

GEp Calorimeter Status

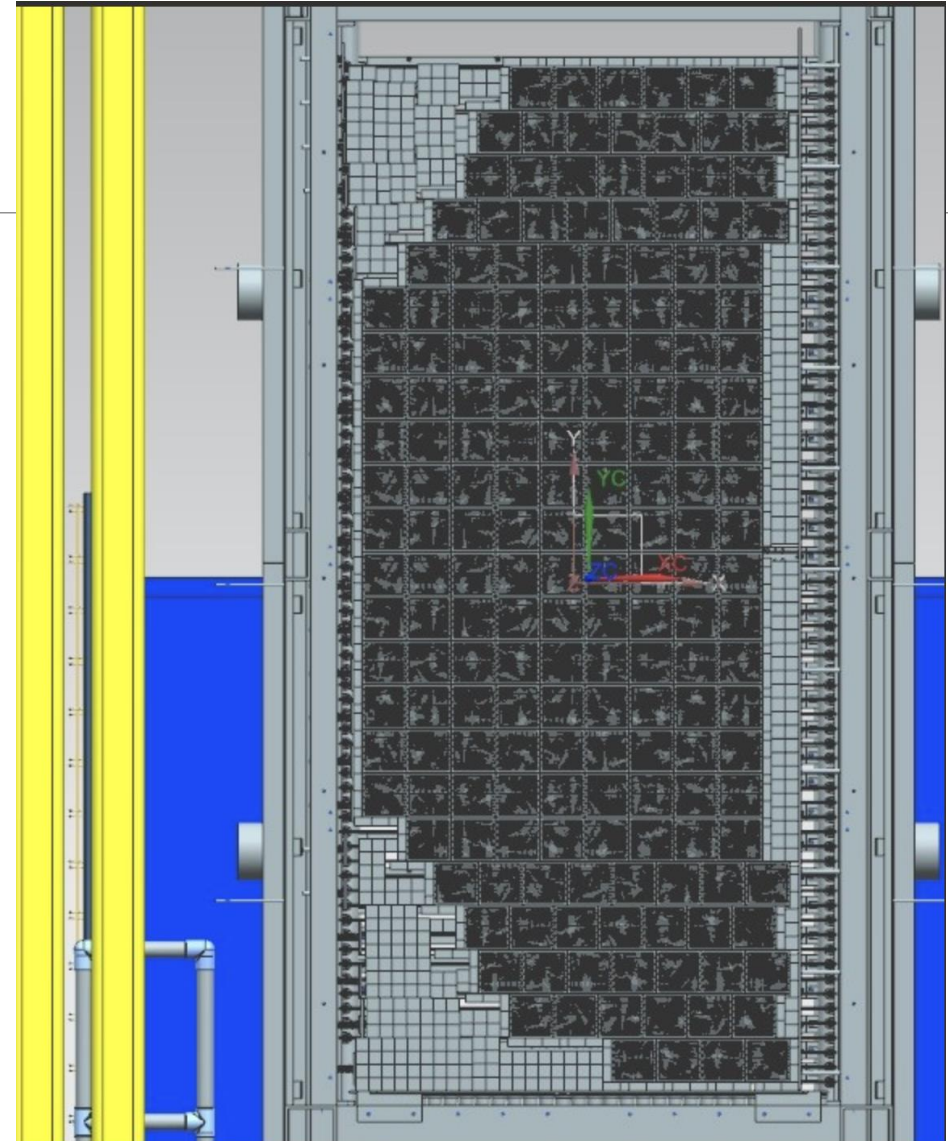
JIMMY CAYLOR

HALL A WINTER COLLABORATION MEETING

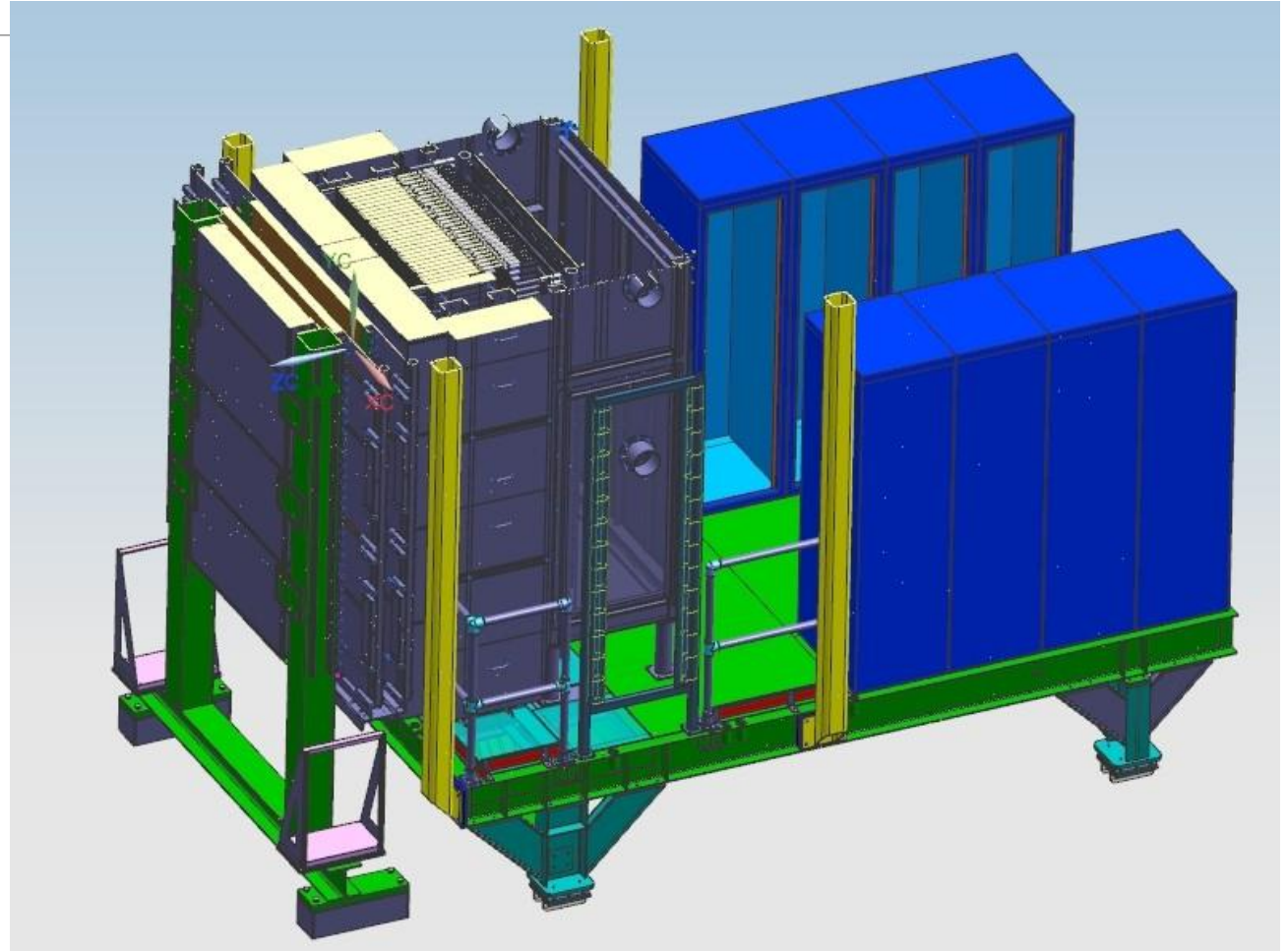
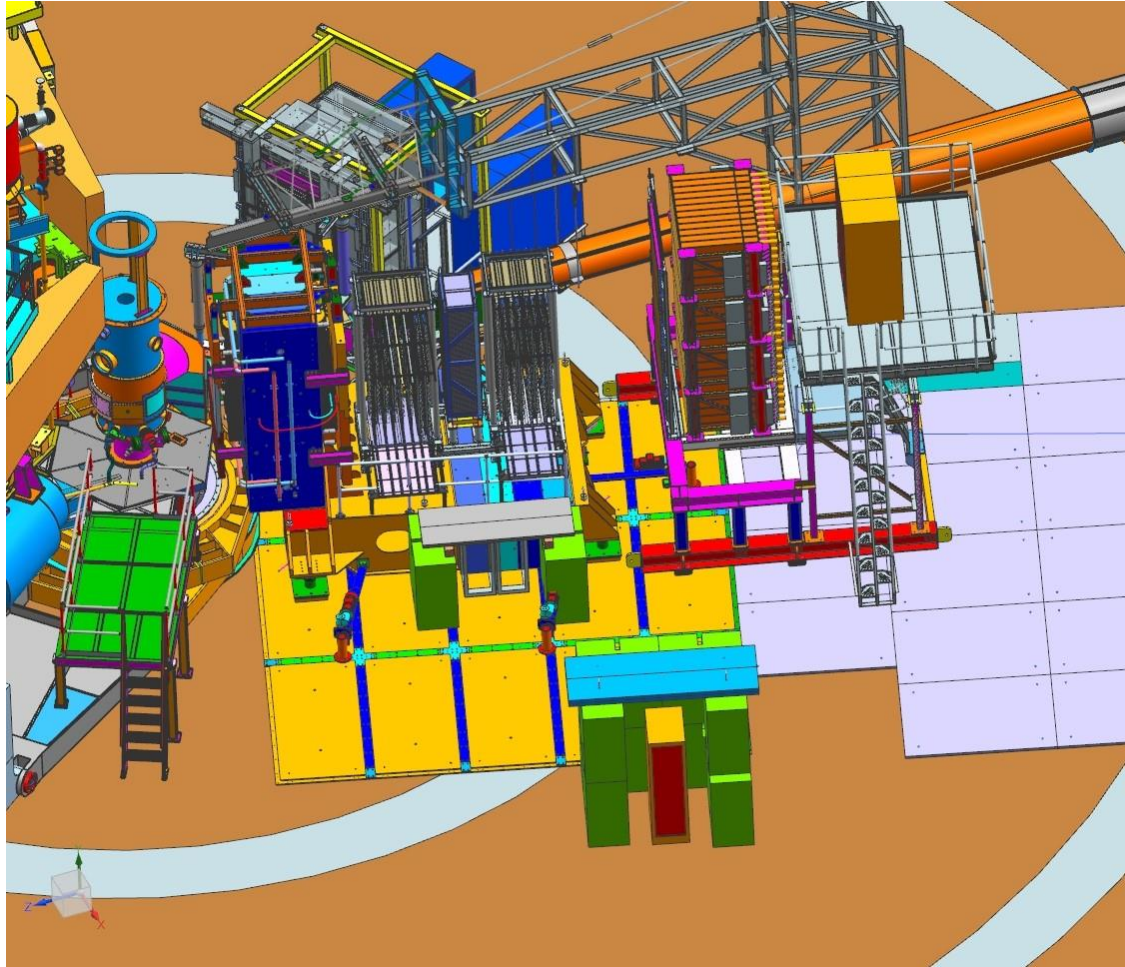
1/17/2024

ECal overview

- 184 supermodules
 - Each with 9 crystals and 9 PMTs (1656 total)
 - 5" x 5"
 - 23 tall (9.6') and 9.5 (4.0') wide in active area
- Frame sits on elevated (3' tall) platform.
 - Frame further elevates active area so that bottom row is 5' off the hall floor and the detector is centered on beam line 10' off the floor
- Inactive crystals used for stacking support
- Will be located at three different angles and distances from target, so entire platform on Hilman rollers
- Lead glass crystals heated to 220 deg C on front end (180 deg C on back end) to provide continuous annealing.



GEP/ECAL Apparatus Overview



Completed Activities List

- Install ECal Platform and Frame in the Hall
- Cut, bundle, terminated and labeled ~800 75 m BNC cables
- 1656 8 m signal and HV cables labeled and bundled
- Move front end electronics racks, crates and modules into the Hall
 - Install ribbon cables
 - Install ribbon-BNC patch panels
 - Develop cable map for front end amplifiers and FADCs
- Move HV racks, crates and modules into the Hall
 - Install SHV-27 pin patch panels
 - Cable from HV modules to patch panels
- Finalized heater design

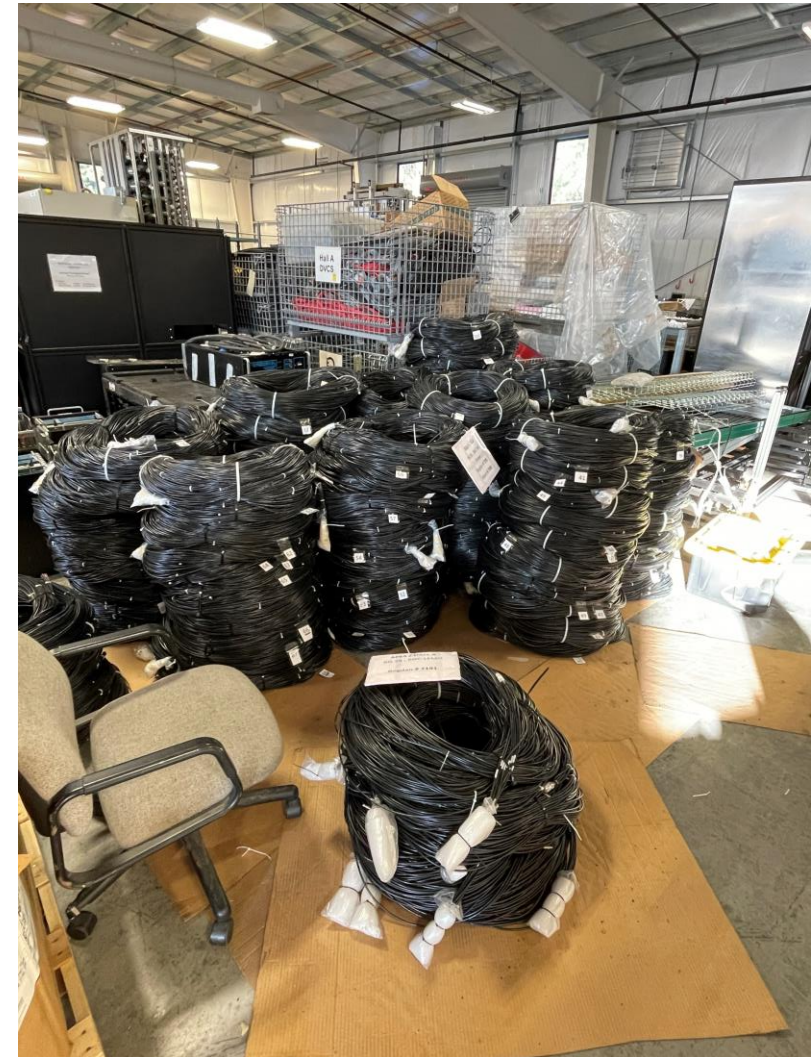
Unassembled ECal Platform and Front End Racks in the Hall



ECal Platform and Front End Electronics



DAQ bunker HV racks, crates, and modules. Signals cables in ESB



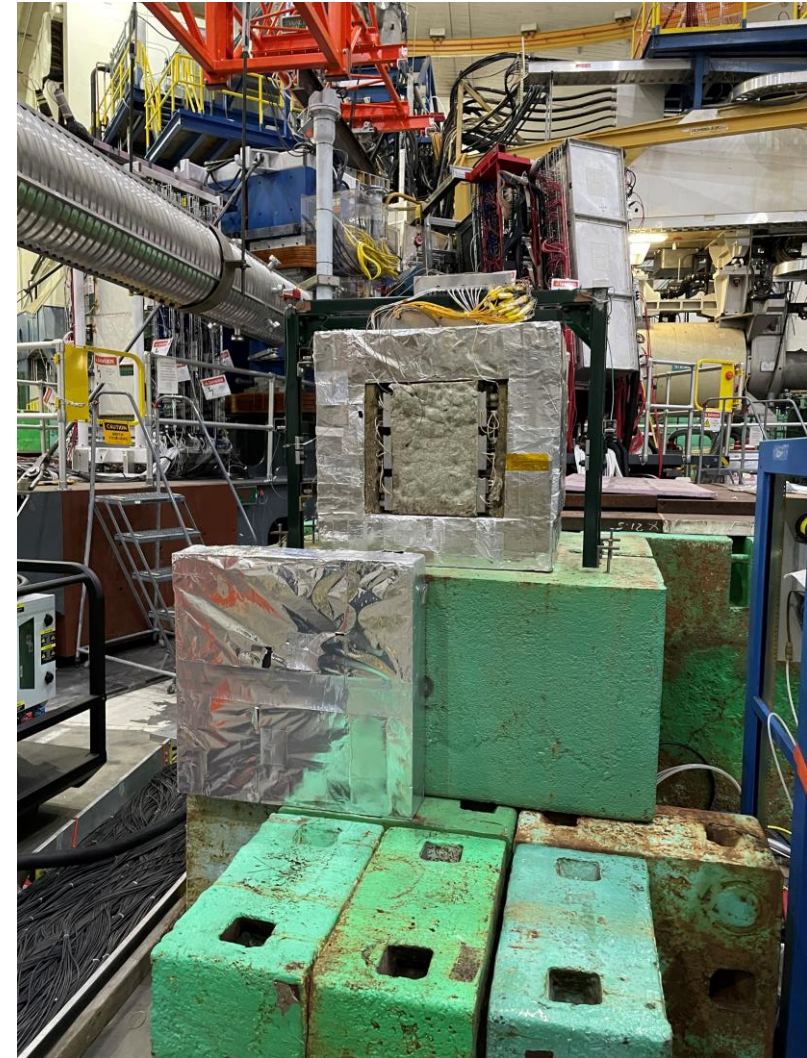
Activities In Progress

- Stacking supermodules in the ECal frame (15 out of 23 rows completed)
 - Thermocouples installed in between layers
- Completing mu-metal shielding and Kapton taping of PMTs
 - Decide which PMTs to use where (gain curves)
 - Cut out light guide-PMT connecting “cookies”
- Assembling PMT cooling distribution system
- Heater system test ongoing in the Hall (ERR asked for demonstration of annealing with final heater design)
 - Test annealing under radiation load
 - Install cooling system enclosure on back of heater test
 - Able to hold front of crystals at 220 C during end of Gen running
- Remotely controlling and testing HV channels

Supermodule Stacking Progress



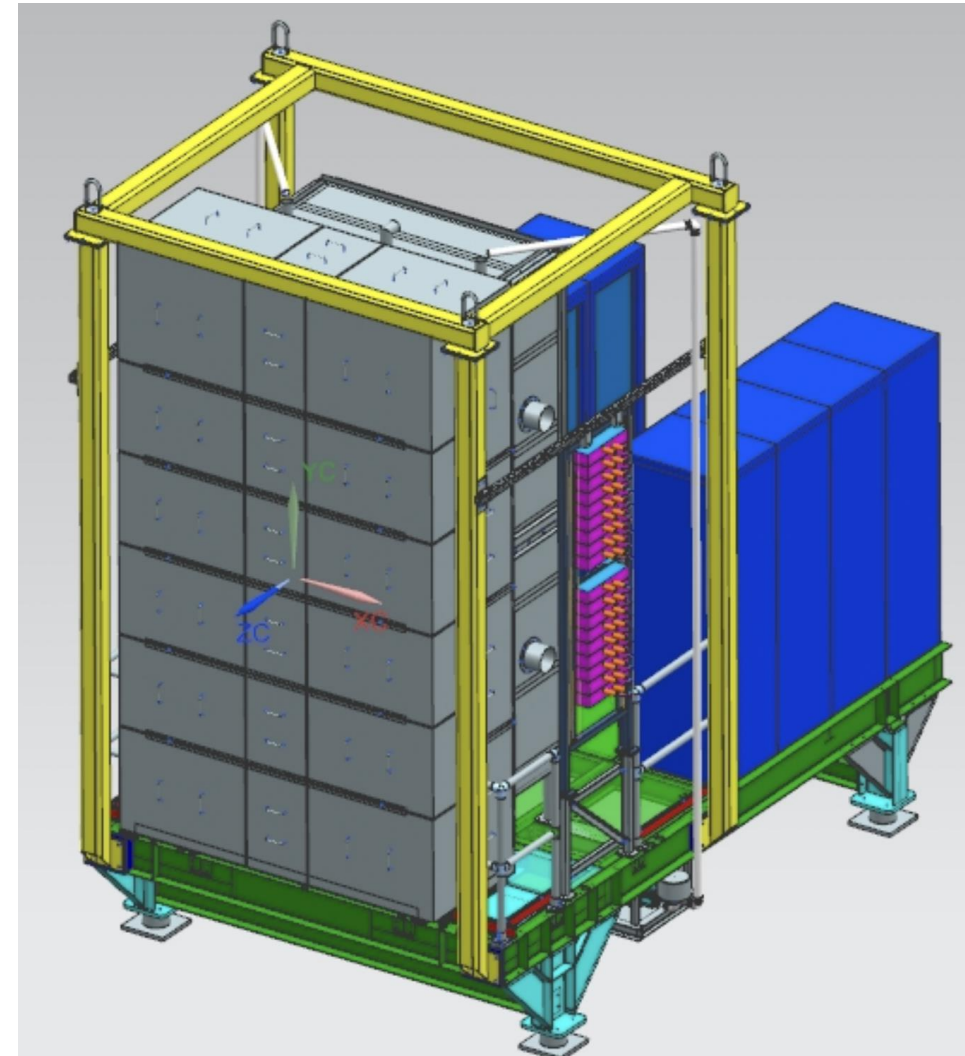
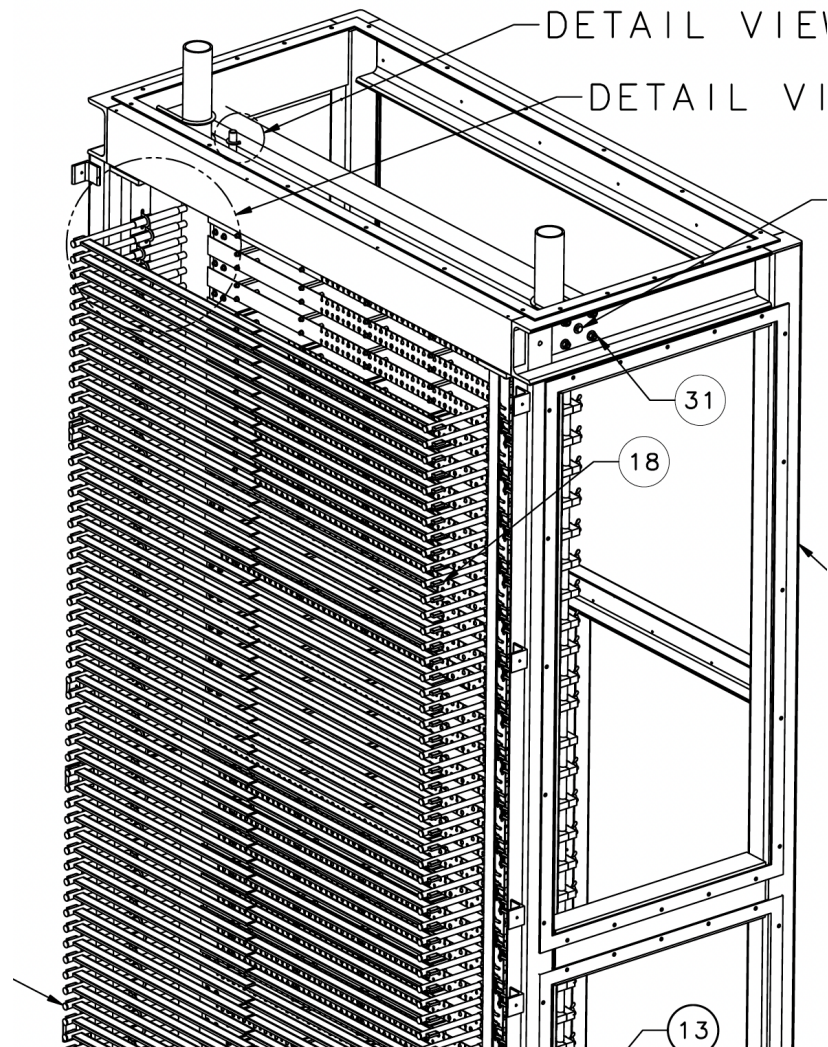
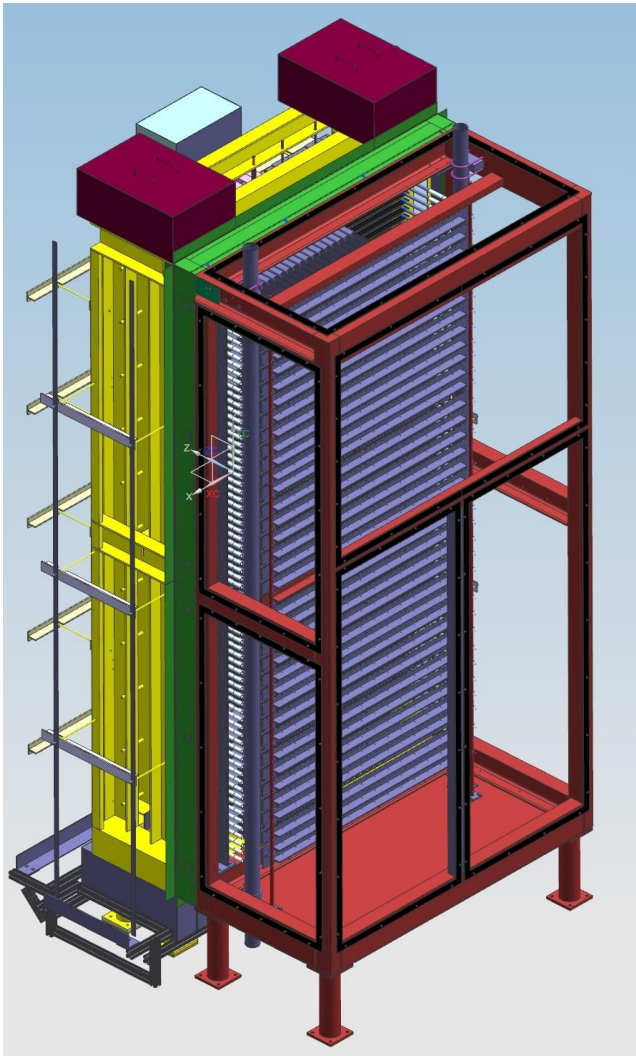
ECal Heater Test



Future Tasks

- Connect PMTs and bases to the light guides once stacking is completed
 - Need PMT bases to hold PMTs in place, currently being built at JMU
- Install cooling system
 - Carefully insert from the sides so that minimum disassembly is required
 - Temporarily restrain while...
 - Connect cooling pumps to manifolds
- Install ECal enclosure (Techs)
- Install “patch panels” inside the enclosure for the signal and HV cables
- Run signal cables from inside the enclosure to the front end amplifiers
- Run HV cables from inside the enclosure to the 27 pin patch panels installed on the side of the ECal platform
- Make enclosure light tight
- Run cables from ECal platform to upstream DAQ bunker
 - 10 cable carts are being fabricated to facilitate movement between kinematic points (Techs)

Completed ECal Frame and Enclosure



Future Tasks (BBCal dependent)

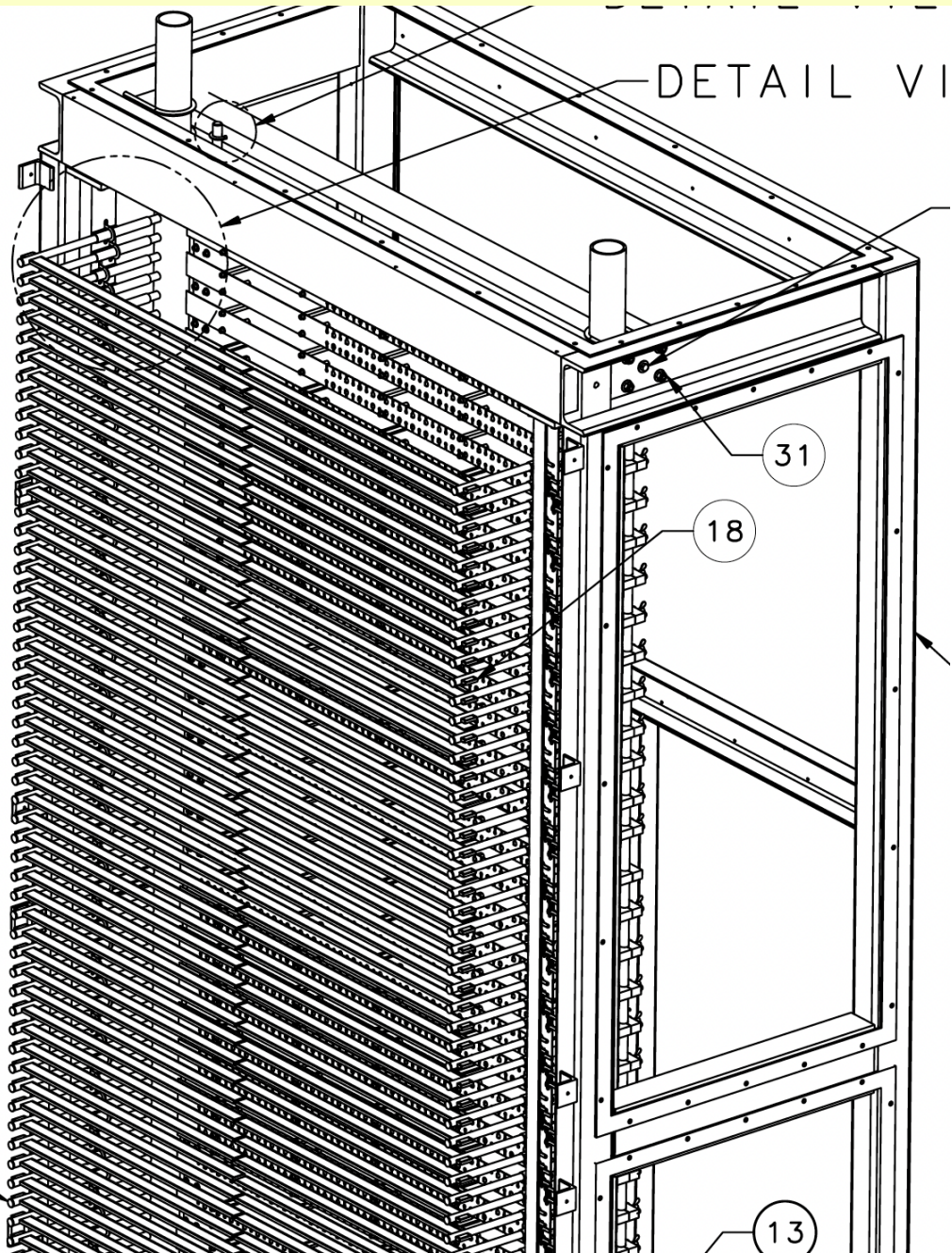
- Remove BBCal DAQ equipment
- Reuse FADCs from BBCal
- Reuse cables from BBCal
- Rearrange DAQ bunker crates and racks
- Move Ecal into place
 - Approximately the currently location of BBCal

Summary – Help Wanted

- GEp slated to start running end of Oct 2024
- Want ~2 months for cosmic tests/trigger DAQ configuration, testing
 - Installation finished end Aug/start Sept
- Want to finish PMT, cooling system, heater system and enclosure by June
 - Allow ~2 months to complete all cabling (~ 10,000 connections needs to be made)
- Gen-RP & K_LL will run in April and May
- Finish stacking supermodules in Feb and start PMT installation ASAP
- If you would like to join an ambitious detector project, with an ambitious timeline... we can use your help

Back Up Slides

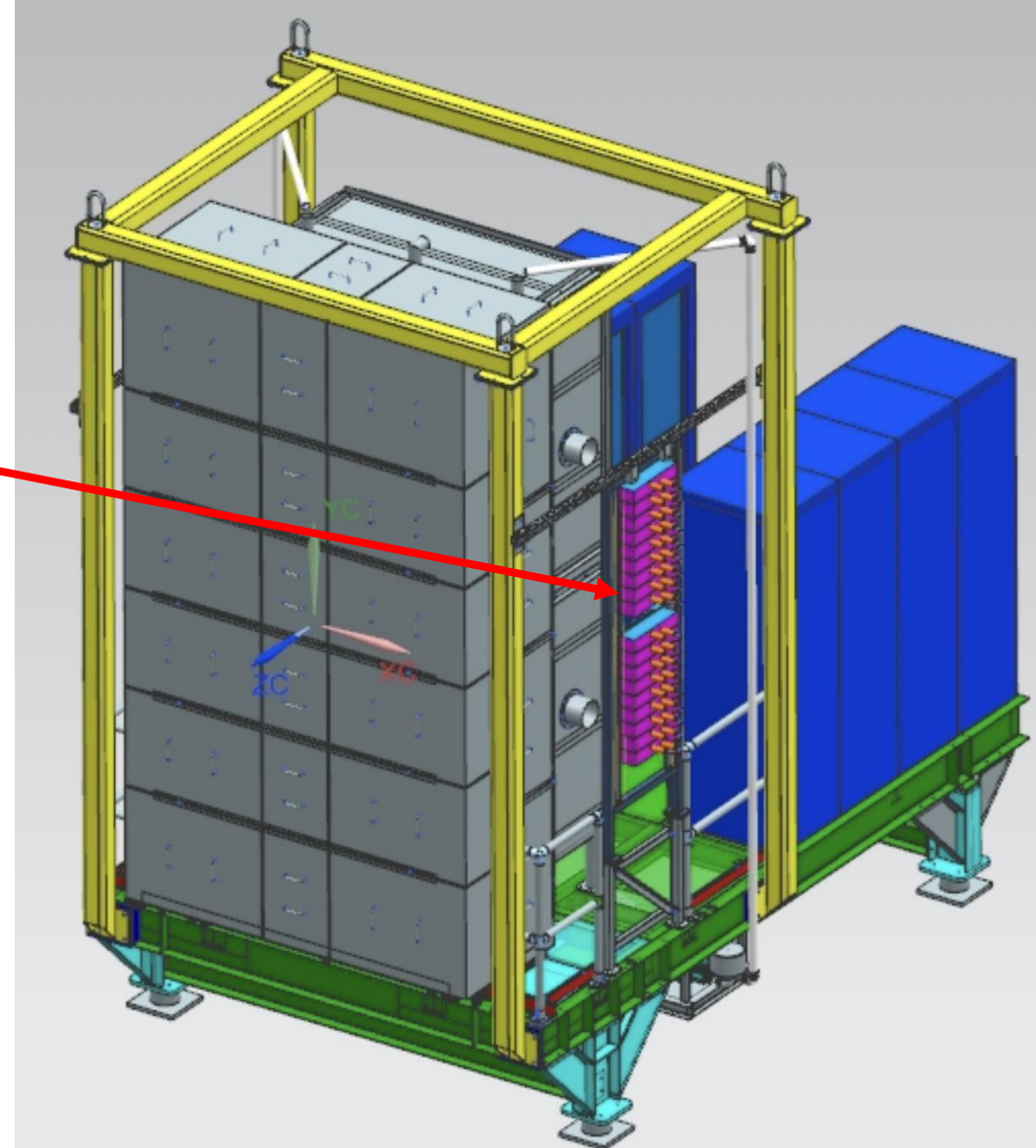
Installation process for back of detector



1. Remove all aluminum plates from rear of SMs
2. Install enclosure frame on rear of ECal detector stack
3. Install cooling system components including
 - Upright manifolds
 - Connector pipes
 - Horizontal air ducts between each row of PMTs
4. Re-install aluminum plates and then install PMTs and bases.
5. Install vertical supports for PMT patch panels.
6. Row by row install the patch panels connecting the signal and HV lines to the patch panels as you go. It is difficult to get your hands in between rows of patch panels to connect so it is imperative that these connections be finished in a given row before proceeding to install the row above. Is there a way to test these connections without HV?
7. Install light-tight panels on rear frame.
8. Row by row connect and route signal and HV cables from the patch panels out through the cable channels in the enclosure panels. Consult the map to ensure the proper cables are installed.
9. Install HV boxes and route HV cables, connecting them to the HV boxes
10. Install cable trays and route signal cables, connecting them to the front end electronics

Cable installation

1. 1656 8m signal cables (LEMO F. to LEMO M) from PMTs to Front End Summing modules
2. 1656 25' HV cables from PMTs to plastic connector HV boxes
3. 72 75m 24 ch HV cables from plastic connector HV boxes on ECal platform to SHV boxes in DAQ bunker
4. 1656 75-100m BNC to BNC signal cables from Front End to DAQ bunker patch panels
5. 1656 3m BNC to LEMO cables from DAQ patch panels to FADCs



1656 Channels VME FADCs

