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Contribution of the Direct Electronuclear Processes to Thin Target Activation

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Contribution of the direct inelastic interactions of electrons with nuclei to the neutron production and to the material activation radiation source terms may become significant or even critical in certain conditions at high energy electron accelerators. Impact of these processes may be considered negligible in descriptions and simulations of fully developed electromagnetic or hadronic particle cascades in thick targets and beam dumps. However, in the cases of electron beam interactions in targets thinner than few percent of a radiation length, the direct electronuclear processes become dominant. At Jefferson Lab's CEBAF accelerator these processes are often responsible for the significant portion of the radiation source terms in the experimental Halls. New experimental data on thin nuclear target activation by the few-GeV electron beams, obtained at JLab recently, help to evaluate the contribution of the direct electronuclear processes to the thin target activation. A model description of the process based on the Equivalent Photon Approximation method, the corresponding Monte Carlo simulation algorithm, and the (limited and simplified) method of implementing these processes in the FLUKA code are presented.

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