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Measurement of the $^{80}\text{Se}(\gamma, n)$ reaction with linearly polarized γ rays

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This paper reports the results of the first measurements of the differential cross section of the $^{80}\text{Se}(\gamma, n)^{79}\text{Se}$ reaction with a linearly polarized gamma-ray (γ -ray) beam. The cross section was measured at three incident γ -ray beam energies: 15.6, 15.8, and 16.0 MeV, with a beam energy spread of 3.0% full width at half-maximum (FWHM). The differential cross section for the excitation spectrum in ^{79}Se was measured at two scattering angles in the plane of the beam polarization: $\theta=90^\circ$ and 135° , and at one angle in the plane perpendicular to the plane of polarization: $\theta=90^\circ$. The total photoneutron cross sections determined from these data are between 0.8 and 1.3 standard deviations smaller than previously published results. The excitation spectra measured in this work were fit with a Hauser-Feshbach model. Better fits to the data were obtained with a constant-temperature formulation of the nuclear level density (NLD) than with a Fermi-gas NLD model. The parameters for the constant-temperature NLD model obtained in this work are consistent with those obtained for medium-mass nuclei in previous studies.

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