

ABSTRACT

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Program Studi : Fisika
Judul : *Preliminary Study of Influence of Variation of Photon Energy and Material Phantom Rectangular Parallelepiped (RPP) Photon Fluence Used Monte Carlo Simulation Fluka*

Research has been carried out using the FLUKA program based on the Monte Carlo method. The Monte Carlo method in medical physics is widely used in detector simulations on nuclear medicine and calculation of absorbency doses on radiotherapy. FLUKA is a development software from the Monte Carlo method that can model geometry using graphical user interface (GUI) flair. This study uses two geometric modeling, namely collimator and phantom to determine the effect of variations in photon and material energy on phantom. The energy variations of photons used are 6, 8, 10, 12, 16, 18 MeV while the variation of PMMA phantom material and tissue. Based on the results of the fluence simulation, there are three interactions such as backscatter, Compton effect, and photopeak. Photon energy and phantom material variations produce the most fluence when experiencing Compton effect interactions. The greater the photon energy the greater fluence is generated from the interaction of the Compton effect and the greater the material density, the greater the fluence that results from the interaction of the Compton effect.

Keywords: FLUKA, Monte Carlo method, fluence, backscatter, Compton effect, photopeak

ABSTRAK

Nama : Indriani Rahmawati
Program Studi : Fisika
Judul : *Studi Awal Pengaruh Variasi Energi Foton dan Material Phantom Rectangular Parallelepiped (RPP) Fluence Foton Menggunakan Simulasi Monte Carlo Fluka*

Telah dilakukan penelitian menggunakan program FLUKA berdasarkan metode Monte Carlo. Metode Monte Carlo dalam fisika medis banyak digunakan pada simulasi detektor pada kedokteran nuklir dan perhitungan dosis serap pada radioterapi. FLUKA merupakan *software* pengembangan dari metode Monte Carlo yang dapat memodelkan geometri menggunakan *graphical user interface (GUI) flair*. Penelitian ini menggunakan dua pemodelan geometri yaitu *collimator* dan *phantom* untuk mengetahui pengaruh variasi energi foton dan material pada *phantom*. Variasi energi foton yang digunakan 6, 8, 10, 12, 16, 18 MeV sedangkan variasi material *phantom PMMA* dan *tissue*. Berdasarkan hasil simulasi *fluence* yang dihasilkan mengalami tiga interaksi seperti *backscatter*, *efek Compton*, dan *photopeak*. Variasi energi foton dan material *phantom* menghasilkan *fluence* terbanyak pada saat mengalami interaksi efek Compton. Semakin besar energi foton semakin besar *fluence* yang dihasilkan dari interaksi *efek Compton* dan semakin besar *density* material maka semakin besar *fluence* yang dihasilkan akibat interaksi *efek Compton*.

Kata Kunci: FLUKA, Metode Monte Carlo, *fluence*, *backscatter*, *efek Compton*, *photopeak*