Various diagnostics of the proton beam size on the Vacuum Insulated Tandem Accelerator

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Neutron source consisting of a vacuum insulated tandem accelerator, a thin solid lithium target and a beam shaping assembly is in operation at Budker Institute of Nuclear Physics. Successful biological studies were carried out at the source [1, 2], the content of hazardous impurities in boron carbide ceramic samples developed for ITER was measured [3], radiation testing of optical fibers of the CMS calorimeter laser calibration system for the Large Hadron Collider in high luminosity mode (CERN) is being prepared. The need to ensure long-term stable neutron generation requires the development of diagnostic methods that display real-time state of various subsystems of the neutron source. In this work diagnostics of the proton beam size are described, such as: i) using a blistering effect at proton implantation in metal, ii) using thermocouples, inserted in the lithium target, iii) using a melting of the lithium layer of the target under powerful proton beam, iv) using an activation of the lithium target by berilium-7, v) using video cameras, vi) using an infrared camera, vii) using an effect of the luminescence of the lithium under proton bombardment and viii) using collimator with 2 mm aperture.

Keywords:
vacuum insulated tandem accelerator, epithermal neutron source, beam diagnostics

References:

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