Detector Support Group
Weekly Report, 2016-11-09
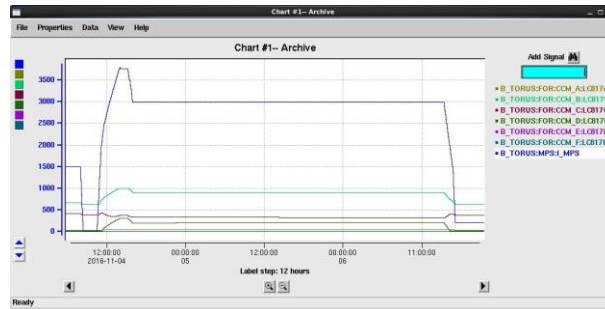
<u>Ongoing Projects</u>

<u>Magnet Control System</u>
<u>Solenoid</u>
- Work continuing on Solenoid Vacuum System.
- Solenoid Master Instrumentation List modified.

<u>Torus</u>

MPS Current and Coil Load Cells signals during full current power-up for the Torus Magnet.

<u>Gas System</u>
- Testing FPGA DAQ speed using cRIO.

<u>RICH</u>
- Meeting with INFN collaborators on assembly procedure and upcoming tasks.
- **Hall B engineering dropped the ball on the approval of pressure system.**
    - ★ Searching for Design Authority.

<u>HDice</u>
- NMR program changed to allow for multiple run cycles, afterthought from HDice group.
- IBC wiring diagram doesn't exist.

<u>FT</u>
- Interlock work continuing.

<u>DC</u>
- **Hall B engineering dropped the ball on the approval of pressure system.**
    - ★ Dave Kashy has been asked to be the Design Authority

<u>SVT</u>
- Operation manual for Hardware Interlock System, for the ERR, ready.
- Work started on R4 module replacement and integration.

Mindy Leffel, Amanda Hoebel, Brian End, and Marc McMullen (not in picture) routing R1-R3 cables

Antonioli, Mary Ann
- Made first edits to **gas system** Purge Systems Operators Manual.
- Updated **HDice** RF Attenuation/Switching Unit to include indicator "lights" of each test's completion and a test "stop" button.

Arslan, Sahin
SVT
- Transferred empty N_2 bottles to gas cage.
- Pulled faraday cage from R4.
- Following modules were debugged and installed on R4 barrel.
  - ✦ P67 went in R4M24 location.
  - ✦ P30 went in R4M14 location.
  - ✦ P08 went in R4M4 location.
- Add valve on chiller panel to control R4 flow (on, off).
- Attached R1 cables and worked on cable management.

DSG
- Strung 30-micron wire in wire quality check chamber.
- Changed the Ar bottle.

Bonneau, Peter
Magnet Systems
- Working with Pablo on finalizing vacuum system design.
- Monitored and analyzed data from Torus instrumentation and cryogenic system status via EPICS, during testing.
  - ✦ Tests of Torus fast power dumps took place at 350 A, 650 A, 850 A, and 1500 A.

Forward Tagger
- FT Hardware Interlock System.
  - ✦ Hall B IP address for cRIO controller has been issued.
  - ✦ Modules (ADC, relay, RTD, etc.) have been added to cRIO and configured.
  - ✦ Module signal definitions are progressing.

SVT
- For the ERR, wrote a program operation manual for Hardware Interlock System. Also updated system description document and design documentation.

HDice
- Worked with Amanda on debugging and testing of NMR instrumentation and program for rack #2 in HDice lab.
- CAENels firmware engineer is currently working on modification to CT-Box to allow triggering (using oscilloscope mode) and first version expected to be available in a few weeks.
- Met with Xiangdong Wei and Mike Lowry regarding DSG work for the HDice Group.
  - ✦ DSG will continue work on software program update for replacement cRIO processor. Since there is no repair OSP specific to cart, hardware work cannot be performed by DSG.
  - ✦ Work requested for switch heater control cannot be implemented until details of required interlocks are determined.

Campero, Pablo

Magnet

- Worked with Peter on Solenoid Vacuum System.
  - ✦ Selected three channels of module AB-1756-IF16 to read three analog inputs (0-10 V) for vacuum level and turbo pump.
  - ✦ Proposed 1756-IB32 PLC module to read one (0-24 V) signal to monitor open/close of solenoid vacuum gate valve.
  - ✦ Checked space available in solenoid racks to set up vacuum control panel.
  - ✦ Verified availability for UPS power supply connection and location in Solenoid racks.
  - ✦ Checked spares available in Rhino 24 VDC power supply, which is already used for solenoid instrumentation.
- Worked on Solenoid magnet PLC programming and instrumentation for Solenoid Service Tower.
  - ✦ Modified Solenoid Master Instrumentation List.
    - ▪ Added SV8675BY signal for solenoid valve.
    - ▪ Updated all temperature and load cell sensors with new PV names, according to Jlab nomenclature.
  - ✦ Read CLAS 12 Solenoid Cooldown and Cryogenic Operational Procedure to understand cooldown parameters required for Solenoid.
  - ✦ Modified FastDaq_Processing program.
    - o Broke down arrays that come from Sol LV cRIO into individual signals for load cells and temperatures (Cernox and pt100) sensors.
    - o Used J-Lab Process Variable names for each sensor.
- Monitored EPICs screen for MPS, Cryo system, Strain Gauges, and Load cell on daily basis.
  - ✦ On 11/04/16 the Torus magnet reached its max design current 3770 A.

Eng, Brian

SVT

- H1 on HTSB1 is bad, debugged with Marc; confirmed it isn't connector problem.
- Installed L1C cage for R1 and R2 with Marc.
- Trained with Mindy and Sahin on cable-lacing R1-3 cables on support tube.
- Colored electrical tape was added to cables by region to make it easier to identify (black = R1, green = R2, orange = R3).

Gas System

- Captured network packets to EPICS server from cRIO to help NI debug problem (none sent when run from real-time executable).
- Testing FPGA DAQ speed using cRIO.

Magnets

- Planned fast dump at 1750 A. Fast DAQ cRIO stopped sending values to PLC. cRIO was power-cycled due to time constraints.
- Kept at 3000 A over weekend without any trips, but tripped on Monday (voltage taps).

Hoebel, Amanda

- Ran cable bundles for **SVT** R2 and R3.

HDice
- Fixed NMR program to allow for multiple cycles.
  - ★ Array concatenation inside loop caused memory leak.
- Troubleshoot RF Attenuator signal not changing with power.
  - ★ RF Attenuator signal shown on oscilloscope, seems to work fine.
- Started flowchart of IBC LabVIEW VI front panel.
- Met with Xiangdong, Mike, and Pete to discuss pump cart.
  - ★ No electrical diagram, TSA, or repair OSP available.
  - ★ DSG contributes to software only.
  - ★ CAENels firmware modification to allow CT-Box to trigger lock-in amplifier in NMR program.

Jacobs, George
- Provided info to Dave K. about DC **Gas System** for relief valve determination for ASME storage tanks

GAS Systems
- Created PR 366938 for funding liquid nitrogen contract.
- Created PR 366942 for funding the liquid argon contract.
- Created PR 367039 for liquid argon tank "hot fill".
- Discussions with Albert DeC. on bulk liquid Ar and liquid N_2 bid schedule for new contract (SOTR). Estimated Lar and LN_2 usage for the next three years for bid package.
- R2-R3 DC Gas flow rotameters have arrived, R1 rotameters are in hand.

Leffel, Mindy

SVT
- Repaired R1 slow controls cable.
- Worked on R2 and R3 with Amanda, Brian and Marc.
  - ★ Routed R2 cable bundles through flange.
  - ★ Color coded cables and cable bundles.
- Worked with Brian and Sahin cable-lacing regions 1, 2, and 3.

FT
- Modified 37-contact, D-sub connector on preamplifier motherboard.
- Made modifications to DIN rail and AC plug on interlock chassis.
- Attached selector switch.

Lemon, Tyler
- Monitored **Torus** EPICS screens on daily basis.

RICH
- Discussed assembly procedure and upcoming tasks with DSG and INFN collaborators.
  - ★ Assembly structure and detector components will arrive at JLab January 2017.
  - ★ Spherical mirrors will ship for final reflective coating by November 14, 2016 and estimated return to JLab: March 2017.
  - ★ Electronics boards will ship to JLab February 2017.
  - ★ Viewed diagrams, images, and videos detailing assembly structure and detector assembly.
- Reviewed optics principles used for mirror d0 measurements.
  - ★ Wrote Python program that models d0 measurement (see plots below).

✦ Added to d0 measurement note.
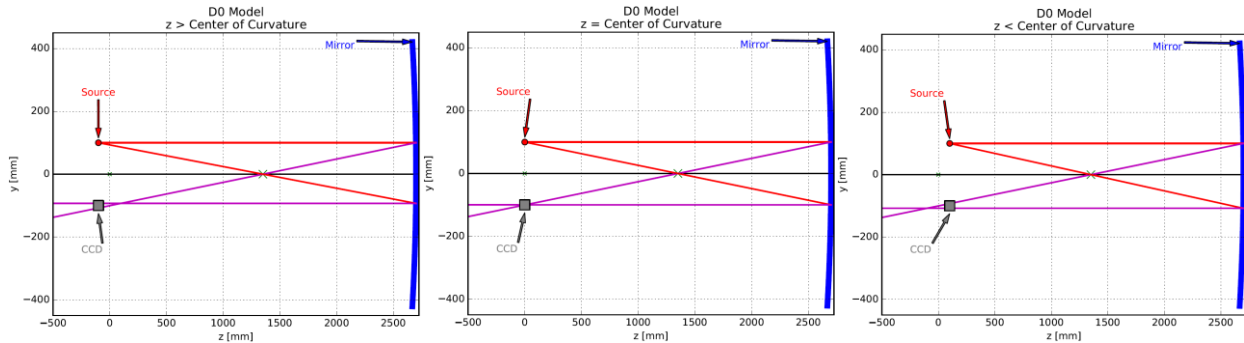
Ray diagrams generated in Python for three d0 measurement cases:

<u>Left:</u> Source and CCD at z > center of curvature (C); CCD views reflected light after reflected image of source, d0 > height of source.

<u>Center:</u> Source/CCD at z = C; CCD views image of reflected source, d0 = ~height of source.

<u>Right:</u> CCD/Source at z < C; CCD views reflected light before reflected image of source, d0 > height of source.

McMullen, Marc

Gas System

- For **DC**, Powered both Thermal Conductivity Units (TCU). Mix 1output (no gas) 10.45 V from process controller. Mix 2 output (no gas) 0 V. Mix 2 is likely malfunctioning, but will have to retest after Ar/CO2 delivery.
    - ✦ George has a spare TCU.

RICH

- Started resolving OSP issues. Reviewed OSP document, compiled rewrite recommendations.
    - ✦ Contacted Hall B Mechanical to get status of ASME/Pressure documentation and DA assignment.
    - ✦ Collected documentation necessary to calculate Hall B ODH.

SVT

- Worked on R1-3 cabling with Mindy Leffel, Amanda Hoebel, and Brian Eng.
- Installed L1 disconnect cages with Brian Eng.
- Debugged slow controls humidity fault with Brian Eng. First sensor has a connection/failure between the board and the connector. Board is inaccessible, so readings will be taken from second sensor on board.
- Conducted quarterly **safety** inspection.