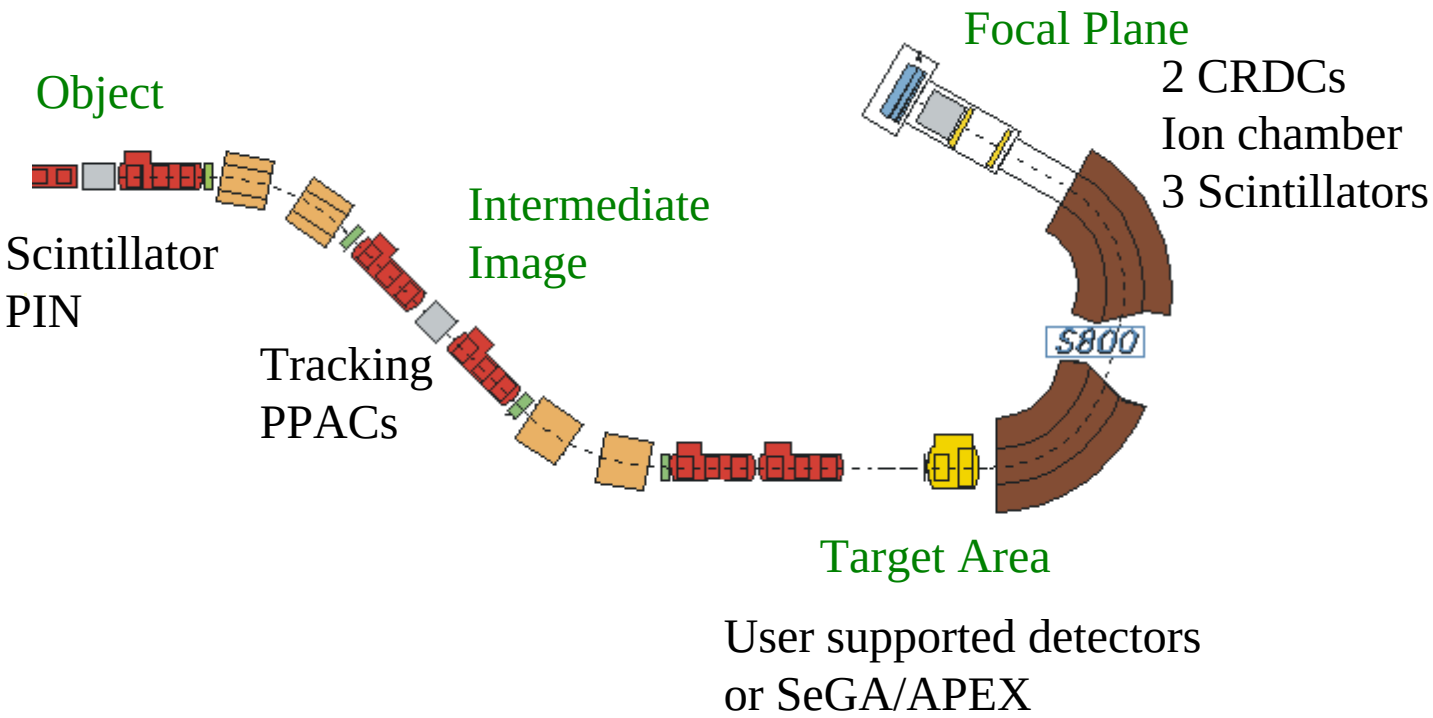
Hitchhiker's guide through the S800

J. Yurkon *et al.*, Nucl. Instr. Meth. **A422** (1999) 291.

D. Bazin *et al.*, Nucl. Instr. Meth. **B204** (2003) 629.



S800 dedicated Linux PC

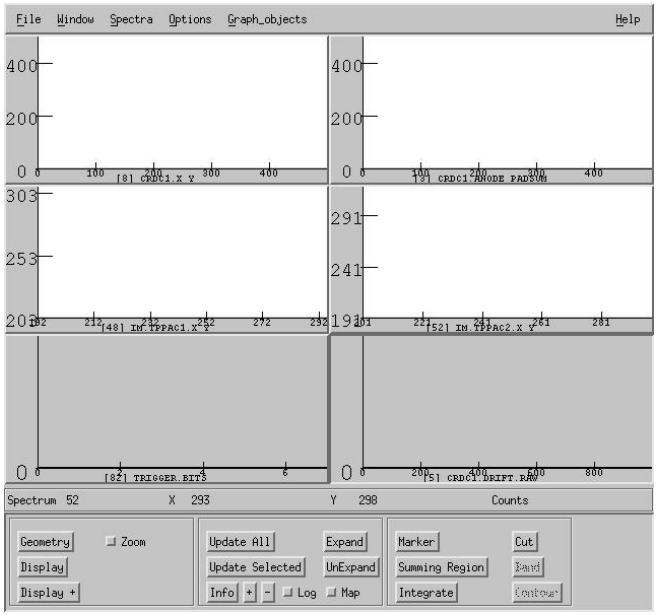
Running on the S800 dedicated Linux box (uxpc2):

- S800 SpecTcl
- S800 scalers
- DAQ Controls
- Alarm server and alarm monitors
- HV control for the gas-filled FP detectors and tracking PPACs
- NMR GUIs
- Barney

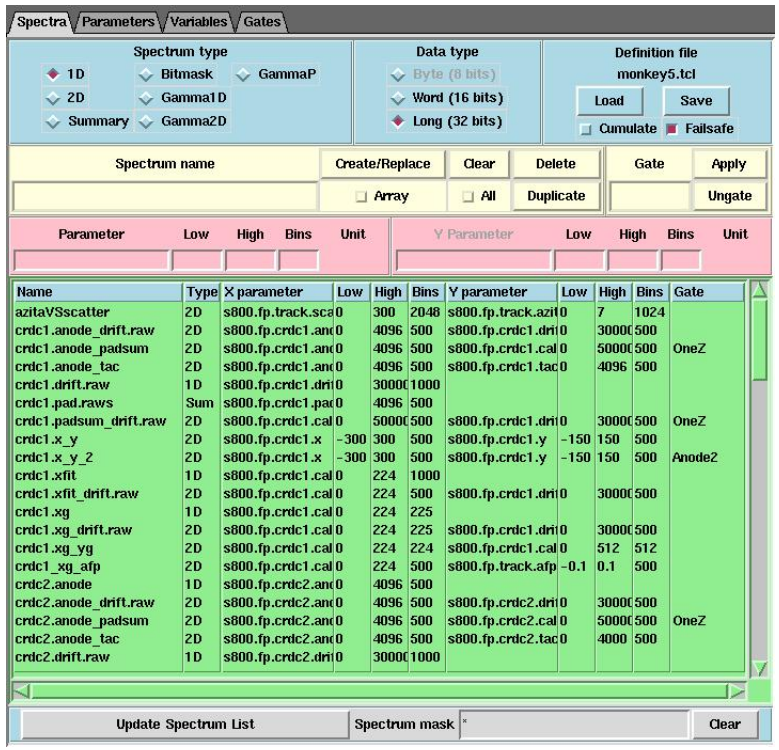
Started from ICONS on the uxpc2 desktop!

S800 SpecTcl terminology

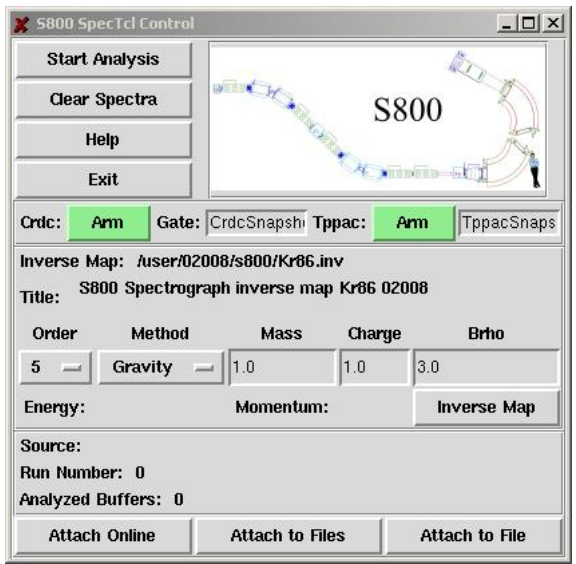
Xamine



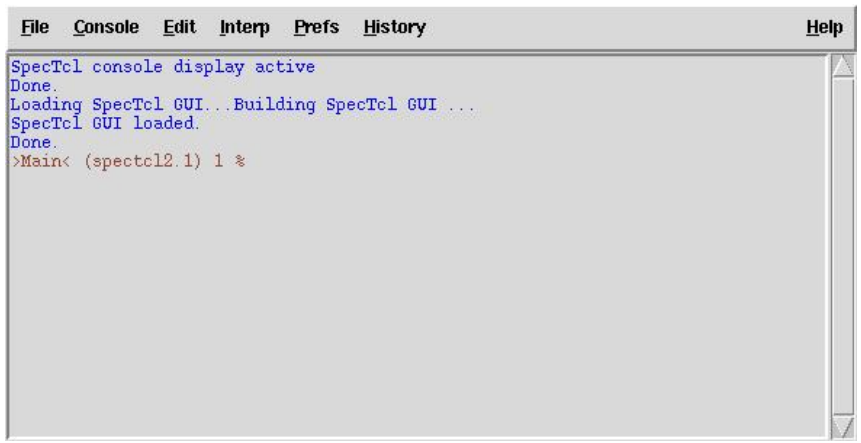
GUI



SpecTcl Control



Console

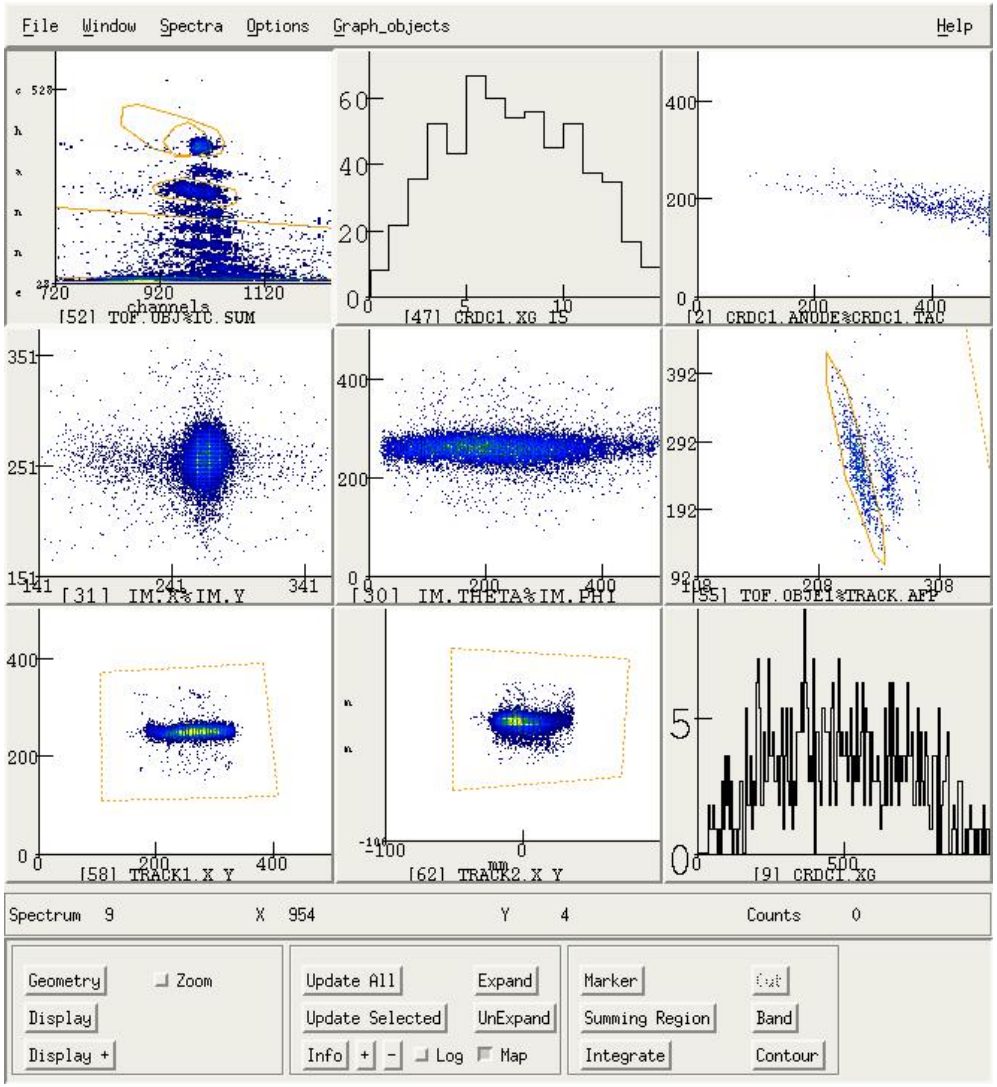


S800 SpecTcl

Provided for experimenters:

- Spectrum definition file for SpecTcl (loaded with the GUI)
- Window definition file for Xamine (loaded from the “window” menu in Xamine)

→ Reference spectra of PID to check the consistency of the incoming data



S800 Scalers

Provided for the experiment:

Scaler readings of the extended focal plane scintillator of the A1900 and all S800 supported detectors (except for the TPPACs)

S800 Scaler Display

Run Title:			unknown
Run Number:	0	Elapsed Run Time:	00:02:52
Run State:	active	Elapsed Run Time [sec]:	172
Readout Interval [sec]:	8.0	Live Time Ratio:	0.038

Scaler Name		Counts/s		Ratio	Counts (total)		Ratio
Live.Trigger	Raw.Trigger	250	6556	0.038	13987	367504	0.038
Live.Clock	Raw.Clock	183	9538	0.019	10133	534671	0.019
S800.Source	S800.Trigger	6556	6556	1.000	367504	367504	1.000
Second.Source	Second.Trigger	0	0	1.000	0	0	1.000
Ext1.Source	Ext1.Trigger	0	0	1.000	21	0	n/a
Ext2.Source	Ext2.Trigger	0	0	1.000	0	0	1.000
Coinc.Trigger		0			0		
E1.Up	E1.Down	0	0	1.000	0	0	1.000
E2.Up	E2.Down	0	0	1.000	0	0	1.000
E3.Up	E3.Down	0	0	1.000	0	0	1.000
CRDC1.Anode	CRDC2.Anode	0	0	1.000	0	0	1.000
TPPAC1	TPPAC2	0	0	1.000	5	5	1.000
OBJ.Scint	XFP.Scint	0	0	1.000	0	0	1.000
OBJ.Si	XFP.Scint	0	0	1.000	0	0	1.000
S800.Source	OBJ.Si	6556	0	n/a	367504	0	n/a
S800.Source	OBJ.Scint	6556	0	n/a	367504	0	n/a
S800.Source	XFP.Scint	6556	0	n/a	367504	0	n/a
Bad CRDC	Live.Trigger	250	250	1.000	13987	13987	1.000

Advice

Ratios to monitor:

Object scintillator / extended FP (A1900)
(transmission between A1900 and S3 vault)

E1.up / object scintillator
(transmission through the analysis beam line and the spectrograph)

Dramatic and sudden changes might indicate a magnet failure (rare, and magnet status is monitored by the control room) and a slow change over time might imply aging of the object and/or extended focal plane scintillator due to high rate with heavy beams (experienced in the past)

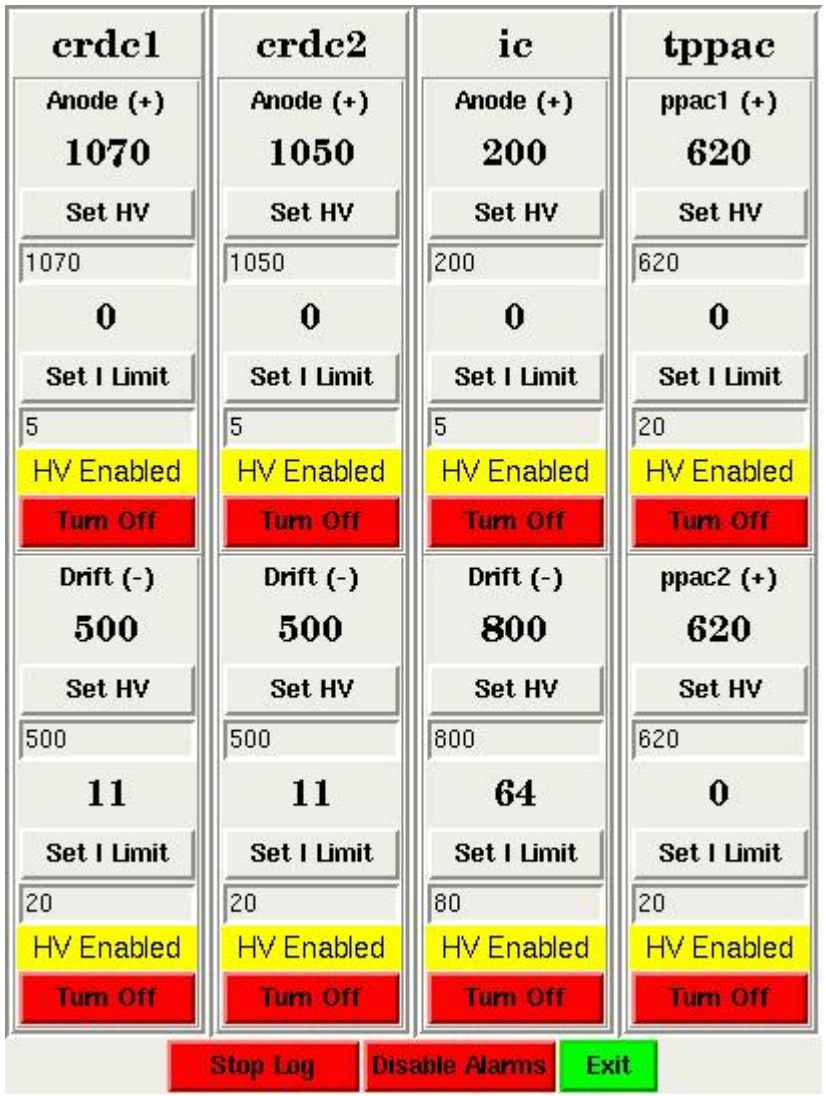
Response to changes of scaler ratios

Magnet failure: Insert the beam stop and follow instructions given by the operator in charge

Scintillator aging: Inform the S800 device physicists for the object scintillator and the A1900 physicists for the extended focal plane scintillator

Advice: Monitor the performance of the object and extended focal plane scintillators in SpecTcl. Apply a gate set on the ion chamber (s800.fp.ic.sum) to the respective time-of-flight spectra (s800.tof.obj and s800.tof.xfp). The ratio counts(icsum gated obj or xfp TOF spectrum)/counts in icsum gate gives the efficiency of the scintillators relative to the ion chamber.

HV Control

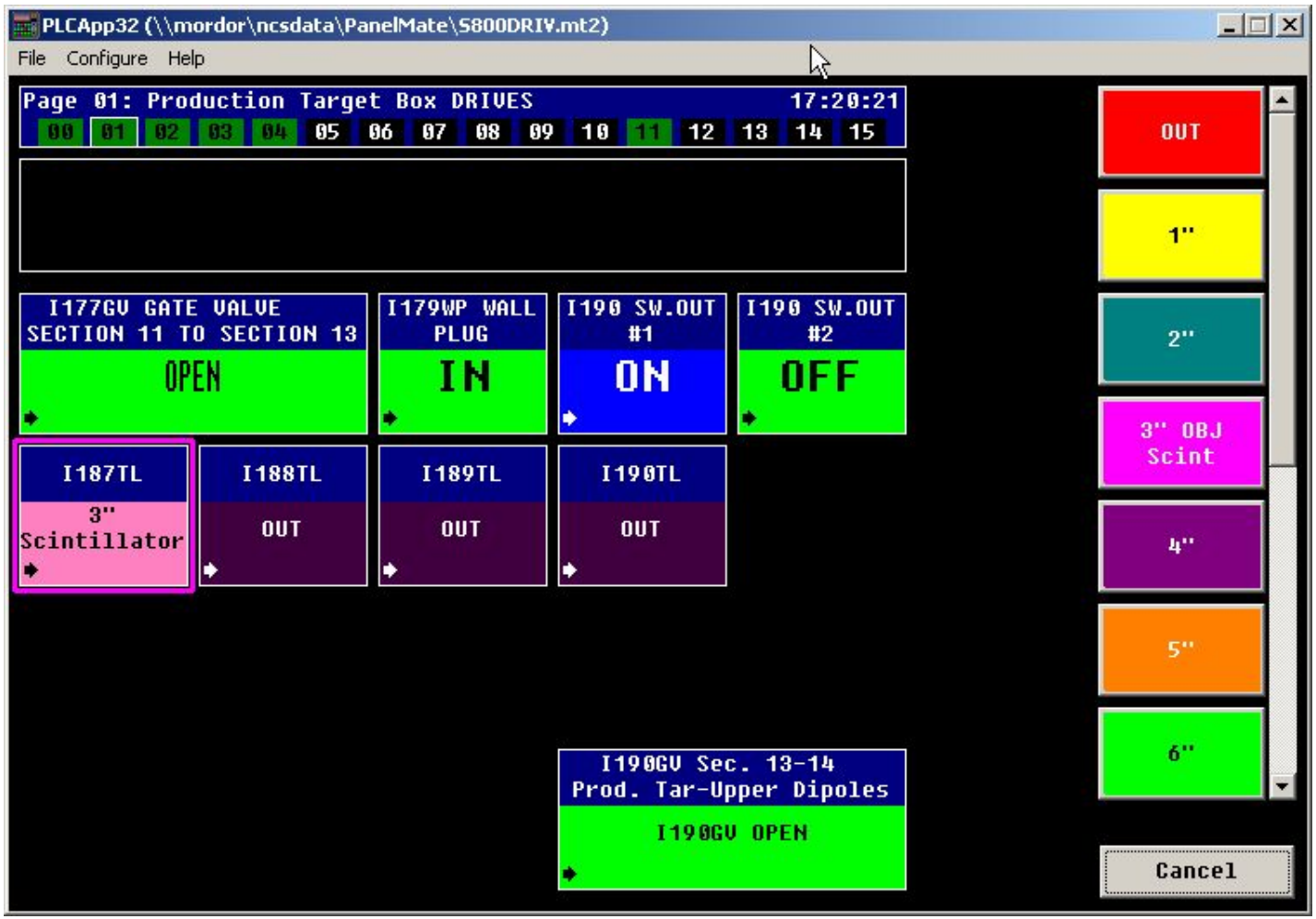


Control interface for the ISEG power supplies used for the CRDCs, IC and TPPACs

- turn detectors on and off
- set the HV
- shows read voltages and currents
- set current limit (HV trips if current is above the set limit)
- voltage readings are logged to file (/user/s800/experiment/current/hv.log)
- voice alarm if read voltage ≠ set voltage

Object scintillator

S800DRIV.mt2

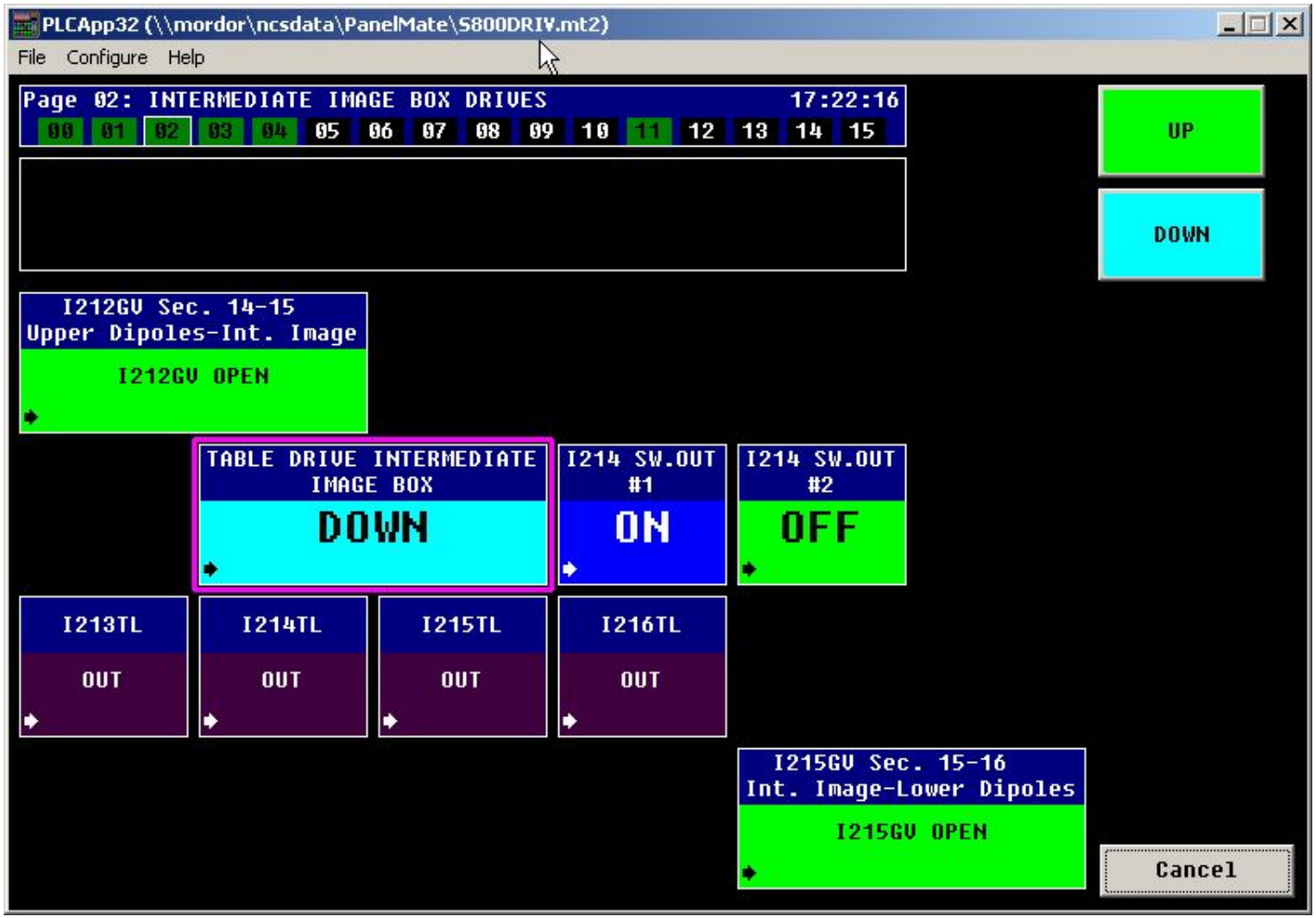


On page 1 of the S800 drives page:

The drive I187TL is used to insert and retract the object scintillator. Example on the left: Scintillator is inserted. The scintillator can be retracted by setting the drive to “OUT”

Inserting and retracting the tracking PPACs

S800DRIV.mt2

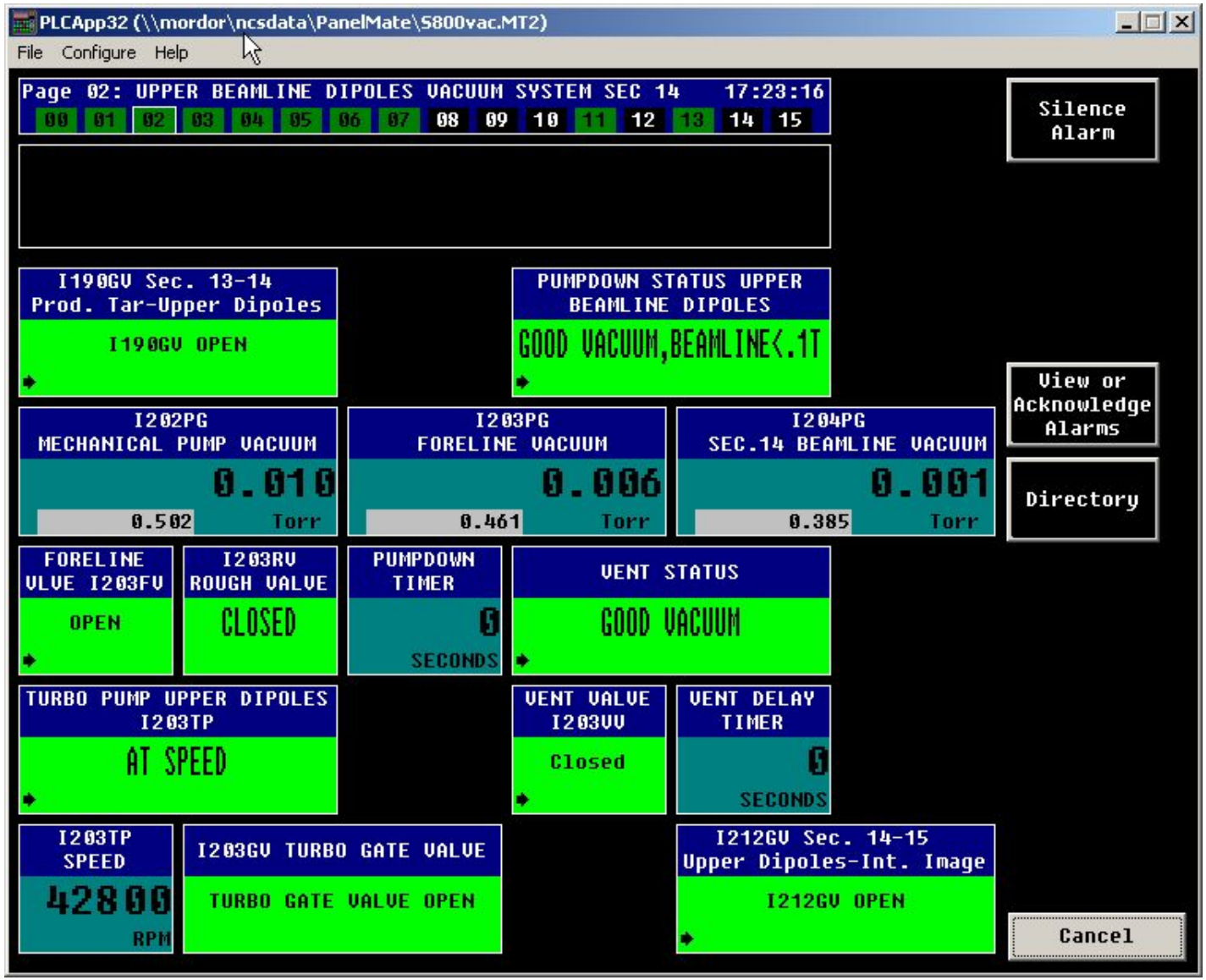


On page 2 of the S800 drives page:
The "table drive intermediate image box" can be used to insert and retract the tracking PPACs.

Indicators
Down: PPACs in
Up: PPACs are out

Vacuum status in the S800 beam lines

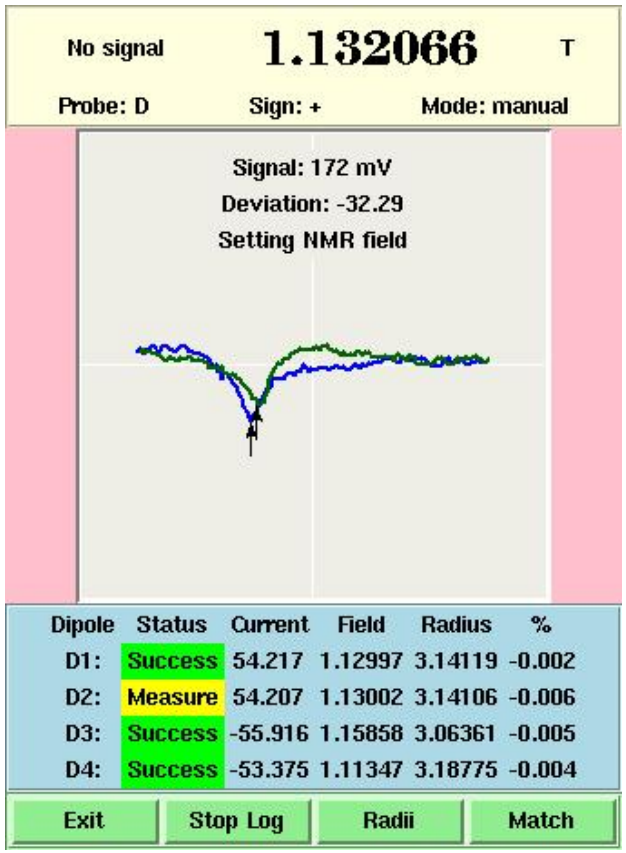
S800vac.MT2

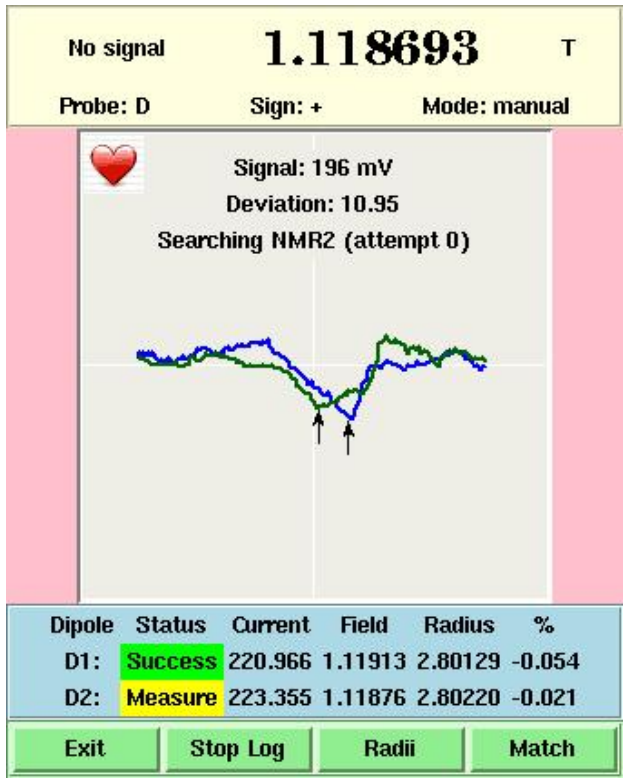


Displays the status of the vacuum from the S800 object (“production target box”) page 1 to the focal plane on page 7. All gate valves can be controlled from there. Important gate valves for experimenters:

I255GV and I249GV on page 4 separating the target area from the lower dipole section upstream and the spectrograph beam line downstream

NMR GUIs





Log files in:
/user/s800/experiment/current/

analysis.log
spectrograph.log

NMR GUIs:
Read, log to file and communicate the settings of the analysis and spectrograph beam lines to Barney

Analysis beam line:

D1: I200DS
D2: I205DS
D3: I223DS
D4: I228DS

Spectrograph:

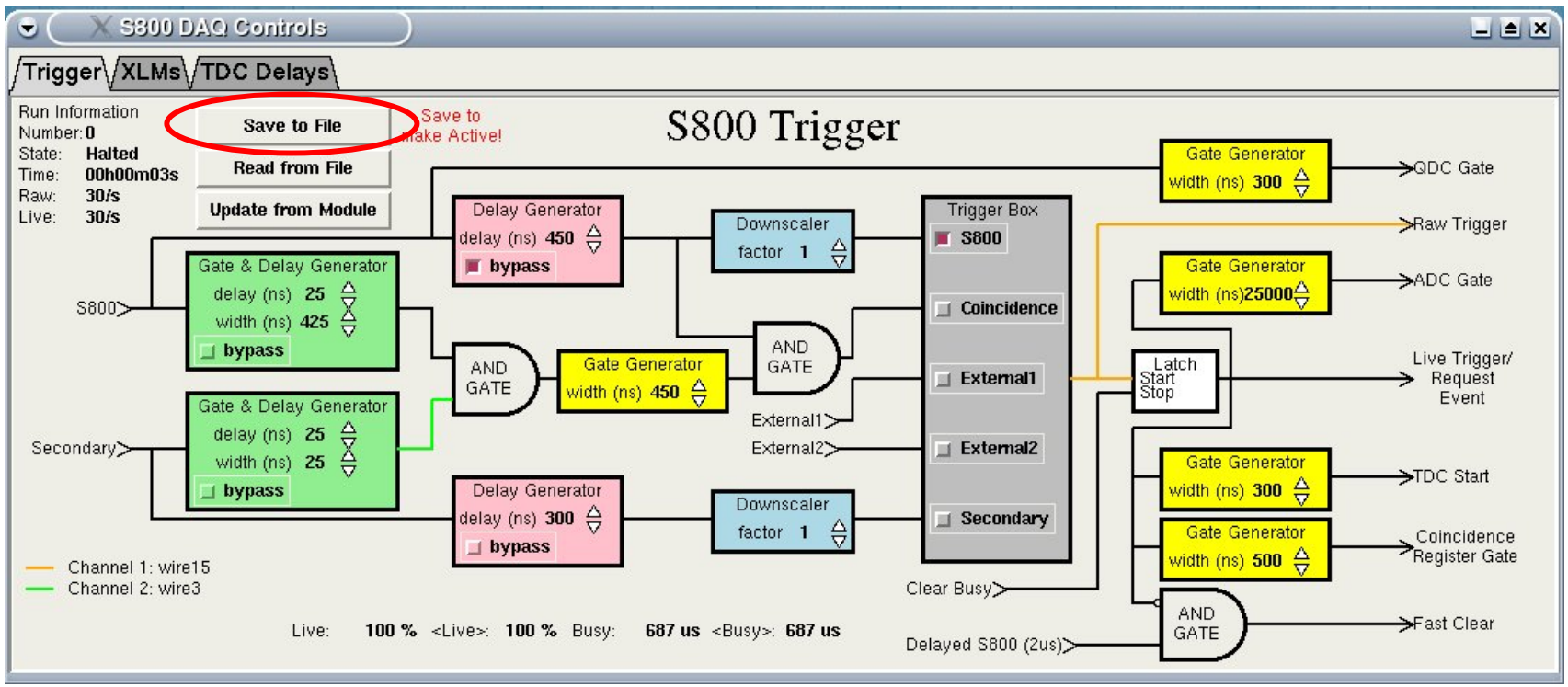
D1: I265DS
D2: I269DS

For crashes see troubleshooting section
http://groups.nscl.msu.edu/s800/Users/How-to/troubleshooting.htm

The S800 trigger GUI

Allows to select and set the trigger condition, trigger timing and downscale values

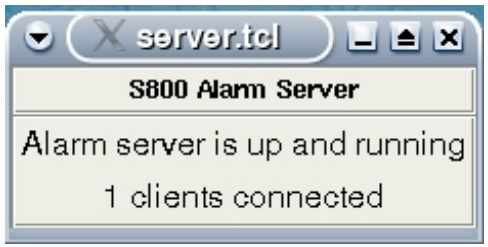
For safety: changes can only be made when the run is stopped. The changes will take effect for the next run after being "saved to file". The trigger GUI is locked while the DAQ is taking data. A log file with he trigger condition is saved run-by-run.



Alarms

Started from the respective icons on UXPC2

Alarm server



Monitored by the alarm server:

- Isobutane, CF4 (CRDCs) and P10 gas flows
- HV of CRDCs, IC, TPPACs

GHS monitor
(FP gas handling system)

Alarm monitor

Response to alarms

Response to alarms:

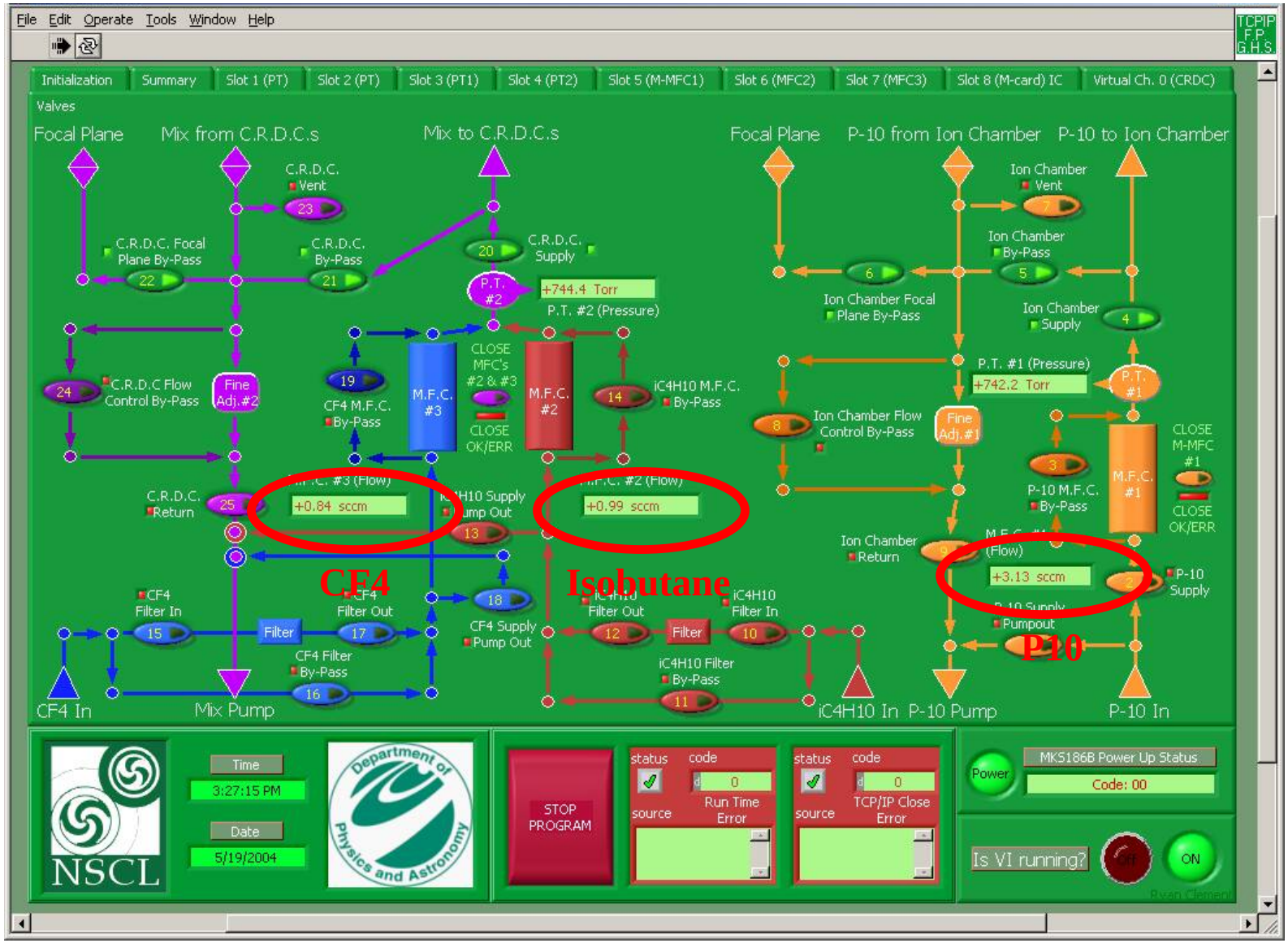
- HV: Check the set and read voltages on the HV GUI for the detector triggering the alarm. If a PPAC tripped, turn it back on. If the PPAC continues tripping:

  lower the voltage by 5-10V or lower the beam rate on the detectors

If the drift or anode voltage of the ion chamber or the CRDCs tripped, stop the beam and contact one of the S800 device physicists

- GHS: Check the flow on GHS GUI on the dedicated GHS PC and compare to the expected range which will be communicated to the experimenters at the beginning of the experiment

Response to GHS alarms



Real GHS alarm: Stop the beam and inform one of the device physicists

False alarms

Response to alarms:

After a thorough check, if there is no apparent reason for the alarm, acknowledge the alarm on the alarm monitor. The alarm won't come back if it was false.

False HV alarms occur occasionally at the beginning of a run when the VME crate is busy and the voltages are not read back properly from the ISEG power supplies

False GHS alarms are due to network outages between the labview GHS program and the terminal server in the vault

Barney

NMR probes haven't read yet

Not well matched

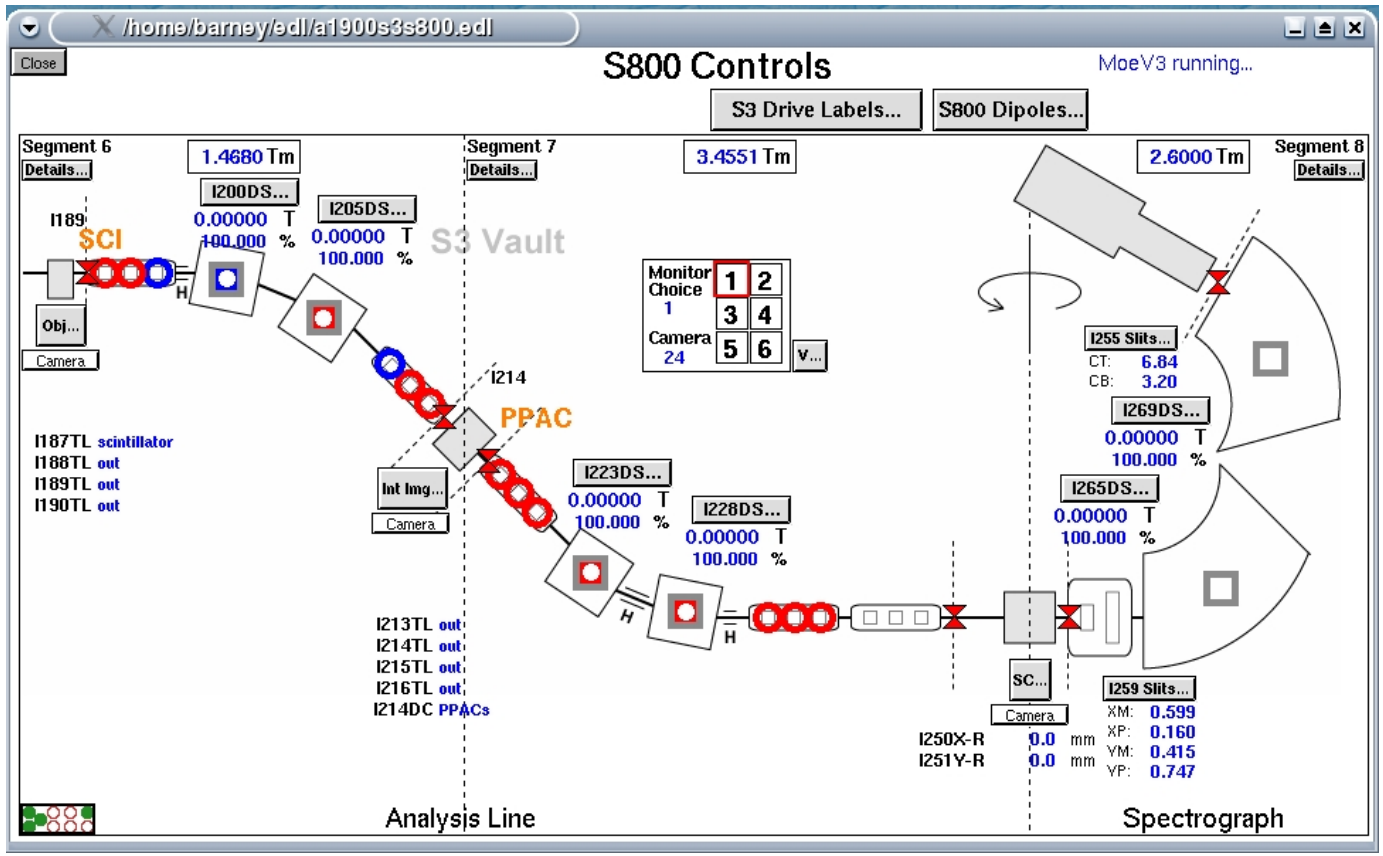
Tolerance for |read-set| exceeded

Same as above, but additionally below a predefined threshold

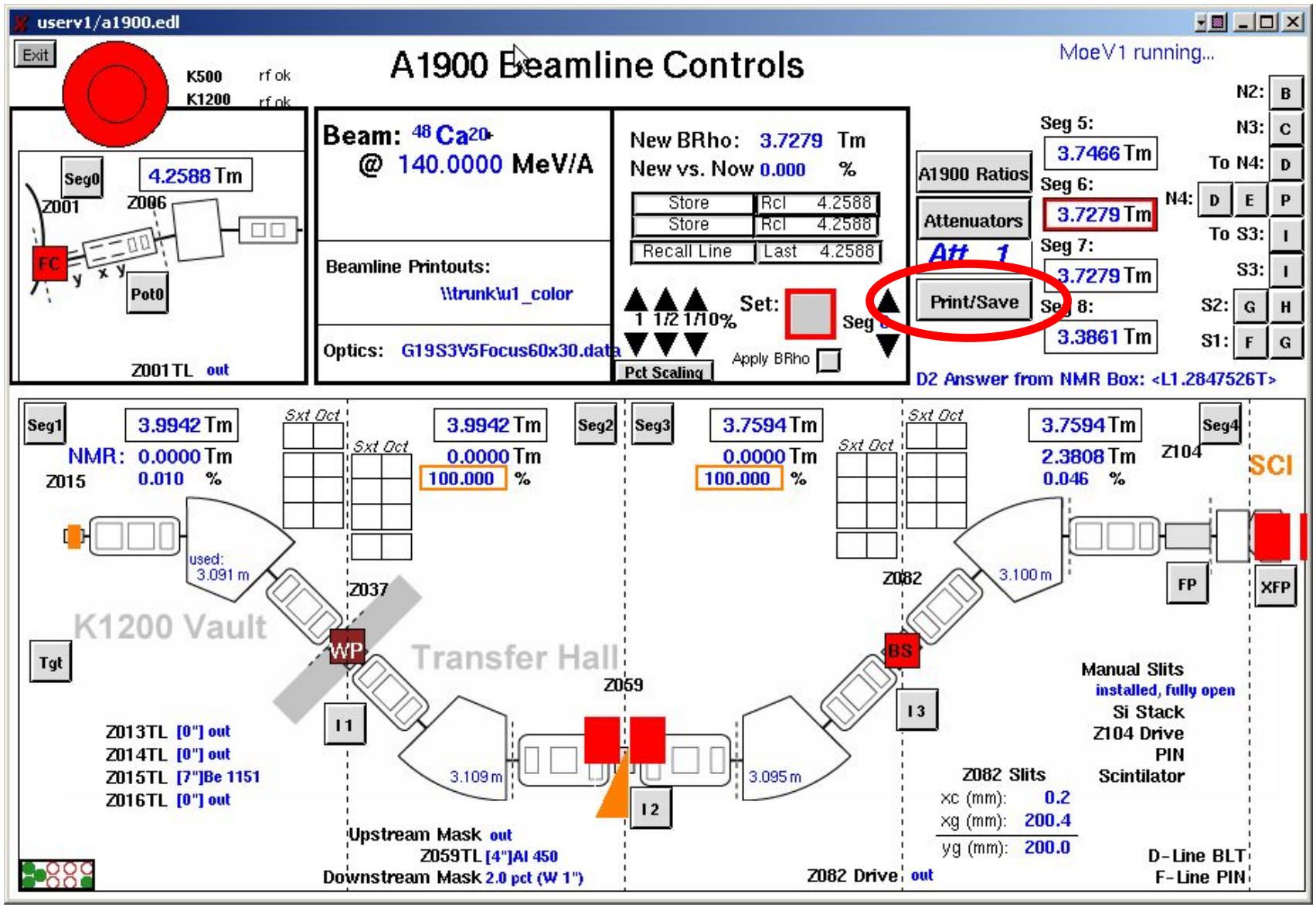
Vacuum gate valve closed

Device is set to 0 but should be non-zero according to the optics file

Disclaimer:
Barney is not supported by the S800 device physicists. Complaints and suggestions to M. Steiner



Barney printouts



Barney printouts

Barney printouts usually go to the printer u1_color and are saved to disk automatically

http://groups.nscl.msu.edu/a1900/archive/barney/list_savesets.php?dir=BeamLines/I%20Line

Typical file name: Print11Apr05_16h34.txt

```
A1900 "Print11Apr05_16h34.txt"    Monday 16:34:35 2005-04-11  A1900
***                          54Ti to S800 FP ***
Expt: 03036 "Two-proton knockout near N=34" [Robert Janssens] Line: S800 [8]
Beam: 76 Ge 12+  11.59 MeV/nuc (K500) 27+ 130.00 MeV/nuc (K1200)
<Att   30>  ECR, Apertures: RTECR 50.0; 15.0; 50.0 mm RHVBI: 25.4900 kV
K500 a,b:    675 A,    651 A K1200:    812 A,     62 A RF:  22.49306 MHz
       A1900 Optics: G19S3V13_30x20Focus60x30.data
       Rigidity       Field     Radius       (live)  Difference (Field*Radius)
Seg 0:  4.32100 Tm
Seg 1:  3.68380 Tm  1.18875 T  3.09882 m    3.09889 m    0.00224 % (3.68372 Tm)
Seg 2:  3.68380 Tm  1.18771 T  3.10148 m    3.10160 m    0.00398 % (3.68365 Tm)
Seg 3:  3.38380 Tm  1.09280 T  3.09632 m    3.09644 m    0.00389 % (3.38367 Tm)
Seg 4:  3.38380 Tm  1.09347 T  3.09461 m    3.09454 m   -0.00234 % (3.38388 Tm)
Seg 5:  3.36480 Tm
Seg 6:  3.33163 Tm
Seg 7:  3.33163 Tm
Seg 8:  2.74982 Tm
```

Barney printouts are the responsibility of the experimenters

Barney printouts – S800 beam lines

Barney printouts usually go to the printer u1_color and are saved to disk automatically

http://groups.nscl.msu.edu/a1900/archive/barney/list_savesets.php?dir=BeamLines/I%20Line

Typical file name: Print11Apr05_16h34.txt

---------- Segment 6 ----------							
I191TA	5.115	17.844	1.025000	1.025000	23.1738	23.118	I191TA
I193TB	-5.273	-18.138	1.000000	1.000000	-23.6845	-23.722	I193TB
I195TC	2.536	8.356	1.000000	1.000000	10.2074	10.228	I195TC
I197DH	0.000	0.000	0.000-00	0.000-00	0.0000	-0.003	I197DH
I200DS	3.243	10.568	0.978272	0.978272	50.6012	50.600	I200DS
I205DS	3.243	10.529	0.974675	0.974675	50.3911	50.396	I205DS
I209TA	0.655	2.097	1.000000	1.000000	2.5624	2.537	I209TA
I210TB	-4.265	-14.353	1.000000	1.000000	-17.8451	-17.833	I210TB
I211TC	5.438	18.607	1.000000	1.000000	24.5704	24.566	I211TC
---------- Segment 7 ----------							
I216TA	5.438	18.607	1.000000	1.000000	24.5704	24.576	I216TA
I217TB	-4.265	-14.353	1.000000	1.000000	-17.8451	-17.867	I217TB
I218TC	0.655	2.097	1.000000	1.000000	2.5624	2.577	I218TC
I223DS	-3.243	-10.827	1.002227	1.002227	-52.0221	-52.019	I223DS
I225DH	0.000	0.000	0.000-00	0.000-00	0.0000	-0.010	I225DH
I228DS	-3.243	-10.398	0.962542	0.962542	-49.7035	-49.751	I228DS
I231DH	0.000	0.000	0.000-00	0.000-00	0.0000	-0.003	I231DH
I232TA	-0.979	-3.085	1.000000	1.000000	-3.7675	-3.764	I232TA
I234TB	2.613	8.530	1.000000	1.000000	10.4214	10.415	I234TB
I236TC	-3.126	-10.422	1.000000	1.000000	-12.7598	-12.739	I236TC
I241TA	2.253	7.744	1.028000	1.028000	9.4587	9.511	I241TA
I243TB	-1.543	-5.194	1.000000	1.000000	-6.3439	-6.349	I243TB
I245TC	0.859	2.844	1.000000	1.000000	3.4733	3.489	I245TC
---------- Segment 8 ----------							
I256QA	-5.847	-16.079	1.000000	1.000000	-46.2053	-46.219	I256QA
I258QB	3.603	9.907	1.000000	1.000000	44.1562	44.166	I258QB
I265DS	3.559	9.792	1.000521	1.000521	188.5185	188.922	I265DS
I269DS	3.559	9.816	1.002879	1.002879	189.2576	189.087	I269DS

Lists set and read values for all optics elements in the beam lines

Barney printouts are the responsibility of the experimenters

BigBrother

The S800 focal plane is protected from excessive rate by an interlock system ("Big Brother") that de-phases the cyclotron's RF whenever the count rate limit set by the device physicists is exceeded. This will trigger a voice alarm in the control room and the experiment has to continue with appropriate intensity.

The rate limit will be experiment specific since rate damage in the CRDCs has been observed to correlated with Z and rate/area.

Detailed How-To's with background information

How-To's with background information:

http://groups.nscl.msu.edu/s800/Users/How-to/Howto_frameset.htm

S800 troubleshooting:

http://groups.nscl.msu.edu/s800/Users/How-to/troubleshooting.htm

- Gas handling system voice alarms
- HV voice alarms
- NMR GUI beeps or "freezes"
- Resetting the S800 alarm monitor
- DAQ crashes that require a reboot of the VME crate
- How to restart everything when uxpc2 has to be rebooted

Detailed How-To's with background information