

Direct measurement of the cross section for $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ 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. ^{102}Pd is one of the more than 30 p-nuclei, and the $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ reaction is one of its significant destruction reactions. Experimental studies for the p-nucleus ^{102}Pd indicate that the reaction rate for $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ is significantly higher than HF predictions. There are significant discrepancies in the available data on the $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ 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 $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ 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 $^{102}\text{Pd}(p,g)^{103}\text{Ag}$ 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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