



MEETING OF THE AMERICAN PHYSICAL SOCIETY DIVISION OF PARTICLES AND FIELDS

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The Calorimeter Global Feature Extractor (gFEX) for the Phase-I Upgrade of the ATLAS experiment

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The ATLAS Level-1 calorimeter trigger is planning a series of upgrades in order to face the challenges posed by the upcoming increase of the LHC luminosity. The upgrade will benefit from the new front end electronics for parts of the calorimeter which provide the trigger system with digital data with a tenfold increase in granularity. The Global Feature Extractor (gFEX) module is one of the updates of the Level-1 calorimeter trigger project. This unique single ATCA board will use 3 processor Xilinx Ultra-scale FPGAs for data processing and one Xilinx Ultra-scale+, multi-processor system-on-chip, ZYNQ, for configuring all of the processor FPGAs and monitoring the board status and environment. It will allow the identification in real time of large radius jets for capturing Lorentz-boosted objects such as top quarks, Higgs, Z and W bosons, as well as the calculation of global event variables such as missing transverse energy, centrality for heavy ion collisions and event-by-event pile-up subtraction which are fundamental for the LHC physics studies. Extensive simulation studies are carried out to understand and optimise the characteristics of gFEX. Prototypes have been built and extensively tested to prepare for the final steps and the production of the modules. The design of the final gFEX module as well as the performance of the prototypes will be presented.

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