

SHIELDING PARAMETERS OF CONCRETE AND POLYETHYLENE FOR THE PSI PROTON ACCELERATOR FACILITIES

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Abstract

The Paul Scherrer Institut (PSI) operates 72-MeV, 250-MeV and 590-MeV proton accelerator facilities. To provide a simple, systematic approach to arising shielding questions within new projects, MCNPX has been used to calculate angle-dependent shielding parameters of concrete, i.e., dose-rate source terms and attenuation lengths, for protons at these three energies striking a stopping-length iron target. Two calculational models (tallies at various levels within a shielding sphere and tallies on the outside of a shielding sphere of varying thickness) and two cross-section sets (ENDF/B-VI and LA-150) have been examined. Polyethylene has also been considered as shielding material for 72-MeV protons. The contributions of photons and neutrons to the total dose rate were analyzed. The results are compared to available measurements.