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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  $\sim 15$  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-79,80,81 obtained 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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[2] A. D. Ayangeakaa et al., PRL **123**, 102501 (2019).

[3] A. Gottardo et al., PRL **116**, 182501 (2016).

[4] F. H. Garcia et al., PRL **125**, 172501 (2020);

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[6] V. Paar, Nucl. Phys. **A351**, 1 (1981);

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