

Enhanced nuclear dipole polarizability and continuity of shell effects in the quasi-continuum of medium-mass nuclei

The nuclear dipole polarizability - a second-order effect in Coulomb-excitation perturbation theory competing with the reorientation effect that varies with the shape of a nucleus and splitting of magnetic substates – governed by the dynamics of the giant dipole resonances has been investigated along with the effects of recently observed enhancement of photon strength functions at low energies for nuclides in the $A \approx 50, 90$ mass region. Empirical drops observed in ground-state nuclear polarizabilities indicate deviations from the effect of giant dipole resonances and reveal the presence of shell effects in semi-magic nuclei with neutron magic numbers $N = 50, 82$ and 126 . Similar drops of polarizability in the quasi-continuum of nuclei with, or close to, magic numbers $N = 28, 50$ and 82 , reflect the continuing influence of shell closures up to the nucleon separation energy. These findings are presented for the first time in this conference and strongly support recent large-scale shell-model calculations in the quasi-continuum region describing the origin of the low-energy enhancement of the radiative or photon strength function as induced paramagnetism, and assert the Brink-Axel hypothesis as more universal than originally expected.

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