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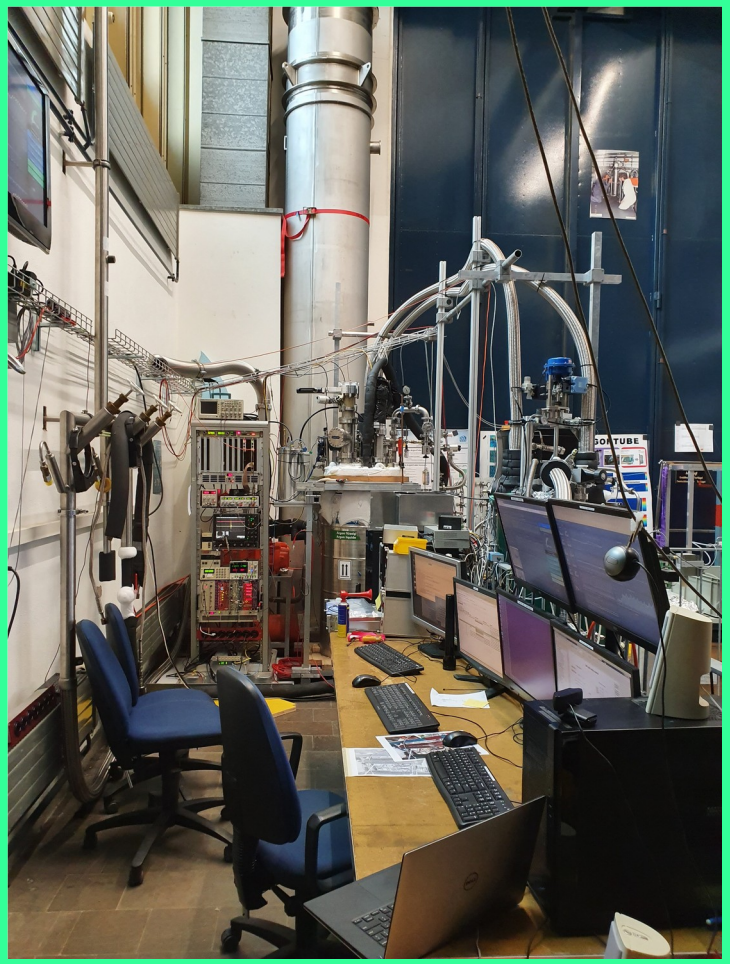
ArgonCube

SingleCube test run intermediate status
October 2020



I. Kreslo, Uni-Bern

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SingleCube test run intermediate status
October 2020

Test objectives:

1. First test of 100-chip pixel plane in 30x30x30 cm SinleCube TPC
2. Confirm ability of the system to reach target LAr purity
3. Validate and quantify charge-light matching between ArCLight and Larpix
4. Confirm ArCLight triggering capability
5. Characterise ArCLight PDE, coordinate and time resolution

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SingleCube October 2020 / SingleCube Oct 2020 - LAr Cryostat

LAr Cryostat

LAr level change rate [mm/h]

LAr level detector (wrt. pixel plane)

LAr LEVEL

Level change: -1 mm/h

LAr level: 227.73 mm

Pressure diff.: cryostat - atmosphere

167.4 mbar

Detector Argon exhaust flow

1.6 l/min

Cryostat over-pressure

Detector cooldown

2020-10-28 20:58:00
Cryostat ullage: 406 mbar

Temperature (sensor height wrt. top G10 structure)

T1 (LAr max, 33.4 cm): -104.0 °C

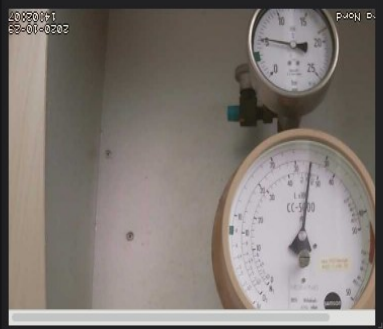
T2 (LAr critical, 15.9 cm): -188.0 °C

T3 (top TPC, -1.8 cm): -188.0 °C

T4 (mid TPC, -28.3 cm): -188.0 °C

T5 (below TPC, -60.0 cm): -188.0 °C

Lab cam



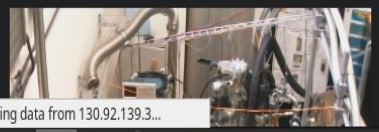
Temperature (sensor height wrt. top G10 structure)

LAr Temperatures

VFD set-point: 52 % of max.

VFD actual: 48 % of max.

Lab cam



VFD Pump

LAr flow

61 l/h

Transferring data from 130.92.139.3...

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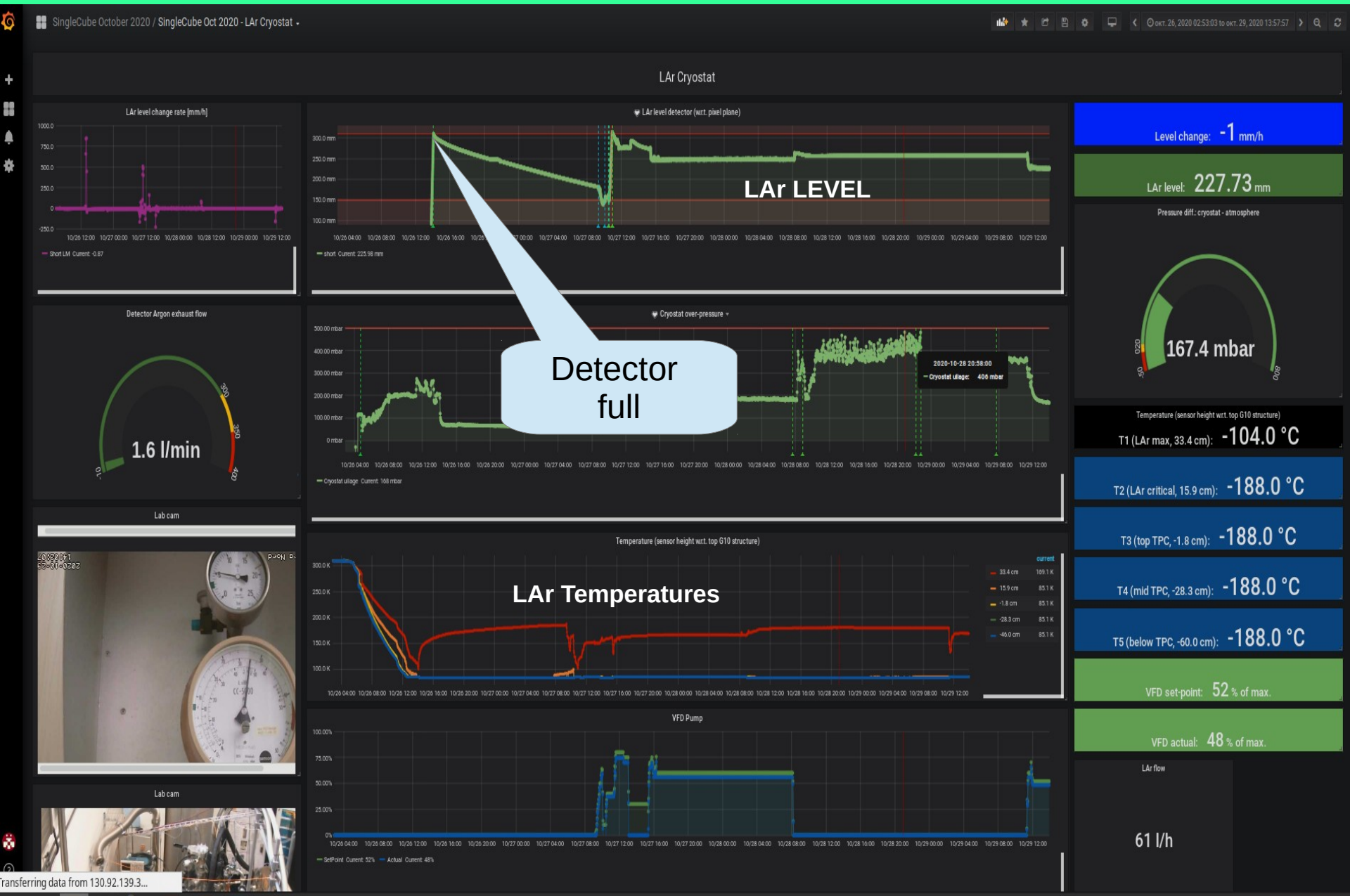

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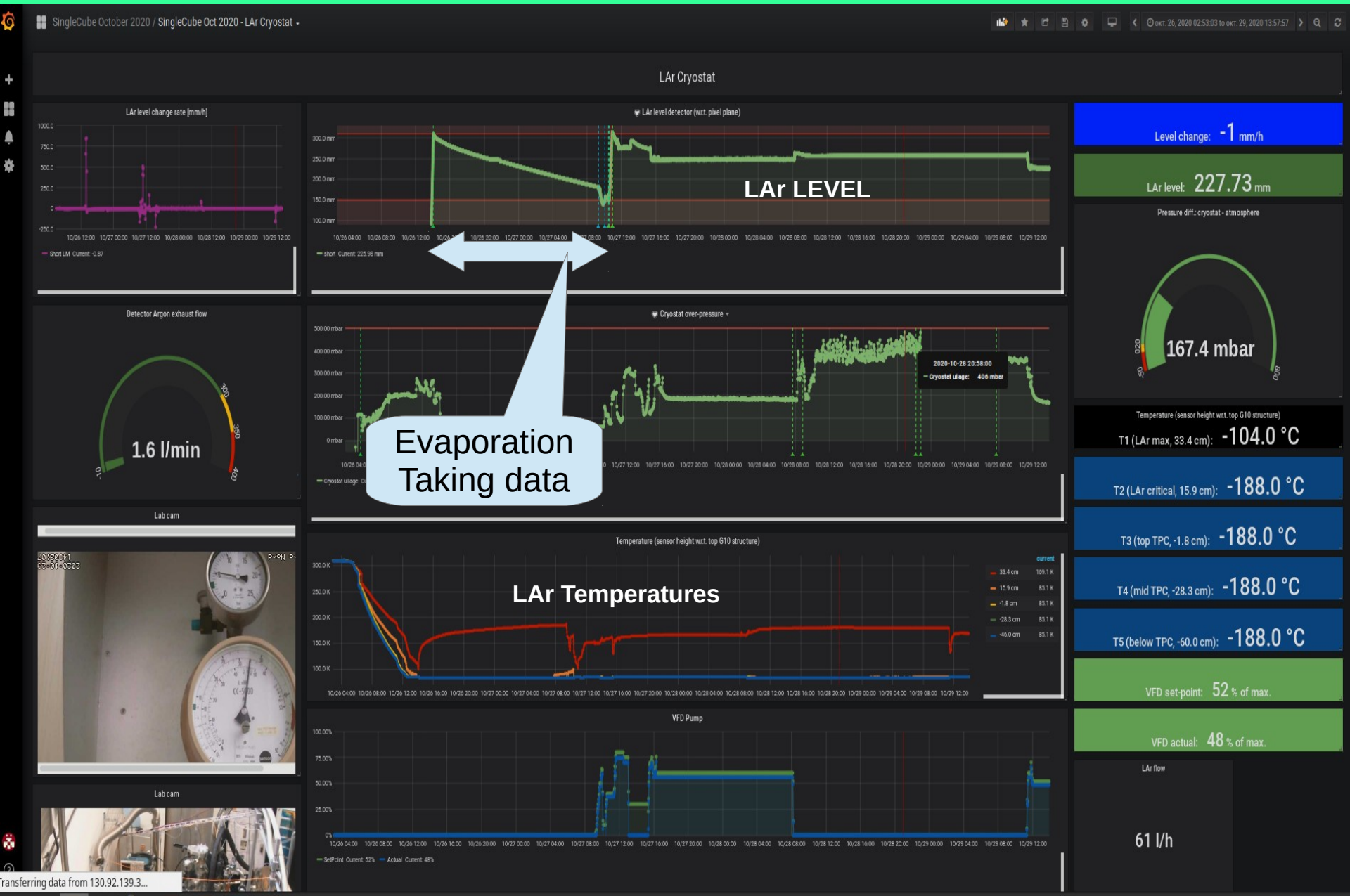

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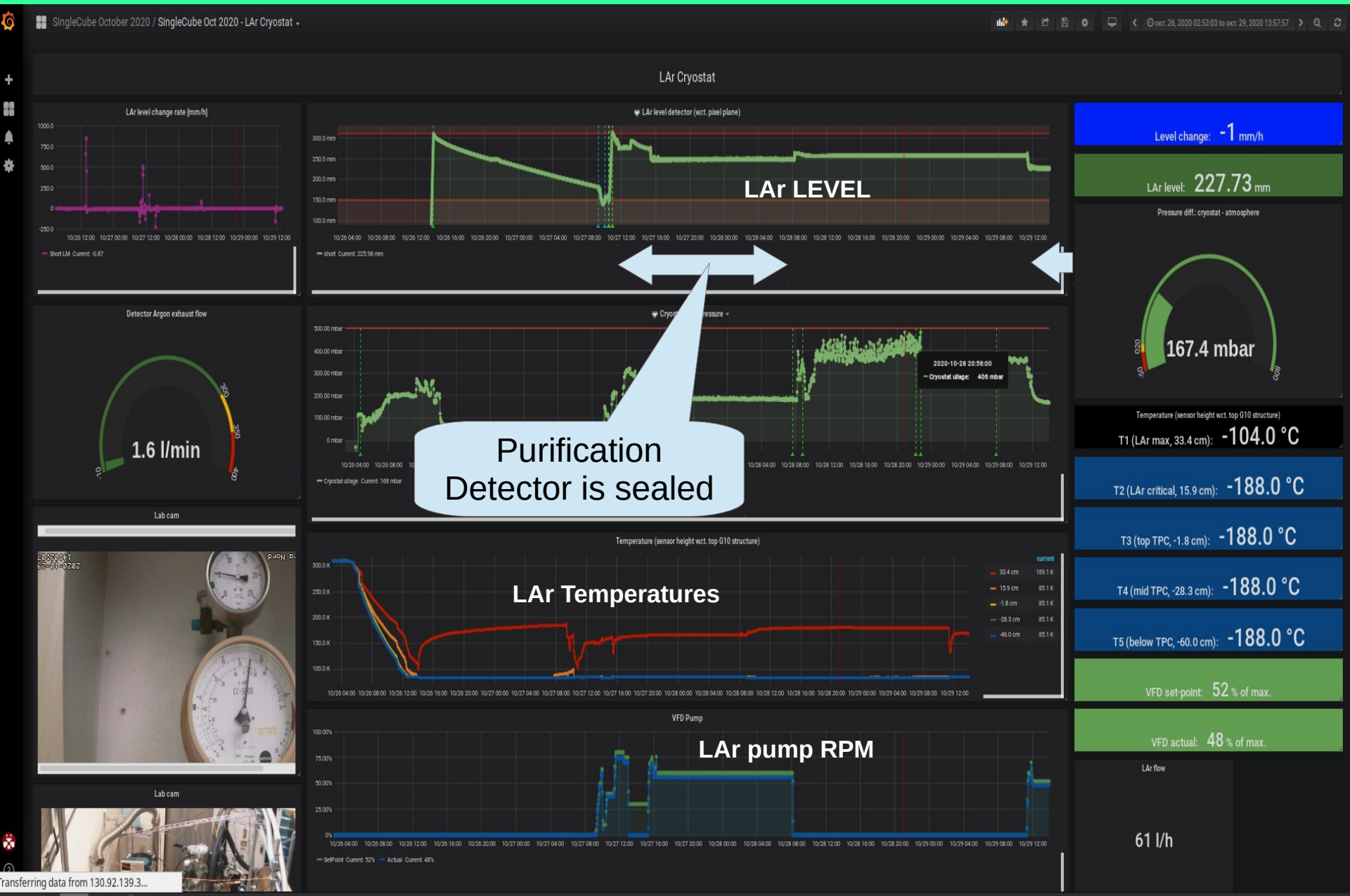

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ArgonCube

About 90 GB of data acquired

SingleCube_Oct2020_RunOverview - Google Sheets - Mozilla Firefox

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OCT 2020 Test Shift Sched | LHEP ELOG - LArPix DAQ | SingleCube_Oct2020_Run | Grafana - SingleCube Oct 2 | LHEP ELOG - Tuesday data t

https://docs.google.com/spreadsheets/d/1_tW79f4e12aAZCdym62E0rLb7h-GHkcAPAUH0HaxBk4/edit#gid=0 50%

SingleCube_Oct2020_RunOverview

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datalog_2020_10_28_11_47_32_CET_h5

SingleCube October 2020

Run number	Run start date	Run start time (Bern)	Run end time (Bern)	Run duration [min.]	PS HV [kV]	PS HV [uA]	Cathode HV [kV]	Triggers	LArPix Filename	Light R/O Filename	Comments
					15.9	70	15		datalog_2020_10_26_23_45_17_CET_h5		3 min test run after reconfiguring thresholds (HV on ~500V/cm) - BAD RUN trigger rate high ~18kHz (halted ~30s into run)
					15.9	70	15		datalog_2020_10_26_23_48_14_CET_h5		3 min test run with no light system connected (HV on ~500V/cm) - high rate ~18kHz
					15.9	70	15		datalog_2020_10_27_00_02_20_CET_h5		3 min test run after reconfiguring 1-2-43 (HV on ~500V/cm) - high rate ~17kHz
					15.9	70	15		datalog_2020_10_27_00_44_16_CET_h5		3 min test run after reconfiguring a number of other channels on io channel 2 (HV o
					15.9	70	15		datalog_2020_10_27_00_58_09_CET_h5		3 min test run after reconfiguring a few more chips (HV ~500V/cm) - high rate still ~
					15.9	70	15		datalog_2020_10_27_01_17_15_CET_h5		3 min test run after reconfiguring a few more chips (HV ~500V/cm) trigger rate ~8k
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_01_42_35_CET_h5	0a7b54bd_20201027_014241.data	3 min run with light system enabled (HV ~500V/cm) trigger rate gradually increases
					15.9	70	15		datalog_2020_10_27_03_15_09_CET_h5		3 min test run with presumed chip configurations (HV ~500V/cm) rate ~19kHz
					15.9	70	15		datalog_2020_10_27_03_50_27_CET_h5		testpulse data DAC=13summary: channels responding (>0 efficiency): 4686/4900 (0.96) channels with high efficiency (>0.85 efficiency): 4278/4900 (0.87) overall efficiency (per channel): 0.92 overall cross-talk (per channel): 0.03
					15.9	70	15		datalog_2020_10_27_04_08_03_CET_h5		pedestal run
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_04_19_20_CET_h5	0a7b54bd_20201027_041624.data	trigger rate high on two channels (light run set for 100k triggers, expecting ~2 hours of LArPix data)
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_04_50_27_CET_h5	As above (long run)	
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_05_08_11_CET_h5	As above (long run)	Missing a number of chips on io channel 2
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_05_27_14_CET_h5	As above (long run) at ~65k triggers	All chips responding
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_05_57_18_CET_h5	As above	
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_06_28_10_CET_h5	0a7b54bd_20201027_064022.data	Started a new 100k trigger light run
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_06_58_55_CET_h5	As above	
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_07_29_54_CET_h5	As above	Charge run killed
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_07_39_02_CET_h5		Pedestal run
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_07_47_56_CET_h5	As above	Starting a new charge run
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_08_18_40_CET_h5	As above	
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_08_49_43_CET_h5	As above	
					15.9	70	15		datalog_2020_10_27_08_56_50_CET_h5		Run stopped following stop of light run. Pedestal run - HV on
					15.9	70	15		datalog_2020_10_27_09_05_50_CET_h5		Pedestal run - HV on
					0	0	0	LED pulser, ~1kHz	none	0a7b54bd_20201027_112409.data	LED calibration run, 50k events, 20V on pulser, atten. 10dB
					0	0	0	LED pulser, ~1kHz	none	0a7b54bd_20201027_113221.data	LED calibration run, 50k events, 25V on pulser, atten. 10dB
					0	0	0	LED pulser, ~1kHz	none	0a7b54bd_20201027_114209.data	LED calibration run, 50k events, 15V on pulser, atten. 10dB
					0	0	0		datalog_2020_10_27_12_01_37_CET_h5		Pedestal run - LAr pump running
					0	0	0	LED pulser, ~1kHz	none	0a7b54bd_20201027_121517.data	LED calibration run, 50k events, 60V on pulser, atten. 20dB
									datalog_2020_10_27_13_10_28_CET_h5		Pedestal run - LAr pump connected
									datalog_2020_10_27_13_24_12_CET_h5		Pedestal run - LAr pump disconnected
					15.9	70	15	ArcLight, th=5600 + self-trigger		0a7b54bd_20201027_133333.data	LED still on -> bad run
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_13_38_24_CET_h5	0a7b54bd_20201027_133835.data	started light run with 50k events; 30 min. run, LArPix forward triggers enabled
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_14_11_25_CET_h5	same as above	stopped light run after 32894 events; 30 min. run; LArPix forward triggers enabled
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_14_17_19_CET_h5	0a7b54bd_20201027_141720.data	2 min. run; LArPix forward triggers enabled
									datalog_2020_10_27_14_21_10_CET_h5	0a7b54bd_20201027_142111.data	2 min. run; LArPix forward triggers disabled
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_27_14_25_53_CET_h5	0a7b54bd_20201027_142555.data	30 min. run; LArPix forward triggers enabled
									datalog_2020_10_27_14_58_52_CET_h5	?	30 min. run; LArPix forward triggers enabled
									datalog_2020_10_27_15_03_56_CET_h5	none	13 DAC --- LArPix internal test pulse (HV off) channels responding (>0 efficiency): 4644/4900 (0.95) channels with high efficiency (>0.85 efficiency): 4255/4900 (0.87) overall efficiency (per channel): 0.92 overall cross-talk (per channel): 0.03
											LAr recirculation/purification for 16.5h
					15.9	70	15	**disabled**	datalog_2020_10_28_08_48_46_CET_h5	0a7b54bd_20201028_084833.data	30 min. run; LArPix forward **triggers disabled**
					15.9	70	15		datalog_2020_10_28_09_19_30_CET_h5		LArPix pedestal; HV on; ArCLight on but idle
					15.9	70	15		datalog_2020_10_28_09_22_53_CET_h5		LArPix rough leakage current; HV on; ArCLight on but idle
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_09_32_35_CET_h5	0a7b54bd_20201028_093126.data	3 min. run; LArPix forward triggers enabled from ArCLight
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_09_41_08_CET_h5	0a7b54bd_20201028_093858.data	30 min. run; LArPix forward triggers enabled from ArCLight
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_10_11_31_CET_h5	0a7b54bd_20201028_101136.data	30 min. run; LArPix forward triggers enabled from ArCLight
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_10_42_05_CET_h5	0a7b54bd_20201028_104136.data	30 min. run; LArPix forward triggers enabled from ArCLight
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_11_14_51_CET_h5		LArPix pedestal; HV on; ArCLight on but idle
					15.9	70	15	ArcLight, th=5600 + self-trigger	datalog_2020_10_28_11_20_47_CET_h5	none	13 DAC --- LArPix internal test pulse (HV off, ArCLight on and taking data) channels responding (>0 efficiency): 4685/4900 (0.96) channels with high efficiency (>0.85 efficiency): 4000/4900 (0.82) overall efficiency (per channel): 0.90 overall cross-talk (per channel): 0.03
					0	0	0	-	none	0a7b54bd_20201028_112135.data	Zero-field ArcLight light yield test. Trigger to PACMAN unplugged.
					0	0	0		datalog_2020_10_28_11_35_46_CET_h5	none	3 DAC --- LArPix internal test pulse (HV off, ArCLight on and taking data) channels responding (>0 efficiency): 4133/4900 (0.84) channels with high efficiency (>0.85 efficiency): 2854/4900 (0.58) overall efficiency (per channel): 0.74 overall cross-talk (per channel): 0.03
									datalog_2020_10_28_11_47_32_CET_h5	none	0 DAC --- LArPix internal test pulse (HV off, ArCLight on and taking data)

Peter Madigan 12:07 AM Yesterday
config-1-2-43-2020_10_26_23_57_36_CET.json

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Data taken and further plan

1. Calibration data for light and charge

2. Scintillation (ArCLight) data for Edrift=0

3. Pixel charge data for Edrift=0.25 kV/cm

4. Syncronous combined data for Edrift=0.5 kV/cm

5. Data with no LAr purification for 24h (sealed detector)

Plan:

- Repurify argon (till tomorrow 8:00 CET)
- Take more syncronous data at 0.5 kV/cm, also with cosmic ray telescope
- Rise to 1kV/cm, take a set of sync data
- Perform a HV scan from 0.2 to 1.0 kV/cm
- Expected stop on Sunday, 1.11.2020

See following talks for data analysis!