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Investigating a proton beam-based neutron source for BNCT using the MCNP simulation

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Works in this project are focused on the optimization and design of a beam shaping assembly (BSA) for the boron neutron capture therapy (BNCT) based on a 30 MeV proton beam generator. The aim is to maximize the epithermal neutron flux and prevent the background radiation which is required for the BNCT designation. A set of material and geometry simulations are examined as neutron multiplier, moderator, reflector, and collimator. The final configuration consists of 0.5 cm of beryllium as a p-n converter, 15 cm in radius of uranium as a neutron multiplier, 44 cm of TiF_3 and 15 cm of Al_2O_3 as a first and second layer of moderator, 10 cm thick of lead as a reflector, and lithium polyethylene as a collimator. According to the results of the calculation, the proposed BSA provides high epithermal neutron flux at the irradiation area.

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