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70MeV~100 MeV Quasi-monoenergetic neutron reference fields in China

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Based on the 100 MeV proton cyclotron at the China Institute of Atomic Energy (CIAE), we have established and investigated quasi-monoenergetic neutron reference radiation fields in the (70-100) MeV energy range. Quasi-monoenergetic neutrons were generated through proton bombardment on metallic Li targets with thicknesses of 3, 4, and 5 mm, followed by deflection magnets and a 3-meter-long collimator system. The neutron energy spectra were measured using the double-scintillator time-of-flight (TOF) method, while neutron fluence was determined through U-8 fission ionization chambers and recoil proton telescopes.
Over the past two years, systematic facility upgrades have been implemented:
1. Comprehensive concrete shielding was installed to fully enclose the neutron target chamber, effectively reducing scattered neutron background.
2. A beam-limiting aperture was added at the beam extraction port to confine the beam spot size to a minimum of 1×1 mm^2, ensuring complete proton bombardment on Li targets while minimizing parasitic neutron production from peripheral materials.
3. A pair of quadrupole lenses was incorporated upstream of the target chamber to enhance beam regulation and control capabilities.
4. Preliminary modifications for pulsed beam operation have been attempted at the cyclotron's extraction port, with this ongoing research currently underway.

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