



# *MICE: Controls & Monitoring*

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# Outline

- Progress since CM40
- DL Efforts
- What We Learned from Mock Data Run (MDR1)
- Preparing for MDR2 and 8<sup>th</sup> March Run
- Odds and Ends



# Since CM40

## ● Trackers

- DL implemented interlocks
- Weiner PL508 power supplies
- ITC508 (temperatures) and MKS937 (vacuum)
- integrated/simplified C&M for shifter operations under development: INITIALIZE/START/PAUSE/STOP/CALIBRATE
- updated VME interface to use CAEN
- built requisite J.Leaver code into standard EPICS code base
- Chris – configuration files for ALH and archiver
- Chris also working on EMR controls – completed WTI power controller
- BeamLine IOC and BeamLine SM
- Running IOCs on miceiocpc1
- RunControl



# DL Efforts

- **RR2 is populated with all of the control racks:**
  - 2 SS power supply racks + 1 energy absorber rack – NEW
  - 1 FC power supply rack – also for beyond Step IV
  - 1 FC instrumentation rack – also for beyond Step IV
  - 1 SS instrumentation rack – NEW
  - 1 additional instrumentation rack w/blister – NEW
  - Tracker/Diffuser control rack
- Racks populated and now being cabled
- Power cables run from RR2 to south mezzanine
- For more information, see Steve Griffeth's talk



# DL Efforts



Power supplies



Instrumentation



# MDR1 - Goals

## • Goals for MDR1 15-01-21

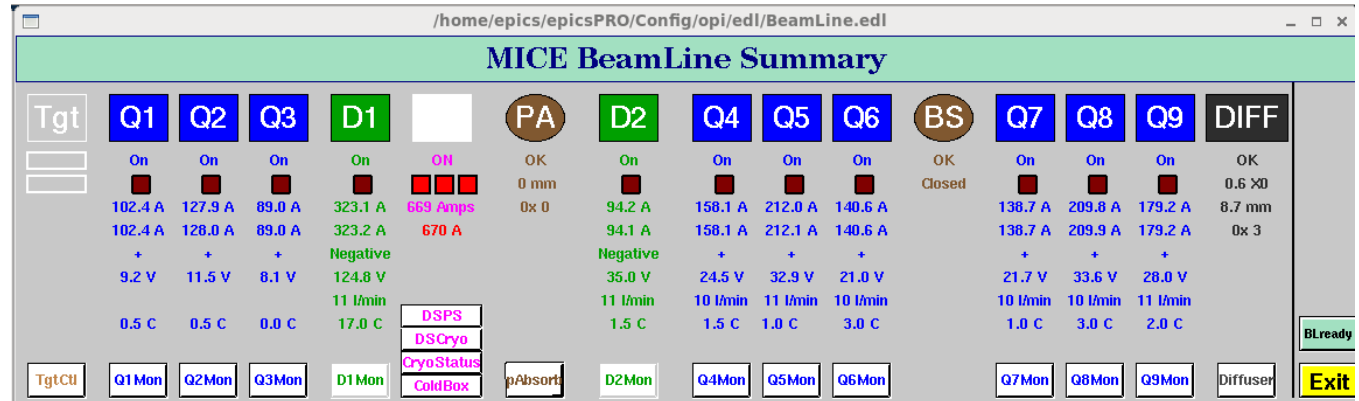
- 1) Integrate BeamLine IOC into BeamLine StateMachine
- 2) Integrate BeamLine StateMachine into RunControl
- 3) Integrate Detectors into Detector StateMachine
- 4) Integrate Detectors StateMachine into RunControl
- 5) Deprecated goal: only BeamLine – drop 3 and 4
  - EMR C&M not ready
  - tracker C&M not far enough along



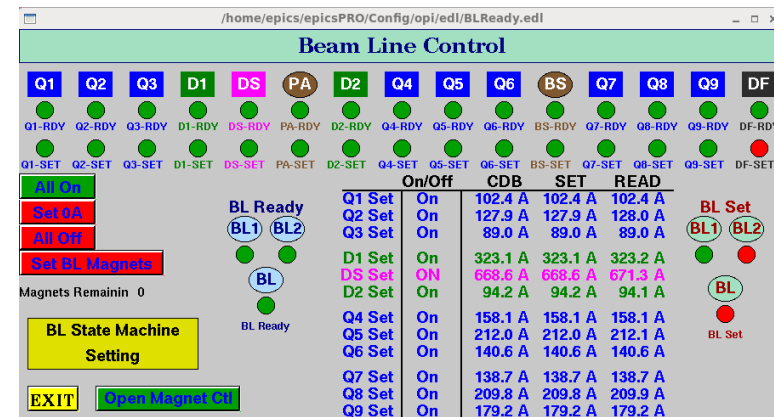
# MDR1 - BeamLine IOC

- BeamLine is:

- Target
- NC magnets
- Decay Solenoid
- Proton Absorber
- Beam Stop
- Diffuser



- BeamLine IOC does not include Target or DS
- Combines remaining elements
- Checks readiness of each device
- Checks when each device has read=set values
- Provides menu driven control for PA & DF







# MDR1 - BeamLine IOC

## Menu driven control of proton absorber and diffuser

Proton Absorber Control (on miceiocptest...)

Device Name: "TCW181-CM"  
 Software version: "v1.01"  
 Release date: "August 2012"  
 IP Address: 172.16.246.156  
 SubNet Address: 255.255.255.0  
 Gateway Address: 172.16.246.165  
 MAC Address: 00 04 A3 AA 11 3  
 DHCP Config: 0

ON OFF  
 1 1 0  
 2 2 0  
 3 3 0  
 4 4 0  
 0 0

AllOn  
 AllOff

Set value for proton absorber: **146mm**

5.7 bar Supply air pressure  
 1.0 bar Relief IN air pressure  
 1.0 bar Relief OUT air pressure

Exit

p Absorber Switch	Limit Switches	p Absorber Plates
29mm Up value	0 Closed	29 mm
49mm Up value	0 Closed	49 mm
53mm Up value	0 Closed	53 mm
15mm Up value	0 Closed	15 mm
29mm Down value	1 Open	p Absorber 146 mm
49mm Down value	1 Open	
53mm Down value	1 Open	
15mm Down value	1 Open	

Bit mask : 0xF

/home/epics/epicsDEV/Config/opi/ed/diffuser.edl (on miceiocptest.micenet.rIac.uk)

IRIS 1 IRIS 2 IRIS 3 IRIS 4

0.207 X0 0.000 X0 0.938 X0 0.000 X0

OPEN CLOSE OPEN CLOSE OPEN CLOSE OPEN CLOSE

Line Pressure  
 Remote  
 Power

Diffuser  
 In 3 1 Out

AirOff

IRIS MASK  
 0x 5

Total RadLen  
 1.1 X0

Set Diffuser  
 1.944 X0  
 Setting

Exit

Busy: IRIS 2 opening

This feature allows RC to set these devices; i.e. read value from CDB and then set device





# **MDR1 - BeamLine State Machine**

- **It WORKS!**
- **First attempt to test BL SM.**
- **Needs tuning, but need time with equipment in operation**
- **Needs alarm and archiver parameters tuned by BL expert**



# MDR1 - Run Control

- It WORKS with BeamLine!
- First attempt to test with BL SM.
- Needs tuning, but need time with equipment in operation
- New IOCs (NUC) work
- Will not work when errors are present

The screenshot displays two main windows: 'MICE Run Status' and 'MICE Run Control'. The 'MICE Run Status' window shows run parameters for run number 5994, type 'Physics Data', and trigger 'TOF1'. It includes three histograms for Event Size, Particle Triggers, and Acc/Req Triggers, all showing a distribution of values. Below the histograms is a table of trigger counts for various LMCs (LMC-12, LMC-34, LMC-1234) and a table for Spill and Integrated counts. The 'MICE Run Control' window shows a 'Begin Run' button, current 'MICE Step IV', and 'Run Type Physics Data'. It also displays 'Beam Optics 6-200+M0' and 'Cooling Chan CoolChan'. A yellow banner at the bottom of this window reads 'Ready to Start DATE from DAQ PC'. The 'DATE Status' is 'Run Complete' and 'RC Status' is 'Writing End Run Info to CDB'. A 'Debug On' button is visible. A terminal window at the bottom shows the command prompt 'epics@miceiocptest: ~/epicsDEV/iocTops/DAQMon/DAQMo...'. A black box with white text on the right side of the Run Control window reads 'BeamLine not ready' and 'Please Note Hit display when complete'.



# MDR1 - Problems

- ToF & KL use CAEN SY527 – pci card did not run w/SL6.4; built deprecated PC (SL5.7) to operate – thanks Ed
- Ignored GVa1 & CKOV HV C&M since awaiting new SY4527 card
- **Note: have no spare for aging and unsupported system**
- Diffuser: new hardware problem – IRIS 1 does not open
  - this brings to light failure of RC when HW problem exists
  - fixed by closing/opening IRIS
- Run Control GUI needs updating
  - fix to selections of: beam configurations, BL ready button, step selection
- Integration with DAQ – missing parameters from DATE
- Need TargetMon to work again
- Write to CDB did not work; normally awaits trigger, so don't know root cause



# MDR1 - Problems

- Most significant lesson is the rigidity of operational requirements of subsystems for RC
  - this **MUST** be true for data taking
  - develop “TEST” runs to allow for operation with missing subsystems
  - TEST will give options to turn off READY requirements of individual devices



# Preparing for MDR2

- **Goals for MDR2 – sometime late February?**
  - 1) **Integrate BeamLine IOC into BeamLine StateMachine**
    - **Fix problems from MDR1**
  - 2) **Integrate BeamLine StateMachine into RunControl**
    - **Complete tests from MDR1**
  - 3) **Integrate Detectors into Detector StateMachine**
    - **EMR C&M in progress – see C.Heidt's talk**
    - **tracker C&M in progress – w/E.Overton**
  - 4) **Integrate Detectors StateMachine into RunControl**

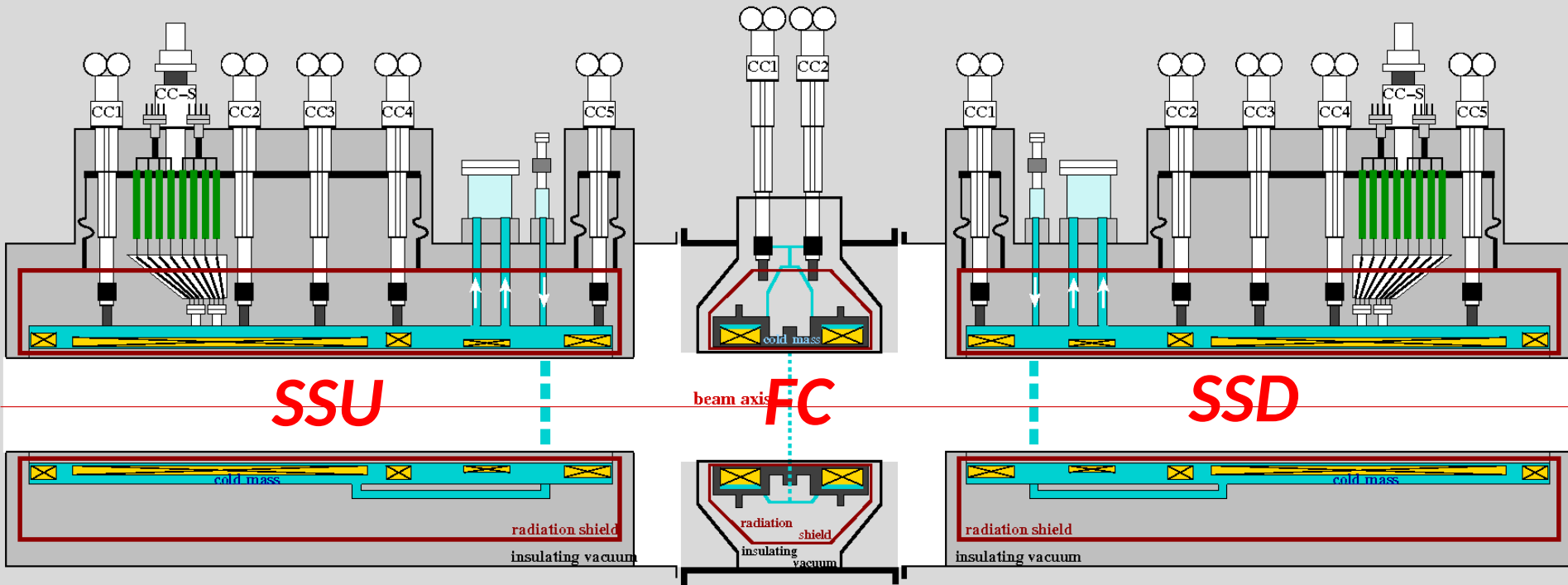


# ***Odds and Ends***

- **Post MDR2 – 8<sup>th</sup> March running**
- **W/BeamLine and Detectors integrated, next need MICE channel elements:**
  - **SSs**
  - **FC**
  - **LH2**
  - **PRY movement monitoring**
  - **B-Field monitoring**
  - **Good news: SS and FC SMs advanced**
- **Goal is to have MLCR “look & feel” complete before MICE channel is integrated – March weekend running**



# Step IV Operations



- Vacuum
- Compressors
- Cryogenics
- Pressure
- Power Supply

- Vacuum
- Compressors
- Cryogenics
- Pressure
- Power Supply

- Vacuum
- Compressors
- Cryogenics
- Pressure
- Power Supply





# Summary

- **Much progress since CM40:**
  - BeamLine IOC and SM
  - RunControl w/BeamLine integration
  - Tracker C&M: Weiner PSs, integration, ...
  - Updated ALH and Archiver configuration files
  - Progress on EMR C&M
- **MDR1 exhibited many successes**
- **MDR1 taught us many lessons**
  - RunControl too strict; will use TEST mode when hardware fails
- **Preparing for MDR2 and beyond**
- **MICE channel integration well advanced, but next to come online in April**