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Diamond dosimeter for the measurement of the proton beam impact position on a neutron spallation target

Wednesday 10 September 2025 16:00 (2 hours)

In close proximity to the spallation neutron source of the neutron time-of-flight facility n_TOF at CERN, diamond detectors are installed to measure the fast neutron beam. The detectors are located 2.3 m from the center of the spallation target at 100° with respect to the impinging proton beam. The 20 GeV/c proton beam from CERNs Proton Synchrotron (PS) hits the Pb-spallation target with a nominal intensity of 8.5e12 protons/bunch, a proton bunch length of 16 ns FWHM and a maximum repetition rate of 0.8 Hz. The proton beam intensity is monitored with a beam current transformer (BCT) installed in the PS extraction line to n_TOF. The proton beam position is measured using a SEM grid 2 m before the spallation target. A linear correlation between the horizontal proton beam impact position on the Pb-target and the measured dose of the secondary radiation at the measurement station for each pulse is observed. While the proton beam impact position varies by 12 mm, the normalised dose varies by 20%. The achievable precision of the proton beam position measurement using the diamond dosimeter and the linearity of the dose measurement for individual bunches is studied and will be presented.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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