Detector Support Group

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

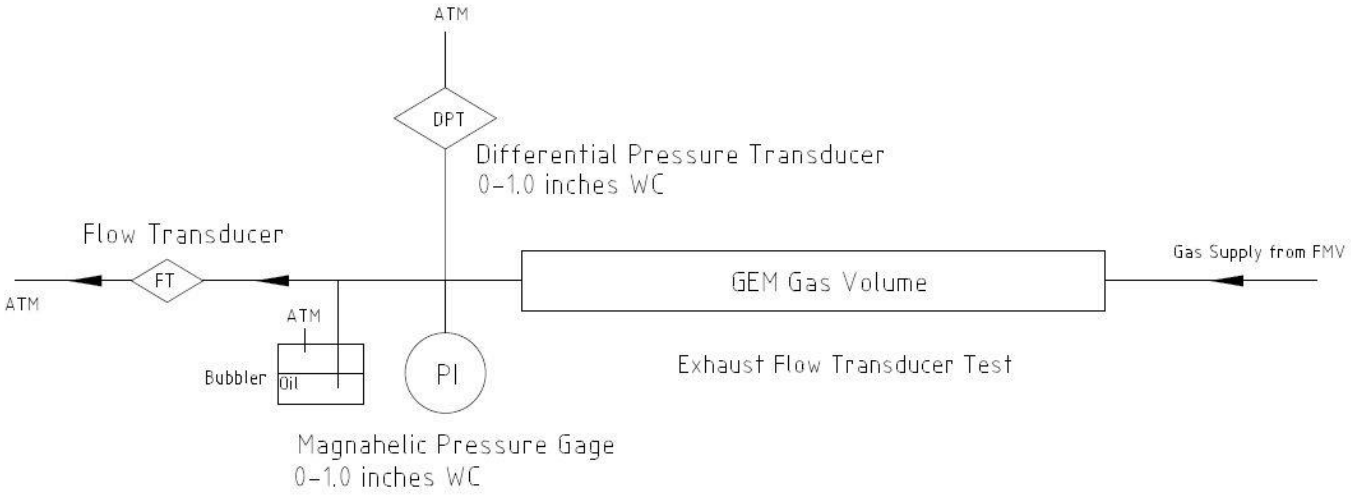
Weekly Report, 2021-03-31

Summary

Hall A – GEM

Mary Ann Antonioli, Peter Bonneau, Brian Eng, George Jacobs, Mindy Leffel, Tyler Lemon, Marc McMullen

- Tested successfully BigBite gas distribution system
  - ✶ Standard flow channels were at ~350 sccm for about an hour
  - ✶ High flow channels were at ~560 to 580 sccm for about an hour
- Developed, in AutoCAD, setup for exhaust flow transducer testing



Schematic for exhaust flow transducer test setup

- Populated an I^2C multiplexer board; three of six complete
- Cut, fabricated, and tested 38 of 272 I^2C communication cables

Hall A – HCal

Mindy Leffel

- Cut and stripped ten of 60 cables to fabricate LEMO-to-LEMO cables

Hall A – SoLID

Mary Ann Antonioli, Pablo Campero, Mindy Leffel, Marc McMullen

- Simulated the circuit of the Constant Current Source board
  - ✶ Observed output current is 97.9 μA
  - ✶ Changed input voltage for board; current output remained at ~100 μA as expected
  - ✶ Simulated results match the measured voltage and current of the fabricated board
- Modified *Cryo Control Reservoir Expert* HMI screen
  - ✶ Added temperature sensors for current leads
  - ✶ Changed colors for valves shown on screen
- Populated 8th, and final, constant current source board

Hall B – RICH-II

Mary Ann Antonioli, Peter Bonneau, Tyler Lemon

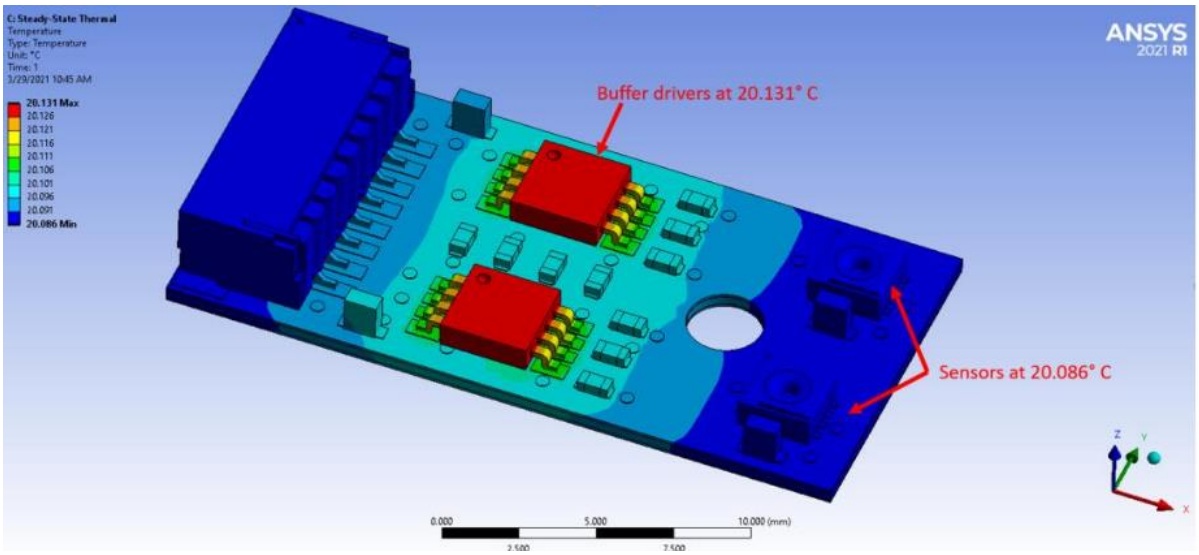
- Reviewed requirements for mirror reflectivity automation stages to ensure stages suggested by Zaber are able to support probe and any other equipment

Item	Model #	Specification	Units	Value
X stage	LC40	travel	mm	800
		capacity	kg	50
		stage weight	kg	3.114
		estimated weight to be carried	kg	16.546
Y stage	LC40	travel	mm	1100
		capacity	kg	50
		stage weight	kg	3.866
		estimated weight to be carried	kg	12.68
Z stage	X-LSQ300A-E01	travel	mm	300
		capacity	kg	50
		stage weight	kg	1.8
		estimated weight to be carried	kg	10.88
theta stage	X-RSW60A-E03	rotation	deg	360
		capacity	kg	20
		stage weight	kg	0.67
		estimated weight to be carried	kg	10.21
phi stage	X-RSW60A-E03	rotation	deg	360
		capacity	kg	20
		stage weight	kg	0.67
		estimated weight to be carried	kg	9.3
Theta-phi mount	AB136	weight	kg	0.24
Probe	RP26	weight	kg	1.6
Probe mount	8028N11	weight	kg	0.7
Extras	—	weight	kg	2
Safety margin	—	weight	kg	5

Table of travel, carrying capacity, and weight specifications for proposed Zaber stages.

- Modified SHT35 sensor PCB
  - ✶ Replaced thermal vias with direct connections to the plane layers
  - ✶ Relocated decoupling capacitors near the buffer drivers
- Developed, in NX-12, a model of a multilayer SHT35 sensor board to have a more accurate model for ANSYS analysis
  - ✶ PCB was initially represented by a simplified solid block without any layers
  - ✶ Manually generating a model with layers allowed ANSYS to assign appropriate materials (copper, FR-4, solder) to items to get a simulation result that more closely matches real world behavior
  - ✶ Resulting analysis showed that when PCB reaches a steady state (in terms of heat load), temperature increase is only 0.038 °C from ambient

- Temperature increase is less than the accuracy capability of SHT35 sensor; this means heat generated by buffer drivers should not affect their temperature readings

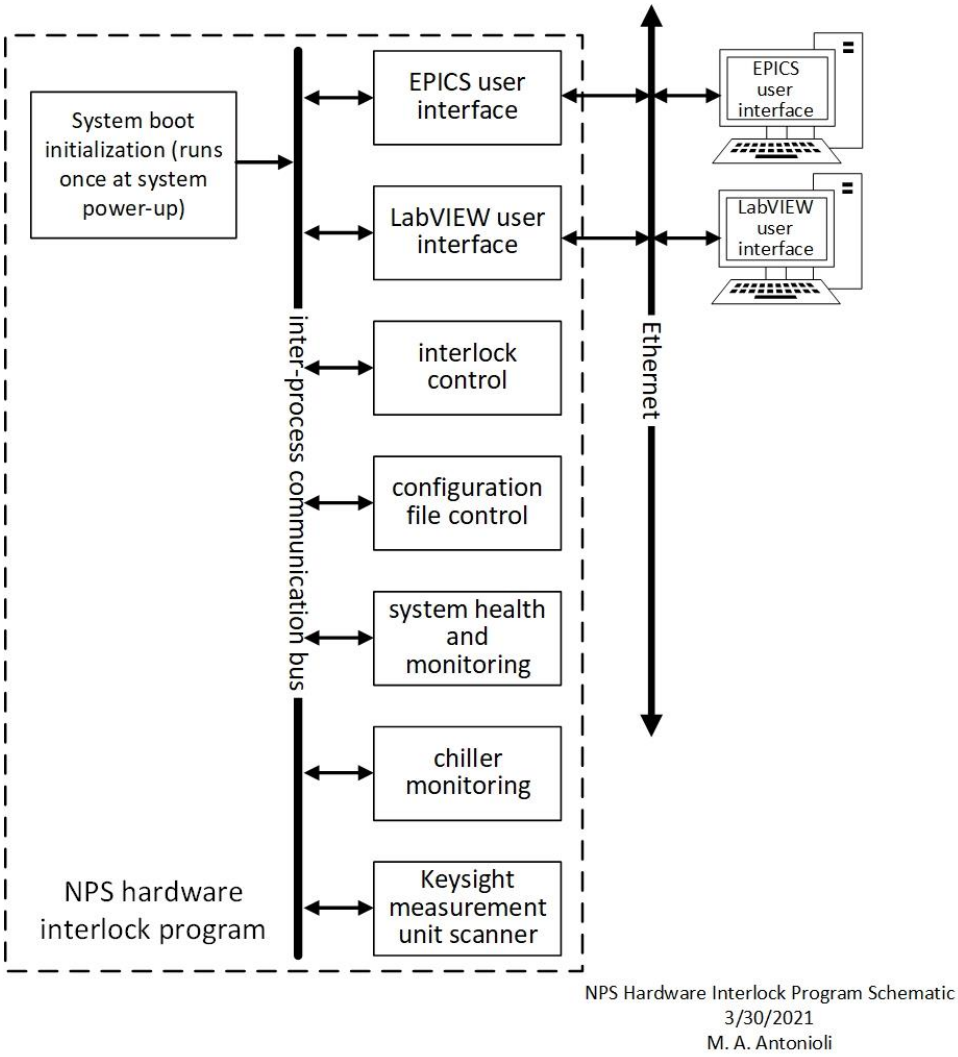


ANSYS results for multilayer PCB

Hall C – NPS

Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Pablo Campero, George Jacobs, Mindy Leffel, Tyler Lemon

- Development of the LabVIEW subroutine architecture for the Keysight switch/measurement unit
  - ✶ Program will initialize the Keysight mainframe using configuration data downloaded from the cRIO controller
    - Configuration data includes the channel measurement type (temperature, voltage, and resistance), measurement options, and scan rate
  - ✶ After initialization the subroutine will scan the enabled channels
    - Channels can be disabled by the user if there is a faulty sensor or if the multiplexer channel is not used for the detector
  - ✶ The subroutine will track and report on the number of completed relay cycles for each multiplexer channel as an indicator of relay life usage
- Developed, in Visio, NPS Hardware Interlock System program block diagram
  - ✶ Block diagram shows each LabVIEW subroutine and the communication lines between them



Schematic for NPS Hardware Interlock program

- Added jumpers to four HV Supply cables' SAMTEC 3 connectors (between pins 1 and 8) to enable no load cable testing

EIC

Brian Eng

- Scaling ALICE (A Large Ion Collider Experiment) ITS (Inner Tracking System) services to EIC Silicon detector

DSG – Cleanroom EEL 124

Marc McMullen

- Coordinated the effort to reestablish protocols in the large cleanroom
  - ✶ Cleanroom air handler maintenance is scheduled for 03/31/2021
  - ✶ Filters will be changed, belts checked, and other general maintenance