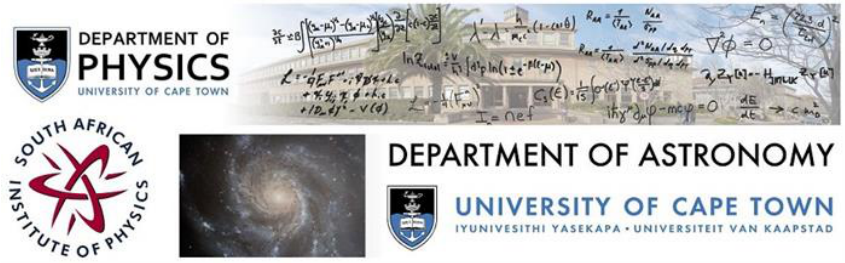

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Optimising GPU Integration into the ATLAS Trigger

Wednesday, 6 July 2016 10:20 (20 minutes)

Abstract content
   (Max 300 words)
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General Purpose Graphics Processing Units (GPGPU) are suited to rapidly performing independent (non-sequential) computations on large datasets and it seems likely that it will be the workhorse for applications involving massive parallelism in the near future. The ATLAS detector in the Large Hadron Collider is currently the subject of investigation with regards to the use of GPGPU. The planned increase in detector luminosity will lead to increased pile-up (a time-energy resolution artifact). Preliminary tests indicate a reduction in trigger latency with the introduction of GPUs, implying they can be used to run more complex algorithms in a similar or smaller amount of time than CPUs, thereby reducing pile-up associated errors. These tests have been conducted on high-end server-grade GPUs for demonstrative purposes. However when selecting a GPU platform for large-scale integration into the ATLAS Trigger, performance/watt and performance/dollar are the parameters of interest. It is not trivial to categorise the relative performance of GPUs because of the factors involved in its determination i.e. FLOPS, global and local memory bandwidth and size, core count, etc. This investigation focuses on the categorisation of GPUs representative of those most likely to be integrated into the trigger system. Criteria include power consumption, cost, ease-of-use, and reliability. Preliminary results indicate that lower-end, more energy-efficient GPUs could, in this context, be used in place of high-end GPUs with similar results.

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