Measurement of High Energy Neutron Spectra behind Shielding of CERF Facility

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Neutron energy spectra behind the lateral shield of the CERF (CERN-EU High Energy Reference Field) facility at CERN were measured with a 120 GeV/c positive hadron beam on a cylindrical copper target (7-cm diameter by 50-cm long). NE213 organic liquid scintillator (12.7-cm diameter by 12.7-cm long) was located at various longitudinal positions behind shields of 80- and 160-cm thick concrete and 40-cm thick iron. Neutron energy spectra in the energy range between 32 MeV and 380 MeV were obtained by unfolding the measured pulse height spectra with the detector response functions which have been experimentally verified in the neutron energy range up to 380 MeV in separate experiments. The corresponding MARS15 Monte Carlo simulations were also performed, and these generally were in good agreement with the experimental energy spectra. These experimental results are useful as benchmark data for different Monte Carlo simulation codes.