

Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Efficient Online and Offline Trigger and Energy Calculation Algorithms for the Nab DAQ AARON SPROW, CHRISTOPHER CRAWFORD, University of Kentucky, NAB COLLABORATION — The Nab experiment requires efficient detection of a low-energy 30 keV proton and a coincident 50-750 keV electron. In addition to the requirements of 2 keV energy precision and a low-threshold trigger, the DAQ must also be capable of 10 ns timing to identify the initial hit of a backscattered electron. We tested six potential DAQ candidates to determine energy and time resolution on a prototype Nab detector mounted in the UCNB apparatus at Los Alamos National Laboratory. In addition to considering the performance of traditional FPGA-implemented FIR's (CR-RC², trapezoid) for event triggering and online energy calculation, we developed and tested a weighted linear least squares fit filter for offline energy reconstruction determined from short, captured waveform traces. In convolving our filter over the length of the trace, we can precisely determine both the energy and time of each event. We present the results of our analysis, and additionally discuss possible filter improvements and implementation into FPGA logic.

Aaron Sprow
University of Kentucky

Date submitted: 01 Jul 2014

Electronic form version 1.4