Detector Support Group

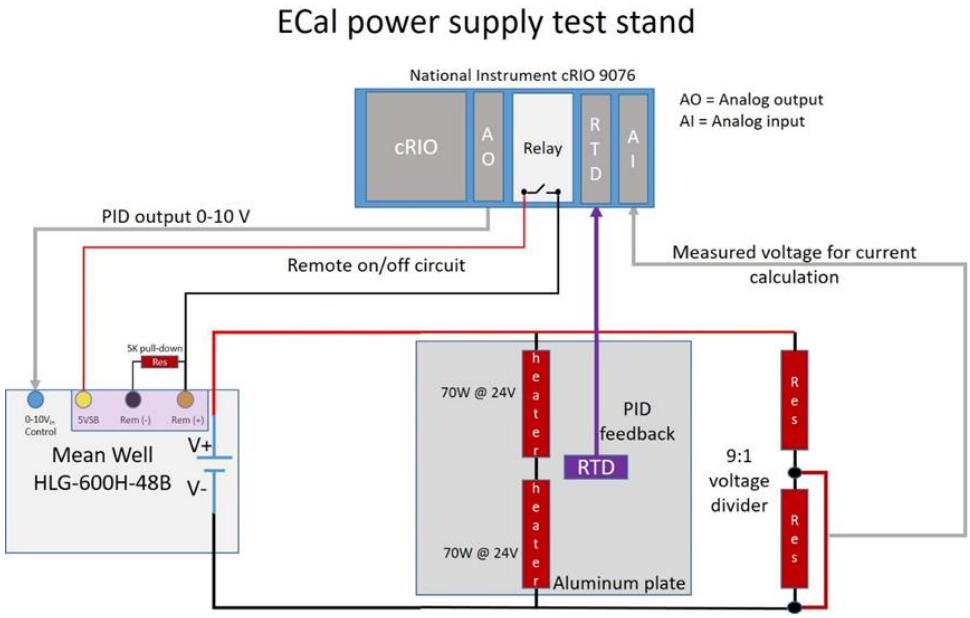
We choose to do these things "not because they are easy, but because they are hard".

Weekly Report, 2023-07-12

Hall A - ECal

Brian Eng, Mindy Leffel, and Marc McMullen

- Fabricated two high voltage cables with Fischer connectors on each end; 5 of 23 completed
- Conducted test of Mean-Well power supply using a combination of the +5 V standby voltage provided by the power supply and the remote on/off function
  - ✶ Needed to add a pull-down resistor, but circuit works as expected
  - ✶ Can remotely turn supply on and off with a relay and if the relay is removed or fails, the supply turns off



The 5 VSB signal was connected to the remote on/off circuit through the relay channel

Hall A – GEM

Marc McMullen

- Updated software on SBS gas monitoring Raspberry Pi

Hall A – Møller

Brian Eng

- Fixed error with STEP7 licensing
  - ✶ Was using an upgrade license that by itself does not work, but needs to be applied to a floating license
  - ✶ Upgraded V17 to V18, after which only V18 floating remains
- Connected analog outputs of flowmeter for flow and temperature to analog input module in PLC

Hall B - Central Calorimeter

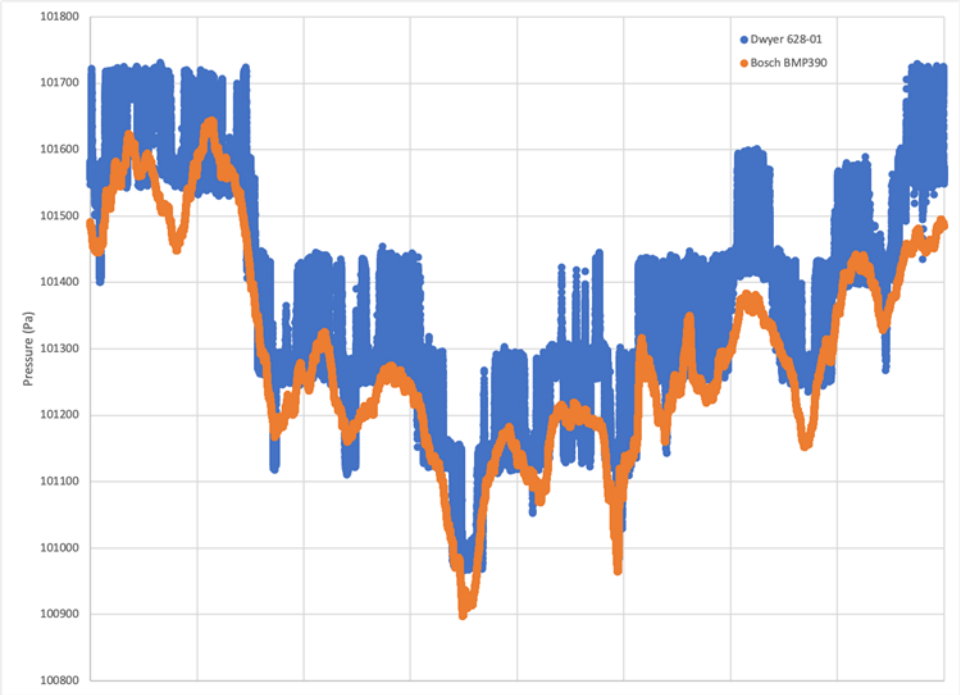
Mindy Leffel

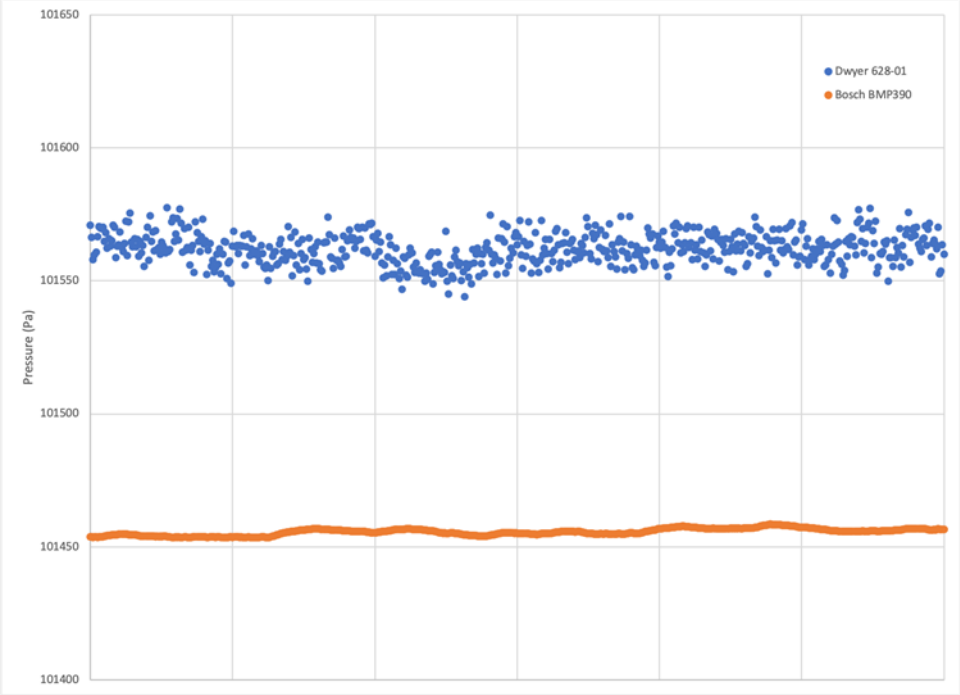
- Terminated five coax cables with LEMO connectors; 15 of 24 completed

Hall B – Gas System

Brian Eng

- Evaluation of sensors after datalogging
  Dwyer σ=5.89 Pa, Bosch σ=1.27 Pa

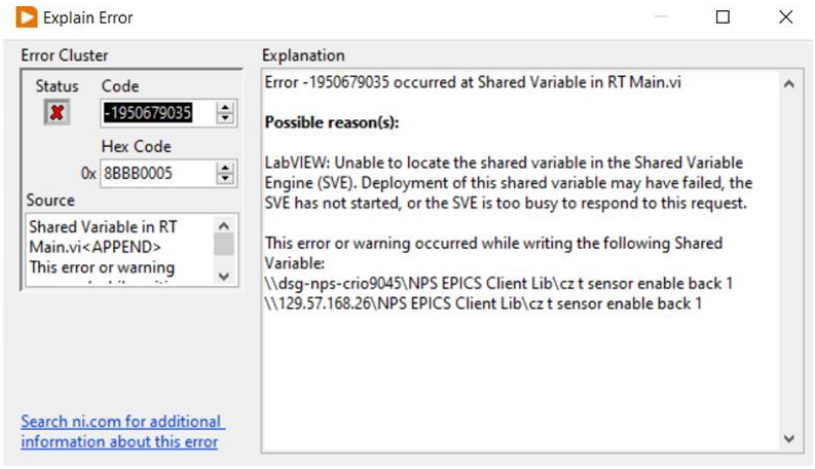




Hall C – NPS

Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Pablo Campero, Brian Eng, Mindy Leffel, and Marc McMullen

- Debugging thermal readback LabVIEW program
  - ✶ Received error regarding shared variable engine that suggested the EPICS client library was not being deployed or improperly deployed



Screenshot of shared variable engine error from LabVIEW

  - ✶ Made a test subVI with two EPICS shared variables, changing datatype of the shared variables from Boolean input to double analogue input, and adding code between local variables and shared variables to convert the variable datatypes; communicated between LabVIEW and EPICS
  - ✶ Made same changes to thermal readback program
  - ✶ Still having an issue with some numerical values not being sent to EPICS; debugging
- Continued cleaning up LabVIEW code, making subVIs to further reduce visible size of code on block diagram
- Started fabricating a power source box for the humidity and temperature sensors to ensure the supply voltage contacts are covered
- Developed alarm test system process variable simulator
  - ✶ Programming simulated process variables into alarm test station server nodes
  - ✶ Developed templates for simulating detector temperature, humidity, and dew point signals
- Thermal analysis
  - ✶ Added individual crystal blocks with dividers into detector model
  - ✶ Subtracted crystal blocks, dividers, and cooling plate from inner volume of the detector
  - ✶ Researched Fluent options for models with thin geometry
    - ▪ *Shell* options can be used to simulate heat transfer from the dividers to the crystals, allowing removal of dividers from the model and use of a simple mesh

Hall D – JEF

Mindy Leffel

- Populated 20 PMT bases; 425 of 1200 completed

EIC - DIRC

Peter Bonneau, Tyler Lemon, and Marc McMullen

- Interlock PCB
  - ✶ Reviewed the manufacturing files and sent PCB for manufacture, which shipped to Jlab on 7/10/23
  - ✶ Procured all components
- Developed backend of linear stage controls for Python user interface program
  - ✶ Added functions to check whether stages are connected to PC and their homing status, to jog stages (or move stage position by a pre-set increment), and to monitor and display as a Boolean indicator whether a stage is in motion
- Creating a flow chart for remote user interface program

EIC – RICH

Tyler Lemon

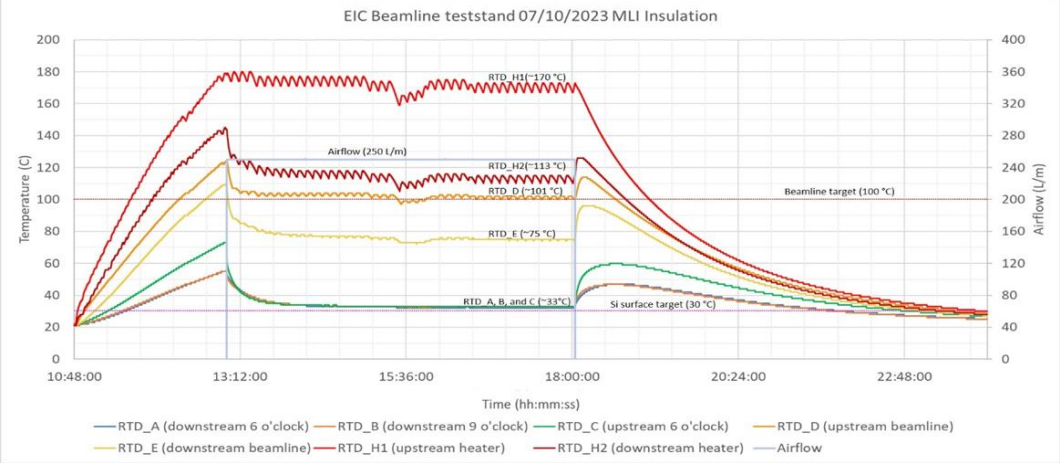
- Debugging after attempting to measure sample mirror with UV wavelengths
  - ✶ Results were lower than anticipated; ~20% of light reflected vs. ~90% anticipated
  - ✶ Debugging light source and optical fiber attenuation

EIC - Thermal Test Stand

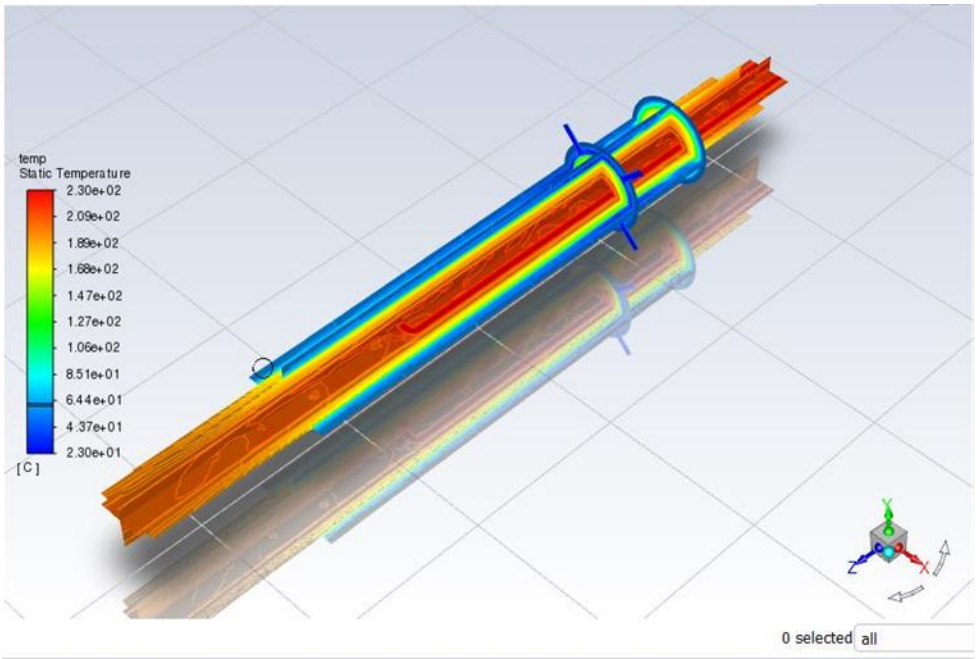
Pablo Campero, Brian Eng, George Jacobs, and Marc McMullen

- Replaced leaking adapter fittings for the vent pipe

- Ran test using the same polyimide multi-layered insulation
  - ✶ Heated beamline to ~100ºC with airflow of 250 L/m; silicon measured ~33ºC



- Thermal analysis
  - ✶ Ran simulation with fluid inlet velocity for the inner volume (mineral oil) of the heater pipe and the inner volume of the beampipe (air)
    - Temperature for the heater elements of 230°C
    - Laminar flow for both fluid volumes
    - Velocity of 0.1 m/s for both inner volumes
    - Results showed that heat transfer between the heater element and the surrounding fluid was not sufficient to heat the outlet section of the inner volume of the heater pipe
  - ✶ Ran simulation with no inlet velocities for the inner volume; applied thermal natural convection and radiation for fluid zones of the inner volume of the heater pipe and the beampipe
    - Temperature for the heater elements of 230°C
    - Used Boussinesq approach to vary the density of the mineral oil
    - Enabled gravity (*y*-axis direction, -9.81 m/s)
    - Results showed higher heat transfer between the heater element and the surrounding fluid than previous simulation, with ~10°C difference between the inlet and outlet, and silicon temperature increased to ~60°C



Isometric view when natural convection was simulated with no inlet velocity for heater pipe and beampipe inner volume fluids

- ✶ Wrote Python code to calculate average of the residuals for linear regression model