Sensitivity of Electric Dipole Polarizability to Bulk Nuclear Properties

The electric dipole polarizability, α_D, has been considered in the literature to be sensitive to the neutron skin Δr_{np} and to the density dependence of the symmetry energy $J = J(\rho)$. We carry out a detailed investigation of the sensitivity of α_D to $J(\rho)$ and its derivatives evaluated at the saturation density ρ_0 as well as other bulk nuclear matter (NM) properties, and neutron skin. We use the Hartree-Fock based random phase approximation to calculate strength function of the isovector dipole resonance for ^{40,48}Ca, ^{68}Ni, ^{90}Zr, ^{120}Sn, ^{208}Pb, and calculate α_D, which we compare to experimental results. We also determine the Pearson linear correlation coefficients between α_D and NM properties. Our calculations were carried out using 33 Skyrme type interactions with wide ranges of values for NM properties. We determine approximate bounds on the values for certain NM properties.