

# Detector Support Group Report

Tuesday, April 26, 2016

Amrit Yegneswaran

# Contents

## I. Introduction

- i. Genesis
- ii. Charge
- iii. Staff
- iv. Capabilities
- v. Contributions
- vi. Conclusion

## II. Current projects

- i. Hall B Gas System
- ii. HDICE
- iii. Hall D Solenoid
- iv. Hall B Magnets
- v. Conclusion

# Introduction: Genesis

- **DSG formed January 2014.**
  - Initial staff from Hall B and Hall D.
  - In all, 12 staff members.
- **DSG reports to Dr. Patrizia Rossi.**



*Fortiter in re, suaviter in modo.*

- **First convening of DSG: March 13<sup>th</sup>, 2014.**

*DSG Meeting Minutes – 3/13/14*

*DSG members introduced themselves.*

*Patrizia stated the scope and responsibilities of the group.*

# Introduction: Charge

- **Support tracking detectors in halls B and D.**
  - DC and SVT
  - FDC and CDC
- **Expanded Scope.**
  - Shortly after first meeting, Patrizia advised DSG to:
    - Support any detector and/or magnets in halls B and D.
    - Set priority to be Hall D and CLAS 12 upgrade.

# Introduction: Staff

**Antonioni, Mary Ann**



**Arslan, Sahin**



**Bonneau, Peter**



**Eng, Brian (Deputy)**



**Campero, Pablo**



**Hoebel, Amanda**



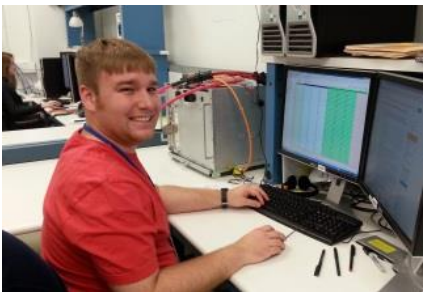
**Jacobs, George**



**Leffel, Mindy**



**Lemon, Tyler**



**McMullen, Marc**



**Sitnikov, Anatoly**



# Introduction: DSG Capabilities

- Design
  - SVT, Magnet electronics, DC electronics, DC stringing and assembling, Gas Systems, Hardware Monitoring System, CCTV system, Slow Controls Systems
- Instrumentation
  - SVT, DC, Gas Systems, CCTV System, Magnets, Hardware Monitoring System, Slow Controls Systems
- Operations
  - SVT, DC, CCTV System, Hardware Monitoring System

# Introduction: DSG Capabilities

- Electronics
  - Design and Development of test stations and fixtures for detector instrumentation and power supplies, multilayer PCBs, flex boards, test and measurement of electronic components and instruments, fabrication of equipment, programming PIC microcontrollers, FPGAs
- Hardware
  - Wire-bonding, Soldering, Cable and component fabricating, Optical fiber polishing, 3-D printing, Machining
- Software
  - C, C++, Python, JAVA, ROOT, Data basing software (SQLite and Oracle), Mathematica, GEANT, Adobe CS6, EPICS, AutoCAD, NX (solid modelling), PLCs, LabVIEW, PIC Microcontrollers , Xilinx, Altera

# Introduction: Contributions to Hall B

- **Silicon Vertex Tracker**
  - All phases: from design to operations
- **Drift Chambers**
  - Fabrication, instrumentation, testing, gas system, and operational support
- **Central Time of Flight**
  - PMT amplifier boards (~100), disassembly and reassembly
- **Low Threshold Cerenkov Counter**
  - Mirror testing, Winston Cone Testing, Testing program, analysis, gas system, leak check, and documentation
- **High Threshold Cerenkov Counter**
  - Prototype gas system
- **Gas System**
  - DC, LTCC, HTCC, SVT, MicroMegas, RICH, Forward Tagger
- **Torus and Solenoid Magnets**
  - Testing PLC codes
- **HDICE**
  - RF cable, RF Box, Rotation of Target Polarization, Mathematica upgrade
- **MicroMegas**
  - Gas System
- **RICH**
  - Gas System and assembly aspects



# Introduction: Contributions to Hall D

- **PLC programs**
  - Solenoid, Pair Spectrometer, BCAL, FCAL, CDC, FDC, Start Counter
- **Solenoid**
  - PXI based Fast DAQ System
- **Pair Spectrometer**
  - Power Supply, Cabling, added temperature monitoring
- **BCAL**
  - Voltage and environmental monitoring, added new heartbeat code
- **FDC**
  - Implemented gas system alarms
- **CDC**
  - Implemented gas system alarms
- **FCAL**
  - HV supply debugging
- **Start Counter**
  - Implemented heartbeat code
- **Tagger**
  - Debugged HV reset issues
- **Target**
  - Configured/tested temperature set-point alarm
- **Slow controls**
  - Tested magnet vapor-cooled lead flow controls
  - Voltage tap tag data basing in EXCEL
- **Gas System**
  - Programmed controls for pressure flow system

# Introduction: Conclusion

- Diverse contributions to halls B and D.
  - Design, Instrumentation, Operations, Electronics, Software, and Hardware
- Staff exceptionally talented, *dynamic*, skilled and *gifted*.

**Group loves the work**

**and**

**loves to work and contribute as a team.**

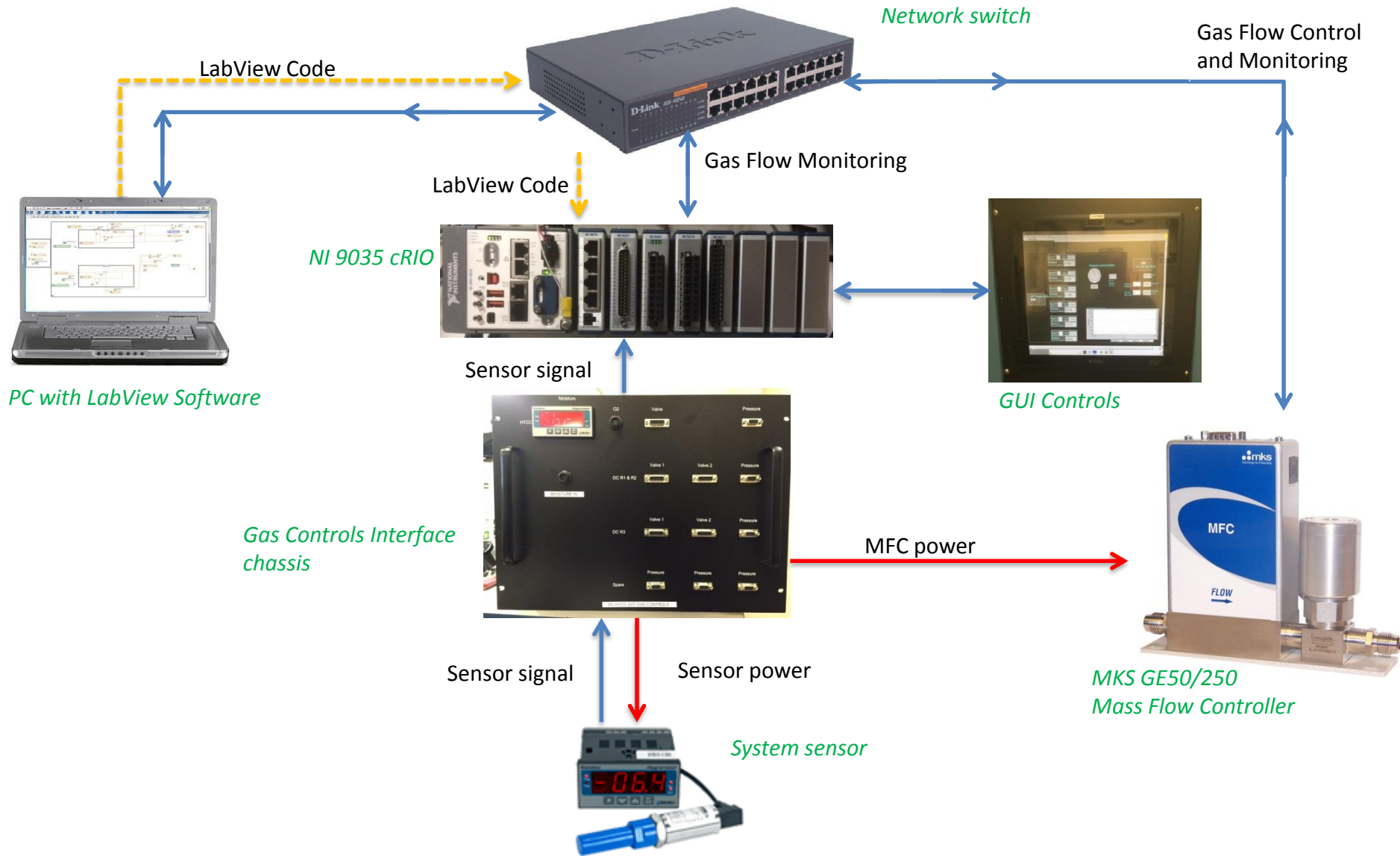
# Current Projects

## I. Hall B Gas System

### Team: DSG

- Designing, developing, and implementing Gas System in Hall B.
  - DC, SVT, LTCC, HTCC, MicroMegs, RICH, and Forward Tagger
- Designing, developing, and implementing Gas System in EEL and in TEDF for testing detectors .

# Hall B Gas System: Generic Layout



# Hall B Gas System: DC Gas Controls

## Gas Shed

hb-crio-gs

Network Switch

Network

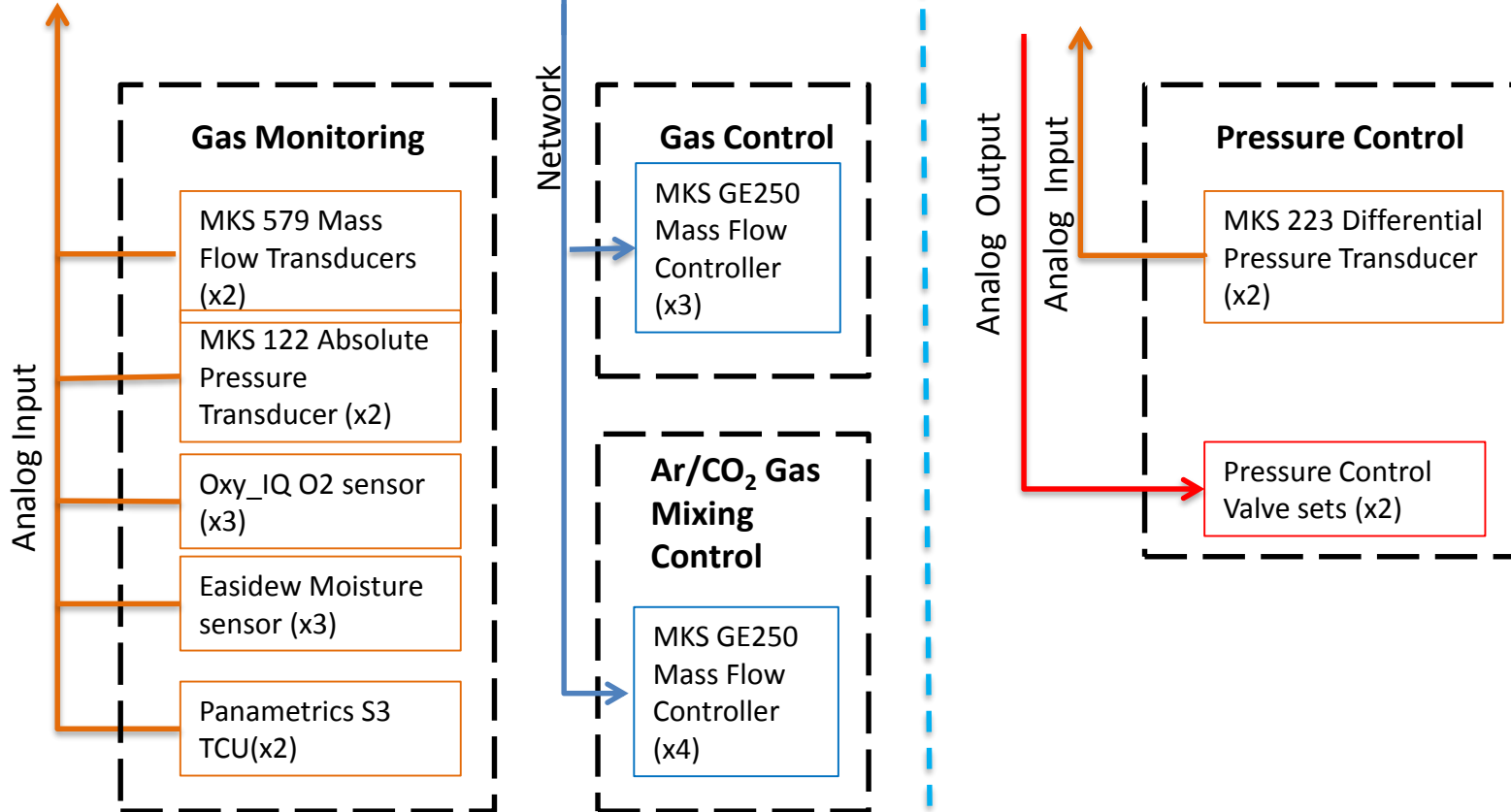


## Space Frame

hb-crio-sf

Network Switch

Network



# Hall B Gas System: Layout



National Instruments compact RIO DAQ and controls.

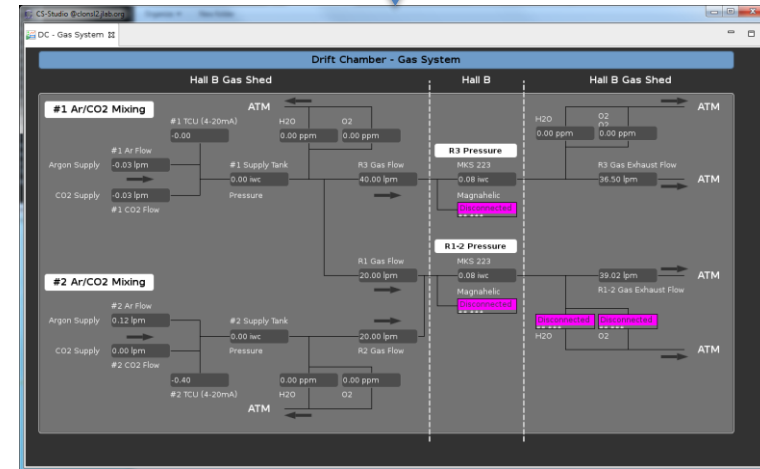
1. Hall B's gas system controlled by three individual setups. (GS, SF, FC)
2. Setups work in concert over slow controls network (160).
3. Provide *operational control* in Hall B gas shed and *monitoring data* to EPICS system in counting house.



Custom controls interface chassis with touchscreen monitor



National Instruments LabView software in gas shed.

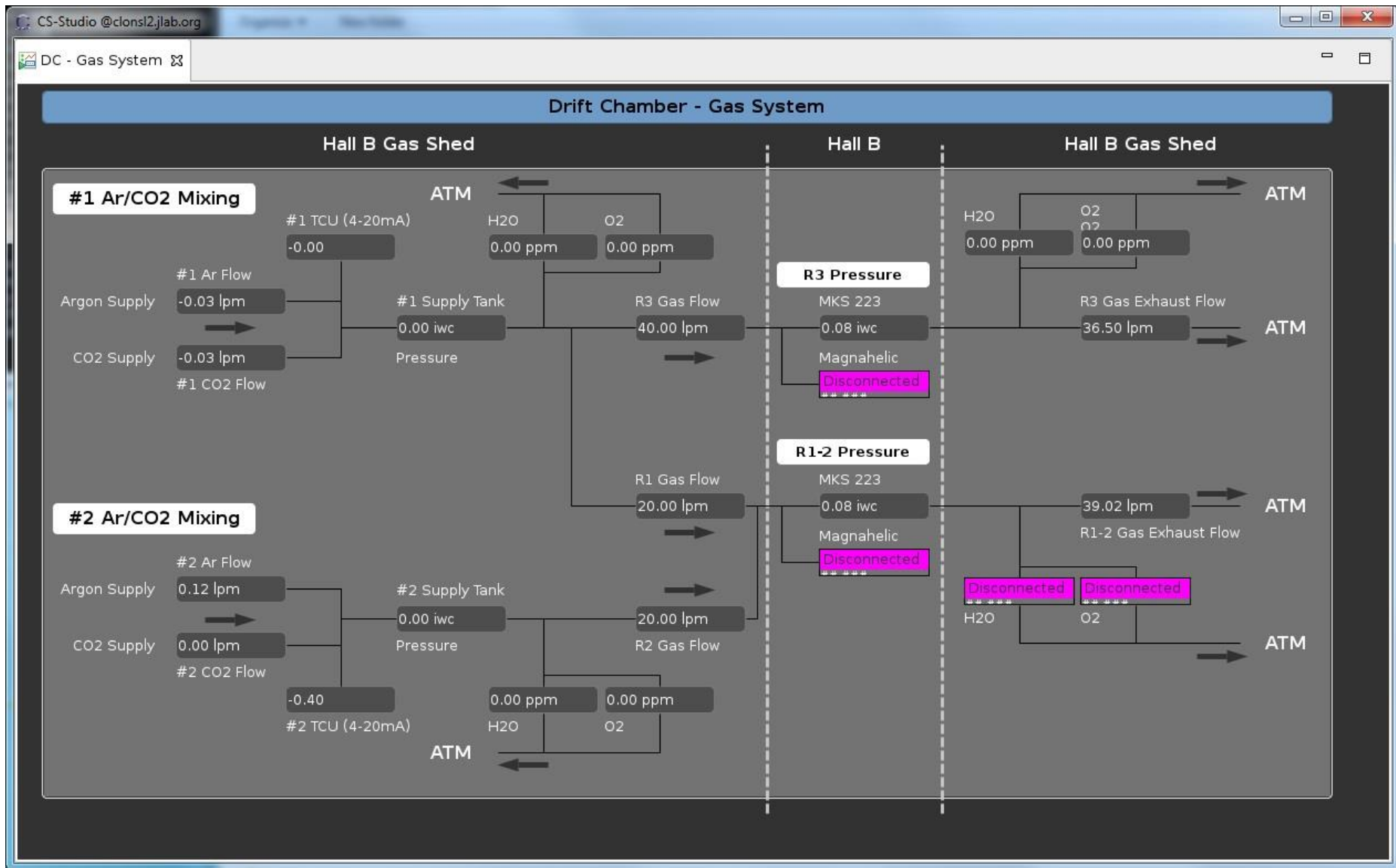


EPICS monitoring screen in counting house.

# Hall B Gas System: DC Gas Controls GUI



# Hall B Gas System: DC Gas EPICS Monitoring Screen





# Hall B Gas system: Status

#	Location	Detector	Gas	Hardware		Software	Deployed	Tested
				Piping	Instrumentation			
1	H a l l  B	DC	Ar/CO <sub>2</sub>	X <sup>†</sup>	✓	✓	✓	X
2		HTCC	N <sub>2</sub>	X <sup>†</sup>	X	✓	✓	X
4		LTCC	C <sub>4</sub> F <sub>10</sub>	X <sup>†</sup>	✓	✓	X	X
5		SVT	N <sub>2</sub>	X <sup>†</sup>	X	✓	✓	X
6		RICH	N <sub>2</sub>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>
7		MicroMegas	Ar, C <sub>4</sub> H <sub>10</sub> , C <sub>2</sub> H <sub>6</sub> , Ne <sup>††</sup> , CF <sub>4</sub>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>	X <sup>††</sup>
8		Forward Tagger	N <sub>2</sub>	X	X	X	X	
9		E E L	SVT	N <sub>2</sub>	✓	✓	✓	✓
10	MicroMegas V.1		Pre-mix Ar/C <sub>4</sub> H <sub>10</sub>	✓	✓	N/A	N/A	N/A
11	Micromegas V.2		Mix Ar/C <sub>4</sub> H <sub>10</sub>	X	X	N/A	N/A	N/A
12	Forward Tagger		N <sub>2</sub>	✓	✓	N/A	N/A	N/A
13	TEDF	HTCC	N <sub>2</sub>	✓	✓	✓	✓	✓

† Waiting on Hall B Engineering. †† Waiting for more information.

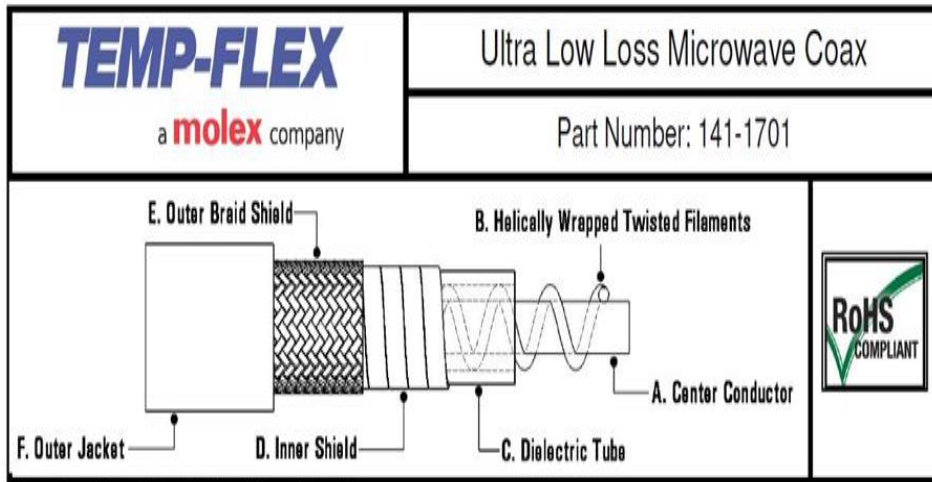
# Current Projects

## II. HDICE

Peter, Brian, Mary Ann, Mindy, Sahin, Anatoly

### Hardware

- Researched flexible air core RF cables, tested, and terminated them with “N” plugs.



- Designing and fabricating RF Attenuation/Switching box



# Current Projects

## II. HDICE

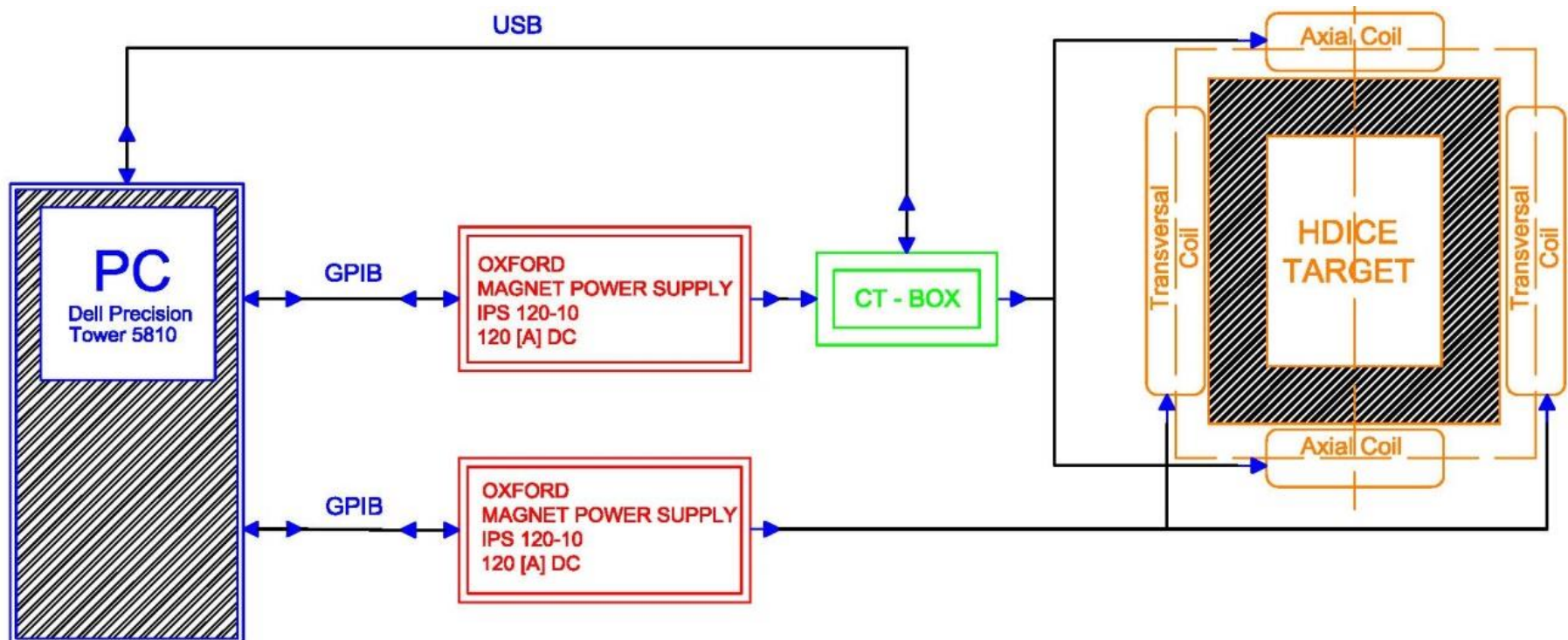
Peter, Brian, Mary Ann, Tyler, Amanda, Pablo

### Software

- Development of rotation of target polarization program.
- Design and development of calibration system for measuring current.

# HDICE: Rotation of Target Polarization Setup

- Hardware configuration schematic



# HDICE: Rotation of Target Polarization GUI

Rotation of Target Polarization.vi

File Edit View Project Operate Tools Window Help

## HDice Rotation of Target Polarization User Interface

### Program Control

Exit Program  
**OFF**

---

Manual/Automatic Mode  
**Automatic Mode**

---

Transverse Ramp Hold  
**OFF**

Axial Ramp Hold  
**OFF**

---

Axial PS GPIB Addr  
25

Transverse PS GPIB Addr  
26

Power Supply Comm Error

### Transverse Power Supply Status

LOC/REM	Mode	System Status
<input checked="" type="checkbox"/> Local & Locked	<input checked="" type="checkbox"/> At Rest	<input checked="" type="checkbox"/> Normal
<input checked="" type="checkbox"/> Remote & Locked	<input checked="" type="checkbox"/> Sweeping	<input checked="" type="checkbox"/> On Pos. Voltage Limit
<input checked="" type="checkbox"/> Local & Unlocked	<input checked="" type="checkbox"/> Sweeping Limit	<input checked="" type="checkbox"/> On Neg. Voltage Limit
<input checked="" type="checkbox"/> Remote & Unlocked	<input checked="" type="checkbox"/> Sweeping & Sweep Limiting	<input checked="" type="checkbox"/> Outside Neg. Voltage Limit
		<input checked="" type="checkbox"/> Outside Pos. Current Limit
		<input checked="" type="checkbox"/> Normal
		<input checked="" type="checkbox"/> Quenched
		<input checked="" type="checkbox"/> Overheated
		<input checked="" type="checkbox"/> Warming Up
		<input checked="" type="checkbox"/> Fault

Activity

<input checked="" type="checkbox"/> Hold	<input checked="" type="checkbox"/> Amps (Fast)
<input checked="" type="checkbox"/> To Set Point	<input checked="" type="checkbox"/> Tesla (Fast)
<input checked="" type="checkbox"/> To Zero	<input checked="" type="checkbox"/> Amps (Slow)
<input checked="" type="checkbox"/> Clamped	<input checked="" type="checkbox"/> Tesla (Slow)

Transverse Current: 0 Amps    Transverse Field: 0 T    Transverse Ramp Rate: 0 Amps/Min    Transverse Ramp Rate: 0 T/Min

### Axial Power Supply Status

LOC/REM	Mode	System Status
<input checked="" type="checkbox"/> Local & Locked	<input checked="" type="checkbox"/> At Rest	<input checked="" type="checkbox"/> Normal
<input checked="" type="checkbox"/> Remote & Locked	<input checked="" type="checkbox"/> Sweeping	<input checked="" type="checkbox"/> On Pos. Voltage Limit
<input checked="" type="checkbox"/> Local & Unlocked	<input checked="" type="checkbox"/> Sweeping Limit	<input checked="" type="checkbox"/> On Neg. Voltage Limit
<input checked="" type="checkbox"/> Remote & Unlocked	<input checked="" type="checkbox"/> Sweeping & Sweep Limiting	<input checked="" type="checkbox"/> Outside Neg. Voltage Limit
		<input checked="" type="checkbox"/> Outside Pos. Current Limit
		<input checked="" type="checkbox"/> Normal
		<input checked="" type="checkbox"/> Quenched
		<input checked="" type="checkbox"/> Overheated
		<input checked="" type="checkbox"/> Warming Up
		<input checked="" type="checkbox"/> Fault

Activity

<input checked="" type="checkbox"/> Hold	<input checked="" type="checkbox"/> Amps (Fast)
<input checked="" type="checkbox"/> To Set Point	<input checked="" type="checkbox"/> Tesla (Fast)
<input checked="" type="checkbox"/> To Zero	<input checked="" type="checkbox"/> Amps (Slow)
<input checked="" type="checkbox"/> Clamped	<input checked="" type="checkbox"/> Tesla (Slow)

Axial Current: 13.809 Amps    Axial Field: 0.0172 T    Axial Ramp Rate (A): 3 Amps/Min    Axial Ramp Rate (T): 0.004 T/Min

Automatic Mode    Manual Mode    Expert Controls

### Ramp Rates

R1 Ramp Rate: 3 Amps/Min

R2 Ramp Rate: 9 Amps/Min

R3 Ramp Rate: 3 Amps/Min

R4 Ramp Rate: 9 Amps/Min

R5 Ramp Rate: 3 Amps/Min

### Wait Times

T1 Wait Time: 10 Sec

T2 Wait Time: 15 Sec

T3 Wait Time: 15 Sec

T4 Wait Time: 10 Sec

Step % of Completion: 25

Elapsed Time: 24.0 Sec, 0.400 Min

Program Status: Ramping Axial Supply to 10.2 Amps at R1 Ramp Rate

Ramp Type: **Negative**

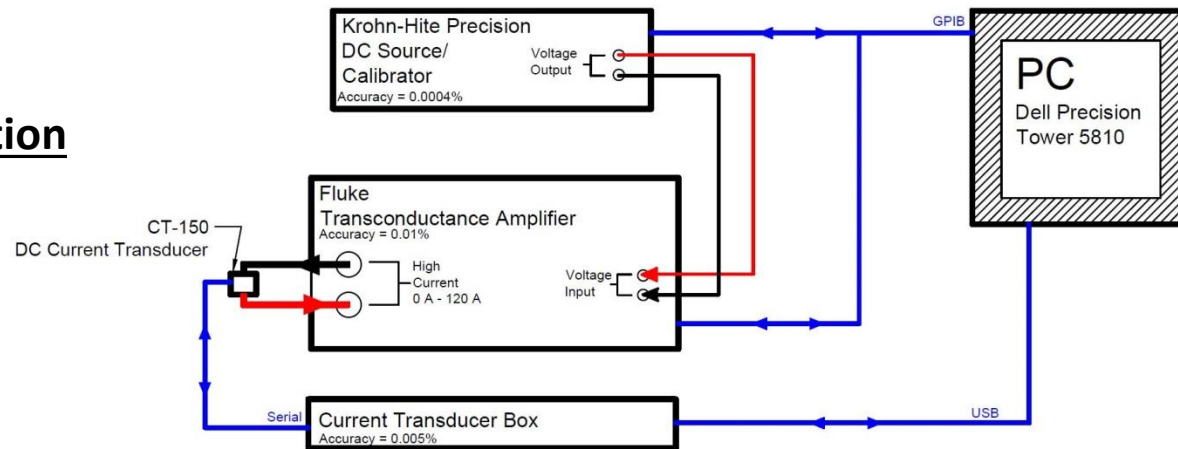
### Automatic Mode Diagram

Starting (+A, +T)

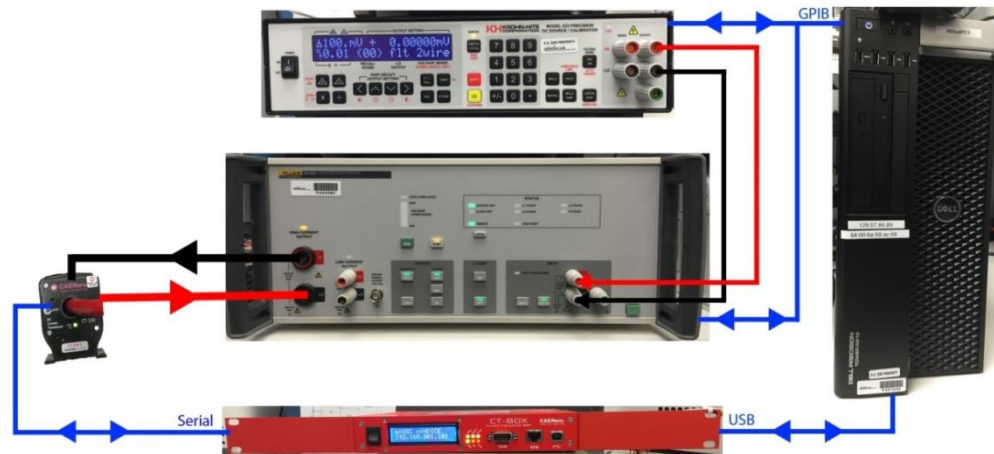
Ending = Starting (-A, -T)

# HDICE: Current Transducer Box Calibration Setup

- Abstraction



- Realization



Linear fit of data using Mathematica:  $I_{Meas.} = 0.99997 I_{Set} + 0.00268$ ;  $(I_{Set} - I_{Meas.})/I_{Set} \rightarrow 0.00003$  for  $I_{Set} \gg 0.0028$

# Current Projects

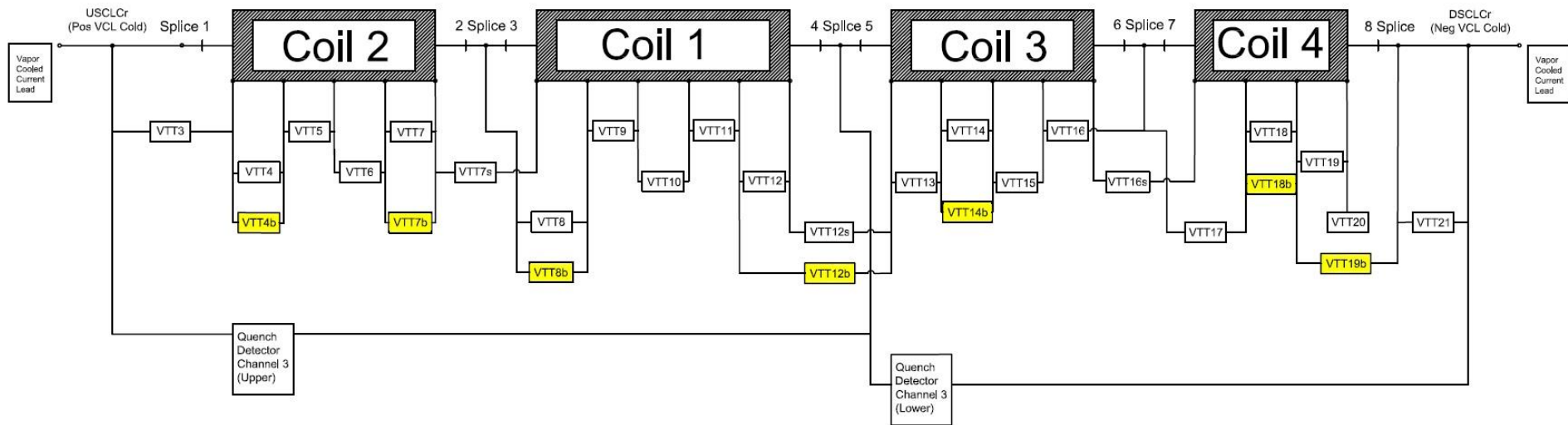
## III. Hall D Solenoid

Peter, Brian, Tyler, Amanda, Pablo

- Databased in SQLite, Excel voltage tap measurements of solenoid coils.
- PLC Support
  - Documenting PLC system.
  - Generated Allen Bradley report.
  - Verifying report with existing hardware.

# Hall D Solenoid: Voltage Tap Tags

- Voltage Tap Tag Schematic





# Hall D Solenoid: Excel

- Voltage Tap Measurements

## Voltage Drop Readings on Voltage Taps

Date 12/3/2015			Date			
Voltage 5.0V			Voltage			
Current 0.3A			Current			
Voltage Tap designation	Voltage Reading	Drop Difference	Voltage Tap designation	Voltage Reading	Drop Difference	Voltage Tap Pairs Difference
<b>Measurements @ Current Limiting Resistor Boxes</b>			<b>Measurements @ Voltage Taps Test Box</b>			
USCLW (Pos. VCL Warm)	2.8046	-0.0245	USCLW (Pos. VCL Warm)	2.8044	-0.0256	-0.0002
USCLC (Pos. VCL Cold)	2.8291	0.0001	USCLCr (Pos. VCL Cold)	2.8300	0.0009	0.0009
SC2_VT1	2.8290	0.3388	SC2_VT1r	2.8291	0.3294	0.0001
SC2_VT2	2.4902	0.1683	SC2_VT2r	2.4997	0.1779	0.0095
SC2_VT3	2.3219	0.1874	SC2_VT3r	2.3218	0.1877	-0.0001
SC2_VT4	2.1345	0.2760	SC2_VT4r	2.1341	0.2763	-0.0004
SC2_VT5	1.8585		SC2_VT5r	1.8578		-0.0007

Coil 2

# Hall D Solenoid: SQLite Database

- Voltage Tap Database in SQLite

The screenshot shows a SQLite database viewer interface. The database is named 'voltage\_taps.sqlite'. The table 'voltage taps' is displayed with the following columns: rowid, Date, Test\_Volta..., Current, Voltage\_T..., Voltage\_R..., Drop\_Diffe..., Voltage\_T..., Voltage\_R..., Drop\_Diffe..., Difference, and Comments. The data is sorted by rowid, showing 425 rows in total. The current page displays rows 301 to 400.

rowid	Date	Test_Volta...	Current	Voltage_T...	Voltage_R...	Drop_Diffe...	Voltage_T...	Voltage_R...	Drop_Diffe...	Difference	Comments
314	8/28/2015	10	3.1	USCLW (Po...	0	N/A	USCLW (Po...	0	N/A	0	No ground..
315	8/28/2015	10	3.1	USCLC (Po...	0.0003	-0.0003	USCLCr (P...	-0.0003	0.0003	-0.0006	No ground..
316	8/28/2015	10	3.1	SC2_VT1	-0.0025	0.0028	SC2_VT1r	-0.0026	0.0023	-0.0001	No ground..
317	8/28/2015	10	3.1	SC2_VT2	-0.5307	0.5282	SC2_VT2r	-0.5396	0.537	-0.0089	No ground..
318	8/28/2015	10	3.1	SC2_VT3	-0.829	0.2983	SC2_VT3r	-0.829	0.2894	0	No ground..
319	8/28/2015	10	3.1	SC2_VT4	-1.1338	0.3048	SC2_VT4r	-1.1338	0.3048	0	No ground..
320	8/28/2015	10	3.1	SC2_VT5	-1.5828	0.449	SC2_VT5r	-1.5828	0.449	0	No ground..
321	8/28/2015	10	3.1	SSPL_VT6	-1.5847	0.0019	SSPL_VT6r	-1.5847	0.0019	0	No ground..
322	8/28/2015	10	3.1	SC1_VT7	-1.5873	0.0026	SC1_VT7r	-1.5873	0.0026	0	No ground..
323	8/28/2015	10	3.1	SC1_VT8	-2.4027	0.8154	SC1_VT8r	-2.4022	0.8149	0.0005	No ground..
324	8/28/2015	10	3.1	SC1_VT9	-2.572	0.1693	SC1_VT9r	-2.572	0.1698	0	No ground..
325	8/28/2015	10	3.1	SC1_VT10	-2.6838	0.1118	SC1_VT10r	-2.6838	0.1118	0	No ground..
326	8/28/2015	10	3.1	SC1_VT11	-2.9915	0.3077	SC1_VT11r	-2.9915	0.3077	0	No ground..
327	8/28/2015	10	3.1	SC1_VT12	-3.6443	0.6528	SC1_VT12r	-3.6443	0.6528	0	No ground..
328	8/28/2015	10	3.1	SC3_SSPL13	-3.6328	-0.0115	SC3_SSPL13r	-3.6327	-0.0116	0.0001	No ground..
329	8/28/2015	10	3.1	SC3_VT14	-3.6345	0.0017	SC3_VT14r	-3.6345	0.0018	0	No ground..
330	8/28/2015	10	3.1	SC3_VT15	-4.4271	0.7926	SC3_VT15r	-4.4271	0.7926	0	No ground..
331	8/28/2015	10	3.1	SC3_VT16	-5.2479	0.8208	SC3_VT16r	-5.2479	0.8208	0	No ground..
332	8/28/2015	10	3.1	SC3_VT17	-5.3556	0.1077	SC3_VT17r	-5.3556	0.1077	0	No ground..
333	8/28/2015	10	3.1	SC3_VT18	-5.581	0.2254	SC3_VT18r	-5.581	0.2025	0.0229	No ground..
334	8/28/2015	10	3.1	SC4_SSPL19	-5.583	0.002	SC4_SSPL19r	-5.583	0.0249	0	No ground..
335	8/28/2015	10	3.1	SC4_VT20	-5.585	0.002	SC4_VT20r	-5.585	0.002	0	No ground..
336	8/28/2015	10	3.1	SC4_VT21	-6.142	0.557	SC4_VT21r	-6.142	0.557	0	No ground..
337	8/28/2015	10	3.1	SC4_VT22	-8.021	1.879	SC4_VT22r	-8.021	1.879	0	No ground..
338	8/28/2015	10	3.1	SC4_VT23	-9.659	1.638	SC4_VT23r	-9.659	1.638	0	No ground..
339	8/28/2015	10	3.1	SSPL_VT24	-9.66	0.001	SSPL_VT24r	-9.66	0.001	0	No ground..
340	8/28/2015	10	3.1	DSCLC (Ne...	-9.663	0.003	DSCLCr (N...	-9.663	0.003	0	SSPL_VT24 .
341	8/28/2015	10	3.1	DSCLW (N...	-9.663	0	DSCLW (N...	-9.663	0	0	No ground..

# Hall D Solenoid: PLC Support

Peter, Brian, Mary Ann, Tyler, Amanda, Pablo

- PLC Chassis 1 layout
  - Generated from Allen Bradley report

Chassis 1	Slot 0	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9
Power Supply 1756-PA72	Iso. 24 V Sequ. of Events Input 1756-IB16ISOE	Iso. 24 V Sequ. of Events Input 1756-IB16ISOE	Analog Input 1756-IF16	Analog Input 1756-IF16	Analog Input 1756-IF16	Analog Input 1756-IF16	Analog Input 1756-IF16	Analog Input 1756-IF16	Analog Input 1756-IF16	EtherNet /IP 1756EN2T
Bit/Channel 00	Spare	Spare	VTT #1	SC1_TP1	SC1_SG1	VTT #9	SC2_TP1	SC2_SG1	VTT #17	
Bit/Channel 01	MPS Relay 1 Phase Detector	Fast Relay 1 Vacuum SUM	VTT #2	SC1_TP2	SC_1SG2	VTT #10	SC2_TP2	SC2_SG2	VTT #18	
Bit/Channel 02	MPS Relay 2 A/C Overcurrent	Fast Relay 2 LHe Liquid Level	VTT #3	SC1_TP3	SC1_SG3	VTT #11	SC2_TP3	SC2_SG3	VTT #19	
Bit/Channel 03	MPS Relay 3 Water Flow	Fast Relay 3 DS Lead Flow	VTT #4	SC1_TP4	SC1_SG4	VTT #12	SC2_TP4	SC2_SG4	Spare	
Bit/Channel 04	MPS Relay 4 Overtemp String	Fast Relay 4 US Lead Flow	VTT #5	SC1_TP5	SC1_SG5	VTT #13	SC2_TP5	SC2_SG5	Spare	
Bit/Channel 05	MPS Relay 5 Slow Dump SUM	Fast Relay 5 DSCL Temp	VTT #6	SC1_TP6	SC1_SG6	VTT #14	SC2_TP6	SC2_SG6	Spare	
Bit/Channel 06	MPS Relay 6 Ground Fault	Fast Relay 6 DSCLr Temp	VTT #7	SC1_TP7	SC1_SG_T	VTT #15	SC2_TP7	Spare	Spare	
Bit/Channel 07	MPS Relay 7 CEBAF Panel	Fast Relay 7 USCL Temp	VTT #8	SC1_TP8	SC1_SG_B	VTT #16	SC2_TP8	Spare	Spare	
Bit/Channel 08	MPS Relay 8 Fast Dump SUM	Fast Relay 8 USCLr Temp	Spare	SC1_TCR1	Spare	Spare	SC2_TCR1	Spare	Spare	
Bit/Channel 09	MPS Relay 9 E-Stop / Doors	Fast Relay 9 DSCL Voltage	Spare	SC1_TCR2	Spare	Spare	SC2_TCR2	Spare	Spare	
Bit/Channel 10	MPS Relay 10 Main Contactor	Fast Relay 10 USCL Voltage	Spare	SC1_TCR3	Spare	Spare	SC2_TCR3	Spare	Spare	
Bit/Channel 11	Slow Relay 1 VT Cable Intick	Fast Relay 11 PLC Fast Dump	Spare	SC1_TCR4	Spare	Spare	SC2_TCR4	Spare	Spare	
Bit/Channel 12	Slow Relay 2 Cable Interlocks	Fast Relay 12 Quench Detector	Spare	SC1_TCR5	Spare	Spare	SC2_TCR5	Spare	Spare	
Bit/Channel 13	Slow Relay 3 PLC Watchdog	Fast Relay 13 Refrigerator Monitor	Spare	SC1_TCR6	Spare	Spare	SC2_TCR6	Spare	Spare	
Bit/Channel 14	Slow Relay 4 PLC Slow Dump	Spare	Spare	SC1_TCR7	Spare	Spare	SC2_TCR7	Spare	Spare	
Bit/Channel 15	Spare	Spare	Spare	SC1_TCR8	Spare	Spare	SC1_TCR8	Spare	Spare	
	Wiring Schematic Page - 0110	Wiring Schematic Page - 0120	Wiring Schematic Page - 0107	Wiring Schematic Page - 0111	Wiring Schematic Page - 0112	Wiring Schematic Page - 0108	Wiring Schematic Page - 0114	Wiring Schematic Page - 0115	Wiring Schematic Page - 0109	

# Current projects

## IV. Hall B Magnets

Peter, Brian, Tyler

1. ✓ Test power supply PLC code with Danfysik Power supply.
2. Define/develop EPICS screen(s) for power supply status/control
3. Define/develop Cryo-EPICS screens for Distribution Can and Torus Service Tower.
- ~~4. Solenoid Bore Heater control (out of scope work 😞)~~
- ~~5. Define/develop EPICS screen for Solenoid Bore Heater Control (out of scope work 😞)~~
6. Coordinate checkout of Distribution Box PLC program after Distribution Box installation.

# Current Projects: Conclusion

## I. Hall B Gas System work progressing well.

1. PAC (cRIO) based controls and monitoring system has been developed and is being tested for:
  1. DC, LTCC, HTCC, SVT
2. Concerned about:
  1. Delays due to work coordination with Hall B Engineering
  2. Lead time for gases  $C_4F_{10}$  and Ne
  3. RICH, MicroMegs, Forward Tagger
    - No equipment purchased

## II. HDICE work demanding, aggressive schedule.

1. Request for components for one rack end of Sept. 2016.
  - ✓ RF cable search and secure completed.

## III. Hall D Solenoid support going smoothly.

## IV. Hall B Magnet support work proceeding as well as it can.

1. Work Schedule decided by Ruben Fair of magnet group.
  - ✓ Test power supply PLC code with Danfysik Power supply.

**DSG is Dynamic Skilled and Gifted**