



Contribution ID: 190

Type: Poster Presentation

Angular correlation measurements with the iThemba LABS segmented clover detector

Tuesday, 26 June 2018 15:00 (2 hours)

iThemba LABS has purchased a segmented clover detector, a detector that uses the latest achievements in the Ge detectors technology. Contrary to the standard Ge detectors the new detector is segmented on the outer contact, resulting in 8 segments per crystals, or 32 segments for the whole detector. The segments can be run as individual detectors, allowing considerably higher event rates to be handled successfully. In addition, utilising segments allows improved accuracy for all direction-sensitive measurements, such as Doppler correction, angular distributions and correlations, g-factor measurements based on recoil in vacuum technique, linear polarization, lifetime measurements based on Doppler effects, etc. The impact of this improvements increases dramatically with the increase of the opening angle of the detector, i.e. at small detector-to-target distances.

In close geometry the face of the detector covers a large opening angle, for instance at 4 cm from the radioactive target the detector subtends a solid angle of approximately $1/8$ of 4π . Therefore, it covers the whole range of angles needed for precise angular correlation measurements. Such full coverage in addition to the excellent position sensitivity of the detector (due to its segmentation and its tracking ability) allows very precise spin and parity measurements to be carried out. It should be noted that measurements with such precision cannot be performed at present with the current much larger AFRODITE array. In particular, one would be able to measure (i) high-order multipolarities such as E3, M4, E4, M5, E5, etc, (ii) mixing ratios of M1+E2, M2+E3, etc, (iii) distinguish unstretched dipole from a stretched quadrupole transition, etc. Furthermore, due to the segmentation and the tracking capability, the detector will produce more precise linear polarization results too.

We collected data with several gamma-ray sources to evaluate the performance of the detector in close geometry for angular correlations measurements. A few targets were also irradiated with neutrons in the neutron therapy vault to test the activity that can be produced and the performance of the detector. The data are being analysed, but preliminary results look very promising. The results will be presented and discussed.

Please confirm that you have carefully read the abstract submission instructions under the menu item "Call for Abstracts" (Yes / No)

YES

Consideration for student awards
Choose one option from those below.
N/A
Hons
MSc
PhD

N/A

Supervisor details
If not a student, type N/A.
Student abstract submission requires supervisor permission: please give their name, institution and email address.

N/A

Primary author: Dr SHIRINDA, OBED (iThemba LABS/Stellenbosch University)

Co-authors: Dr LAWRIE, Elena (iThemba LABS); Mr EASTON, Jayson (iThemba LABS and University of the Western Cape); Dr LAWRIE, Kobus (iThemba LABS); Ms MTHEMBU, Sinegugu Happiness (iThemba LABS); Mr NONCOLELA, Sive (UWC); Dr BUCHER, Thifhelimbilu Daphney (iThemba LABS); Dr DINOKO, Tshepo (iThemba LABS); Mr MTSHALI, W.X. (iThemba LABS)

Presenter: Dr SHIRINDA, OBED (iThemba LABS/Stellenbosch University)

Session Classification: Poster Session 1

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