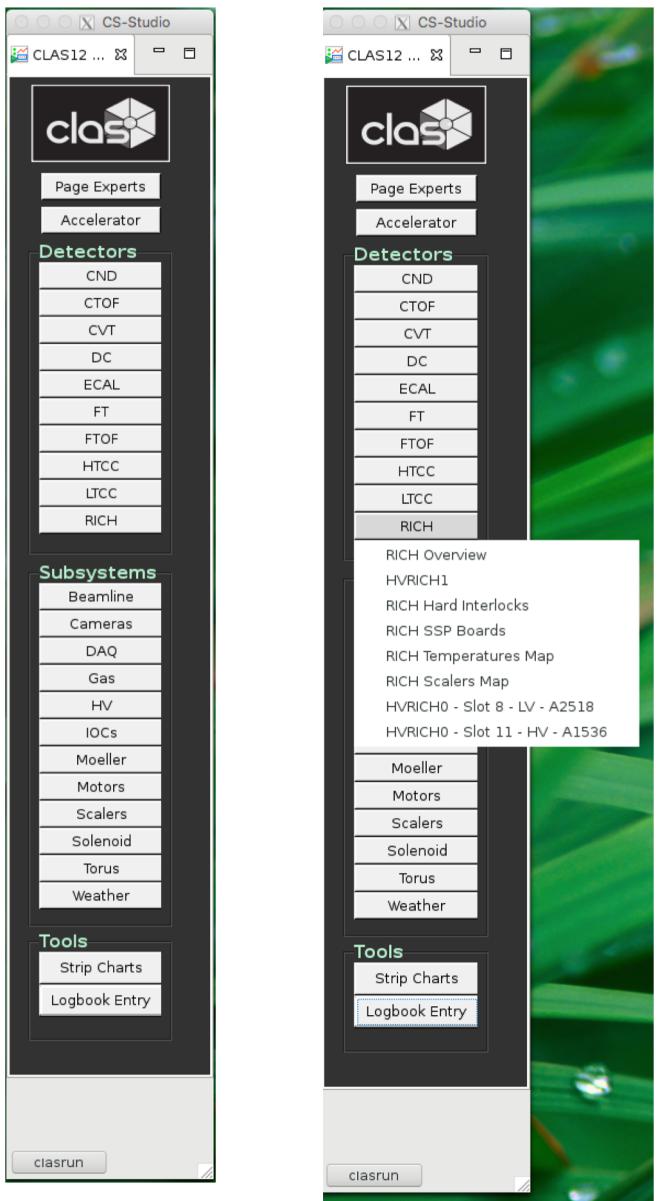


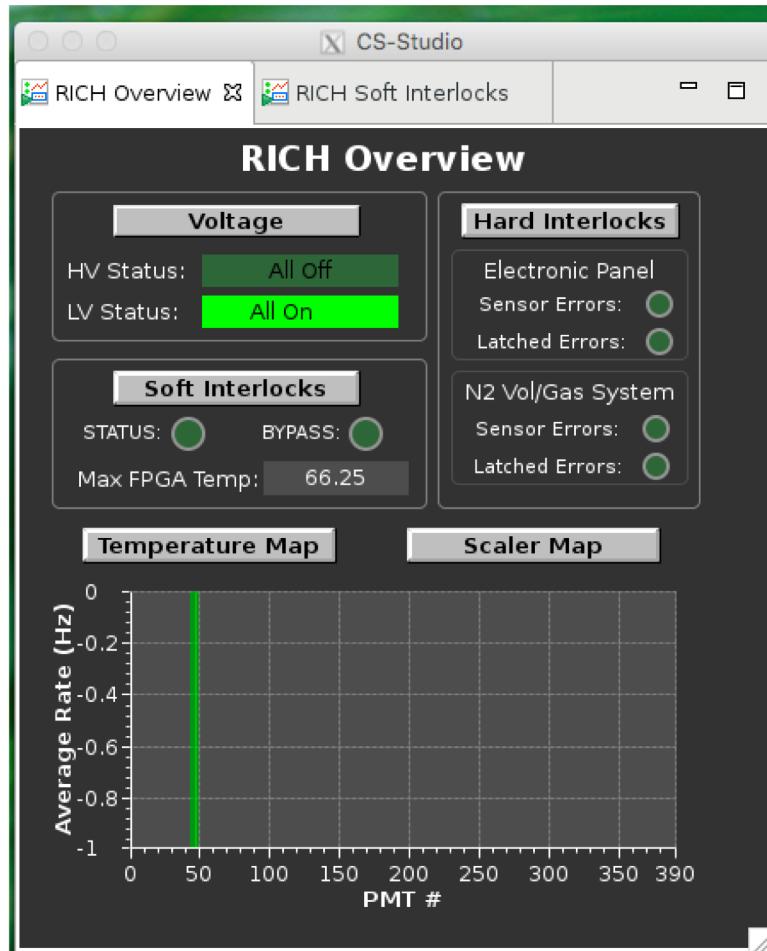
RICH Control Manual

September 20, 2021



- Press RICH on clascss menu
- Chose RICH Overview

RICH Overview



- **Voltage** control RICH HV and LV
- **Temperature Map**

Shows the temperature of the RICH electronic boards

- **Scaler Map**

Presents the rate of the MAPMT pixels

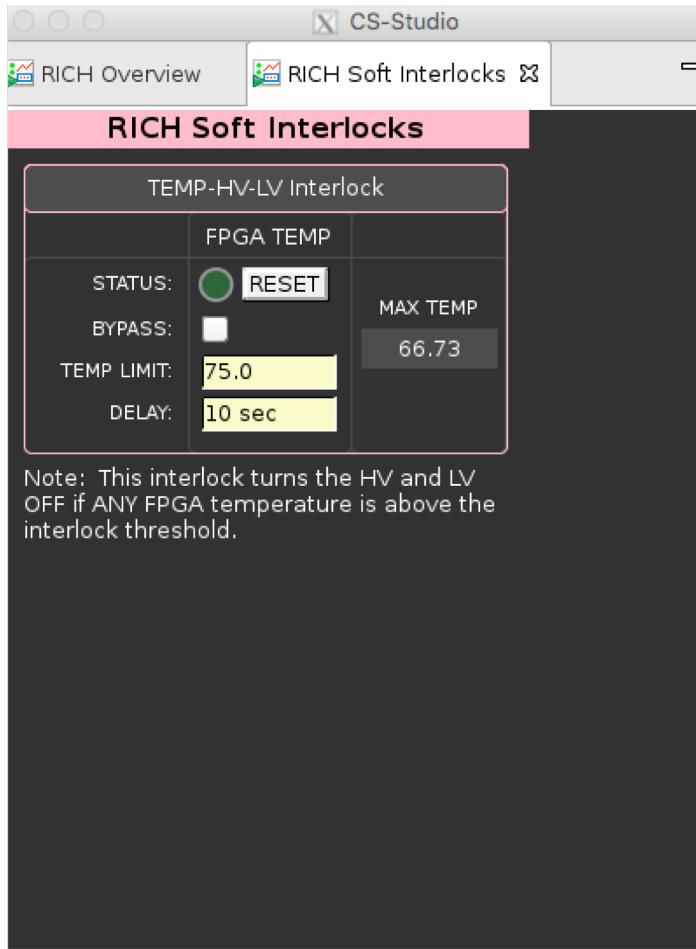
- **Hard Interlock**

Control the RICH interlock

- **Soft Interlock**

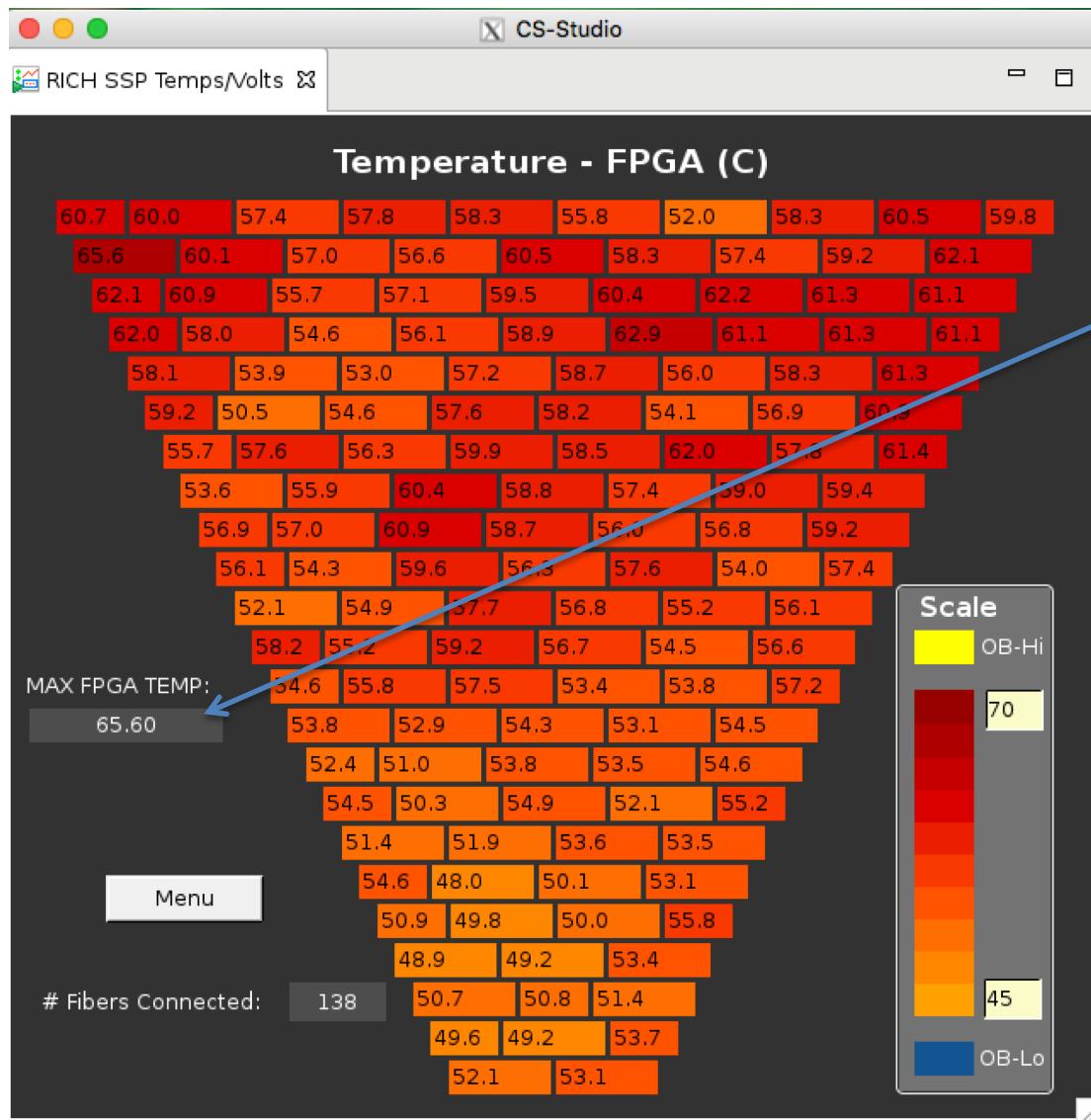
Control the max temperature of the RICH electronics

Soft Interlock



- Max temperature has to be less than 75 C
- Reset the interlock if necessary

Temperature Map

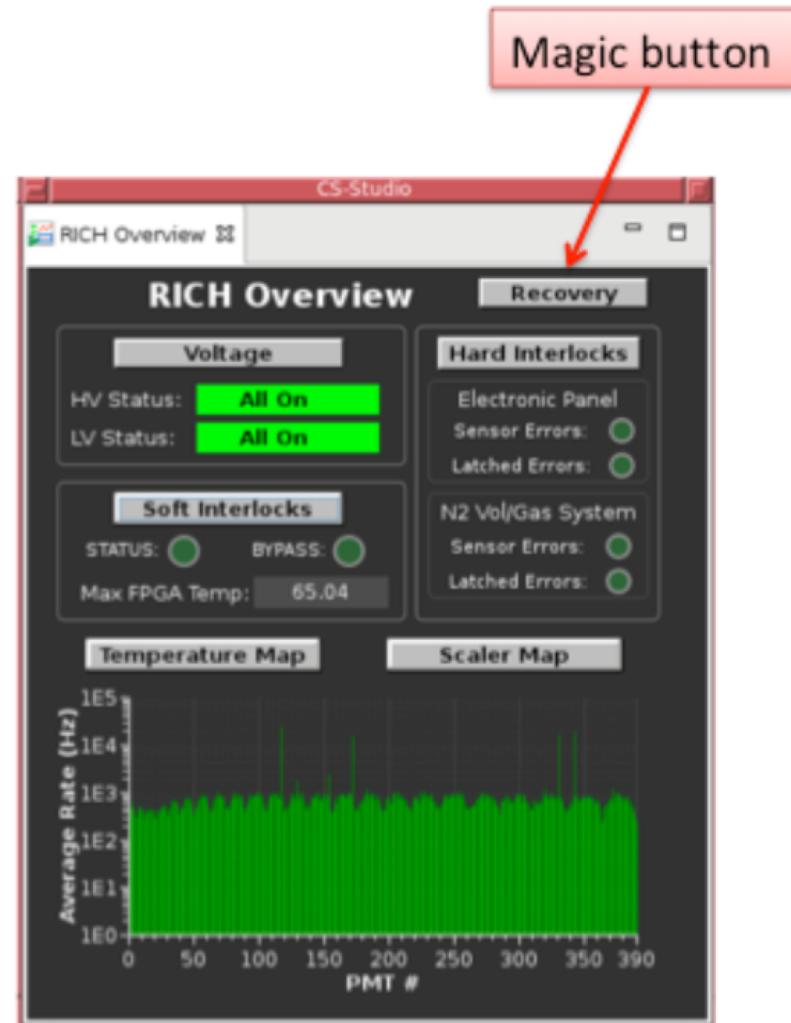


- Max temperature has to be less than 75 C
- Soft interlock switches off The RICH HV and LV if $t > 75^{\circ}\text{C}$
- All tiles have to be present

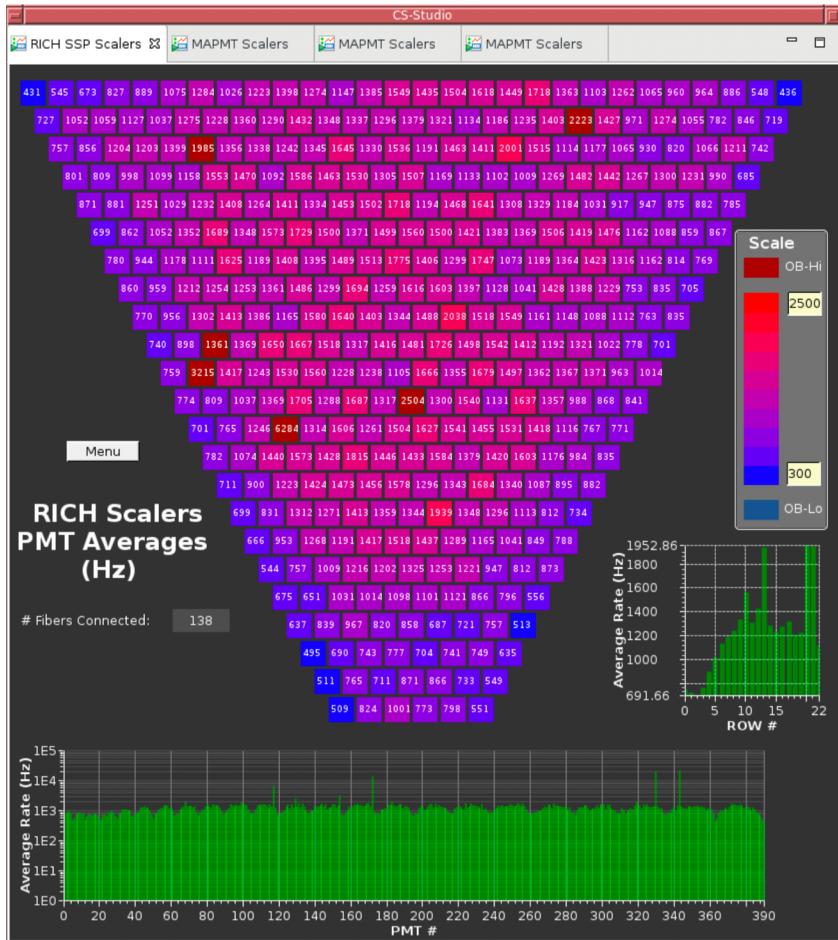
**Do RICH RECOVERY
every day shift and in
case of missing tiles in
the temperature or
scaler plots**

- The radiation damage causes the malfunctioning of frontend. Dead tiles appeared.
- The damage is not permanent. It can be recovered by switching LV OFF/ON
- RICH front end is sitting in the beam of secondary particles.
- **One click RICH recovery procedure**
 - RICH HV OFF/ON
 - Reboot rich4 crate
 - Set the DAQ parameters to the RICH fronernd
 - Reboot iosrich

RICH Recovery

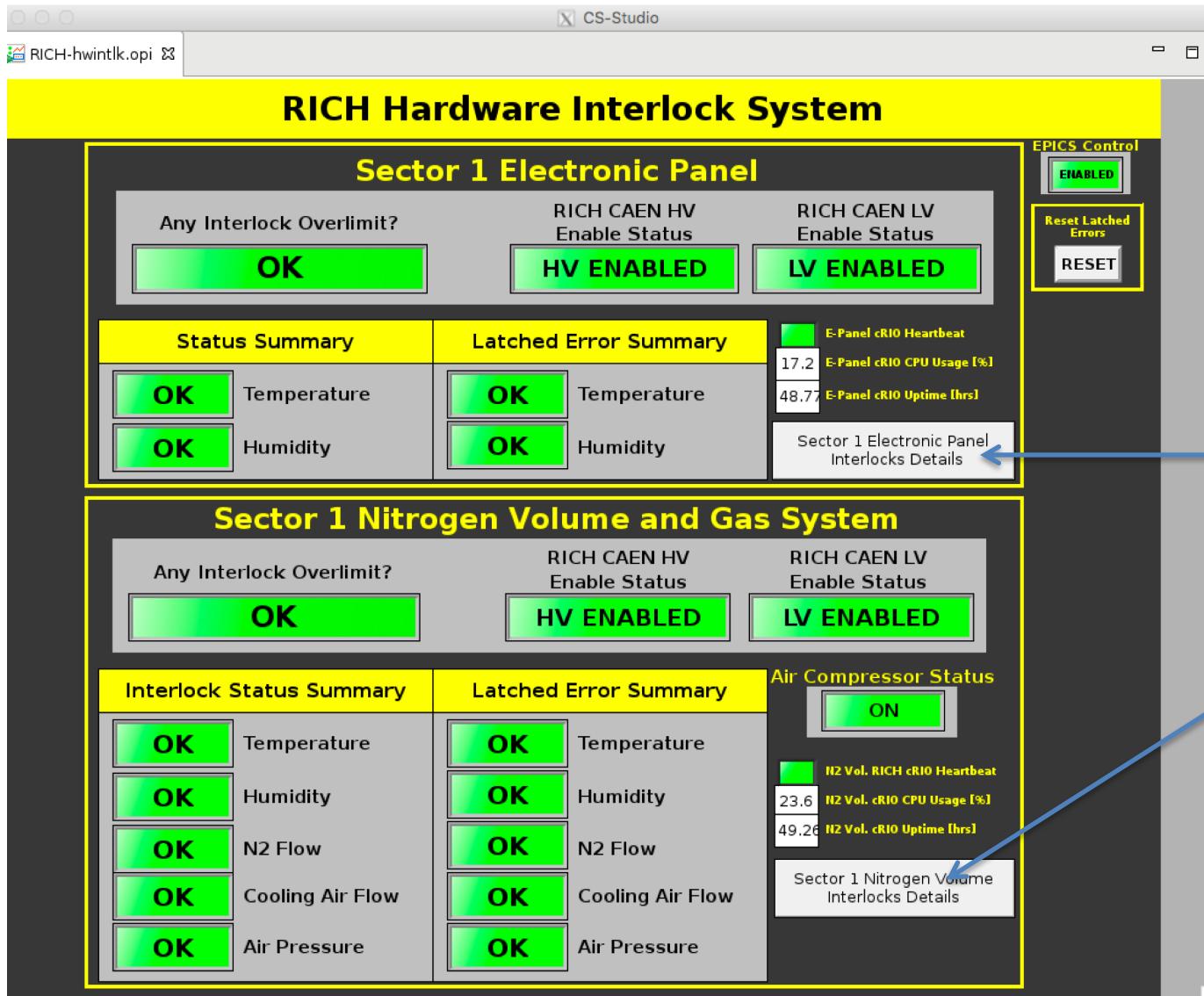


RICH scalers



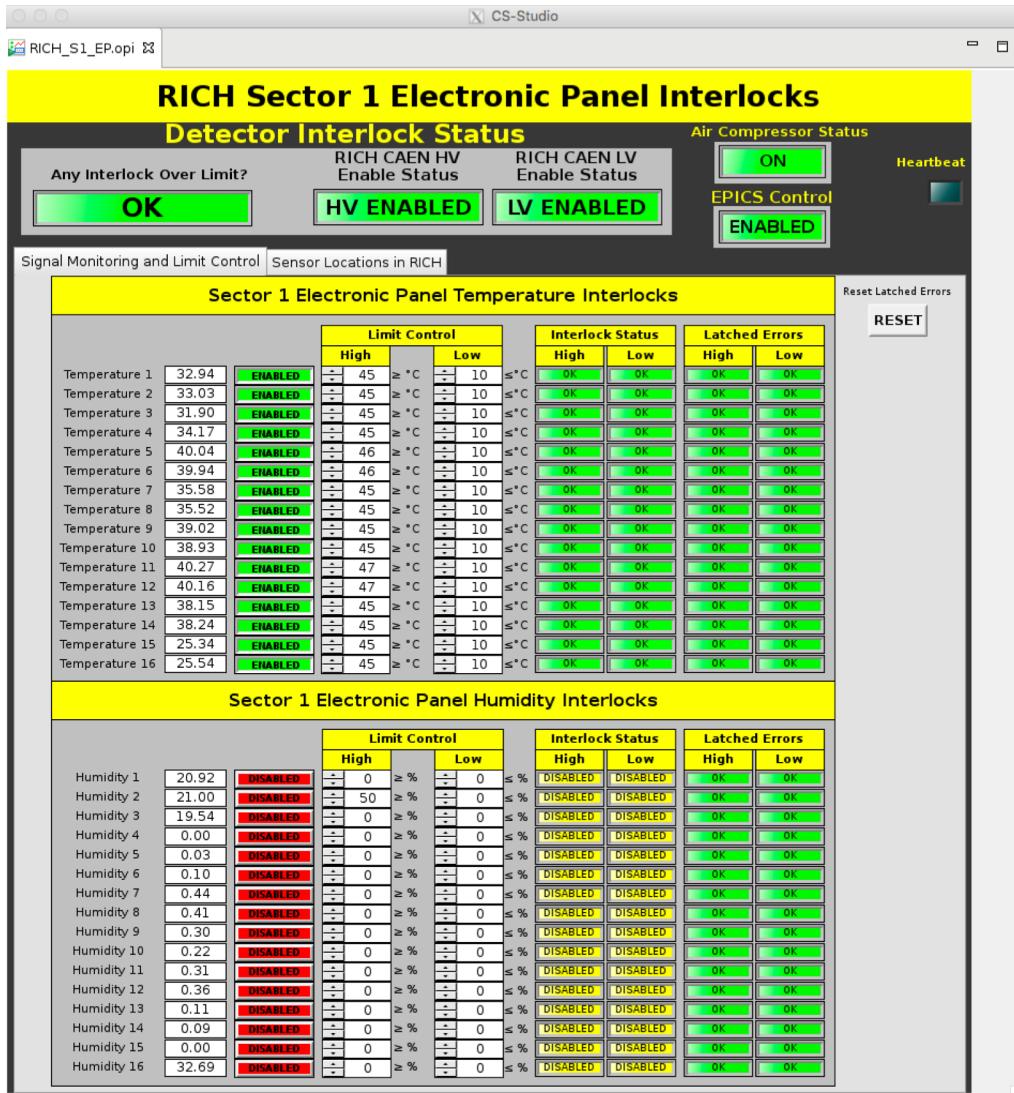
- The plot presents the average rate of the MAPMT pixels
- ALL MAPMTs have to be present

Hard Interlock



- Hard Interlock controls the temperature and humidity inside the RICH detector
- Press this button to view the Electronic panel Interlock
- Press this button to view the Nitrogen volume Interlock

Electronic Panel Interlock



Check the temperature and humidity

Nitrogen Interlock

CS-Studio

RICH_S1_N2.opi

RICH Sector 1 Nitrogen Volume Interlocks

Detector Interlock Status

Any Interlock Over Limit?	RICH CAEN HV Enable Status	RICH CAEN LV Enable Status	Air Compressor Status	Heartbeat
OK	HV ENABLED	LV ENABLED	ON	EPICS Control ENABLED

Sensor Monitoring and Limit Control | Sensor Locations in RICH

Sector 1 Nitrogen Volume Temperature Interlocks

Temperature	Limit Control		Interlock Status		Latched Errors	
	High	Low	High	Low	High	Low
Temperature 1	26.63	ENABLED	-30 \geq °C	-15 \leq °C	OK	OK
Temperature 2	25.56	DISABLED	-30 \geq °C	-10 \leq °C	DISABLED	OK
Temperature 3	25.45	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 4	23.62	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 5	26.96	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 6	24.32	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 7	26.04	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 8	24.70	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 9	26.67	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 10	25.52	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 11	23.70	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 12	27.11	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 13	24.23	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 14	26.00	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 15	24.73	ENABLED	-30 \geq °C	-10 \leq °C	OK	OK
Temperature 16	25.54	DISABLED	-30 \geq °C	-10 \leq °C	DISABLED	DISABLED

Reset Latched Errors | **RESET**

Sector 1 Nitrogen Volume Humidity Interlocks

Humidity	Limit Control		Interlock Status		Latched Errors	
	High	Low	High	Low	High	Low
Humidity 1	1.81	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 2	0.00	DISABLED	-5 \geq %	-1 \leq %	DISABLED	DISABLED
Humidity 3	0.38	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 4	0.00	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 5	3.74	ENABLED	-7 \geq %	-1 \leq %	OK	OK
Humidity 6	1.96	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 7	0.00	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 8	1.42	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 9	1.10	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 10	0.00	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 11	0.00	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 12	3.65	ENABLED	-6 \geq %	-1 \leq %	OK	OK
Humidity 13	1.62	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 14	0.84	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 15	1.20	ENABLED	-5 \geq %	-1 \leq %	OK	OK
Humidity 16	0.00	DISABLED	-5 \geq %	-1 \leq %	DISABLED	DISABLED

Sector 1 Gas System Interlocks

	Limit Control		Interlock Status		Latched Errors	
	High	Low	High	Low	High	Low
Airflow 1	532.13	DISABLED	0 \geq slm	0 \leq slm	DISABLED	DISABLED
Airflow 2	413.37	DISABLED	1 \geq slm	0 \leq slm	DISABLED	DISABLED
Air Pressure	123.04	DISABLED	1 \geq psi	0 \leq psi	DISABLED	DISABLED
N2 Flow 1	21.16	DISABLED	0 \geq slm	0 \leq slm	DISABLED	DISABLED
N2 Flow 2	20.52	DISABLED	1 \geq slm	0 \leq slm	DISABLED	DISABLED

Check the temperature and humidity