

Fast Neutron Excitation of the Ground-
State Rotational Band of $^{238}\text{U}^*$

by

P. Guenther, D. Havel and A. Smith

Argonne National Laboratory
Argonne, Illinois 60439

ABSTRACT

The differential neutron cross sections for the excitation of the 2+(45 keV), 4+(148 keV) and 6+(308 keV) states of ^{238}U are measured for scattered neutron energies in the range 0.1 to 3.0 MeV. The observed excitation cross sections vary smoothly with energy with no significant fluctuations. The experimental results are correlated with the predictions of compound-nucleus and direct-reaction models. At lower energies (\lesssim 0.8 MeV) the observed inelastic scattering cross sections are consistent in shape and magnitude with the predictions of compound-nucleus theory. Above \sim 1.0 MeV comparison of measured and calculated values indicates large direct-reaction contributions. The experimental and computational results are compared with the evaluated nuclear data file, ENDF/B-IV, and significant discrepancies are noted. The present results and selected values from the literature are used to deduce an evaluated set of ^{238}U inelastic scattering cross sections.

*This work supported by the U.S. Energy Research and Development Administration.