

# Using GPGPU to Increase Accessibility and Efficiency in LHC Computational Systems

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After the 2022 upgrades, the ATLAS detector will be generating raw data at a rate of about 40 TB/s. The ATLAS triggering system thus presents an opportunity to explore the use of general-purpose computing on graphics processing units (GPGPU). GPUs could be used in both first and high level triggering (HLT) systems; in the former to reduce power consumption and increase event selection accuracy, and in the latter to implement existing algorithms more efficiently and to implement novel algorithms not implementable in traditional CPU farms. Moreover, GPUs can be programmed in C/C++, making them more accessible as compared to FPGAs. Currently, research into the viability of an ARM-based processing unit (PU) is being conducted at Wits. The introduction of GPUs into this PU could increase its computing capabilities. Upstream, the use of GPUs could enable the use of increasingly complex algorithms in the HLT system to increase its ability to find physical events of interest. This project will consider how GPUs can best be utilised as a subsystem of ATLAS in terms of power and computing efficiency.

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