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A Nonlocal Application of the Dispersive Optical Model to 208Pb

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A nonlocal application of the dispersive optical model to neutrons and protons in ^{208}Pb is presented. A nucleon self-energy is described by parametrized real and imaginary parts connected through a dispersion relation. This parametrization includes nonlocal Hartree-Fock and spin-orbit and local Coulomb real terms, and nonlocal volume and surface and local spin-orbit imaginary terms. A simple Gaussian nonlocality is employed, and appropriate asymmetry parameters are included to describe the N-Z dependence of the nucleus. These parameters are constrained by fitting to experimental data, including particle numbers, energy levels, the charge density, elastic-scattering angular distributions, reaction cross sections, and the neutron total cross section. From the resulting nucleon self-energy, spectroscopic factors, spectral strength, and the neutron matter distribution are deduced. The neutron skin thickness, important to the physics of neutron stars, is determined to be 0.154 fm, a value consistent with the results of recent parity violating elastic scattering experiments. Future constraints and applications of the model, including the high-momenta nucleon fraction and the ground state energy, are discussed.