



Contribution ID: 68

Type: Oral

Exploring the Level Structure of ^{59}Co and ^{61}Co

Fusion evaporation reaction induced by a beam of 43MeV ^{14}C on ^{48}Ti and ^{50}Ti targets has been used to populate the high spin levels in ^{59}Co and ^{61}Co . Emitted γ rays were detected using the FSU clover array which consists of 6 high purity germanium clover detectors (with BGO shields for Compton suppression) and a few single-crystal detectors all placed at 3 different angles. The directional correlation from oriented states (DCO ratio) was measured using ratios of intensities from detectors at 90° and 135° . The polarization was also measured, which in addition to the DCO ratio was used to determine the spin and parity of the energy levels. Previously known spins in the ^{59}Co were confirmed and their parity was assigned. The level scheme of the ^{59}Co has been extended to 11139keV with $J\pi = 31/2^+$. Positive states were also observed in ^{61}Co which has not been observed in previous studies. The results were compared with the theoretical shell-model calculations within the fp- $g_{9/2}$ shells valence space and were found to agree up to the single-particle excitation. The positive parity states show some regularity with strong M1 transitions indicating magnetic rotation in the bands. This work was supported by the U.S. National Science Foundation under grant number Phy-2012522.

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Session Classification: Poster Session

Track Classification: Poster Presentations