

Detector Support Group

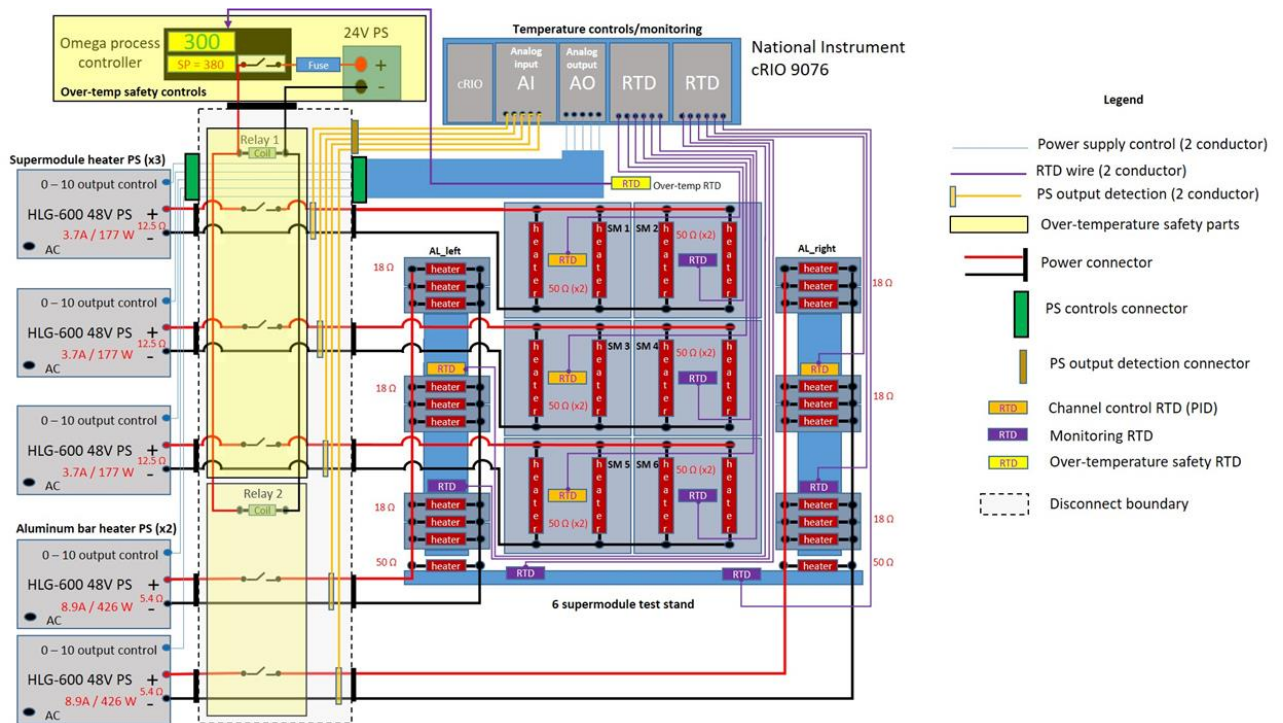
We choose to do these things "not because they are easy, but because they are hard".

Weekly Report, 2023-07-19

Hall A - ECal

Brian Eng, Mindy Leffel, and Marc McMullen

- Fabricated two high voltage cables with Fischer connectors on each end; 7 of 23 completed
- Worked on alternative independent safety system for heater shutoff that does not rely on power supply itself to turn off
 - ★ Relays on after power supply output with coils chained together controlled by an Omega
- Investigating switching from RTD module to TC module
 - ★ TC module has up to 16 channels compared to eight with RTD
 - ★ More higher temperature process models available (400°C+)
 - ★ Lower cost sensors, but possibly higher cost extension cable
- Began making controls components list for full detector
- Diagramed controls and instrumentation for the six-supermodule test stand



Hall A - Møller

Brian Eng

- Updated Siemens PLC price quote from ~72 K to ~75 K
 - ★ Latest delivery of Feb 2024 (improved from May 2024)

Hall B - Central Calorimeter

Mindy Leffel

- Terminated nine coax cables with LEMO connectors; 24 of 24 completed

Hall B – Magnets

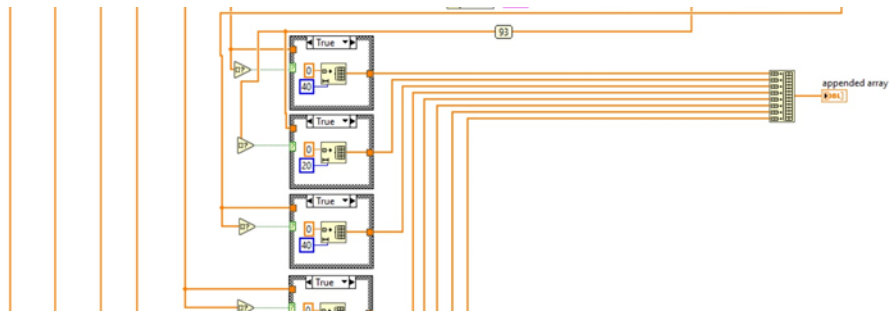
Brian Eng

- Met with Nathan to discuss replacing VME crate with cRIO as the EPICS interface for various magnet power supplies
 - ★ Møller Quads, mini-torus, pair spectrometer magnets
 - ★ Mostly TTL signals, with some analog inputs
 - ★ Possibly interfacing with flux meter via serial
 - ★ Located on SFL1N, most have multi-conductor cable to adapter boards, to convert to ribbon cable for VME modules
 - ★ cRIO and modules on hand

Hall C – NPS

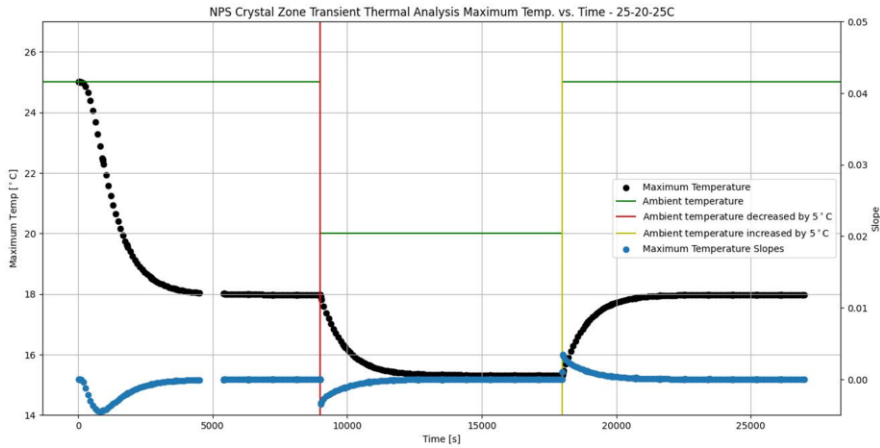
Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Pablo Campero, Brian Eng, Mindy Leffel, and Marc McMullen

- Debugging thermal readback and chiller controls LabVIEW program
 - ★ Added case structure to each multiplexer scan to check if array produced by the scan is empty, to ensure length of the All Keysight Values array does not change
 - If an array is empty, it is replaced with an array of zeros of the same length

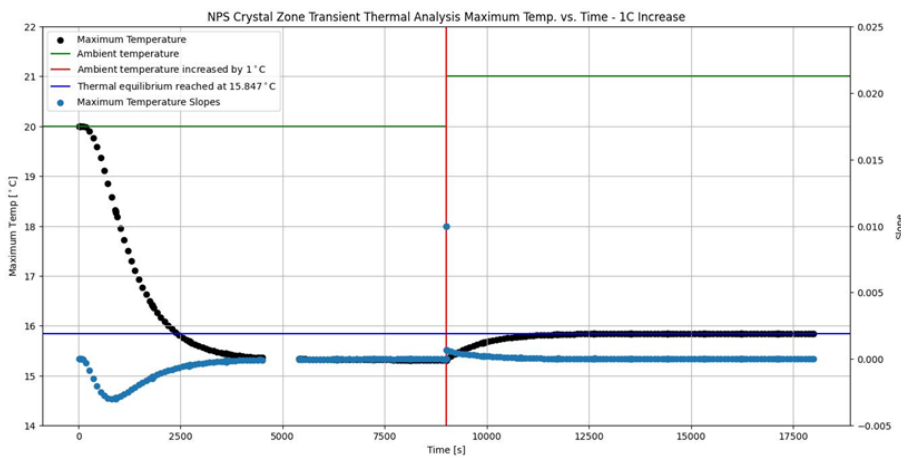
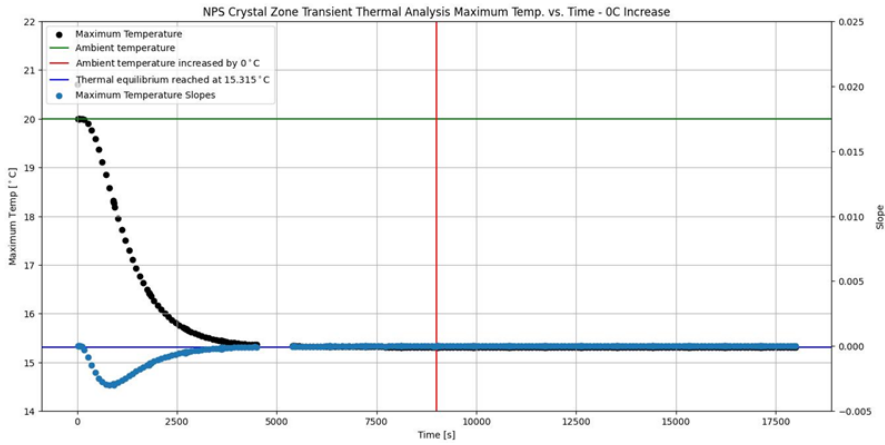


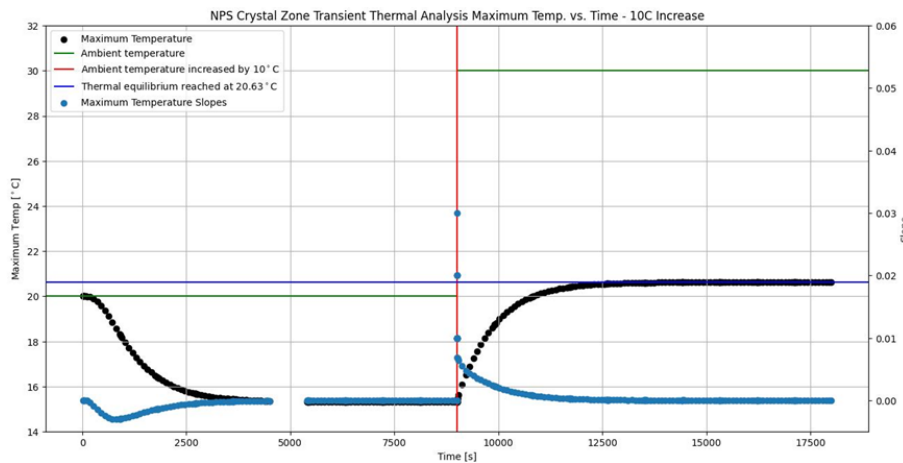
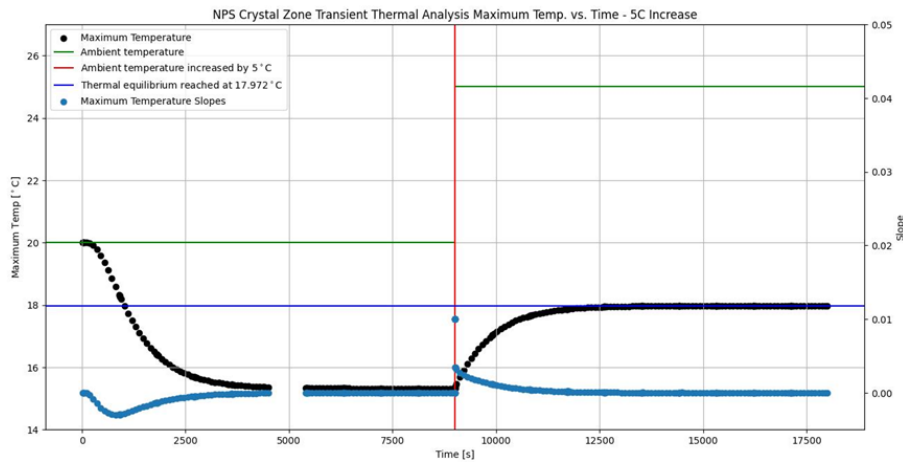
Screenshot of case structures added to Keysight scanning portion of LabVIEW code

- ★ Raw values (voltages) from flow meters are being sent to EPICS, instead of the converted values, due to array elements being replaced in multiple places in the code; will change code
- Continued making subVIs to further reduce size of code on LabVIEW block diagram
- Revised screen manual with pictures of new screens and new screen descriptions
- Recovered chiller communication after Hall C power outage
- Worked on VI for displaying maximum and minimum values of each element of an array (for future monitoring version)
- Ran Ansys simulation
 - ★ Ambient temperature was set to 25°C; after thermal equilibrium was reached (~17.9°C in 5553 s), ambient temperature was reduced to 20°C
 - ★ After thermal equilibrium was reached again (~15.3°C in 3932 s), ambient temperature was increased back to 25°C
 - ★ The final thermal equilibrium (~17.9°C) was reached in 4499 s



- Generated plots of Ansys simulations of the crystal array with the ambient temperature being increased from 20°C by 0°C, 1°C, and 10°C





- Modified Ansys 3D model
 - ★ Completed subtraction of crystal, dividers, and cooling plate
 - ★ Removed mu-metal and carbon fiber dividers
 - ★ Model meshing in progress
- Debugging Phoebus test station alarm server
 - ★ A configuration file will load alarm parameter settings for each simulated detector process variable when the system is first initialized
 - ★ System correctly accepts some process variables (~60%), but others are ignored
 - ★ No errors are reported by the Phoebus alarm server console

Hall D – JEF

Mindy Leffel

- Populated 10 PMT bases; 435 of 1200 completed

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Weekly Report, 2023-07-19

EIC - DIRC

Peter Bonneau, Tyler Lemon, and Marc McMullen

- Adding status indicators to remote user interface program to show that program is waiting for a task to complete and not frozen
- Creating flow chart of remote user interface program
- Began layout of laser interlock system's interior control unit box
 - ★ Submitted PRs for power distribution and supply
- Received all components for interlock PCB; made parts inventory and checked fit of chips, terminals, and transistors
- Completed High Risk Restart form; form has been signed

EIC – RICH

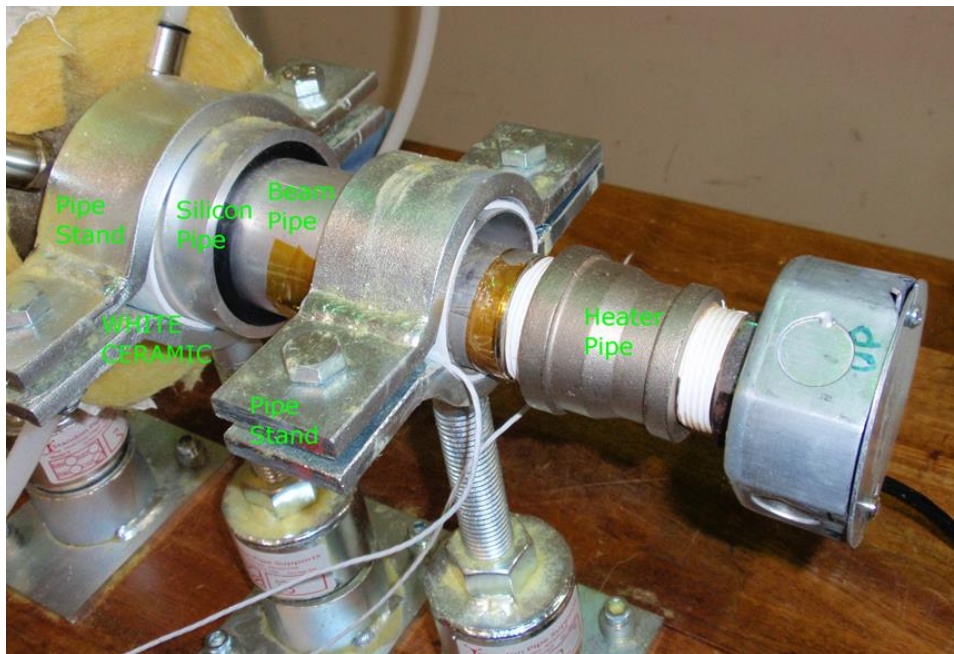
Tyler Lemon

- Gave an in-person demonstration and explanation of reflectivity, d0, and Shack-Hartmann mirror tests to collaborators

EIC - Thermal Test Stand

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

- Adding insulation between beampipe and stands, which requires removal of the current insulation around the stands

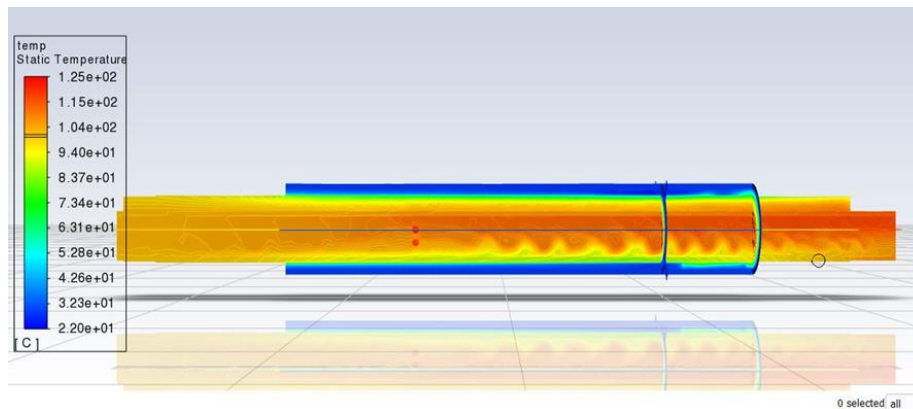


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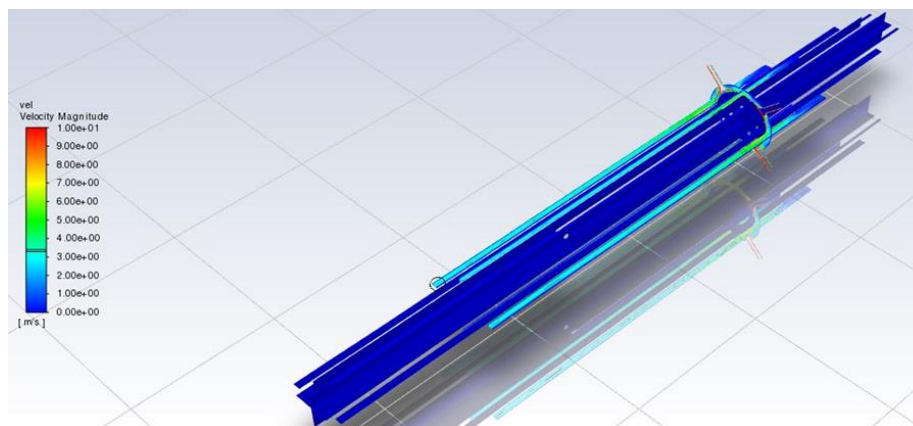
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- Ran thermal simulation in Ansys-Fluent with different configurations
 - ★ Reduced heat source to $\sim 1,365,516$ W/m³ to achieve a temperature of 100°C in the beampipe
 - ★ Set configurations to simulate natural convection for the fluids in the heater pipe and beampipe inner volumes
 - ★ Implemented polynomial curves' coefficients to simulate thermal properties of the mineral oil (based on its specifications); resolved previous floating point exception errors by using piece polynomial with range parameters
 - ★ Results shown in velocity and temperature contour plots
 - Silicon temperature is 30.22°C, beampipe temperature 100.13°C, and heater pipe upstream 112.4°C
 - Temperature differential between upstream and downstream of heater pipe is $\sim 14^\circ\text{C}$
 - Maximum velocity at outlet of the annulus space is 3.4 m/s when inlet airflow is 210 L/min



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



Velocity contour plot, isometric view, showing velocity variation in the annulus space with inlet airflow of 210 L/min

- Wrote Python code to calculate sum of residuals for linear regression model