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Review of (n,gamma) reactions in astrophysics and scope at J-PARC

YASUKI NAGAI, Japan Atomic Energy Agency

A neutron capture reaction cross section of a nucleus at stellar temperatureis one of important key parameters in the construction of stellar models. A measurement of the mentioned cross section has been carried out worldwide using various neutron sources and various detectors to detect γ-rays promptly emitted from a neutron capture reaction of a nucleus at stellar energy. I will review recent works of the neutron capture reactions of stable and/or unstable nuclei from nuclear astrophysics interest, including our recent work of the neutron capture reaction cross section measurement of ^{208}Pb. I also discuss a new facility for a neutron capture reaction study at J-PARC. A new beam line (BL04) was constructed in the in the Materials and Life Science Facility (MLF). Two sample positions are located at 20 amd 25 m away from the spallation neutron source, where anti-Compton Ge and NaI(Tl) spectrometers are placed, respectively. An experiment to measure the cross section of minor actinide isotopes has started since last November at a proton beam power of 20 kW.