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P4.206 Neutron field study of p(24)+Be source reaction using the multi-foil activation technique

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The accelerator-driven fast neutron sources of broad- and quasi-monoenergetic spectra are operated at the NPI Rez Fast Neutron Facility utilizing the Be(thick) and 7Li(C) target stations and the variable energy proton beam (up to 37 MeV) from the isochronous cyclotron U-120M. The beryllium target station standardly operated with 35 MeV proton beam is used for production of IFMIF-like (International Fusion Material Irradiation Facility) neutron energy spectrum up to 33 MeV with mean energy of 14 MeV (corresponds to the ITER-tokamak neutron source). Recently, the source reaction of p(24)+Be was investigated using the 24 MeV protons on beryllium target, and neutron field in close source-to-sample distance was determined employing the dosimetry foils activation method (set of activation foils contained Al, Au, Fe, Ni, Y, Ti, In, Co, Nb, Lu). Neutron spectrum reconstruction from resulting reaction rates was performed using the modified version of SAND-II unfolding code and neutron cross-sections from the EAF-2010 nuclear data library. Obtained neutron energy spectra were validated against the Monte Carlo MCNPX predictions. Developed p(24)+Be neutron field up to 22 MeV represents a useful tool for intensive irradiation experiments, radiation hardness study of materials, and validation of cross-sections in energy range relevant to fusion neutrons (≥ 12 MeV). Neutron characteristics of p(24)+Be neutron source will be discussed in the article.

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