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[P08] Measurement of 107-MeV proton-induced double-differential neutron yields for iron for research and development of accelerator-driven systems

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For accurate prediction of neutronic characteristics for accelerator-driven systems (ADS) and a source term of spallation neutrons for reactor physics experiments for the ADS at Kyoto University Critical Assembly (KUCA), we have launched an experimental program to measure nuclear data on ADS using the Fixed Field Alternating Gradient (FFAG) accelerator at Kyoto University. As part of this program, the proton-induced double-differential thick-target neutron-yields (TTNYs) and cross-sections (DDXs) for iron have been measured with the time-of-flight (TOF) method. For each measurement, the target was installed in a vacuum chamber on the beamline and bombarded with 107-MeV proton beams accelerated from the FFAG accelerator. Neutrons produced from the targets were detected with stacked, small-sized neutron detectors composed of the NE213 liquid organic scintillators and photomultiplier tubes, which were connected to a multi-channel digitizer mounted with a field-programmable gate array (FPGA), for several angles from the incident beam direction. The TOF spectra were obtained from the detected signals and the FFAG kicker magnet's logic signals, where gamma-ray events were eliminated by pulse shape discrimination applying the gate integration method to the FPGA. Finally, the TTNYs and DDXs were obtained from the TOF spectra by relativistic kinematics. The measured TTNYs and DDXs were compared with calculations by the Monte Carlo transport code PHITS with its default physics model of INCL version 4.6 combined with GEM (INCL4.6/GEM) and those with the JENDL-4.0/HE nuclear data library. Details of the TTNY and DDX measurements and their experimental results will be presented.

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