



Contribution ID: 186

Type: Poster Presentation

## Characterisation of a new LSO block detector for Positron Emission Particle Tracking

The University of Cape Town Physics Department recently acquired a Siemens Biograph 16 HiRez combined PET/CT scanner manufactured in 2005. Unlike older scanner models utilized by the department in Positron Emission Particle Tracking (PEPT), the Biograph scanner uses modern lutetium oxyorthosilicate (LSO) scintillators with a rapid response time, pixelated into a finer spatial grid. The new scintillating material promises an increased light output and faster decay time resulting in improved spatial resolution and reduced dead time compared to the conventional bismuth germanium oxide (BGO) crystals. Advanced front end data acquisition and processing compliment the new detector physics enabling high (energy, timing, & spatial) resolution measurements with low distortion.

The LSO crystal dimensions are  $4 \times 4 \times 20 \text{ mm}^3$  arranged in blocks of  $13 \times 13$  optically coupled to 4 photomultiplier tubes. Groups of 12 blocks are serviced by a detector controller responsible for analogue front end data acquisition and digitisation. The full scanner contains 12 controllers totalling 24336 crystals arranged in rings of 39 axially and 624 transaxially. Detector blocks and controllers have been extracted from the original device and reconfigured with a customised data acquisition system. Characteristics such as detector efficiency, temporal resolution, energy resolution, and spatial resolution have been investigated and are compared to performance of previous models for further use in PEPT and positron imaging applications.

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

Yes

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

Hons

**Primary author:** MCKNIGHT, Alice (University of Cape Town)

**Co-authors:** VAN DER MERWE, Robert (University of Cape Town); LEADBEATER, Tom

**Presenter:** MCKNIGHT, Alice (University of Cape Town)

**Session Classification:** Poster Session

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