

FAST NEUTRON INTERACTION WITH COLLECTIVE CADMIUM NUCLEI

by

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ABSTRACT

Differential neutron elastic-scattering cross sections of elemental cadmium are measured from ≈ 1.5 to 10 MeV. From ≈ 1.5 to 3.0 MeV the measurements are made at ≈ 100 keV incident-neutron energy intervals and at 10 scattering angles distributed between $\approx 20^\circ$ and 160° . From 3 to 4 MeV the measurements are made at ≈ 200 keV intervals and at 20 angles. Above 4 MeV the incident-energy interval is ≈ 0.5 MeV with ≥ 40 differential values at each incident energy, distributed between $\approx 18^\circ$ and 160° . Concurrently, differential cross sections for the excitation of observed "levels" at 0.589 ± 0.047 , 1.291 ± 0.066 and 1.839 ± 0.57 MeV are determined, with attention to the direct excitation of the yrast 2^+ levels of the even isotopes ($\approx 75\%$ abundant) and of the $3/2^+$ and $5/2^+$ levels of the odd isotopes ($\approx 25\%$ abundant). Optical-statistical, dispersive-optical and coupled-channels interpretations are carried out and comparisons made with "regional" and "global" parameters. Consideration is given to the fundamental nature of the real potential in the vicinity of the Fermi Surface with implications on the equation of state and the reduced mass, in the context of the dispersive optical model.