The Main Control Panel for the SSD

- For normal operations push

  "Turn SSD On" (5 minutes)

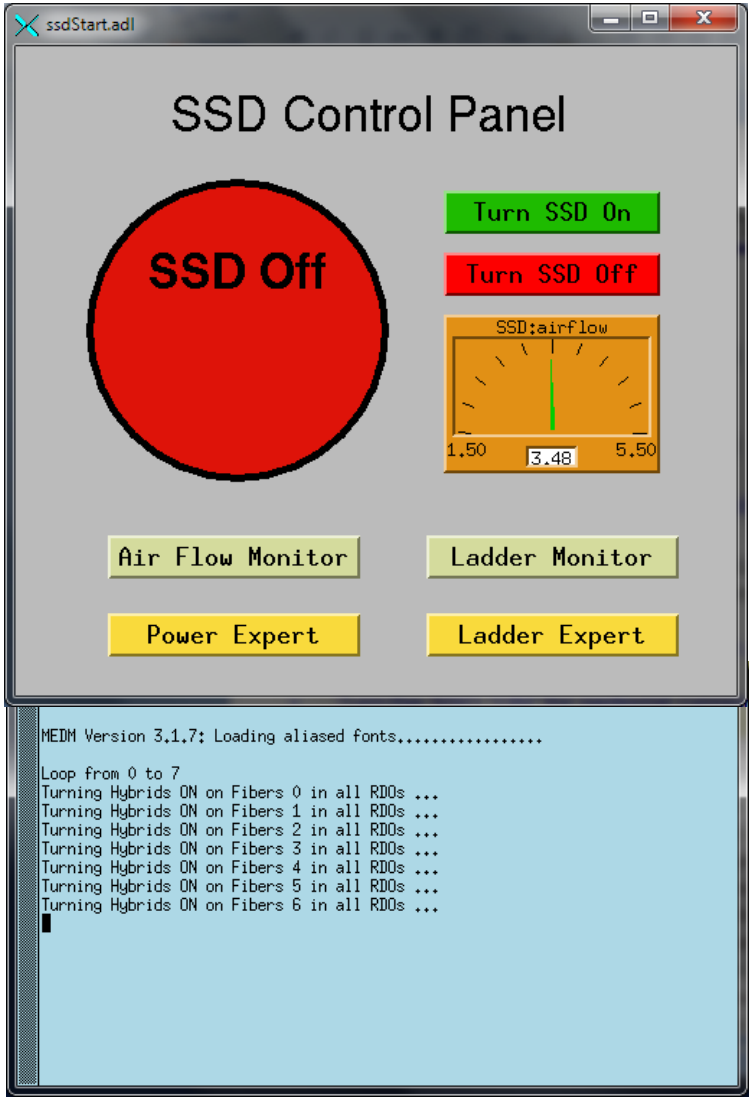
  or

  "Turn SSD Off" (3 minutes)

- Turn the SSD "ON" when beams are stable and ready for "Physics Running"
  - Include the "SST" in the run at the DAQ console
  - Include the "SST" trigger in the run (VPDMB-5-SSD)
  - Turn the SSD "OFF" in preparation for a beam dump
  - Turn the SSD "ON" for pedestal running w/beam off, or cosmics, then OFF again when done

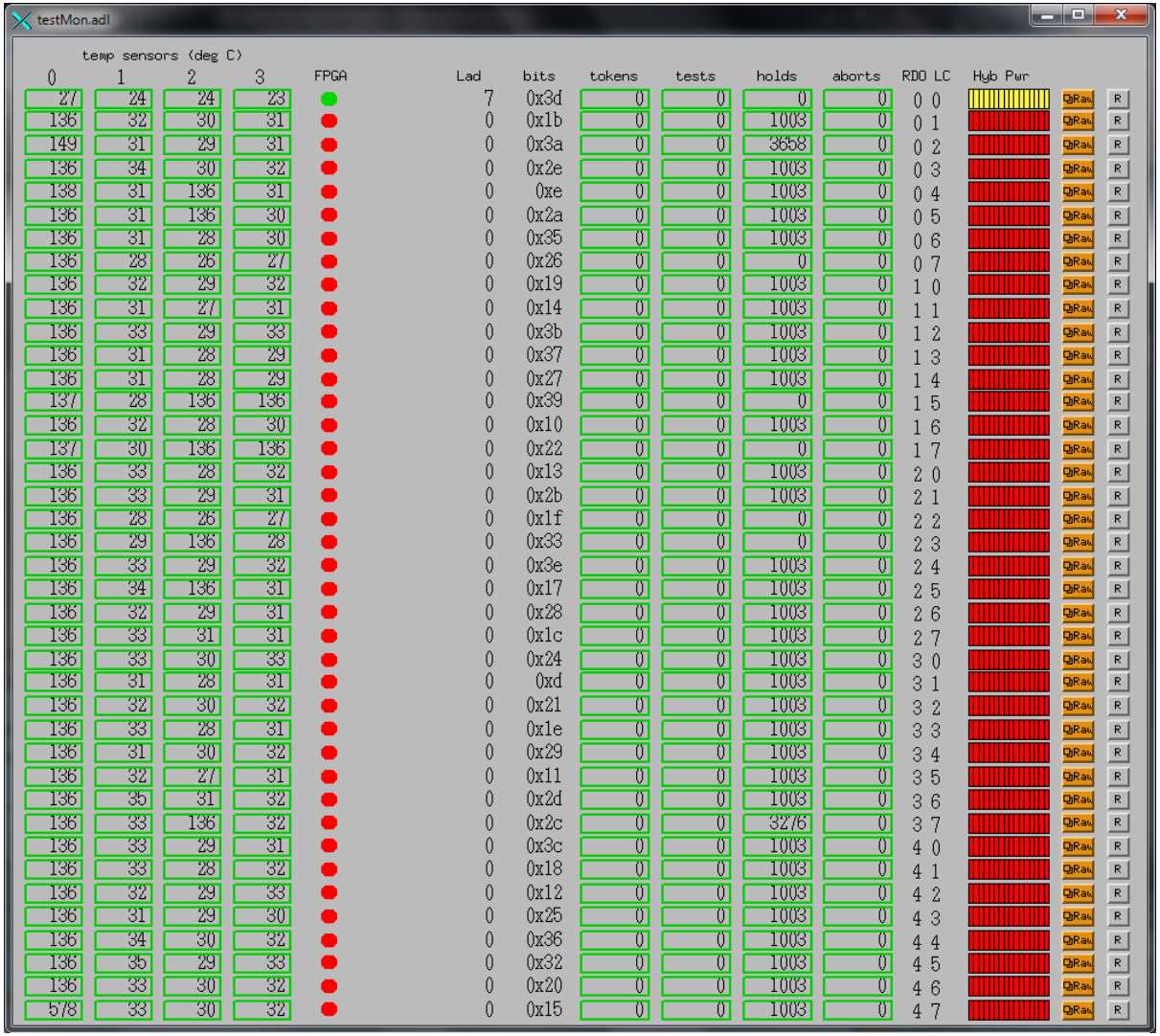
- The large circle will change Red / Yellow / Green
  - The detector is "ON" when the console screen says "SSD Detector is ON and configured for Normal Ops"
  - The detector is "OFF" when it says "SSD Detector is OFF"

- Call an expert if you have questions



Ladder Monitor

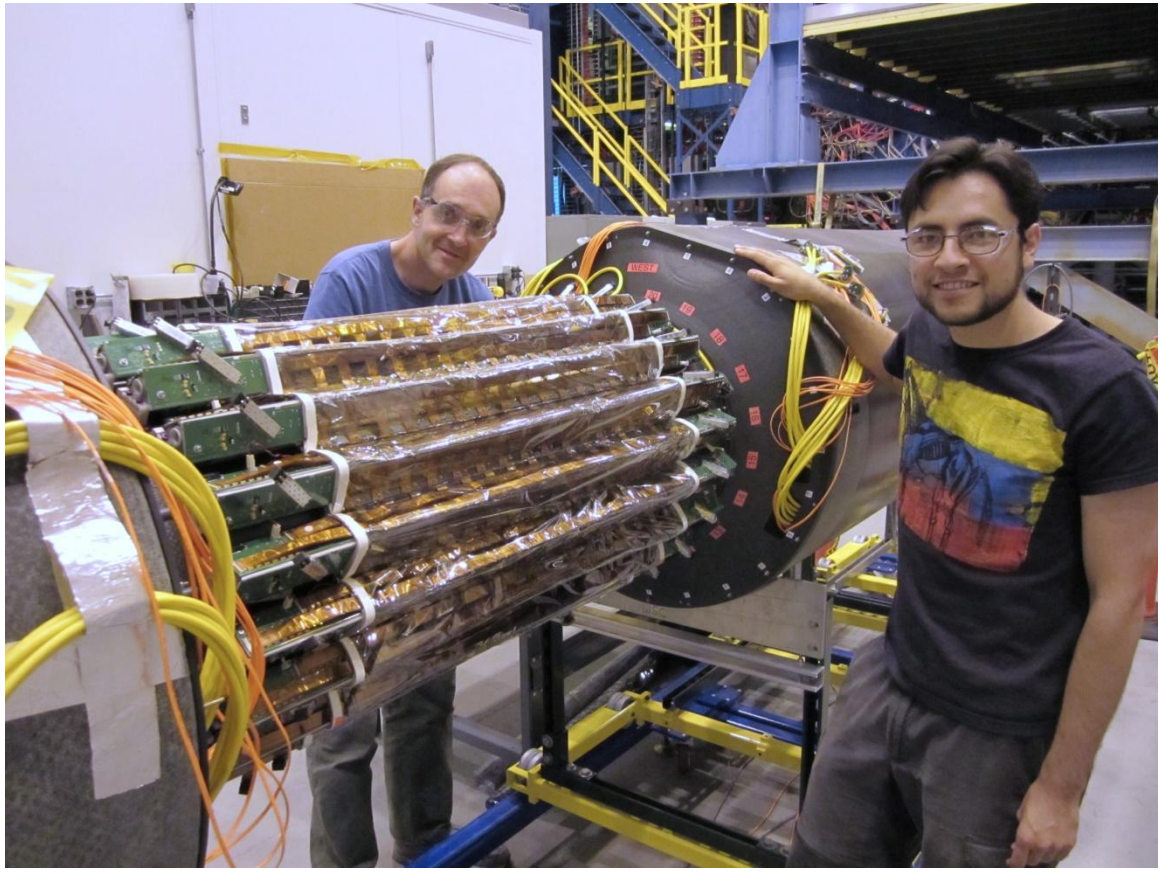
- Ladder temperature
  - (in 4 places) shown in the first 4 columns
- FPGA status
  - shown by the red/green circle
- RDO #
  - the SSD has 5 RDO's (0-4)
- LC #
  - each RDO talks with 8 ladder cards (0-7)
- Hybrid Power
  - Status of the hybrids (16 total) on each LC red = off, yellow = on
- Reset Button "R"
  - Cycle power on one ladder if "Hyb Pwr" shows red bits. Ignore FPGA Status.



temp sensors (deg C) 0	1	2	3	FPGA	Lad	bits	tokens	tests	holds	aborts	RDO LC	Hyb Pwr		
27	24	24	23		7	0x3d	0	0	0	0	0 0		QRaw	R
136	32	30	31		0	0x1b	0	0	1003	0	0 1		QRaw	R
149	31	29	31		0	0x3a	0	0	3658	0	0 2		QRaw	R
136	34	30	32		0	0x2e	0	0	1003	0	0 3		QRaw	R
138	31	136	31		0	0xe	0	0	1003	0	0 4		QRaw	R
136	31	136	30		0	0x2a	0	0	1003	0	0 5		QRaw	R
136	31	28	30		0	0x35	0	0	1003	0	0 6		QRaw	R
136	28	26	27		0	0x26	0	0	0	0	0 7		QRaw	R
136	32	29	32		0	0x19	0	0	1003	0	1 0		QRaw	R
136	31	27	31		0	0x14	0	0	1003	0	1 1		QRaw	R
136	33	29	33		0	0x3b	0	0	1003	0	1 2		QRaw	R
136	31	28	29		0	0x37	0	0	1003	0	1 3		QRaw	R
136	31	28	29		0	0x27	0	0	1003	0	1 4		QRaw	R
137	28	136	136		0	0x39	0	0	0	0	1 5		QRaw	R
136	32	28	30		0	0x10	0	0	1003	0	1 6		QRaw	R
137	30	136	136		0	0x22	0	0	0	0	1 7		QRaw	R
136	33	28	32		0	0x13	0	0	1003	0	2 0		QRaw	R
136	33	29	31		0	0x2b	0	0	1003	0	2 1		QRaw	R
136	28	26	27		0	0x1f	0	0	0	0	2 2		QRaw	R
136	29	136	28		0	0x33	0	0	0	0	2 3		QRaw	R
136	33	29	32		0	0x3e	0	0	1003	0	2 4		QRaw	R
136	34	136	31		0	0x17	0	0	1003	0	2 5		QRaw	R
136	32	29	31		0	0x28	0	0	1003	0	2 6		QRaw	R
136	33	31	31		0	0x1c	0	0	1003	0	2 7		QRaw	R
136	33	30	33		0	0x24	0	0	1003	0	3 0		QRaw	R
136	31	28	31		0	0xd	0	0	1003	0	3 1		QRaw	R
136	32	30	32		0	0x21	0	0	1003	0	3 2		QRaw	R
136	33	28	31		0	0x1e	0	0	1003	0	3 3		QRaw	R
136	31	30	32		0	0x29	0	0	1003	0	3 4		QRaw	R
136	32	27	31		0	0x11	0	0	1003	0	3 5		QRaw	R
136	35	31	32		0	0x2d	0	0	1003	0	3 6		QRaw	R
136	33	136	32		0	0x2c	0	0	3276	0	3 7		QRaw	R
136	33	29	31		0	0x3c	0	0	1003	0	4 0		QRaw	R
136	33	28	32		0	0x18	0	0	1003	0	4 1		QRaw	R
136	32	29	33		0	0x12	0	0	1003	0	4 2		QRaw	R
136	31	29	30		0	0x25	0	0	1003	0	4 3		QRaw	R
136	34	30	32		0	0x36	0	0	1003	0	4 4		QRaw	R
136	35	29	33		0	0x32	0	0	1003	0	4 5		QRaw	R
136	33	30	32		0	0x20	0	0	1003	0	4 6		QRaw	R
578	33	30	32		0	0x15	0	0	1003	0	4 7		QRaw	R

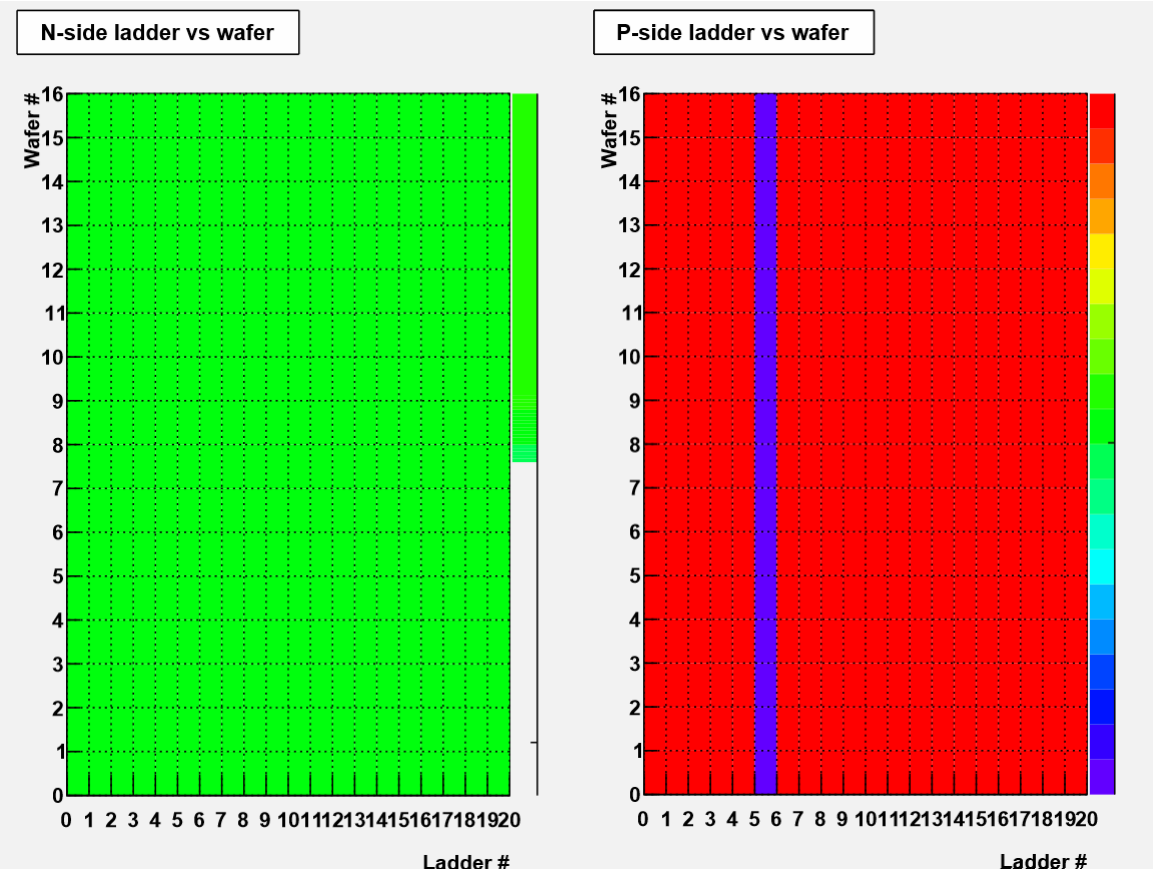
SSD Operations Notes

- The SSD should be on when the PXL+IST detectors are on (Unless otherwise instructed)
  - Usually, this means ZDCand < 50 Khz, but also includes cosmic and pedestal runs



- You may reset bad ladders when they appear in the online plots or on the SSD console screen
  - Do not stop the run
  - Alternatively, check the SSD console at the end of each run. Good time to reset.
- Major issues can be resolved by power cycling the SSD
  - Stop the run and remove the SSD from DAQ. Start a new run without the SSD while cycling power. Start a new run with the SSD when ready.

SSD QA Plots

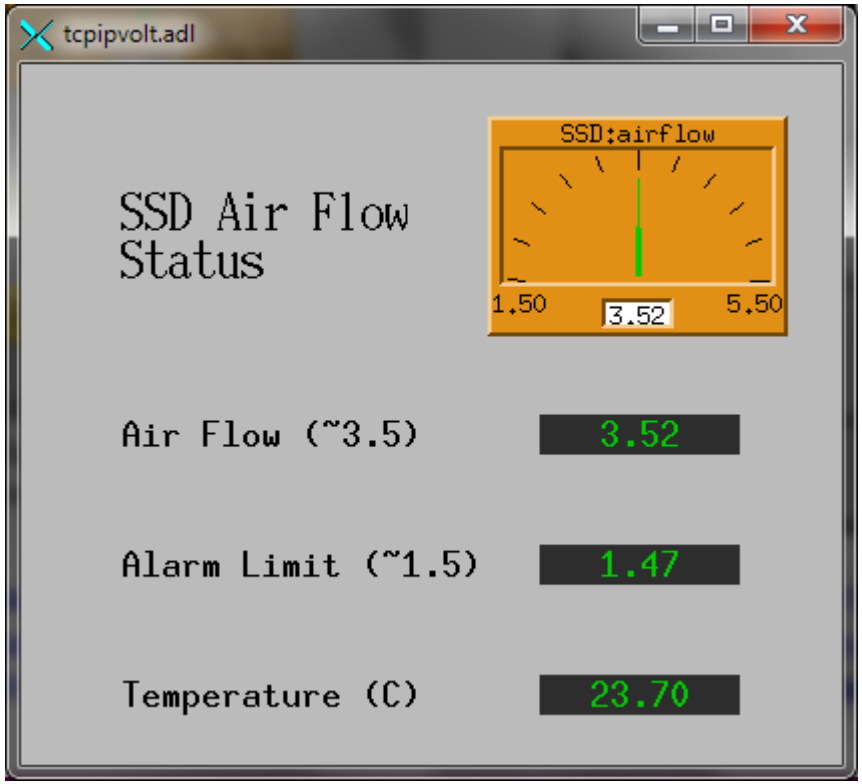


- Plots show the number of events recorded per ladder
- These plots are OK … if the Ladder Monitor is also OK

- The SSD is also known as the "SST".
  - SSD is for hardware, SST is used by DAQ
- The SSD uses Si P/N junction diodes
  - The SSD reads data from both the P side and N side of the Si
- The right most bar on each plot is the vertical scale for the histogram
  - Note that the scale is zero suppressed and auto scaled
- Thus, the blue bar indicates fewer counts than red, but NOT zero

Air Flow Monitor

- The air flow gauge monitors the cooling air flowing through the SSD ladders
  - Normal reading ~ 3.5
- The interlock system will shutdown the SSD if the air cooling fails.
  - No operator action is required to shutdown the system although many alarms will be activated.
  - Recovery after a cooling failure requires an expert.



- The temperature of the cooling air is not very sensitive to the temperature of the detector. The value shown here will rarely rise above room temperature. See the “Ladder Monitor” page for more useful temperature readings.

Ladder Expert

- Panel for configuring ladder cards
  EXPERTS ONLY!

- Power up the SSD by selecting "All" and "All" in the RDO and Fiber menu boxes
  - Push: 1.) Turn On Power 2.) Config LC
    3.) Turn Hybds ON 4.) Config Alice
  - Important: wait for "done" in console window between each step

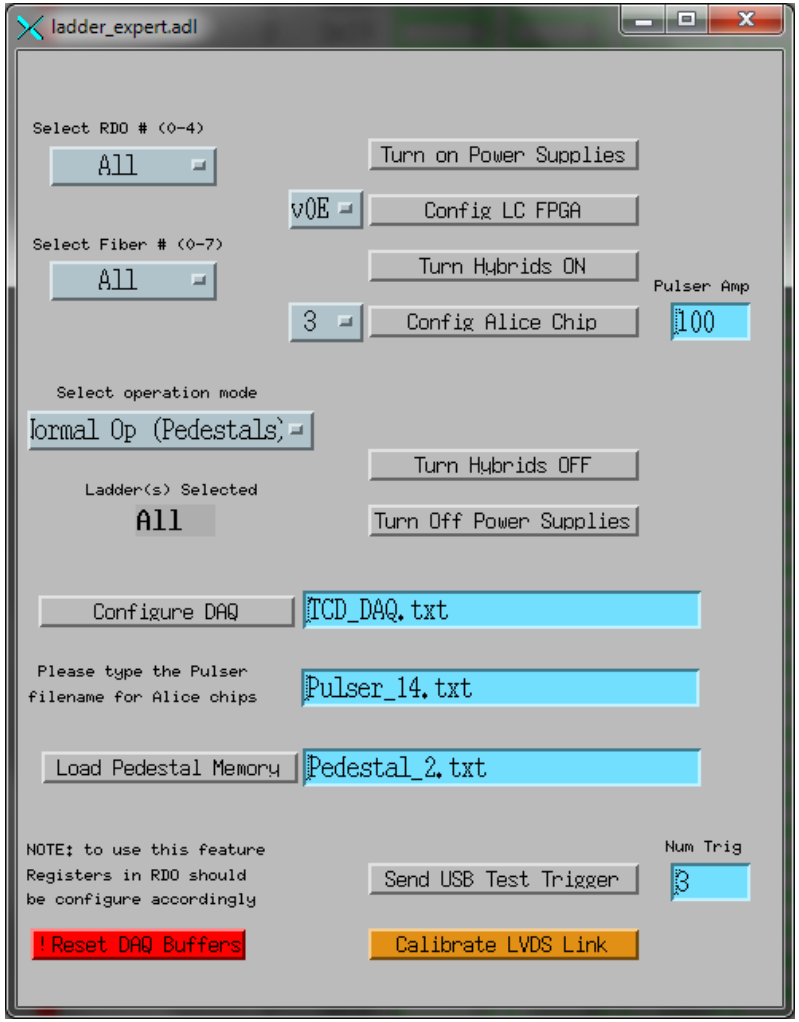
- RDOs and Fibers can also be configured (On/Off) one at a time.

  (In this context, "fiber" is a synonym for "ladder card")

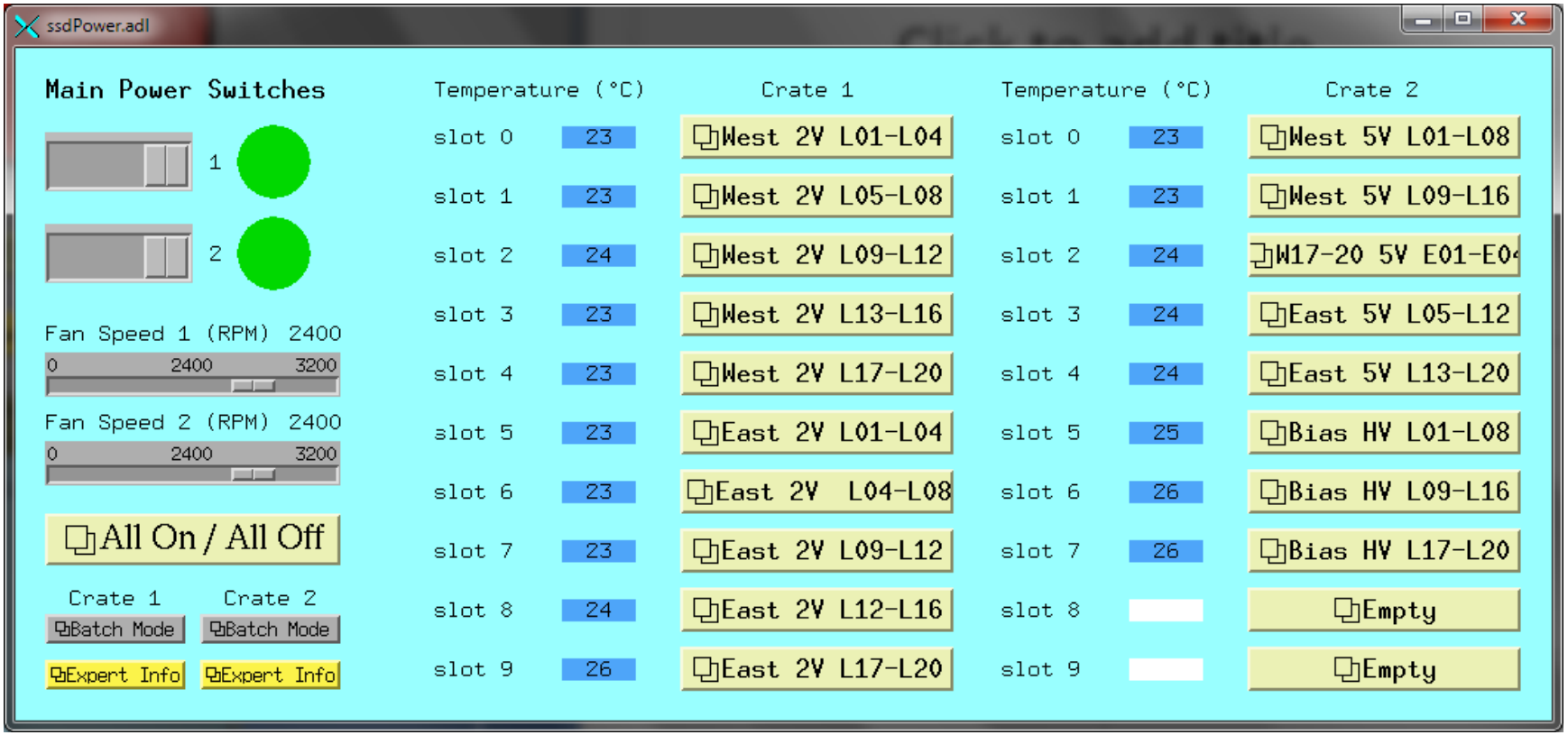
  1.) Config LC 2.) Turn Hybrds ON 3.) Config Alice

  "Turn On Power" is only done once per session, not per Fiber

- Configure DAQ is for superExperts
- Calibrate LVDS is for superExperts
- etc.

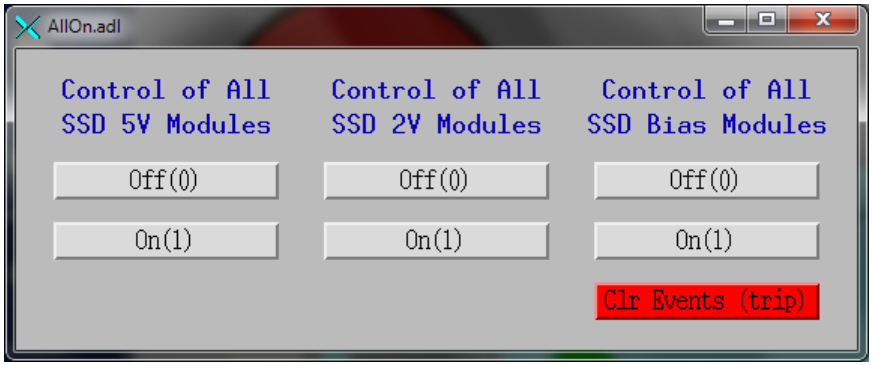


Power Expert



- The main power should never be switched off. Fans always at 2400 RPM.
  - Not even in an emergency. (SSD Interlocks will automatically switch off the power in case of emergency.)
- Experts only!
  - Use the “All On / All Off” to turn power on manually. On: 5V first, then ±2V, then Bias. Off: Reverse order

Power Expert: “All On” and “Batch Mode”

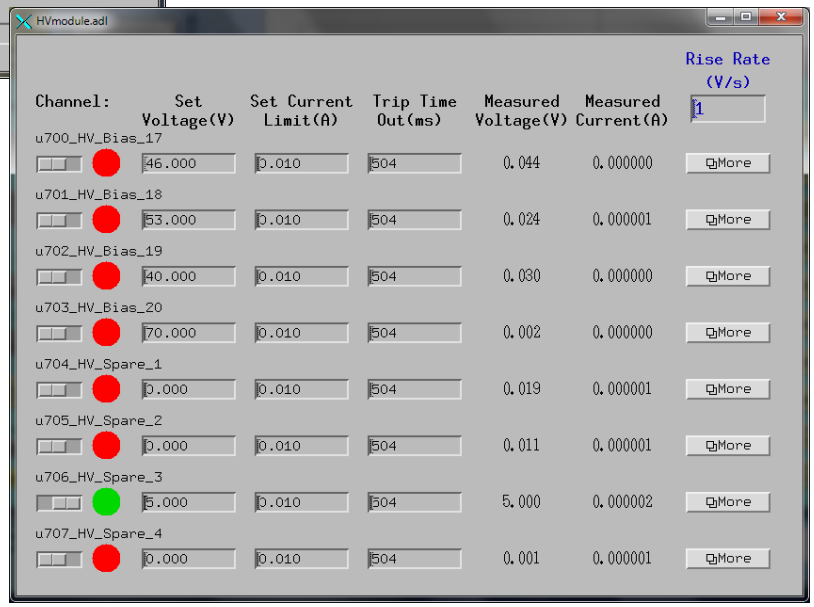


- All On / All Off
  - On: 5V first, then ±2V, then Bias.
    Off: Reverse order
- Clear Events (on HV trip)
  - Press Clr Events if an HV channel has tripped off. Reset HV channel manually to prescribed voltage.

- Experts only!
  - Note Crate_1 or Crate_2 controls
- Batch mode
  - For controlling groups of modules

Power Expert: Setting individual channels

- Experts Only!
  - Note: complex mapping from channel # to SSD Ladder #
  - Highlight value to be changed, enter change and hit (CR)
  - (very important to hit (CR))
  - Changes made here are permanent



- For setting individual channels
  - On/Off
  - Set Voltage (target voltage)
  - Current limit
  - Rise rate (volts per second)
  - Supervision behavior (on trip)
  - “Sense” voltage is the actual voltage on the detector

Schematic Representation of the HFT

- **The STAR Heavy Flavor Tracker – the full suite**
- **TPC – SSD – IST – PXL**
- **TPC pointing resolution at the SSD is ~ 1 mm**
- **SSD pointing at the IST is ~ 400 μm ε = 0.98**
- **IST pointing at PXL 2 is ~ 400 μm ε = 0.98**
- **PXL 2 pointing at PXL1 is ~ 125 μm ε = 0.93**
- **PXL1 pointing at the VTX is < 40 μm ε = 0.94**
- **ε = track matching efficiency**