HCal Status Update

Scott Barcus, Juan Carlos Cornejo, and the HCal Working Group
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Jefferson Lab
Coda 3 Upgrade

- **Completed.**
  - In the process of upgrading DAQ to CODA 3. (Thanks, Bryan!)
    - New CODA configuration written.
    - DAQ readout lists almost updated.
    - About to install final VXS crate. (Thanks, Alex!)
- Need to test CODA 3 on cosmic data as final test.
• DMA transfer terminated by unknown BUS error.
PMT Greasing

- Juan Carlos Cornejo came to Jlab and greased the HCal PMTs.
- 9 PMTs need to be finished. 2 need to be aligned.
Ensuring HCal PMTs are Light Tight

- After greasing reapplied tape to PMT bases to prevent light leaks.
Cosmic Testing Reestablished

- Final VXS crate installed.
- Cosmics retimed for fADCs.
- Now able to run cosmics remotely.
  - Remote VXS crate power cycling.
LED System Work

- HCal has a series of 6 LEDs that can illuminate each PMT.
- Powered by 8 LED power boxes on front-end (4 completed).
- Each LED power box controls 2 LED boxes on the sides of HCal (all 16 completed).

LED Power Boxes

LED Boxes
LED System Work Cont.

- New HV cables (thank Chuck!).
- New LED pulse signal cable bundles.
- LEDs control boards use clock and data in signals.
- Retimed fADCs for LEDs (still need to retime F1TDCs).

Clock = Blue, Data = Yellow

Retiming LEDs
LED System Work Cont.

- Left half HCal LEDs operational now.

12×6 Rows of PMT fADC Signals
• New HCal cable maps for HV and DAQ.
• Updated HArrayList for HCal test lab setup.
• fADCs inventoried.
• DNP HCal talk.
• Left half amplifier power crate occasionally has issues turning on. May want to replace just in case.
• Tested summing amps.
  – All appear operational. Half of one amp broken → swapped out.
  – Still need to test as trigger with cosmics.
• Running cosmics at different HV for signal calibration.
  – Vanessa and Sebastian working on.
• Energy deposition simulation studies.
• Sebastian Seeds has been studying energy deposited in the scintillators from protons and neutrons with G4SBS.
  – Protons and neutrons incident on HCAl in 1 GeV increments.

Proton Fits

Neutron Fits
Proton and Neutron Energy Deposition in HCAL Scintillator vs Incident Hadron Energy

- **Protons**
- **Neutrons**
Completed:

- All DAQ electronics tested and working.
  - Except summing modules require testing.
- Operational decoder and readout lists (CODA 2→CODA 3).
- Full database implemented.
- Available Triggers:
  - Cosmic trigger.
  - LED pulser trigger.
- Flags file to configure ROCs (switch between triggers, set windows, prescales, etc).
  - Standardize across subsystems? GUI?
- Event display available.
- Simple cluster finding algorithm implemented (max energy module).
  - More advanced algorithm under development. (e.g. associates regions of BB with regions of HCal.)
To-do:

- PMT QE calibration requires more LED data (test lab).
- Calibrate NPE to ADC signal (test lab).
- **In Progress:** Calibrate HV to ADC signal (test lab).
- **In Progress:** Test summing module trigger (test lab).
- Implement online monitoring software (maybe mimic Hall C).
  - fADC250 scaler mode. GUI exists (ask Steve Wood?).
- Determine alarm handler information.
  - HV alarms etc.
- Setup HCal in the hall.
  - Reestablish DAQ.
  - Synchronize timings.
Hardware Status

Completed:

- All front-end electronics, cables, patch panels etc. installed and operational.

To-do:

- In progress: 9 remaining.
- Need to finish greasing PMTs.
  - Calibrations can’t be finalized until this is completed.
  - Requires test lab access.
  - Unless we have a volunteer who can access the test lab, Scott will do this when authorized to enter.
  - Hopefully granted access when JLab enters SAD.
- Assemble 4 remaining pulser boxes (CMU).
- Fabricate remaining 3 shims that go between the 4 subassemblies. Other 20 installed already (JLab).
- Move to Hall A and revive the DAQ system.
- Install dry air supply for PMTs in the hall.
Current Status Summary

- DAQ operational and detector fully assembled.
- Cosmics/calibrations will resume when test lab access is restored.
- To do: https://docs.google.com/document/d/1S--0K01QL0gP-EP-2nf8LSBLx6Y6d6TAFrWK1UKrRxBE/
  - 279/288 Grease remaining PMTs.
  - Ongoing Calibrate relative PMT QEs.
  - Ongoing Voltage scans.
  - Ongoing Calibrate PMTs with cosmics.
  - Soon Simulation cosmics vs. real.
  - Completed Finish CODA 3 upgrade.
- Personnel:
  - 2 postdocs: Scott Barcus and Juan Carlos Cornejo.
  - 2 students: Vanessa Brio and Sebastian Seeds. Possibly a third.
  - Brian Quinn and Bogdan Wojtsekhowski.
  - New collaborators: Jim Napolitano, Donald Jones, and Kent Paschke.

- Online monitoring.
- Analysis scripts.
- Assemble remaining pulser boxes.
- Fabricate shims.
- Move to Hall A.
- Install dry air supply.
Acknowledgments

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- Thanks to Alexandre Camsonne for helping us get the DAQ working and finding all the modules for us.
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Questions?