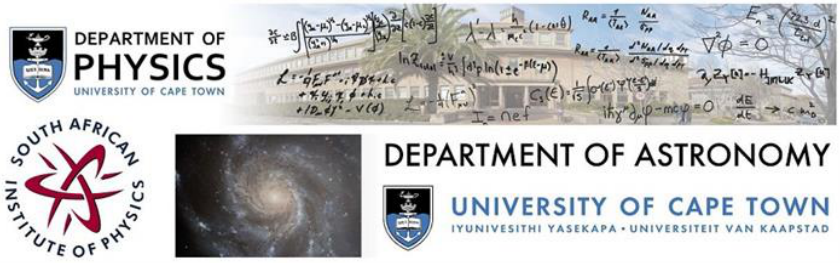

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Novel PET detector with high throughput electronics for Mineral-PET

Wednesday, 6 July 2016 16:10 (1h 50m)

Abstract content
   (Max 300 words)
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There is a need for detectors for Positron Emission Tomography (PET) to operate with increasing rate capacity, higher granularity, better spatial and timing resolution and to be more affordable, allowing essentially square meters of PET detector surface to become feasible. The higher granularity of the detecting crystal pixelisation must be matched by a corresponding increase in the replication of the analogue electronics (signal pulse processing, amplifiers, summing, integrators, comparators, discriminators) as well as the digital electronics (signal digitisation, RoI selections). To lower the primary data output stream rate and the busy-time, intelligence for event building and for defining good events must be moved up the data flow chain as close as possible to the detectors while also exhibiting a high degree of granularity. Field-Programmable Gate Arrays (FPGAs) on a per detector element basis are used. The triggering and buffering (to reduce the event randomisation) as well as compression algorithms are also implemented on a per module (group of detectors) basis. These are also based on FPGA architectures and on-chip PCs. These novel advances have been optimised for the Mineral-PET project. Mineral-PET is a revolutionary new technology for diamond bearing rock sorting which has its roots in medical-nuclear physics. The technique is able to look within rock (with size up to about 15cm) to image locked diamonds, in a run-of-mine scenario. This presentation will cover the development of the novel PET detector system and assess its performance in a dynamic PET environment. The development is applicable to Mineral-PET, Medical-PET and PEPT (Positron Emission Particle Tracking).

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