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High-spin level structures of neutron-rich N = 47, 48, and 49 Ge nuclei, Ge-79,80,81

The neutron-rich Z = 32 Ge nuclei are an abundant source of challenges for nuclear structure physics, ranging from demonstrated triaxiality in Ge-76,78. [1,2] through debatable particle-hole structure and strong prolate deformation in Ge-80 [3,4,5] to the N = 50 closed-shell Ge-82. The structure of Ge-81, with a single hole in the N = 50 closed shell, is also remarkable, inasmuch as only a single level (2+) is known in Ge-82 below 2 MeV contrasted with ~15 levels below 2 MeV in Ge-81, including several neutron particle-hole intruder states. For Ge-79, is the dominant structure 3 neutron holes in Ge-82, or are there influences from triaxial Ge-78? Extensive low-spin level structure is established in both nuclei from direct beta and beta-delayed neutron decay of the respective Z = 31 Ga isotopes. New data for higher spin structures will be presented for Ge-79,80,81obtained using Gammasphere at Argonne National Laboratory to study gamma radiation following multi-nucleon transfer [MNT] reactions. Included in the new data is a wide split between the core-coupled 13/2+ and 11/2+ levels that can be theoretically tied to the quadrupole moment of the core 2+ level. [6] Spin and parity of 10+ is proposed for a new level at 4951 keV in Ge-80. These structures will be compared with those of isotonic Zn and Se nuclei along with shell-model calculations.
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