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Evolution of low-lying M1 modes in germanium isotopes

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Magnetic dipole strength functions are determined for the series of germanium isotopes from N = Z = 32 to N = 48 on the basis of a large number of transition strengths calculated within the shell model.
The evolution of the strength with increasing neutron number in the g9/2 orbital is analyzed. A bimodal structure comprising an enhancement toward low transition energy and a resonance in the region of the scissors mode is identified. The low-energy enhancement is strongest near closed shells, in particular at the almost completely filled g9/2 orbital, while the scissorslike resonance is most pronounced in the middle of the open shell, which correlates with the magnitude of the also deduced electric quadrupole transition strengths. The results are consistent with previous findings for the shorter series of iron isotopes [1] and prove the occurrence and correlation of the two low-lying magnetic dipole modes as a global structural feature [2].

R. Schwengner, S. Frauendorf, B.A. Brown, Phys. Rev. Lett. 118, 092502 (2017).

S. Frauendorf, R. Schwengner, Phys. Rev. C 105, 034335 (2022).

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