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Establishing the deformation characteristics and decay spectroscopy of ^{66}Ge

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The presence of both well-deformed prolate and oblate deformations are expected in the $A \approx 70$ mass region because of the stabilisingly large single-particle energy gaps at $N = 34$. Nonetheless, oblate deformations in this region has mostly been inferred from rotational bands (^{68}Se [1]) or model-dependent decay measurements (^{72}Kr [2]). Only recently, Coulomb-excitation measurements have been able to determine the sign of the quadrupole moment in a few proton-rich nuclei in this region; conclusively prolate in ^{74,76}Kr [3] and slightly oblate in ^{70}Se [4,5], although with large uncertainties. As inferred for ^{68}Se, the $N = 34$ isotone ^{66}Ge is another candidate to possess a large oblate deformation in its ground state. The measurement of the spectroscopic quadrupole moment for the first 2_1^+ excitation, $Q_S(2_1^+)$ and shape coexistence in the neutron-deficient isotope of ^{66}Ge have been investigated using the ^{196}Pt(^{66}Ge,^{66}Ge$)^{196}Pt$ Coulomb-excitation reaction at 4.395 MeV/u with the MINIBALL spectrometer and double-sided silicon detectors. In order to accurately determine the beam purity, the beam was implanted on an aluminium foil and let to decay. Here, we present results from the analysis of the Coulomb-excitation and β-decay data sets, which suggest a strong oblate collectivity with a large $E2$ strength and a potentially large oblate deformation. As found in previous work [3,6], the triaxial degree of freedom seems to be relevant, as also inferred in this work from beyond mean-field calculations where the collective wave functions go from soft in the ground state to a well-defined minimum as the angular momentum increases.

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