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Direct measurement of the cross section for 102Pd(p,g)103Ag reaction in the p-process

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The study of the p-process is of paramount importance in unraveling the origin of heavy elements in the universe. To describe the entire p-nuclei nucleosynthesis process, a comprehensive reaction network involving over ten thousand nuclear reactions is required, and accurate measurements of some key reaction cross sections are essential for determining reaction rates. 102Pd is one of the more than 30 p-nuclei, and the 102Pd(p,g)103Ag reaction is one of its significant destruction reactions. Experimental studies for the p-nucleus 102Pd indicate that the reaction rate for 102Pd(p,g)103Ag is significantly higher than HF predictions. There are significant discrepancies in the available data on the 102Pd(p,g)103Ag reaction cross section in the low-energy regime relevant to nuclear astrophysics. In light of these discrepancies, a direct measurement was carried out to determine the reaction cross section of 102Pd(p,g)103Ag within the energy range of 1.9-2.8 MeV. The measurement was conducted utilizing the 2*1.7 MV tandem accelerator at China Institute of Atomic Energy (CIAE). The latest cross section data were obtained using offline activation measurement technique based on the low background anti-muon and anti-Compton spectrometer in CIAE.
The latest results have extended the cross section of 102Pd(p,g)103Ag to the lowest energy range of proton down to 1.9 MeV. The newly measured cross section data provide valuable experimental references for the calculation of statistical models, particularly in the low-energy regime of interest in nuclear astrophysics. These results contribute to a better understanding of the p-process and its implications for the nucleosynthesis of heavy elements in the universe.

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