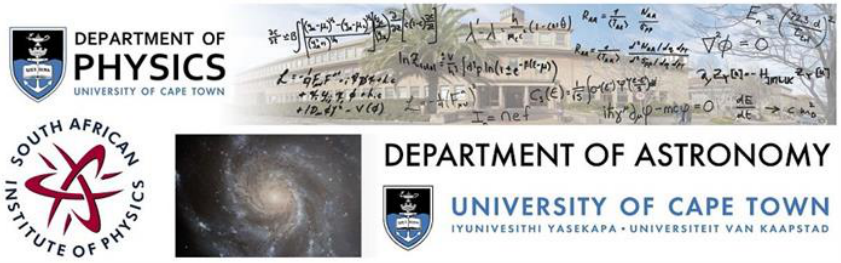

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Optimizing the 90 degree scattering setup for determining the coordinates of the interaction points inside the iThemba LABS segmented clover detector.

Tuesday, 5 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
Formatting &
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The new iThemba LABS segmented clover detector has 32 segments, which are electrically separated. This segmentation allows us to track gamma-rays inside the detector using pulse shape analysis of the traces. The average traces measured for various x y z points inside the detector should be compared with the simulated traces for the same x y z position. Once the measure and the simulated traces agree well a data base of simulated traces will be generated to track gamma-rays inside the detector.

To measure the traces for some interaction points inside the detector, 900 Compton scattering is used. The setup includes the iThemba LABS clover detector in conjunction with a BGO detector. The iThemba LABS detector is mounted vertically on a scanning table. The scanning table is capable of positioning a collimated source in the x y plane with precision of less than a mm. The BGO detector is placed at a specific z height. Coincidence analysis between the clover and the BGO detector selects only the 900 Compton scattering events, determining the three coordinates of the gamma-ray interaction position inside the clover detector. The average trace for this interaction position is then measured

In order to select only the 900 scattering events and reduce background events, optimization of the setup is done. This includes using specific shielding like lead blocks and using other BGO detectors as passive and active shielding. The relative distances between the detectors and the distance from the source also play a role. Optimizing the sorting codes decreases the running time for data collection in order to reduce data files sizes while collecting good events.

The setup and its performance will be discussed.

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