



MICE: Controls & Monitoring

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Outline

- **Standalone systems**
 - ◆ **Spectrometer solenoids**
 - ◆ **Absorber focusing modules**
- **Contributions**
- **Run Control Progress**
- **Other improvements**



Efforts - DL Report

Focus Coil Standalone System:

- FC cool-down now 3rd week March

We should have the test rack in place by then

I anticipate the rack will come in from build to DL on Feb 20th, giving Adrian a couple of weeks to do the controls software. Hopefully this is enough, as the Spec rack tests will hopefully give him a good start.

I understand there may be issues with Cryomech Compressors not performing as anticipated.

There may also be some late delivery on Vacuum gauges.



Efforts - DL Report

Spectrometer Solenoid:

Spectrometer test rack is well advanced I'm just finalising all the Heater controls and Analogue feedback for PSU's etc, Adrian is currently working on testing Comms etc with most things, so its looking good for the end of Feb.



DL Standalone C&M





DL Standalone C&M





Efforts - DL Report

My only concern now is having the right people in the right place for when the actual tests take place. Looks like they may be neck and neck, could be a photo finish !!

We might have a problem being in two places at once !!

We can go over things in detail next week.



Efforts – Robinson

Target:

Changes on target2ctl so far

There have been general stability improvements. James's code struggled with the EPICS PVs and with the usb interface to the target controller hardware. Both of these have been stabilised, not to 100% but enough to make them more practical for long runs. In particular when the usb link is lost, 5 attempts are made to reestablish it before an exception is thrown. In addition, we have replaced the mATX based Dell computer for the target with a full ATX rackmount machine which has a more stable usb host controller and creates interruptions in the usb link between the target controller and James's software less often.



Efforts – Robinson

Target:

Paul S has approximately doubled the number of possible error conditions of the controller, and James's software now understands and properly handles these errors. When an error is detected, a detailed explanation is displayed on the target control UI to tell shifters not only what has happened, but also the most likely causes and what they should do to correct them: check this, reset that, call this person and so on. Just recently various bugs were corrected which prevented James's code from reading EPICS PVs from external servers and undermined the overall stability of the software. As a result, the target system in R78 is now reading temperatures directly from the Daresbury VME controller which drives the target power systems.



Efforts – Robinson

Tracker:

Similar stability improvements and enhancements are planned for the tracker once it is warm (planned for next week or so). Since the tracker AFE programmer works, it has been left alone until a time when the planned changes cannot interfere with the running. Some of the improvements to the target software are in shared code and will apply also to the tracker. Specifically the parts dealing with the software's functions as an EPICS channel access server and channel access client.



Efforts – Heidt

Step I Documentation:

This task will close out C&M for Step I, by documenting what we have:

- list of EPICS Pvs
- which are controls Pvs
- which are monitored
- which have alarms
 - what are the limits
- which are archived
 - what is the archiving frequency

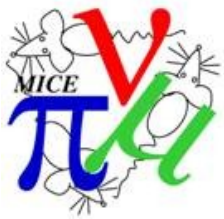
Estimate that Chris is 95% finished



C&M Run Control Goals

MICE is a precision experiment since we are making a 0.1% measurement. This requires, amongst other things, that we correctly document run conditions. To date, we have been using “the spreadsheet”.

- ◆ ***only as good as the shifter can type***
- ***C&M and DATE has complete knowledge of all running parameters***
- ***CDB has ability to record this on a run-by-run basis***
- ***RC gathers parameters and stores in CDB***



C&M Run Control Goals – Parameters

Present list of “Begin Run” parameters:

- **Run Number – key**
- **Run Start Time**
- **Run Type**
- **Trigger**
- **Gate Width**
- **Date Version**
- **Start Pulse**
- **Target Depth**
- **Target Delay**



C&M Run Control

Goals – Parameters

Present list of “Begin Run” parameters:

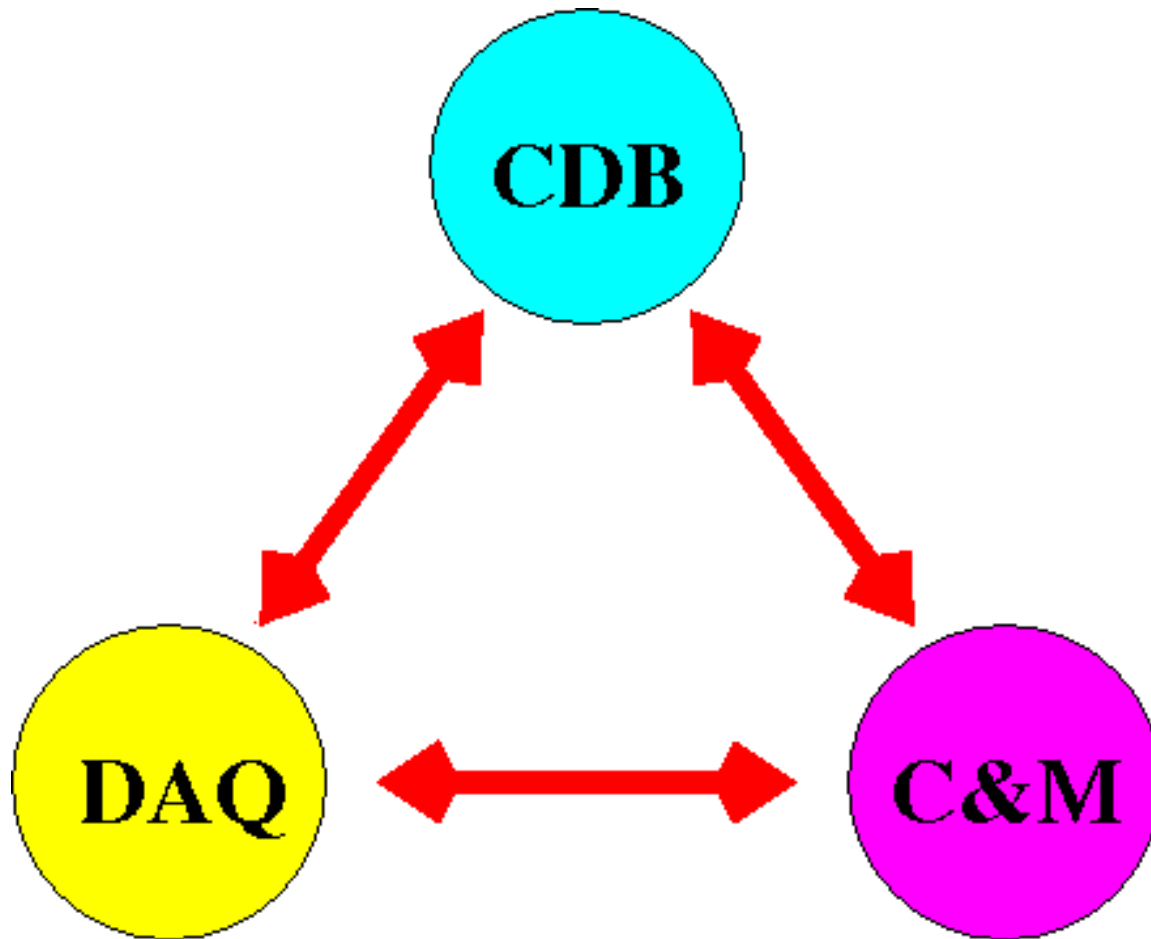
- **Beamline Settings – “optics”**
 - **Magnet currents**
 - **Proton Absorber**
 - **Diffuser**
- **Cooling channel elements???**
- **PID ???**

Present list of “End Run” parameters:

- **Run Number – key**
- **All summed scalers**



C&M Run Control Goals – Parameters





DAQ Monitoring

- ***C&M already has running parameters***
- ***C&M already has read/write connectivity with CDB***
- ***first step was to gather DATE information***
 - ◆ ***requires communication between DATE and EPICS***
- ***W/Yordan, DATE and EPICS can communicate!***



DAQ Monitoring

MICE Run Control

DATE status Taking Data

Begin Run

Run Type

Trigger Type

Beam Optics

Comment

what else?

EXIT

event 000685 2011/12/15 09:50:50

Run 3511 Event 104394

Max Target Depth 15.616

Beam Current 2.885

Beam Loss Total 2.659

Beam Loss S7 -0.892

Beam Loss S8 -0.946

Beam Position 0.0006

EXIT

MICE Run Status

Run number 3511 Target Set BCD 38.30 mm

Run type Special Data

Trigger Type TOF1 Target Set Delay 13.50 ms

Spill Gate Width 2.99 ms

DATE status Taking Data

EXIT

	Spill: 506	Integrated
# Particle Triggers	14	1.90e+04
# Requested Triggers	15	1.99e+04
# GV1 Triggers	288	3.24e+05
# ToF0 Triggers	174	1.04e+05
# ToF1 Triggers	37	2.00e+04
	LMC-12	825
	LMC-34	854
	LMC-1234	189
		1.07e+05

TargetMon.stp Graph

09:50:53 Dec 15, 2011

SCROLLING

Graph

09:50:53 Dec 15, 2011

SCROLLING

MICE-DA-DATE-01:TrgRatio (0, 1) VAL=0.956522
Acc/Req Trigger Ratio
MICE-DA-DATE-01:SCL00 (0, 200) VAL=36
Particle Triggers
MICE-DA-DATE-01:SCL01 (0, 200) VAL=37
Requested Triggers

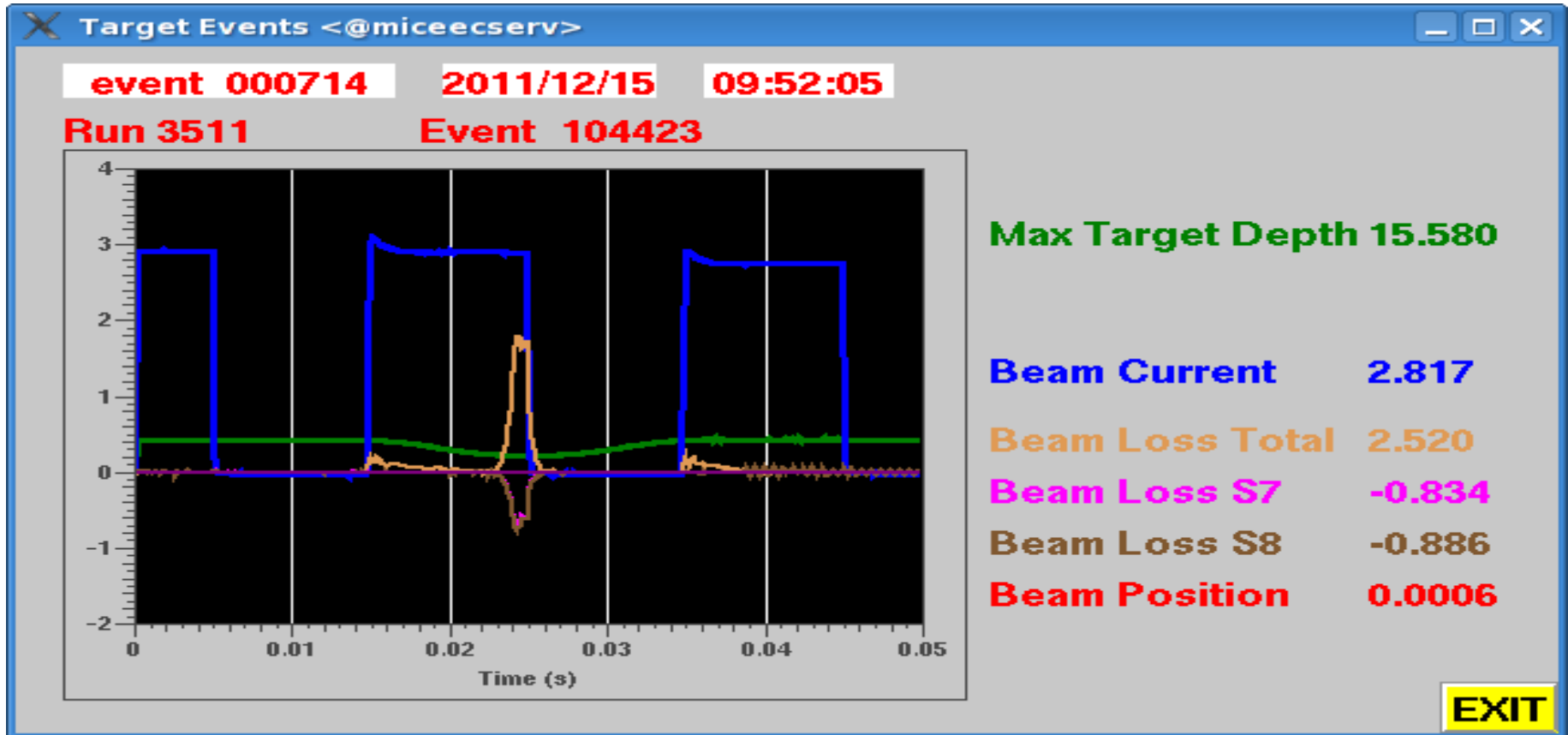
Target BeamLine DecaySol PID Tracker epics@miceiocpl1~ X edm 1-12-17 <@mice X edm 1-12-17 X edm 1-12-17 <@mice X Remote Client Launch Graph

Absorber RF Environment Misc WWW epics@miceiocpl1~ X /home/epics/epics/Col X Target Events X /home/epics/epics/Col X TargetMon.stp Gra X Microsoft Word - 2006

09:50 2011-12-15

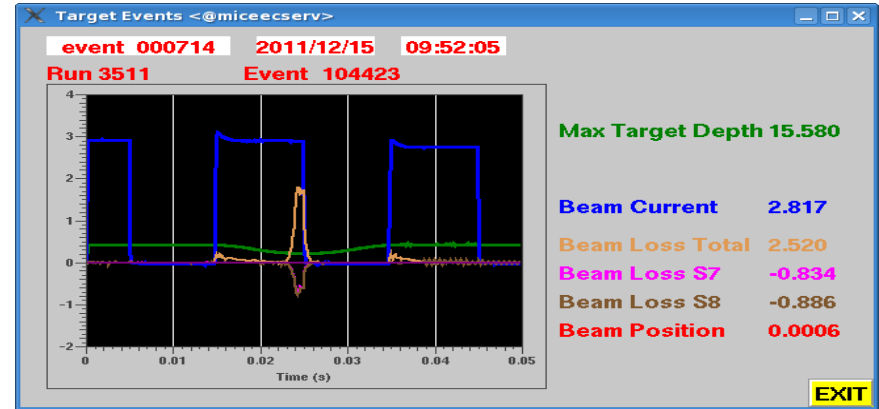


Target Monitoring





Target Monitoring

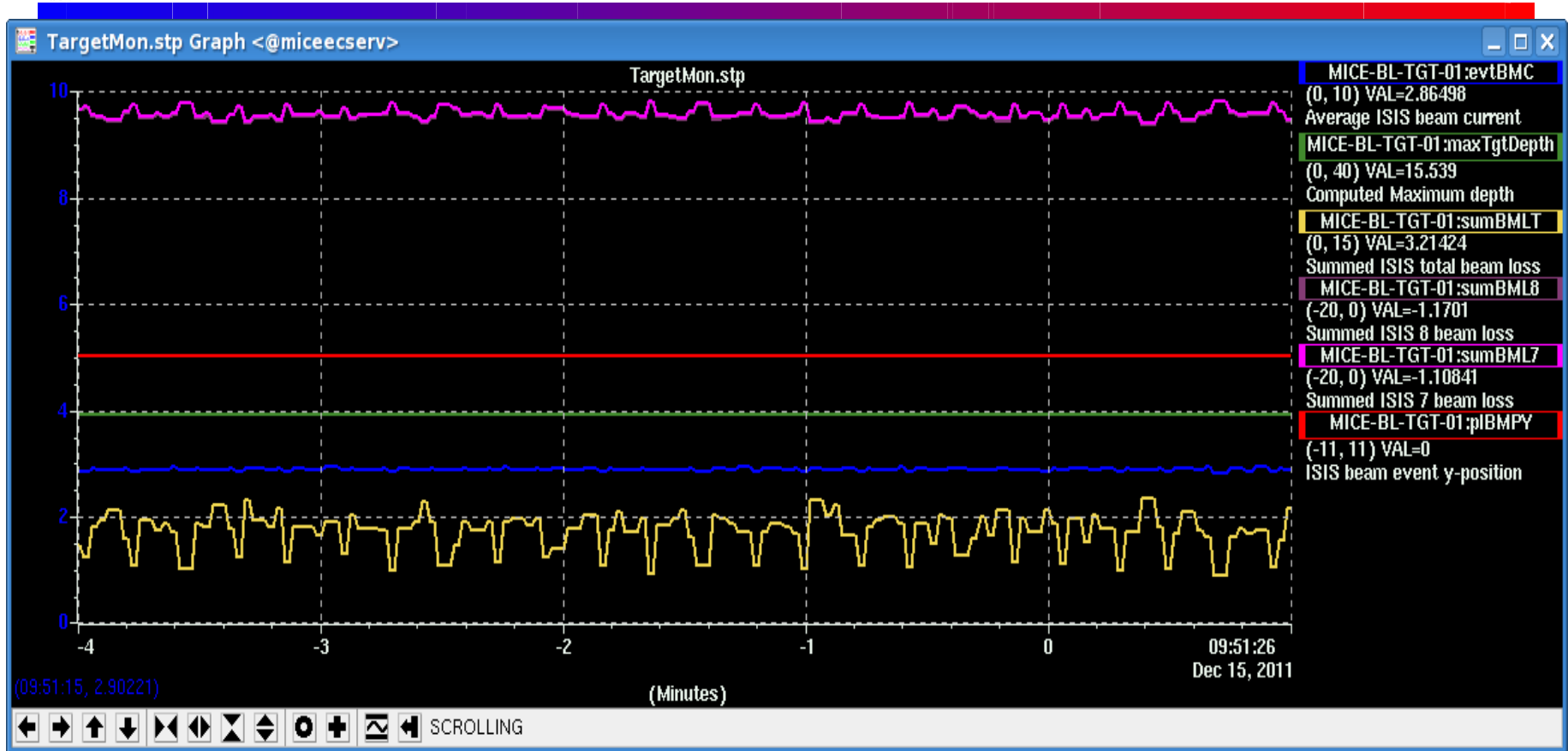


- **Display shows:**
 - ◆ **Target and DATE information**
- **Problem:**
 - ◆ **doesn't relate directly to ISIS**
 - ◆ **missing ISIS beam position**

THESE SIGNALS ARE COMING!



Target Monitoring



With ISIS Beam X and Y: can correlate to trigger depth (constant) and ISIS losses



DATE Monitoring

`/home/epics/epics/Config/opi/edl/RunStatus.edl <@miceecs`

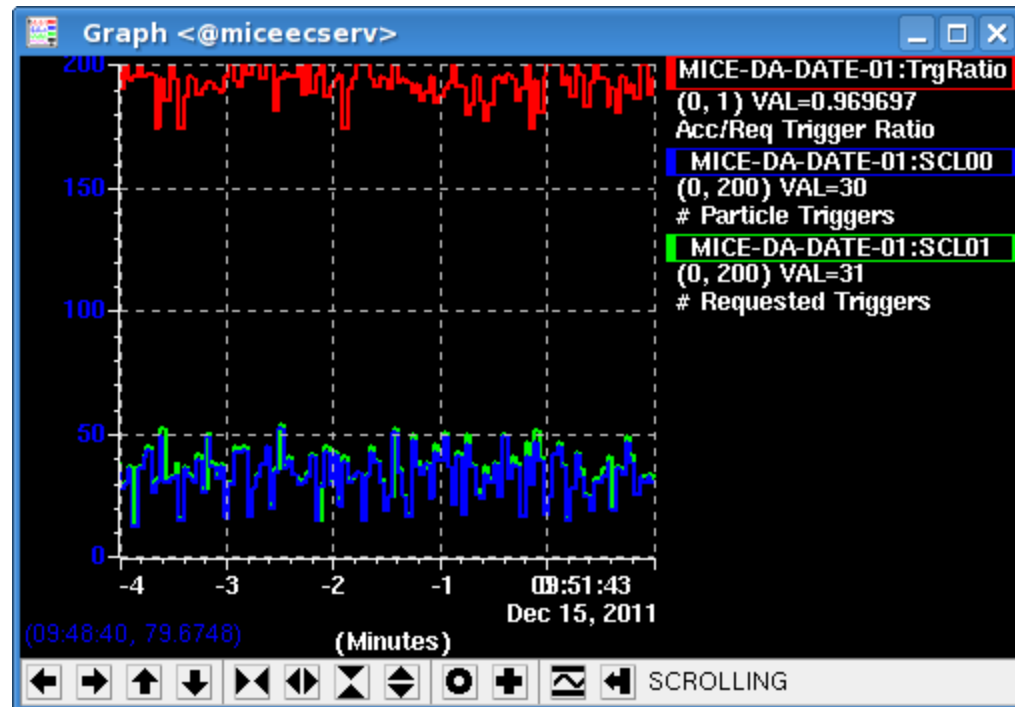
MICE Run Status

Run number 3511 Target Set BCD 38.30 mm
 Run type Special Data
 Trigger Type TOF1 Target Set Delay 13.50 ms
 Spill Gate Width 2.99 ms
 DATE status Taking Data

0.00 MB 1.00

EXIT

	Spill: 512	Integrated
# Particle Triggers	30	1.92e+04
# Requested Triggers	31	2.01e+04
# GVa1 Triggers	515	3.27e+05
# ToF0 Triggers	167	1.05e+05
# ToF1 Triggers	31	2.02e+04
LMC-12	801	4.82e+05
LMC-34	833	5.06e+05
LMC-1234	190	1.08e+05



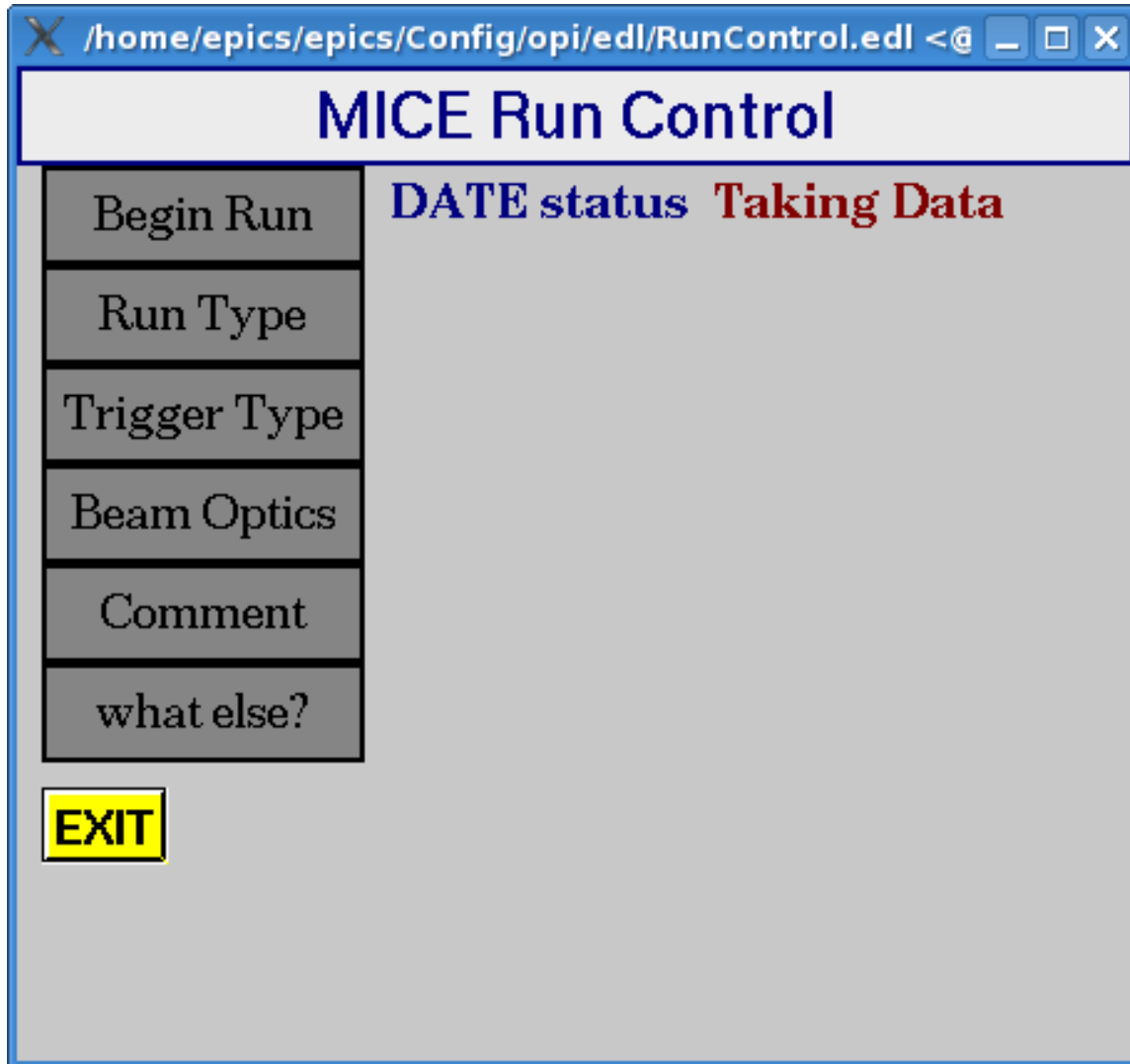


Run Control: Sequence

**Run Control is on its way to being
a push-button system**



Run Control



Run Control does not allow operator interruption when DATE is arming or taking data



Run Control: Sequence

`/home/epics/epics/Config/opi/edl/RunControl.edl` <@ _ □ ×

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	
what else?	

EXIT

**Run Control:
gathers input
to record in
CDB and Data
Run Header**



Run Control: Sequence

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	
what else?	

EXIT

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	Reference
Trigger Type	Calibration
Beam Optics	Physics Data
Comment	Special Data
what else?	Pulser

Cosmic Data
Test

EXIT



Run Control: Sequence

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	
what else?	

EXIT

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	GVA1
Beam Optics	TOF0
Comment	TOF1
what else?	PULSER

EXIT

COSMIC



Run Control: Sequence

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	
what else?	

EXIT

`/home/epics/epics/Config/opi/edl/RunControl.edl`

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	RefRun w/DS
Comment	RefRun w/o DS
what else?	140 MeV/c
	200 MeV/c
	240 MeV/c
	Special

EXIT



Run Control: Sequence

`/home/epics/epics/Config/opi/edl/RunControl.edl` <@ _ □ ×

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	
what else?	

EXIT

`/home/epics/epics/Config/opi/edl/RunControl.edl` <@ _ □ ×

MICE Run Control

Begin Run	DATE status Run Complete
Run Type	
Trigger Type	
Beam Optics	
Comment	Enter Run Comments: [e+ defocussed for TOF2 cal
what else?	

EXIT



Run Control: Sequence

Now, one can begin the run:

- **DATE begins ARM process**
- **DATE sends information to C&M**
- **When ARM is finished, DATE status is changed to “Taking Data”**
- **C&M writes run information to CDB**

At the end of the run:

- **C&M sends integrated scalars, etc to CDB**



Alarm Handling +

The screenshot displays the Alarm Handler software interface, which is divided into three main windows:

- Alarm Handler: DAQ:** This window shows a tree view of DAQ components including DAQ, DATE, ConfigDB, and IOCs. It also displays execution status (Local Active), mask settings, and alarm counts.
- Alarm Handler: HV:** This window shows a tree view of HV components including HV, HVSy127-01, and HVSy127-02. It displays execution status (Local Active), mask settings, and alarm counts.
- Alarm Handler: BeamLine_Elements:** This window shows a tree view of BeamLine_Elements components including BeamLine_Elements, ISIS, Target, BeamStop, ProtonAbsorber, MagnetWaterSupply, Quadrupoles (Q1-Magnet to Q9-Magnet), Dipoles (D1-Magnet to D2-Magnet), DecaySolenoid, LindeFridge, DSCryostat, DSTemperature, DSFlowRates, DSPressures, DSVacuum, DSPowerSupply, and Diffuser. It also displays execution status (Local Active), mask settings, and alarm counts.

The interface includes a sidebar on the left with buttons for "EPICS Server Menu" and "Controls Menu". The bottom of the screen shows a taskbar with various application icons and a system tray displaying the time as 4:08 on 15/12/2011.



+TOF/KL Groups

HV Control allows On/Off by detector type

/home/epics/epics/Config/opi/edl/HVSY527.edl <@miceecserv>

C.A.E.N. SY527 V 1.7

CRATE: 2 SLOT: 0 CHANNEL: 0

NAME: **KLn_1**

1699.6 V 407.0 uA

STATUS: ON, OFF, OVC, OVV, UNV, TRIP, RAMP UP, RAMP DW

Set Group Parameters: Load from CDB, Save to CDB, Set All Off, Set ToF0 Off, Set ToF1 Off, Set ToF2 Off, Set KL Off

CAEN Connection: Close, Exit

High Voltage Display

Group: All

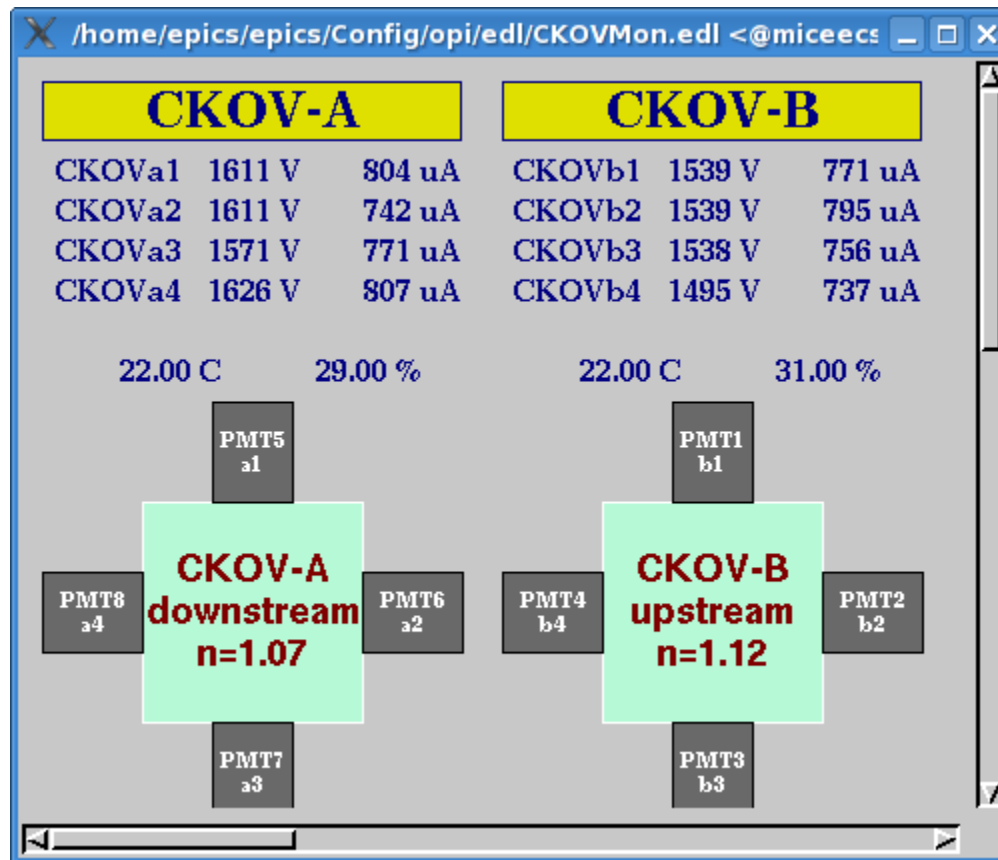
CR	SL	CH	Name	On/Off	V (V)	I (uA)	VSet (V)	ILim (uA)	RmpUp (V/s)	RmpDn (V/s)	TrpTm (s)
-	-	-	-	-	(V)	(uA)	(V)	(uA)	(V/s)	(V/s)	(s)
2	00	00	KLn_1	1	1699.6	407.0	1700.0	3000.0	100	500	10
2	00	01	KLn_2	1	1700.2	407.0	1700.0	3000.0	100	500	10
2	00	02	KLn_3	1	1749.0	419.0	1750.0	3000.0	100	500	10
2	00	03	KLn_4	1	1750.2	420.0	1750.0	3000.0	100	500	10
2	00	04	KLn_5	1	1749.0	418.0	1750.0	3000.0	100	500	10
2	00	05	KLn_6	1	1699.2	408.0	1700.0	3000.0	100	500	10
2	00	06	KLn_7	1	1749.4	420.0	1750.0	3000.0	100	500	10
2	00	07	KLn_8	1	1649.2	396.0	1650.0	3000.0	100	500	10
2	00	08	KLn_9	1	1749.8	421.0	1750.0	3000.0	100	500	10
2	00	09	KLn_10	1	1699.2	409.0	1700.0	3000.0	100	500	10
2	00	10	KLn_11	1	1699.6	409.0	1700.0	3000.0	100	500	10
2	00	11	KLn_12	1	1700.0	409.0	1700.0	3000.0	100	500	10
2	00	12	KLn_13	1	1649.6	396.0	1650.0	3000.0	100	500	10
2	00	13	KLn_14	1	1749.4	419.0	1750.0	3000.0	100	500	10
2	00	14	KLn_15	1	1749.0	420.0	1750.0	3000.0	100	500	10
2	00	15	KLn_16	1	1699.8	408.0	1700.0	3000.0	100	500	10
2	01	00	KLn_17	1	1649.8	393.0	1650.0	3000.0	100	500	10
2	01	01	KLn_18	1	1649.8	393.0	1650.0	3000.0	100	500	10
2	01	02	KLn_19	1	1700.0	405.0	1700.0	3000.0	100	500	10
2	01	03	KLn_20	1	1649.2	392.0	1650.0	3000.0	100	500	10
2	01	04	KLn_21	1	1699.8	405.0	1700.0	3000.0	100	500	10
2	01	05	KLs_1	1	1700.0	405.0	1700.0	3000.0	100	500	10
2	01	06	KLs_2	1	1700.0	406.0	1700.0	3000.0	100	500	10
2	01	07	KLs_3	1	1649.4	392.0	1650.0	3000.0	100	500	10

Next read in 6 s



+CKOV Monitoring

Re-vamped CKOV monitoring





RF Tuners for MTA & MICE:

201MHz at MTA for the single cavity test has no means of tuning the frequency. Berkeley group designed RF tuners.

These are controlled using pneumatic pressure control valves. The present plan for feedback will come from Sten Hanson's RF signals NIM modules.



Conclusions

- **MUCH** progress in C&M
 - **DL** will meet schedule for FC and SS standalone testing
 - **May have timing troubles**
- 
- A glass of wine sits on a dark beach at sunset. The sun is low on the horizon, casting a golden glow over the water and sky. The background shows a calm body of water and a distant shoreline under a cloudy sky.
- **Many thanks to Yordan and Antony**
 - **Great success for the moguls!!!**