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NEUTRON SCATTERING AND MODELS:- SILVER

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ABSTRACT

Differential neutron elastic-scattering cross sections of elemental silver were measured from 1.5 → 10 MeV at ≈ 100 keV intervals up to 3 MeV, at ≈ 200 keV intervals from 3 → 4 MeV, and at ≈ 500 keV intervals above 4 MeV. At ≤ 4 MeV the angular range of the measurements was ≈ 20^0 → 160^o with 10 measured values below 3 MeV and 20 from 3 → 4 MeV at each incident energy. Above 4 MeV ≥ 40 scattering angles were used distributed between ≈ 17^o and 160^o. All of the measured elastic distributions included some contributions due to inelastic scattering. Below 4 MeV the measurements determined cross sections for ten inelastically-scattered neutron groups corresponding to observed excitations of 328 ± 13, 419 ± 50, 748 ± 25, 908 ± 26, 1150 ± 38, 1286 ± 25, 1507 ± 20, 1623 ± 30, 1835 ± 20 and 1944 ± 26 keV. All of these inelastic groups probably were composites of contributions from the two isotopes ^{107}Ag and ^{109}Ag. The experimental results were interpreted in terms of the spherical optical model and of rotational and vibrational coupled-channels models, and physical implications are discussed. In particular, the neutron-scattering results are consistent with a ground-state rotational band with a quadrupole deformation β_2 = 0.20 ± ≈10% for both of the naturally-occurring silver isotopes.