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Electromagnetic properties of 45Sc studied by low-energy Coulomb excitation

The medium-light 45Sc nucleus, situated in the nuclear chart above doubly magic 40Ca, has additional 1 proton and 4 neutrons beyond the Z = N = 20 shell closure. The number of active particles and the p3/2f7/2 configuration space are big enough to allow for the collective motions of nucleons. The negative-parity states built on the 7/2− ground state exhibit a spherical structure, while a well deformed rotational-like band is formed upon the Iπ =3/2+ intruder level at 12.4 keV [1-2]. Our attention is addressed to the positive parity band built on the low-lying, T1/2 = 318 ms isomeric state at the energy of 12.4 keV and spin 3/2+ .
To study the electromagnetic properties of low-lying excited states in 45Sc, Coulomb excitation experiment was performed in November 2016 at the Heavy Ion Laboratory. The γ-rays depopulating Coulomb excited states in the nuclei of interest were detected by the EAGLE spectrometer composed of 16 Compton- suppressed HPGe detectors. Collected data are analyzed using the coupled-channel, least-squares search code GOSIA [3] with the aim of determining matrix elements between low-lying excited states. The measured γ-ray intensities will enable us also to evaluate the B(E3) transition probabilities, in particular: the excitation probability from the ground state to the first excited isomeric state: B(E3, 7/2− ⟶ 3/2+) so far only upper limit is known [4], while the B(E3, 7/2- ⟶ 5/2+) is unknown. In this contribution, the recently performed measurement will be described and the initial results will be presented.
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