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Gamma Detection Efficiency of a State-of-the-Art Ge Detector
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— An experiment to determine the ground state spin of the exotic nucleus ^{23}Al is presented. By analyzing the spectra of the emitted gamma rays of the core nucleus ^{22}Mg arising from the reaction ^{22}Mg(p$^+$, γ)^{23}Al, the higher energy levels of the ^{22}Mg and their associated spin (j) values are determined. Subsequently, the need to precisely calibrate the EXOGAM Ge clovers to accurately determine these gamma ray energies, and therefore draw conclusions about the separation between nuclear shell levels, is met. Using careful analysis of gamma ray spectra and precise calibration of Ge detectors, resulting momentum distributions indicate a ground state spin of $5/2^+$. This both rejects the theory of halo structure of the ^{23}Al exotic nucleus, and is consistent with previous experimental results strengthening the case for the use of mirror symmetry in nuclear astrophysics in systems otherwise not accessible.

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