



gFEX, the ATLAS Calorimeter Global Feature Extractor for the Phase-I upgrade of the ATLAS experiment

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The Global Feature Extractor (gFEX) module is a component of the Level I trigger system for the ATLAS experiment planned for installation during the Phase I upgrade in 2018. This unique single ATCA board with multiple high speed processors on board will receive coarse-granularity information from all the ATLAS calorimeters enabling the identification in real time of large radius jets for capturing Lorentz-boosted objects such as top quarks, Higgs, Z and W bosons. The gFEX architecture is also suitable for the calculation of global event variables such as missing transverse energy, centrality for heavy ion collisions and event-by-event pile-up subtraction.

gFEX will use 3 processor Xilinx Ultra-scale FPGAs for data processing and one single system-on-chip processor, ZYNQ, for configuring all the processor FPGAs and monitoring the board status. The current pre-prototype board which includes one ZYNQ and one Vertex-7 FPGA has been designed for testing and verification. The design of the final gFEX module as well as the performance of the pre-prototype will be presented. This unique board will allow us to increase the sensitivity of the ATLAS experiment in the high luminosity environment expected during the phase I of ATLAS data taking. Although the board is being designed specifically for the ATLAS experiment, it is sufficiently generic that it could be used for fast data processing at other HEP or nuclear physics experiments.

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