ERR ALERT Answer to Response of Collaboration

1 ATOF

1.1 ATOF Prototype

A full scale prototype of an ATOF wedge with all its components has been constructed and two additional tests were performed, one using an Am source on the scintillator bar, and one using cosmics with a 3 fold coincidence between 3 wedges. We laud their efforts and the results confirming a timing resolution that is better than 150ps as required by the experiment.

Comments

- Establish an understanding of the detector response to the Am source in the bars by looking at the mean signal amplitude as a function of distance to the SiPM. We believe this will help the collaboration to understand what signal responses can be expected from other particles like the deuteron and the proton. This will also help strategize and optimize the readout threshold.

1.2 ATOF electronics

The collaboration showed the full scale DAQ/electronics schematic for the recoil detector. The ATOF measurements were performed with electronics based on the Petiroc. A full set of electronics based on the Nalu system is now available and is planned to be used to read out the detector, with the Petiroc based readout boards used as spares.

Comments

- Since the measurements reported in 1.1 were done using a Petiroc test system, we encourage the collaboration to repeat these measurements using the Nalu board technology to convince themselves that the FULL readout out chain is working as expected both in DAQ performance and detector resolution. This is in view of the fact several elements of the proposed system have not been fully vetted. This includes a clock and trigger distribution that will be handled through coaxial connections rather than the standard JLAB electronics using the fiber optics connections built into the SubSystem board in the VXS crate (conf. Fig. 6).
- There are significant circuit board layout activities that will be required with both the JLAB-PetiRoc-FPGA_ReadOutControl method and the Nalu-ASOC-FPGA board before reaching a final decision. There should be a plan for prototyping and testing the FINAL front-end-electronics and readout method selection including final readout hardware, firmware and software technologies.
- While test results with the JLAB PetiRoc-FPGA readout scheme are good to see and the advancement of the Nalu Front-End-Electronics mostly completed, the FINAL details of these layouts with multiple front-end electronics boards, with respect to common critical signals such as SYNC, TRIG, BUSY and CLOCK reference are crucial.

2 AHDC

2.1 AHDC Magnetic Field Tests and timeline

A full scale partial prototype of an AHDC wire chamber is expected to be tested at ANL in magnetic fields up to 4 Tesla. A plan for these tests has been presented as well as a date to perform these tests in January 2022.

Comments

- We recognize the difficulty in planning for test measurements at other laboratories given the current situation regarding the pandemic while travel restrictions are still in effect. We therefore encourage the collaboration to keep these test measurements on their “critical path” and keep the run group and Hall B management up to date on potential changes.

3 Neutron Irradiation

Three different estimates of the expected neutron radiation have been presented. The expected neutron flux based on measurements in Hall B is about 2.5 · 10^10 [1 MeV neq cm−2]. This flux is about a factor of 7x larger than the integrated expected flux of the GlueX experiment in Hall D that spans over several years. Since this experiment will be performed in a much shorter time, annealing will not be as effective as in Hall D.

Comments

- Using Figures 5 and 20 from the Yi Qiang et al paper, the dark rate in an ALERT SiPM during the run will quickly grow to exceed 1 GHz, with the average dark rate during the run being ~4 GHz. We expect that the experiment will start with narrow pedestals and single pe readout sensitivity, but as rad damage accumulates, the pedestals will broaden and become indistinguishable from small pulses. The collaboration needs to anticipate the effect this will have on readout thresholds, data size, and the data analysis.

4 Analysis Status

The collaboration presented a path from data taking, to calibration, to analysis topics, identifying the physics topics with the fastest time to publication (DVCS) as well as those which will require more detailed studies that will take longer such as tagged DIS and tagged DVCS.

Comments

- Since tracking in the recoil detector is essential for any tagged physics analysis, we encourage the collaboration to continue their efforts in using monte carlo simulation data to optimize and test the tracking codes.

5 OSP Documentation

The collaboration demonstrated their understanding of the requirements for detector operations with regard to OSP and documentations and offered a timeline that is in sync with the scheduling of the experiment.