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The shape-transitional 98Zr: Measurement of the 21+ B(E2) value with GRETINA/CHICO2 at ATLAS/CARIBU

The structure of Zr isotopes in the region of sub-shell closures at Z=40, N=50, N=56 and N=58 is of high interest in view of the evolution of collectivity, nuclear shapes, and the energies of nuclear orbitals. Recent work show the coexistence of spherical and deformed structures, with little mixing, which cross between 96Zr and 100Zr, leading to a first order phase transition in this region. Although the relatively high 21+ energy in the intermediate 98Zr indicates that the ground-state band is still spherical, no B(E2) value is known to date which would serve as a test for the corresponding wave functions. In a simple picture, the filling of the neutron s1/2 orbital in 98Zr should still result in magicity, but a scattering of neutrons into higher-lying orbitals, or a mixing with the deformed structure which is known from the neighboring isotopes, would be possible. To study low-lying transitions in 98Zr we performed a Coulomb excitation experiment at the radioactive ion beam CARIBU facility at the ATLAS accelerator of Argonne National Laboratory. We used the coupled state-of-the art γ- and heavy-particle detection arrays GRETINA and CHICO2 in order to obtain optimum Doppler correction. Data allows to extract a stringent upper limit for the B(E2; 21+ ⟶ 01+) value of 98Zr, completing the systematics in the Zr isotopic chain.
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