

NOTE ON NEUTRON SCATTERING AND THE
OPTICAL MODEL NEAR $A=208$ *

by

P. Guenther, D. Havel and A. Smith

ABSTRACT

Elastic neutron scattering cross sections of ^{206}Pb , ^{207}Pb , ^{208}Pb and ^{209}Bi are measured at incident neutron energy intervals of ~ 25 keV from 0.6 to 1.0 MeV with resolutions of ~ 25 keV. Optical model parameters are obtained from the energy-averaged experimental results for each of the isotopes. The observed elastic-neutron-scattering distributions and derived parameters for the lead isotopes (doubly magic or neutron holes in the closed shell) tend to differ from those of ^{209}Bi (doubly closed shell plus a proton). These potentials, derived in the approximately spherical region of $A \sim 208$, are extrapolated for the analysis of total and scattering cross sections of ^{238}U introducing only a small $\frac{N-Z}{A}$ dependence and the known deformation of ^{238}U . Good descriptions of ^{238}U total cross sections are obtained from a few hundred keV to 10.0 MeV and the prediction of measured scattering distributions in the low MeV region are as suitable as frequently reported with other specially developed potentials.

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