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A Data Acquisition System for EIC Experiments

We would like to report a series of studies and prototyping for data acquisition for EIC experiments. The EIC data rate is estimated based on full detector Geant4 simulations of the sPHENIX-EIC concept, which define the strategy in the DAQ design. The DAQ architecture is based on a high-performance FPGA-based PCI-express DAQ interface, which bridges custom front-end and commodity computing. This series of interface cards have been developed for the FELIX DAQ in the ATLAS Phase-I upgrade and beyond, and it has already been adopted by many high-rate experiments in the 2020s. Prototype timing and flow control are used to synchronize all front-ends. The DAQ package, "RCDAQ", is already used by numerous EIC detector prototyping and beam tests. This work is closely connected with the on-going sPHENIX upgrade which supports both triggered and streaming readout at a higher signal data rate than that of the EIC. We welcome discussion, feedback, and collaboration on adopting this DAQ as part of the EIC detector R&D efforts.

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