

AbstractID: 2117 Title: Scattered Radiation Field Estimation In An Interventional X-Ray Room Using Monte Carlo Simulation

As an adjunct to our patient dose tracking system, it would be helpful to provide visual feedback to personnel regarding the scatter distribution in an interventional room. The actual scatter distribution depends on many factors including beam shape and size, beam incident angle, patient size and shape, body part exposed, kVp, mA and SSD. Determining the 3D scatter distribution when a large number of parameters will be varied can be efficiently accomplished using a Monte Carlo approach. The speed of the Monte Carlo simulation that we implemented is less than 5 seconds on an average PC. Classical Monte Carlo concepts such as particle weight and Russian roulette are implemented. The only photon interactions taken into account are photoelectric effect and Compton scattering with coherent scattering being ignored due to its low cross-section. Our initial simulations have used a model that only approximates the human body with a simple geometry, so that the results can be directly compared to experimental measurements. Agreement between the simulation and the scatter distributions measured for a Plexiglas phantom is good in terms of angular distribution and is within 5 percent in magnitude. Additional simulations that more closely model the human patient and clinical procedure conditions are in progress.

Supported by FDA grant #R44FD-01584-02, Esensors, Inc. and an equipment grant from Toshiba, Corp.