Costing template description: ~400 words / ~1/2 page, no figures or tables!

The Athena DAQ will move the digitized, zero-suppressed data from the readout electronics of ~30 subdetectors to a DAQ computing farm which will process the data and transfer it to a computing facility for long term storage. The FELIX card will provide the interface between fiber from the detectors and the PCIx bus of the DAQ readout computers. For costing purposes (at the direction of the EIC Project) we assume that the FELIX board will be available for $15k per board.

The readout of each detector in Athena is handled by the detector groups and involves digitization, zero-suppression, and aggregation of the data. The R&D efforts to date have centered on the first two stages. The electronics for the aggregation of the data have not been defined the detector groups at the level of electronics design. Where there are specific designs considered they are carried over from other experiments, and in general Athena has a large number of channels but low occupancy compared to these experiments so sufficient aggregation is not always specified. For this reason, we also use the FELIX board as a costing basis for aggregation. We note that the actual FELIX is unlikely to be the final solution in many cases. For example, detectors which have currently designs for ASIC based readout systems with a single ASIC reading out to a fiber are far more likely to develop readout boards aggregating multiple ASICs on one board, or by designing a concentrator placed on or close to the detector. In these cases, the cost of the FELIX provides both a fallback option, and also a criterion for evaluating the cost of such development.

For the DAQ computing farm we assume commodity 100Gbit networks. The computers are organized into three levels. The readout computers will need only the appropriate network connections and PCI bus to accommodate the FELIX boards. The analysis farm needs are defined by the number of CPU cores scaled from expected data volume from the STAR HLT trigger. The Transfer computers requirements are defined by the disks needed to buffer 24 hours at peak rate.

The labor requirements were obtained by estimating time periods for each of the major infrastructure projects required to build DAQ system. Each task was assumed to be guided by an experienced expert or engineer but with significant effort provided by students or postdocs. Larger fractions of expert labor were required for the electronics and infrastructure portions of the system.