BigBite
shower and preshower
current status

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• Quick recap (from Nov 9th)
• Shower repair
• Stacking preshower
• Data taking with CODA3 upgrade
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• Moving to Hall A...
Recap (from Nov 9th)...

We removed the glass fragments on the calorimeter block and were looking for the right epoxy to glue the PMT in place...

Preshower current status

- Some more blocks moved from EEL building to the BigBite site but limited by space
- 6 blocks assembled by Bogdan so far
- Will assemble more blocks in the coming weeks.

Shower status

We removed the glass fragments on the calorimeter block and were looking for the right epoxy to glue the PMT in place...
Red = signal from 5.6 top layer
Yellow = signal from 4.6 which is from the replaced PMT

It works!

0.75 ml of Dymax 3094-T epoxy

Bogdan applying UV curing light to cure the epoxy
Preshower stacking

Credit goes to Bogdan for stacking the most number of blocks!
Cabling work for shower and preshower: HV and signal
Useful notes prepared along the way...

Procedure to replace a PMT in the BigBite shower calorimeter
Bogdan Wojtsekhowski
Chuck Long
Arun Tadepalli

Procedure approved by Adam Hartberger from Radcon*

How to use a NIM pocket pulser and measure cable lengths
Arun Tadepalli – Jefferson lab

How to make a cosmic trigger using Fastbus
Mark Jones – Jefferson Lab
Arun Tadepalli – Jefferson Lab
CODA 3 upgrade and further...

- Thanks to Bryan Moffit and Alex Camsonne, CODA 3 (from CODA 2.6) upgrade has been completed!

- Several configuration types were created on tedbbdaq to take data for subsystems in parallel

- Currently using Fastbus for collecting data using shower and preshower to study PMT performance parameters, pedestals and HV tweaking

- Plan is to shift from Fastbus to fADC for preshower next week or so. Eventually the shower will also be included when enough fADC modules are available

- The raw materials for making cables have been given to Detector Support Group (DSG). These are the cables going from the patch panel to fADCs. We have enough cables already made for the preshower DSG agreed to help make new cables for the shower

Thanks to Juan Carlos, Alex, Mark for debugging the decoder!
Looking at pedestals without any HV

- First look at the pedestals for preshower (https://logbooks.jlab.org/files/2021/01/3862178/bbcal_60_ps_ped.pdf) without any HV show that they are
  - Narrow (as they should be)
  - Indication that the front end electronics are ok

- After turning the HV ON (starting point at -1400 V)
  - Replaced a ringing discriminator
  - Cables 1L and 2R were not connected properly (easy fix)
  - Had issues with RPI17 (supports HV for right half of the preshower) that required power cycling (just by Mark??)
  - Overall, we see ADC spectra for all the blocks (great news!)
  - Some of the pedestals have a 10 channel sigma compared to when the HV was off (could be because of dark current, improper grounding, some other source of noise?)
    - I covered the bottom left side with a black cloth but this does not change the current on the pico-ammeter
      => noise probably not because of dark current. Found that the BNC cable grounding was barely held in place by the outer sleeve
Comparison of run 60 and 75 where HV is turned off

Sigma became smaller after fixing the BNC cable
Noisy power supply

RPI17 which is connected to the left side of the preshower seems to pick up some 60 Hz noise. We emailed Jack if there could be better grounding for this HV crate.
Current status of preshower

- Debugging still in progress on a channel by channel basis
  - This will take some time to look at all individual channels with wide pedestals

- Alpha studies for the preshower are in progress
  - Found the alpha for three blocks is lower than the others. Would like to double check the analysis and discuss it with Mark and Bogdan before declaring the values. We started out at an operational voltage of -1400 for all the blocks and this might be “too high” of a starting point. We are now operating at a lower voltage and need to take some more data at this setting.
### Alpha studies for the shower

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**Preshower blocks**

**Top layers shower blocks**

### Values

- **Alpha** values range from 6.6 to 11.8.

### Diagram

- The diagram illustrates alpha values across different NRow and Ncol combinations.

### Conclusion

- The study includes a comprehensive analysis of alpha values for various configurations, aiding in the understanding of shower physics.
List of remaining tasks

• Debugging individual channel pedestals for the preshower
• Alpha studies for the preshower in progress
• Shifting to fADC for the preshower this week and later for the shower at some point
• Decoding for the HCAL and BBCAL after switching over to fADC should be almost identical. So a small group of people (Juan, Mark, Eric, Arun et al. are looking into synchronizing it to optimize efforts)
• Need to checkout the trigger with pulser?
BACKUP
List of remaining tasks – shower (presented at the collaboration meeting)

1. Ask Hall C technicians for help with making whatever cables we need
2. Attach the cables for the updated trigger logic from the patch panels
3. Check for any light leaks
4. Make sure that all the cable connectors are intact
5. Cosmic counter connected but HV connection need to be labeled and identified in the software
6. Check if the cables are connected properly
7. Make sure the current on the HV bases are ok by turning on one layer at a time and observing the base current. Make sure that they are mapped correctly by checking the signals from the DAQ side
8. Check the shape of the amplitude distribution from each module
9. Take data at different high voltage settings
10. Perform gain matching studies for the shower (Mark’s code) and make sure that the $\alpha$ value is satisfactory
11. Make documentation
List of remaining tasks – preshower
(presented at the collaboration meeting)

1. Install the magnetic shield items (blue plate, smaller plate and spacers)
2. Make inlet for gas flow for each preshower block housing
3. Move preshower blocks from EEL building
4. Install the preshower modules in place (rubber piece goes at the bottom*)
5. Install the red u-channel and cable support angle bar
6. Attach the cables
7. Steps are identical as mentioned in the previous slide (steps 1 - 11)