Contribution ID: **24** Type: **Submitted**

# Nuclear Polarizability: The Sleeping Beauty Of Nuclear Physics

*Wednesday, 2 December 2015 10:20 (20 minutes)*

New polarization potentials will be presented based on: 1) the latest photo-neutron cross section evaluation and a missing factor of two in previous work, and 2) the mass dependency of the symmetry energy, $a_{sym}(A)$. The magnitude of the first one is 35% stronger than the currently accepted polarization potential. The second one opens up the possibility for a parameter-free polarization potential. Both polarization potentials are essentially the same for heavy nuclei. The polarization effect on quadrupole collectivity is more substantial than previously assumed for light nuclei. Particular cases will be discussed where long-standing discrepancies between high-precision Coulomb-excitation and lifetime measurements (e.g., tin and nickel isotopes) still remain. A solution to the long-standing discrepancy between B(E2) values determined in $^{18}$O by several Coulomb-excitation studies and a high-precision lifetime measurement is provided in favor of the latter. Polarization effects in light nuclei also influence the determination of spectroscopic quadrupole moments in Coulomb-excitation measurements. The hindrance of polarizability observed in the photo-neutron cross section for single-closed shell nuclei is calculated to have a negligible effect on quadrupole collectivity, within the existing experimental uncertainties. This work provides a deeper insight into nuclear collectivity and presents a new field of exploration that may lead us to the elusive equation of state, tests of 3N forces and descriptions of neutron skins, neutron stars and supernova cores. This work is relevant to the Coulomb-excitation program at ISOLDE.

**Primary author:** ORCE, Nico (University of the Western Cape)

**Presenter:** ORCE, Nico (University of the Western Cape)

**Session Classification:** Nuclear Structure:Looking to the future