Multi-Threaded Algorithms for GPGPUs in the ATLAS High Level Trigger

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- The LHC Upgrade will impose stringent requirements on the ATLAS trigger system

  Need advanced algorithms, capable of higher rejection with same efficiency

- ATLAS is studying the use of GPGPUs for triggering

  Require re-implementation of the algorithms to maximize parallelization

- First evaluation of calorimeter and tracking reconstruction

  Achieved the same physics performance in tracking & cluster reconstruction

  Total execution time reduced by a maximum of

  - A factor of 5 for tracking

  - A factor of 2 for cluster formation

  Lesson: data structures suitable for CPU & GPU would reduce overheads

- Gain in number of processed events/s:

  Between 20-40%, depending on number of processes accessing the GPU

  Larger gain expected when more code is offloaded to the GPU