with the absorbed doses measured with detectors located in the tomographic center.

Keywords: Monte Carlo simulation, X rays, diagnostic image, bimodal tomography.