

Diagnostics and spectrometers for the BNCT field characterization tested at the e_LiBANS facility

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The E_LIBANS project (INFN, CSN 5) aims at producing neutron facilities for diverse interdisciplinary irradiation purposes among which pre-clinical research for BNCT. After the successful setting up and characterization of the thermal neutron source based on a medical LINAC a similar apparatus for epithermal neutrons has been developed. Both structures are based on an Elekta Precise SL 18 MV, installed in a dedicated bunker at the Physics Department of Turin University. In both cases the linac head is coupled with a photoconverter-moderator system which deploys the (γ , n) photonuclear reaction on a thick lead target to convert the bremsstrahlung photons of the linac beam into a neutron field. Suitable materials and geometries are chosen to slow down neutrons to the wanted energy and to reduce the gamma contamination and the residual fast-neutrons component in the irradiation cavity. Relying on two specifically designed photocoverter+moderator assemblies, nearly pure thermal or epithermal fields were achieved. Specially designed thermal and epithermal neutron detectors were developed to resist the intense field and to provide very high neutron-to-photon discrimination capability. Spectrometric systems equipped with active detectors have been studied for the characterization of BNCT neutron field.

This contribution will describe the numerical design of these fields and the experimental measurements performed for their spectrometric characterization together with the innovative diagnostics developed within the collaboration.

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