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Measurement of Relative Differential Cross Sections of the $1\text{H}(n, n)1\text{H}$ Reaction in the Neutron Energy Range from 0.45 MeV to 8.5 MeV

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The $1\text{H}(n, n)1\text{H}$ reaction is important for fundamental physics research, neutron cross-section standards, and nuclear data evaluation. However, there are few differential cross-section data for this reaction in several MeV neutron energy regions. The relative differential cross sections of the $1\text{H}(n, n)1\text{H}$ reaction was measured at the Back-n white neutron source of the China Spallation Neutron Source (CSNS). A 500 nm thick Mylar film was used as the sample for experimental measurements. The charged particles produced by the $1\text{H}(n, n)1\text{H}$ reaction were detected using the ΔE -E telescope array and Silicon detector array of the Light-charged Particle Detector Array (LPDA) spectrometer. The relative differential cross sections of the $1\text{H}(n, n)1\text{H}$ reaction in the center-of-mass system from 66° to 142° in the neutron energy range from 0.45 MeV to 8.5 MeV were obtained from 8 Silicon detectors in the ΔE -E telescope array and the Silicon detector array. This work is an extension of the previous measurement in the neutron energy range from 6 MeV to 52 MeV. The present results are in good agreement with the previous measurement results and evaluation data.

Keywords: $1\text{H}(n, n)1\text{H}$ reaction, differential cross sections, Back-n white neutron source, LPDA

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