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Search for new and old magic numbers

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The nuclear dipole polarizability is mainly governed by the dynamics of the giant dipole resonance and, assuming validity of the Brink-Axel hypothesis, has been investigated along with the effects of the low-energy enhancement of the photon strength function for nuclides in medium- and heavy-mass nuclei. Cubic-spline fits to both data sets extrapolated down to a gamma-ray energy of 0.1 MeV show a significant reduction of the nuclear dipole polarizability for semi-magic nuclei, with magic numbers $N = 28, 50$ and 82 , which supports shell effects at high-excitation energies in the quasi-continuum region. This work assigns σ_{-2} values as sensitive measures of long-range correlations of the nuclear force and provides a new spectroscopic probe to search for old and new magic numbers at high-excitation energies.

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