21st International Conference on Computing in High Energy and Nuclear Physics **CHEP2015** Okinawa Japan: April 13 - 17, 2015

Contribution ID: **515** Type: **oral presentation**

Performance of the NOvA Data Driven Triggering System with the full 14 kT Far Detector

Thursday, 16 April 2015 11:00 (15 minutes)

The NOvA experiment uses a continuous, free-running, dead-timeless data acquisition system to collect data from the 14 kT far detector. The DAQ system readouts the more than 344,000 detector channels and assembles the information into an raw unfiltered high bandwidth data stream. The NOvA trigger systems operate in parallel to the readout and asynchronously to the primary DAQ readout/event building chain, where they examine the full (unfiltered) detector data stream and perform complicated high level pattern recognition and reconstruction algorithms to identify rare and unique interaction topologies.

The data driven triggering systems for NOvA are unique in that they examine long contiguous time windows of the high resolution readout data and enable the detector to be sensitive to a wide range of physics interactions from those with fast, nanosecond scale signals up to processes with long delayed coincidences between hits at the ten's of millisecond scale. The trigger system is able to a true 100% live time for the detector, making it sensitive to both beam spill related and off-spill physics.

We present the performance of the trigger system with the full 14 kT NOvA detector during the first year of physics operations. We discuss the real-time and parallel computing techniques that have been used to obtain the demonstrated performance of the trigger framework. We give details relating to the performance of key triggering algorithms and how they have been used to validate the first observations of neutrinos in the NOvA far detector as well as the challenges of implementing and simulating the performance of these algorithms in the trigger environment.

Primary author: Dr NORMAN, Andrew (Fermilab)

Co-authors: HABIG, Alec (Univ. of Minnesota Duluth); ZIRNSTEIN, Jan (Univeristy of Minnesota); FRANK, Martin (U); TAMSETT, Matthew (University of Sussex); GROUP, Robert (University of Virginia)

Presenter: Dr NORMAN, Andrew (Fermilab)

Session Classification: Track 1 Session

Track Classification: Track1: Online computing