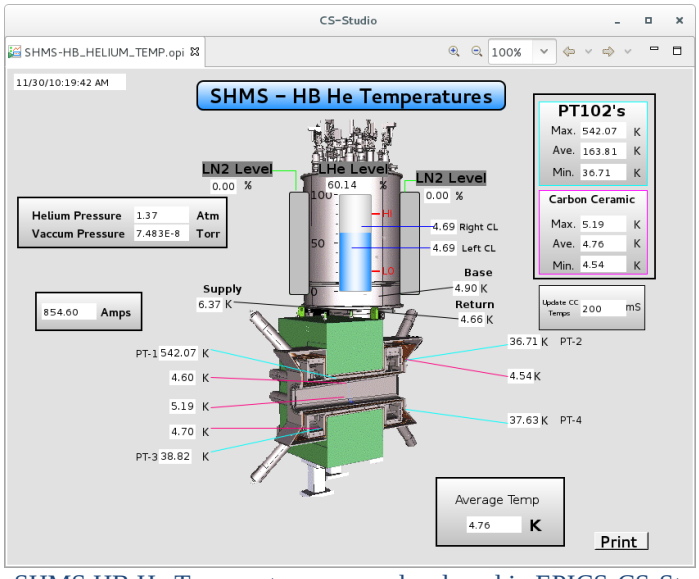
Detector Support Group
Weekly Report, 2018-12-05

Summary

Hall C EPICS Slow Control Systems

- Python script developed to create CS-Studio screens from a tabulated list of PVs.
  - ✶ Python script reads in text file containing PVs and corresponding labels to display, and customizes widget template for each row in the user's tabulated list of PVs.
  - ✶ End result of script is a table-like layout of PV indicators in an OPI file that can be imported into and run in CSS.
  - ✶ Preliminary version of CSS screens for HMS and SHMS created using script.
- WebOPI on Tomcat server debugged.
  - ✶ Tomcat verified to be installed correctly.
    - Able to deploy and run the example web app.
- Successfully ran WebOPI on Tomcat servlet from localhost URL.
  - ✶ SHMS HB Helium Temperature CSS screen transferred to servlet.
- Python script developed to convert OPI files (used by CSS-BOY) to EDL files (used by EDM and WEDM).
  - ✶ Conversion script eliminates the need to replicate CSS screens in EDM for web interface.
  - ✶ Converted and deployed test screen showing HMS magnets' current and spectrometer angle on WEDM.
- EPICS-Base and EPICS-CSS installed on dsg-b-linux1 PC.
- Current Regulation Routine for Quadrupoles submitted.
- SHMS HB Helium temperature OPI screen developed.
  - ✶ New screen based on PLC HMI screen, shows similar appearance and structure for the interface.
  - ✶ Ran OPI screen in real time mode by using PVs from Accelerator SoftIOC.



SHMS HB He Temperature screen developed in EPICS-CS-Studio

Hall B Magnets

- Tubing between LCW manifold and MPS manifold was increased from ¾ inch to 1 inch.
- Data analyzed for Solenoid fast dump on 11/25/2018.
  - Data correlates LCW:92_Flow_Makeup with Solenoid MPS trip.
  - Found dynamic ranges for MPS flow transmitters.
    - FSW1 and FSW3 : 1–80 [l/min]
    - FSW 2, FSW4 and FSW5: 1–15 [l/min]
  - Found recommended water supply flows and ΔP by Danfysik.
    - Flow has to be < 180 [l/min] at ΔP (Sup-Ret) = 6 [Bar].
    - Flow has to be < 115 [l/min] at ΔP (Sup-Ret) = 3 [Bar].
    - The max absolute pressure rated by Danfysik = 12 [Bar].
  - Since actual measured supply flow is 150.57 [l/min] at ΔP (Sup-Ret) = 5.17 [Bar] within the recommended operational values, the MPS water cooling pressure and flow are safe.

RICH

- Pressure transmitters installed for RICH N2 auto-change test on test stand.

LTCC

- Forward Carriage gas controls chassis modified for 4 new differential pressure transducers and an absolute pressure transducer.
- Gas controls chassis in gas shed modified for 2 new absolute pressure transducers.
- C4F10 supply scheduled to ship on 11/30 (delayed due to bad weather).
  - Expected arrival to New York early to mid-December.
- Internal wiring diagram completed for LTCC Solenoid Power chassis.
- Front and rear panel assembly drawings completed for the LTCC Solenoid Power chassis.

Antonioli, Mary Ann

- Made four Visio drawings for **Hall C.**
  - EPICS slow controls, PLC to EPICS, two for Ethernet vs Controlnet.

- Began LabVIEW code to test **cRIO** module 9239.
  - Added manual tests to drop-down selection.
  - Wrote samples, means, accuracy, std. deviation subVI, added to overall test, and tested.
  - Wrote differential nonlinearity subVI, added to overall test, and tested.

- Made final edits to and posted Notes 2018-24, 2018-25, 2018-26, 2018-27, and 2018-28.
- Formatted and edited Note on SoLID gas system.
- Changed website photo.

Bonneau, Peter

HDice

- Reviewed specifications for the Oxford IPS 120-10 magnet power supply as a potential source of "noise" in HDice NMR field sweeps.
  - The specifications state that the current stability due to temperature is +/-3mA per °C.
  - In the NMR system (PD II = ~2 mA/Gauss) the range of 6 mA = ~ 3 Gauss "noise".
  - The specifications also state stability due over time (24 hour period) is also +/-3mA per °C = ~ 3 Gauss
  - The power supply has the potential to be a large source of noise based on Oxford's specifications.
  - The CT-box will directly measure this noise during the NMR sweeps.
- Development of documentation for the upcoming HDice review.
  - An operator's manual is under development.

Hall C Slow Control Systems

- Implementation of EPICS in Hall C slow control systems.
  Rebuilding Linux-based EPICS development system. This system was previously use as a complete stand-alone test station for VME and other hardware IOC's. This computer also serves as a VXworks boot server.
  Development of the over-all systems architecture for the DSG proposed EPICS-based slow controls for Hall C.
- Held status and planning meetings on the implementation of EPICS in Hall C Control systems.
- Worked with Amanda, Mary Ann, Pablo, and Tyler on the development of an overall Hall C slow controls proposal talk.

Features the implementation of CS-Studio into Hall C. Eclipse plug-in components of CS-Studio include CSS-BOY, CSS-BEAST Alarm handler, and WebOPI for remote system monitoring.
The PLC to EPICS interface will use the EPICS EtherIP driver support along with the database of records made from Hall C PLC tags.
A slow-controls server is part of the design. Server runs EPICS base, CS-Studio applications, SoftIOC's, and monitoring software. This computer can also serve as a VXworks boot server.

- Held status and planning meetings on the implementation of EPICS in Hall C Control systems.

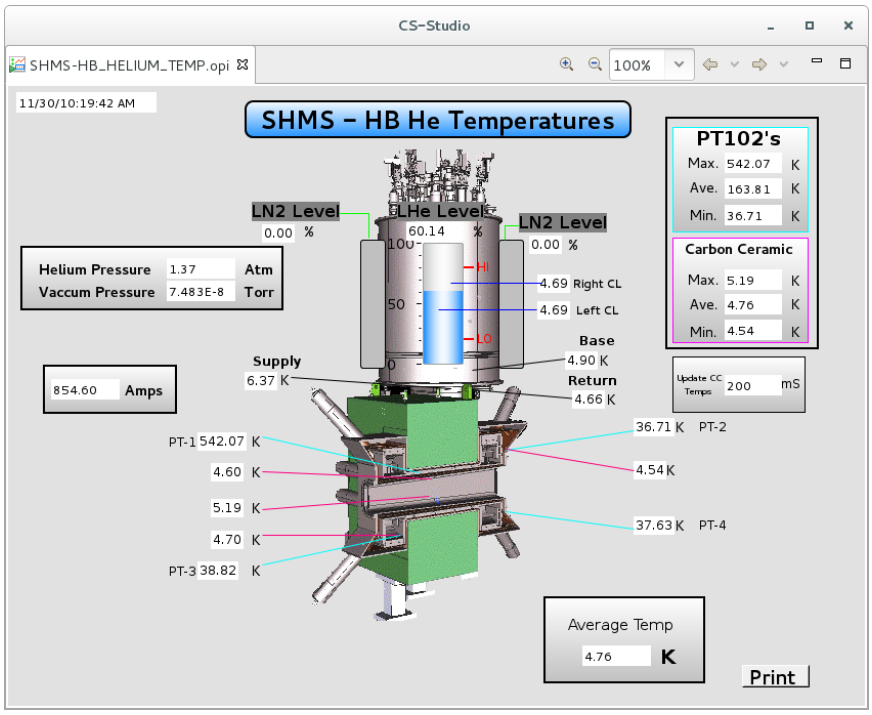
- Development of slow-controls system based on National Instruments single-board cRio (sbcRio) FPGA I/O.
  - ✶ Device driver development and debugging for serial readout of the Sensirion SHT75 humidity and temperature sensor IC's.
  - ✶ Device driver development and debugging for humidity and temperature serial readout of the Sensirion SHT75 sensor IC's.

Campero, Pablo

Hall C

- Completed installation of EPICS-Base on dsg-b-linux1 PC
  Followed directions written by Tyler.
- Installed EPICS-CSS on dsg-b-linux1 PC
- Checked Amanda's PLC code for Quadrupoles current regulation.
  Modified PLC code based on Mike request during last meeting.
- Created new SHMS HB Helium temperature OPI screen using EPICS CSS.

New screen based on PLC HMI screen, shows similar appearance and structure for the interface. Successfully ran OPI screen in real time mode by using PVs from Accelerator SoftIOC.



SHMS HB He Temperature screen developed in EPICS-CS-Studio

Hall B – Solenoid

- Assisted during Solenoid fast dump on 11/25/2018.
  - ✶ Analyzed data that correlates LCW:92_Flow_Makeup with Solenoid MPS trip
  - ✶ Assisted with the measurements of the MPS internal water flows.
- Updated Solenoid *Fast Dump Sep, 2017 to Nov, 2018* table.
- Made PowerPoint presentation with the recent information about the Solenoid fast dump and its potential external source that are making the MPS to trip.
- Modified *Solenoid Fast Dump investigation* PowerPoint presentation
- Researched Danfysik 854 MPS water flow specifications
  - ✶ Find dynamic ranges for MPS flow transmitters.
    - FSW1 and FSW3 : 1–80 [l/min]
    - FSW 2, FSW4 and FSW5: 1–15 [l/min]
  - ✶ Recommended water supply flows and ΔP by Danfysik are:
    - Flow has to be < 180 [l/min] at ΔP (Sup-Ret) = 6 [Bar].
    - Flow has to be < 115 [l/min] at ΔP (Sup-Ret) = 3 [Bar].
    - The max absolute pressure rated by Danfysik = 12 [Bar]
  - ✶ Danfysik performed a pressure test the Solenoid MPS water cooling system at 31 [Bar] for 1 [min], during factory acceptance test protocol on 14/04/2015.
  - ✶ Since actual measured supply flow is 150.57 [l/min] at ΔP (Sup-Ret) = 5.17 [Bar] within the recommended operational values, the MPS water cooling pressure and flow are safe.
- Made a power point presentation to show summary of *MPS Water Flow Investigations.*

- Edited and compile **DSG** weekly report.

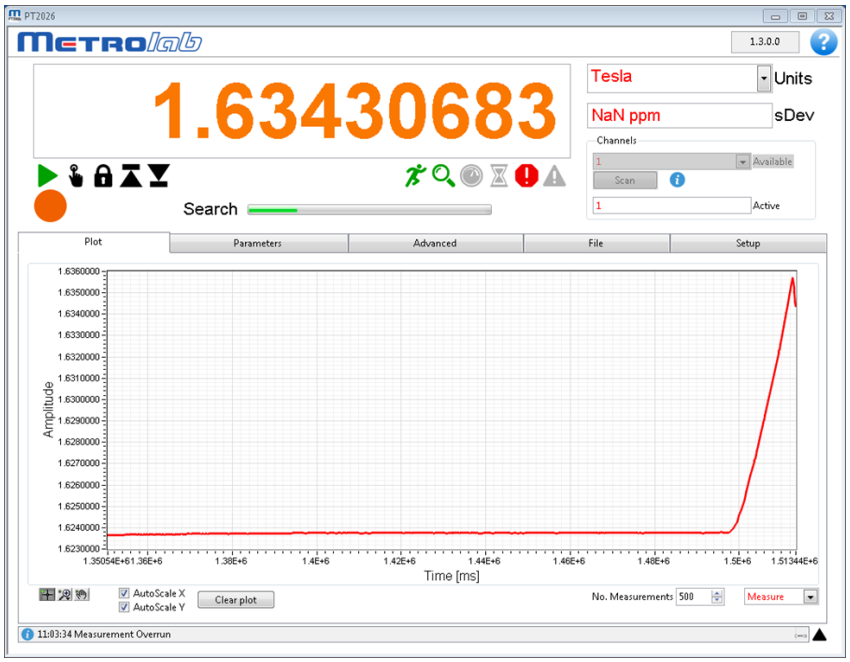
Eng, Brian

Hall B Magnets

- Solenoid fast dumped again, looks like LCW issue again: https://logbooks.jlab.org/entry/3631382
- Tubing between LCW manifold and MPS manifold was increased from ¾" to 1" ID: https://logbooks.jlab.org/entry/3632113

Hall C Magnets

- Computer used for Hall C work wouldn't boot, ordered replacement.
- Investigated problems with flow controller on HMS Dipole.
  Couldn't ramp Dipole past ~1.6 T for NMR testing. Postponing testing for a later date.



NMR lock, then started ramp, magnet tripped and unit lost the lock.

Hoebel, Amanda

HDIce

- Made corrections to CT-Box note.
- Setup new HDIce PC.
  - ✶ Need admin privileges to install LabVIEW.

Hall C

- Finalized Current Loop program to test.
- Reading information on EtherIP_driver for PLC-to-EPICS.
- Downloaded and installed EPICS Base.

- Downloaded and installed etherIP.
- Created test IOC and database that stores local PVs to be read in EPICS.
- Created test IOC and database using etherIP that stores PVs from a PLC.
  - Need Hall C subnet to access DSG_test_PLC.

Jacobs, George

GAS Systems

- Pressure transmitters for auto-change due by end of next week.
- Revised and edited the SOLID HGC C4F10 gas system note doc.

RICH

- N2 Gas Supply Auto Change Manifold Testing.docx, in progress.
- Installed pressure transmitters for RICH N2 auto-change test.

Leffel, Mindy

HCAL Calorimeter

- Cabling project.
  - Labeled 144 cables.
  - Cleaned out first bin in ESB and brought 526, 2m, LEMO to BNC cables back to lab.

Engineering Division

- Continued populating VME FSD boards for Machine Protection System.
  - All surface mount components complete, started through hole.

Lemon, Tyler

Hall C EPICS

- Developed procedure to install EPICS base on new DSG Linux PCs.
  - Procedure tested and refined with Pablo to install EPICS base on his Linux PC.
- Developed Python script to programmatically create CS-Studio screens from a tabulated list of PVs.

  CSS allows user to drag PV names from a text editor into OPI editor, but indicator created has only the "PV name" property filled out.
  OPI files can be opened in a text editor and edited rather than using CSS's GUI.
  "Widgets" (CSS's name for GUI items on screen) all have a template format that a user customizes by changing certain parameters (PV name, widget size, widget placement, etc.)
  Python script reads in text file containing PVs and corresponding labels to display and programmatically customizes widget template for each row in the user's tabulated list of PVs.
  End result of script is a table-like layout of PV indicators in an OPI file that can be imported into and run in CSS.
  Successfully created preliminary version of CSS screens for HMS and SHMS.
    - Screens are essentially PV indicators that are labeled with the PV name in two columns.
- Debugged running webopi on Tomcat server.
  - Tomcat verified to be installed correctly.
    - Able to deploy and run the example web app.
    - Also able to modify example to display my userweb's index.html page.

- From Tomcat's error log, java packages needed to deploy webopi's web archive (WAR) file are missing.
- Created slides on WebOPI and BEAST for project proposal talk.
- Successfully ran WebOPI on Tomcat servlet from localhost URL.
  - Found spacing in Tomcat's configuration file was incorrect, causing the internal server error when WebOPI URL was accessed.
  - Transferred Pablo's SHMS HB Helium Temperature CSS screen to servlet.
- Web-EDM (WEDM) will be used for remote web browser monitoring in first version of controls system.
  - WebOPI support is limited.
  - Accelerator has infrastructure on WEDM running at webepics.jlab.org.
- Developed Python script to convert OPI files in to EDL files.
  - OPI files used by CSS-BOY.
  - EDL file used by EDM and WEDM.
  - Conversion script eliminates need to replicate CSS screens in EDM for web interface.
    - EDM's user interface is hard to work with in comparison to CSS.
  - Both file formats are similar to XML and can be read as ASCII text.
  - Script pulls out relevant widget properties (widget type, widget position on screen, widget size, PV name) and inserts properties into an EDL template for each widget.
  - Currently, script can convert text indicators and label widgets from OPI to EDL.
    - Addition of ability to convert graphical widgets, meter indicators, bar indicators, byte indicators, text controls, and button controls from OPI to EDL is progress.
  - Successfully converted and deployed test screen showing HMS magnets' current and spectrometer angle on WEDM.
    - https://epicsweb.jlab.org/wedm/screen?edl=/cs/opshome/edm/hlc/spectrometers/DSG-test.edl

McMullen, Marc

LTCC

- Modified the FC gas controls chassis to accept 4 new differential pressure transducers and an absolute pressure transducers.
  - The new sensors will provide readings for the primary pressures for each sector (2, 3, 5, and 6) which will controls the supply and return solenoids as long as the sectors are within operating pressures.
    - They will also provide a backup signal for the safety system, which isolates the detector when the pressure is outside of operating range (1 to 2.75iwc).
  - The absolute transducer in the hall measures the gas supply. When the C4F10 supply pressure is too high (> 12psi), the supply solenoids are disable, therefore no gas will be supplied to any of the sectors.
- Modified the GS gas controls chassis to accept 2 new absolute pressure transducers.
  - One signal is the C4F10 Buffer pressure.
    - This signal provides an interlock for the LTCC gas return solenoids.

- The other signal measures the pressure on the output of the return pumps.
  - It also interlocks the return pumps, using the same logic set points as the buffer pressure interlock.

- C4F10 supply scheduled to ship on 11/30 (delayed due to bad weather).
  - Expected arrival to New York early to mid-December. Delivery to Jlab TBD.
- Completed internal wiring diagram for LTCC Solenoid Power chassis.
- Completed front and rear panel assembly drawings for the LTCC Solenoid Power chassis.
- Continued work on LTCC controls software. Added controls for the new FC LTCC gas controls GUI.
- Made a short presentation covering upcoming software changes to the Gas System concerning the LTCC supply and recovery system.