



Contribution ID: 26

Type: Oral Presentation

Angular correlation measurements with a segmented clover detector

Gamma-gamma angular correlation measurements are an important tool to determine (i) the spin and parity of a nuclear state (ii) the multipolarity and the multipole mixing ratio of a gamma-ray transition. A segmented clover detector was placed at close geometry and tested it for angular correlation measurements using ^{133}Ba and ^{60}Co sources. The segments of the clover were used as individual detectors. This allowed one to determine the angular correlation coefficients, a_2 and a_4 , and to determine the multipole mixing ratios of several gamma-ray transitions. Codes to sort and analyze gamma-gamma angular correlation data were developed and a technique to deduce the multipole mixing ratios was established. The angular correlation technique developed for the iThemba LABS segments clover detector allowed the determination of several multipole mixing ratios with high precision and new results on the signs of the multipole mixing ratios for some transitions in ^{133}Ba were obtained. The analysis of the 1173 – 1332 keV cascade in ^{60}Co showed that using the segmented clover one can easily distinguish a stretched dipole from an unstretched quadrupole transition.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

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Session Classification: Poster Session 1

Track Classification: Track B - Nuclear, Particle and Radiation Physics