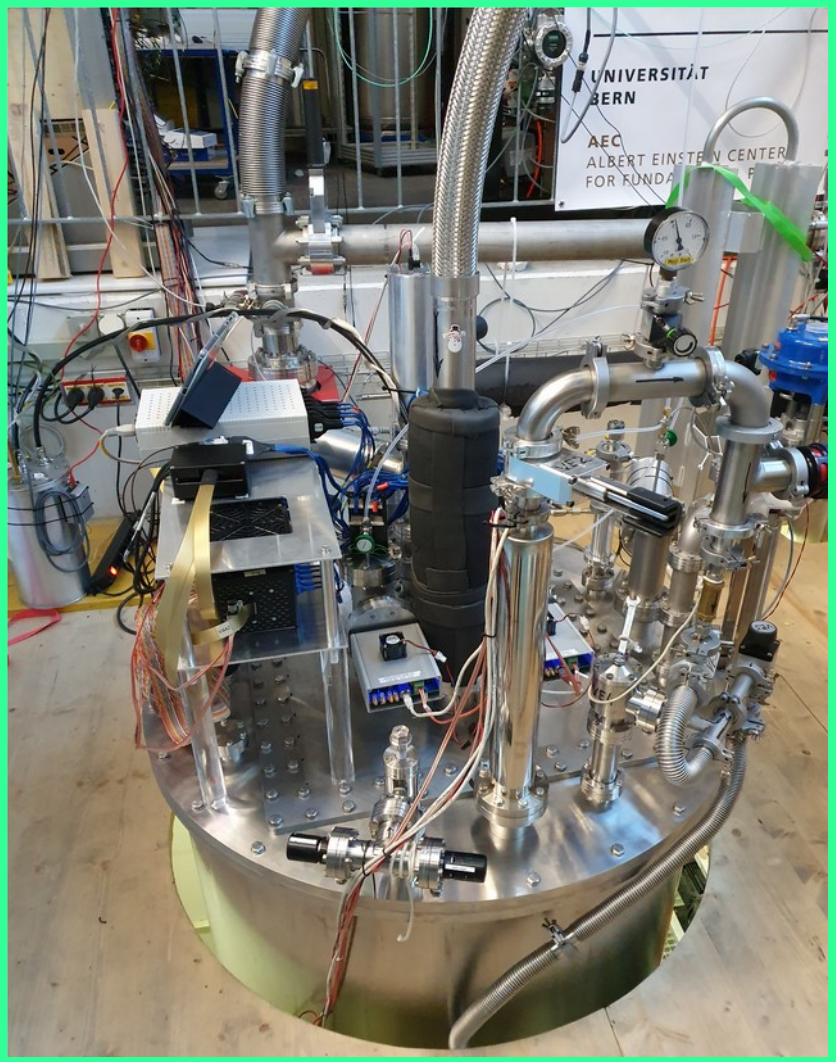
ND-LAr Module-0 test run-2
June 21-27, 2021



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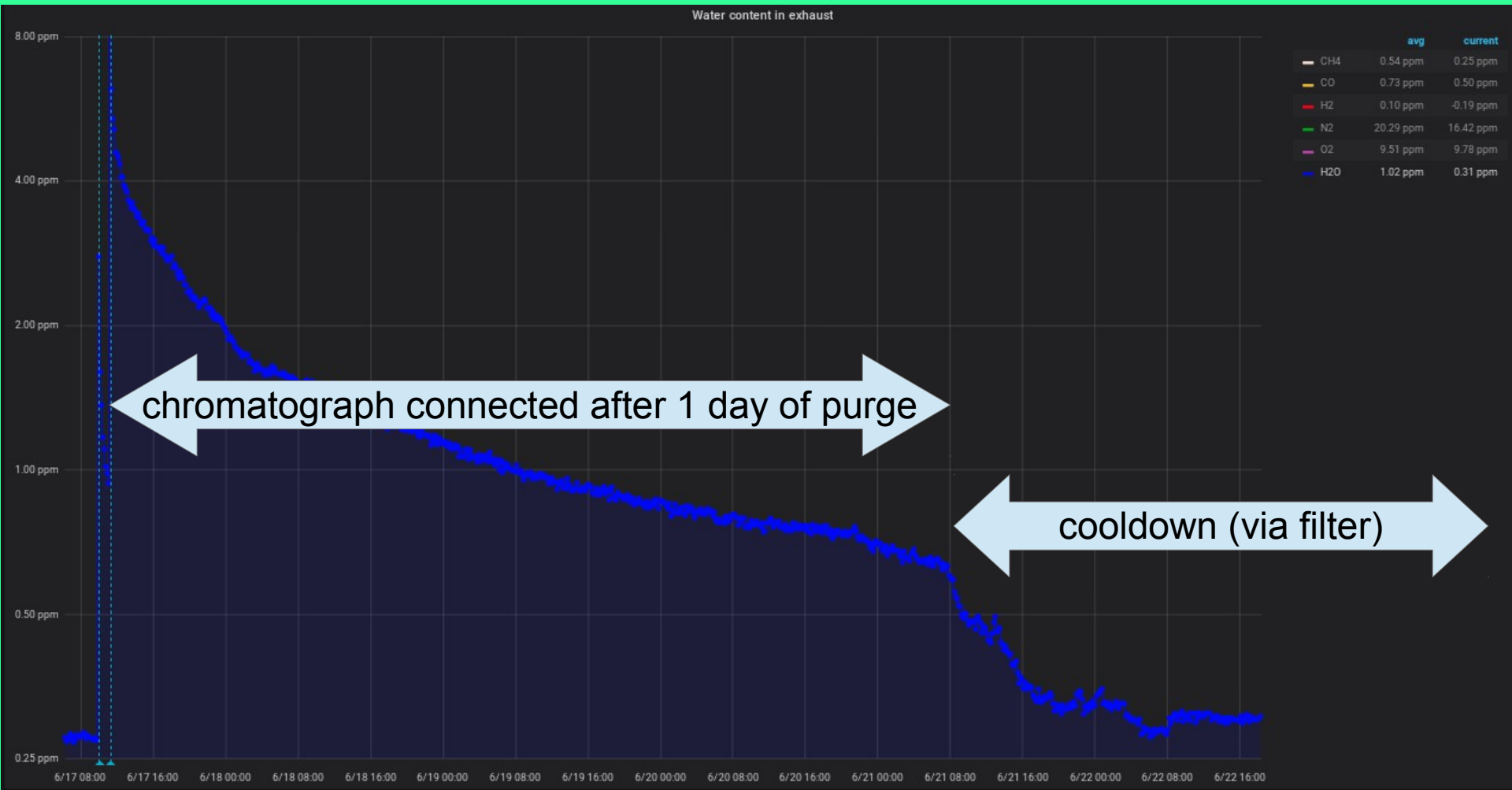
Test objectives

1. Reach the purity with piston purge.
2. Take some more LED pulse data for pulse shape analysis for LDS
3. Measure noise spectrum on the field shell shunt.
4. Gradually lower cooling flow till we have boiling at the ASICs -define the limit
5. Measure noise spectrum on PACMAN analog monitor
6. Take data with trigger from 1 to 4 pixels via analog monitor (& signal from LDS)

Purity

1. Reach the purity with piston purge.

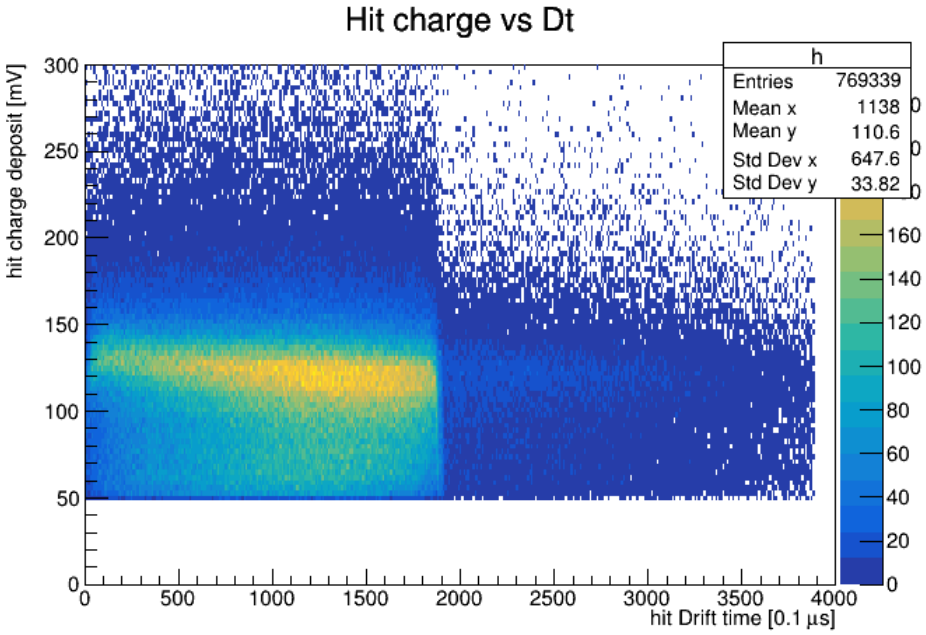
After ~200 gas volume exchanges (5 days),
the H2O level dropped below 1 ppm 3 days after start, 0.7 ppm 5 days after start

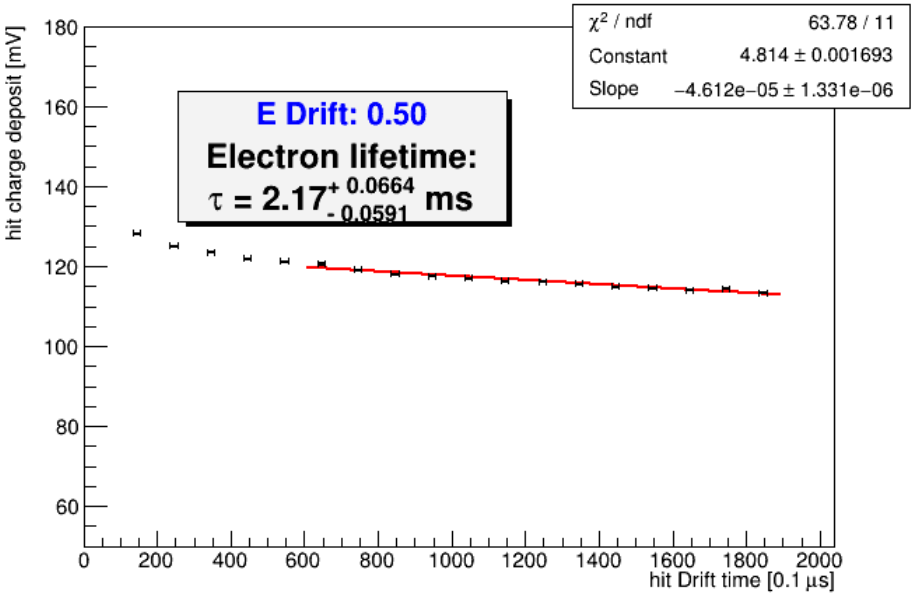


Purity

1. Reach the purity with piston purge.

After ~200 gas volume exchanges,
the H2O level dropped below 1 ppm and after filling and recirculation for 1 day we are at **2.2 ms life time**.

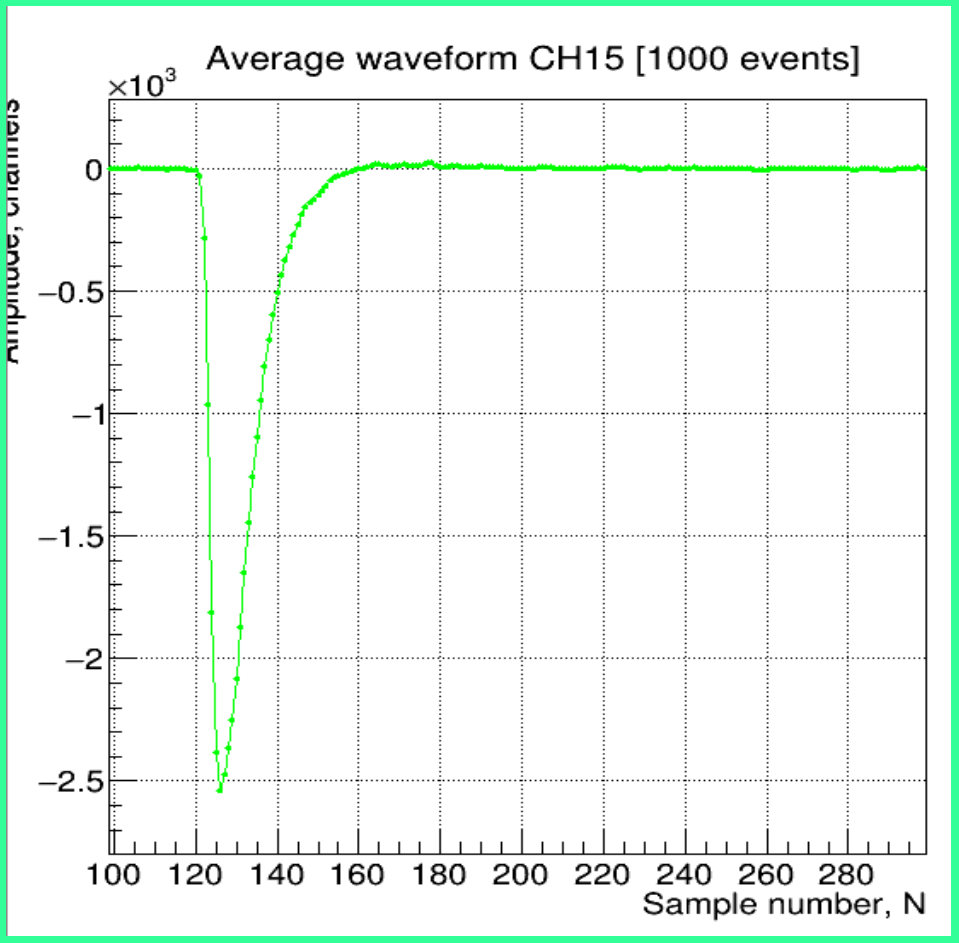


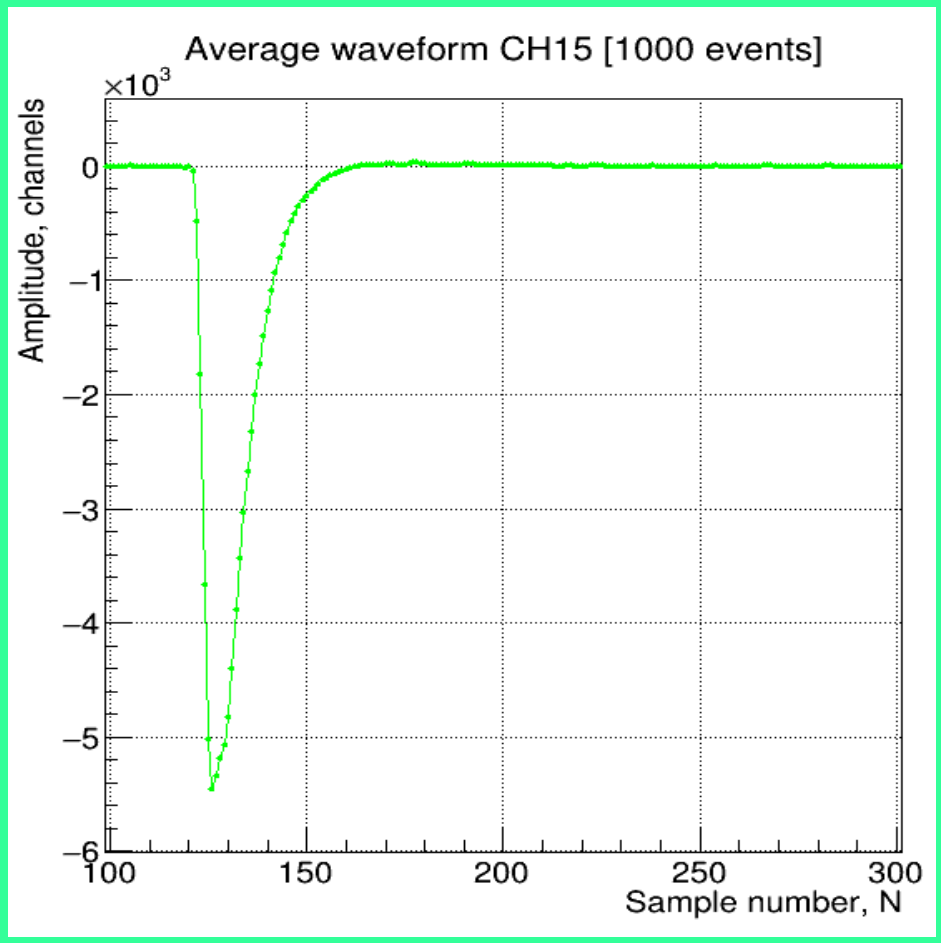


Test objectives

2. Take some more LED pulse data for pulse shape analysis for LDS

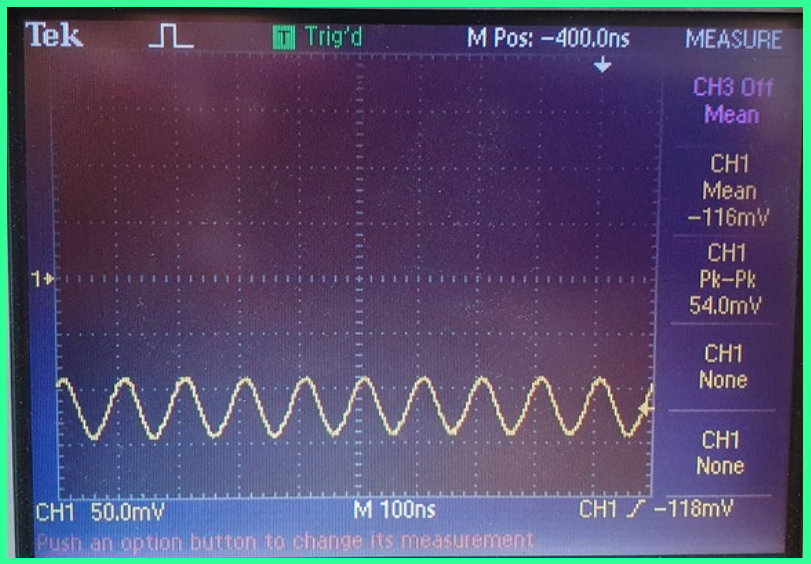
LDS pulse run. Only light data. External trigger to the ADC boards. 10000 events.	20210624_092900.data	5 ns FWHM pulse
LDS pulse run. Only light data. External trigger to the ADC boards. 10000 events.	20210624_094156.data	9 ns FWHM pulse

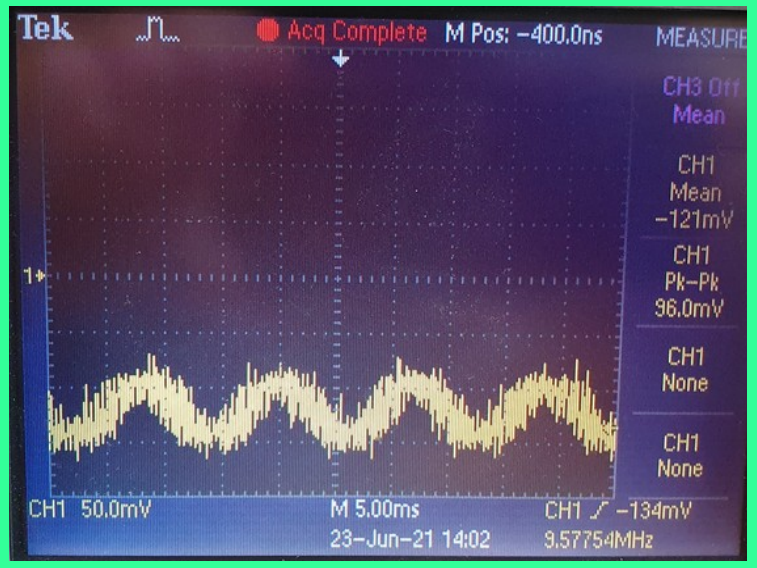




Test objectives

3. Measure noise spectrum on the field shell shunt.





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Flow calculations
(no flowmeter data this run)

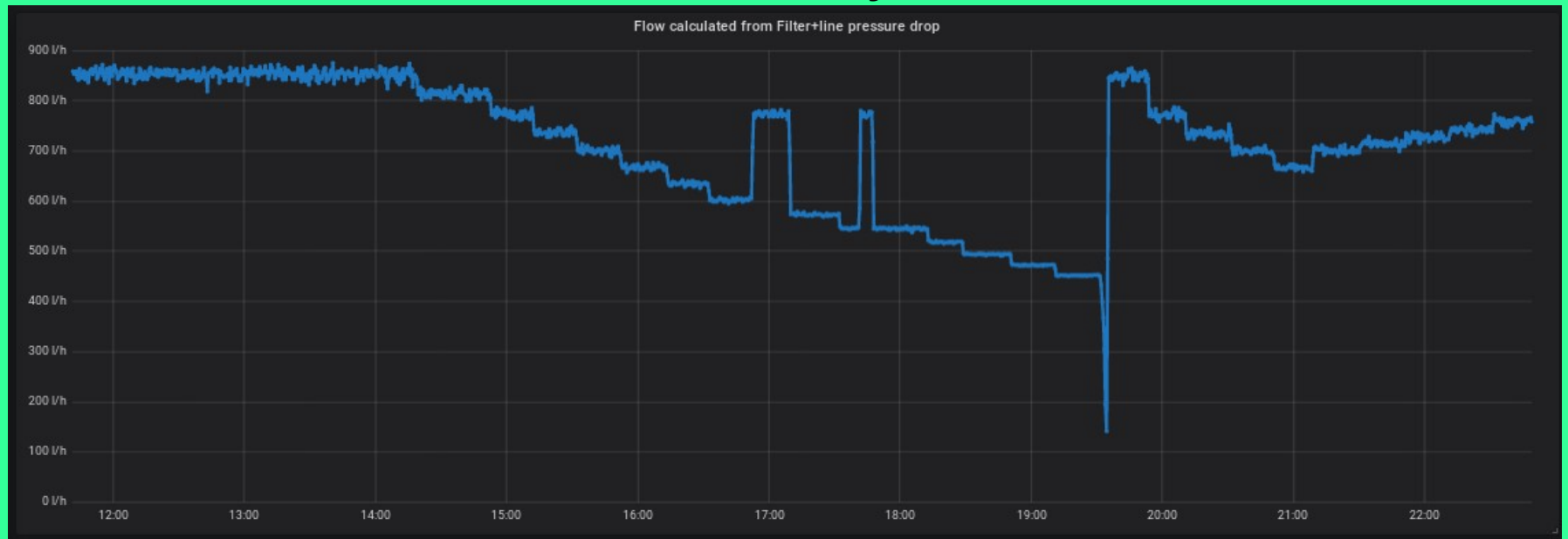
measured:

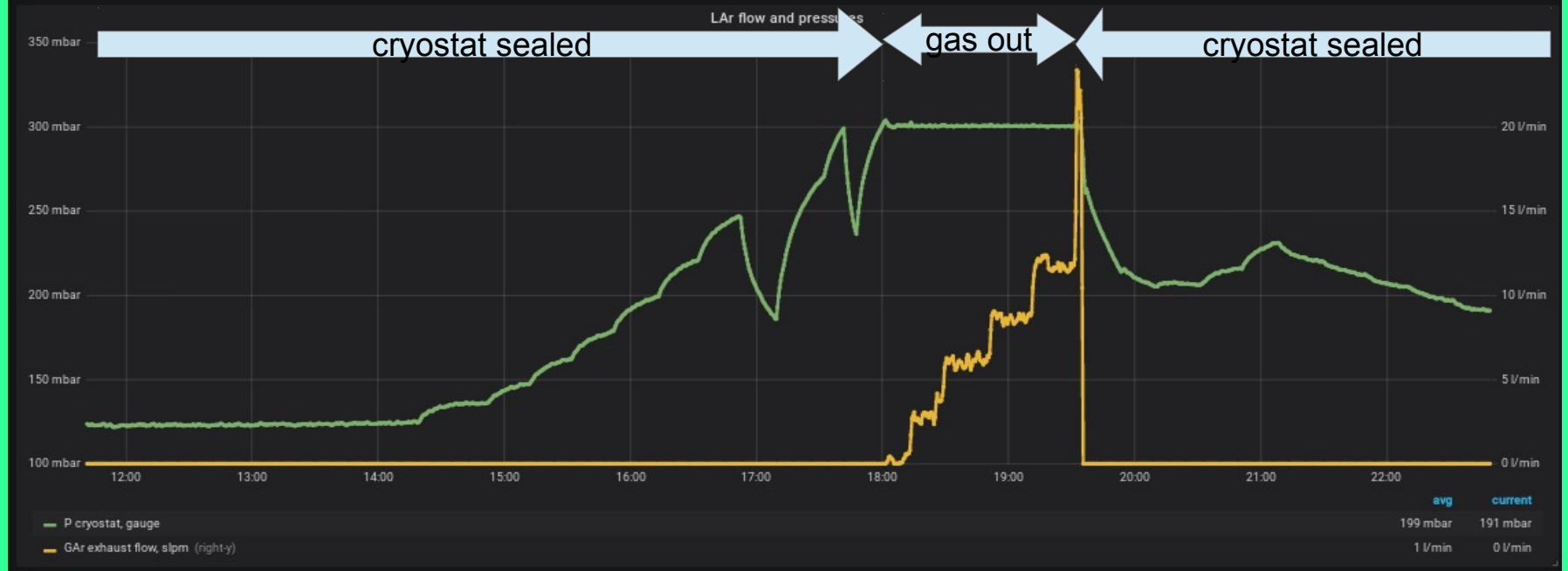
	Run March 21	Run June 21
VFD	90	90
LAR Flow, l/h (flowmeter data)	864	
LAR Flow, l/h (calculated)		853.6
P pump outlet, mbarg	677	713
P filter out, mbarg	330	369
P cryostat, mbarg	81	123
dP filter, mbar	347	344
dP diffusers, mbar	249	246
Filter impedance, dP/Flow, mbar*h/l	**0.402**	**0.403**
Diffusers+line impedance	**0.288**	**0.288**

Cooling performance

4. Lower cooling flow till we have boiling at the ASICS

Cooling performance
Pressure in the cryostat and boil off





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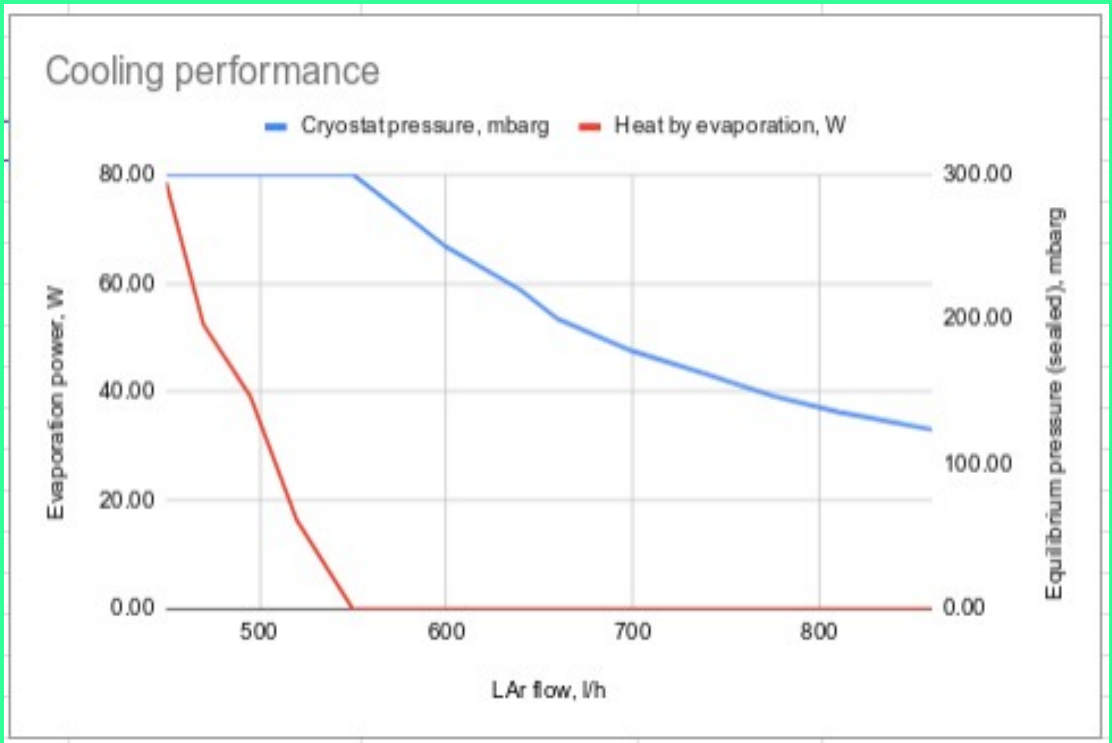
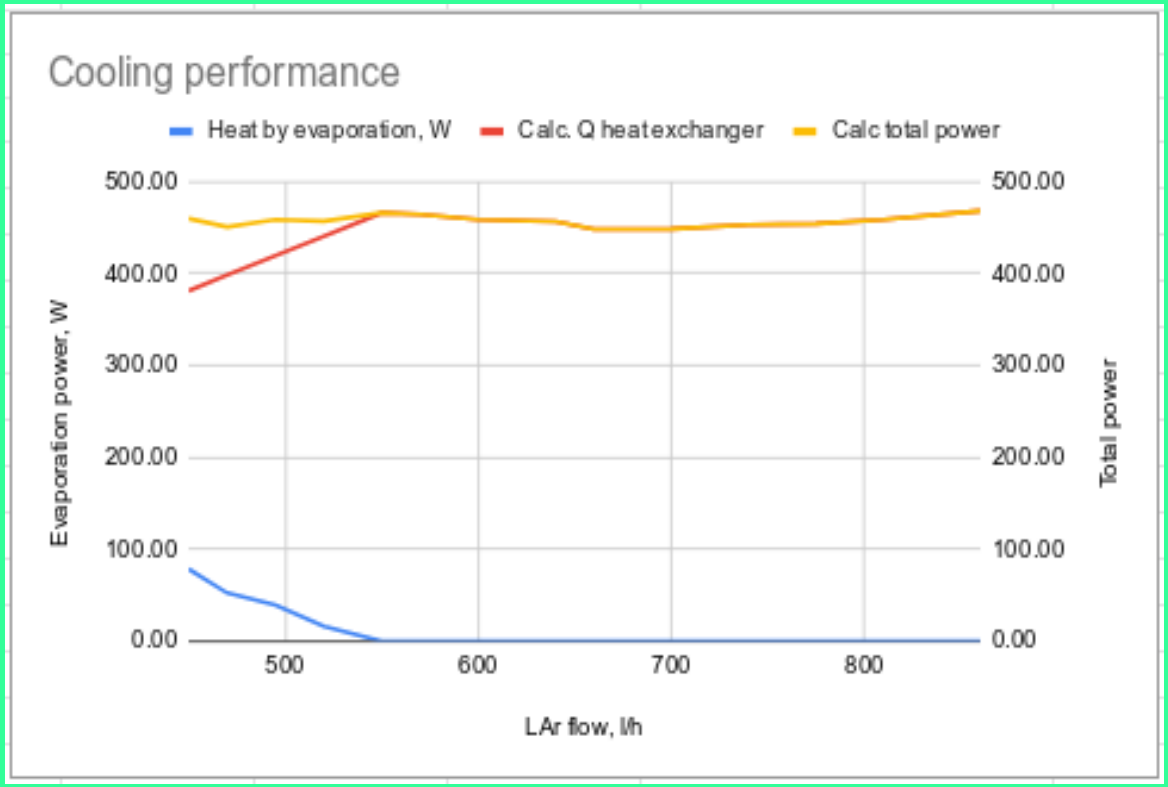
Cooling performance
Pressure in the cryostat and evaporation heat



Cooling performance

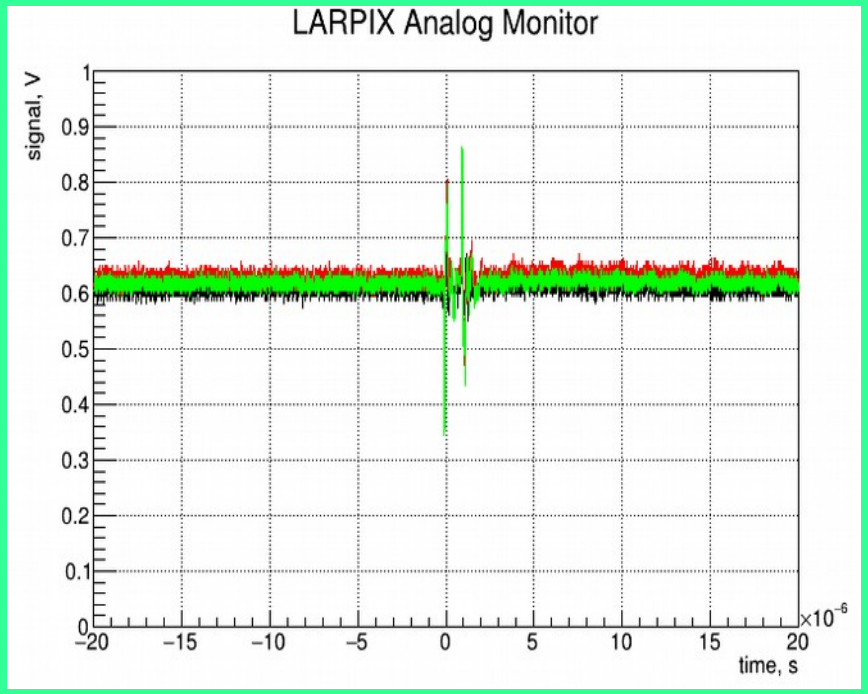


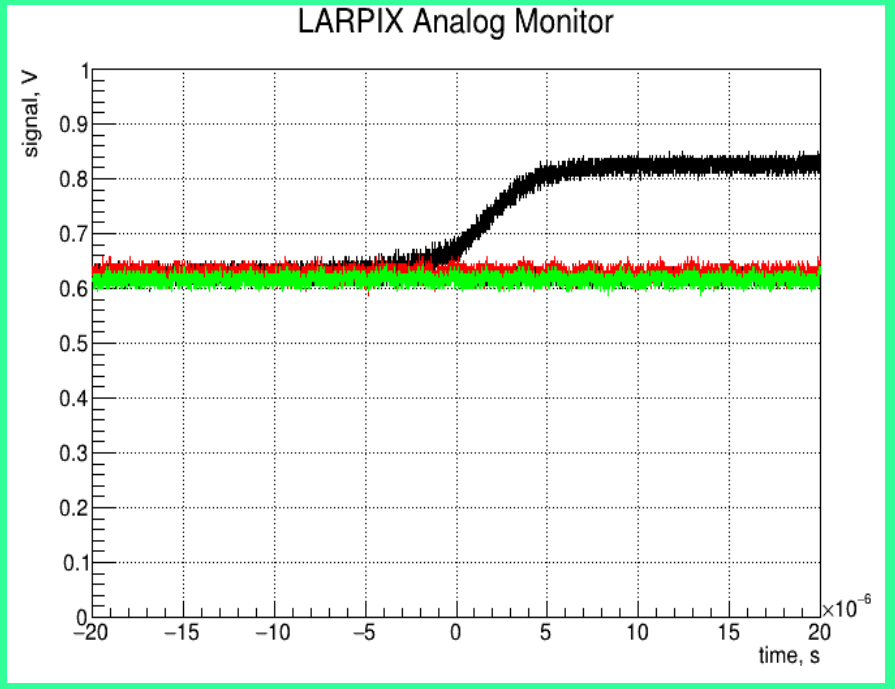
Test objectives

5. Measure noise spectrum on PACMAN analog monitor

6. Take data with trigger from 1 to 4 pixels via analog monitor (& signal from LDS)

(Noise spectrum for 5. will be derived from 6.)





Run-2 conclusion

All items of the plan fulfilled.

Short test: 5 days of piston purge + 7 days from warm to warm.

Acquired some missing information for system improvements and ND design

Proven reproducible detector performance after Run 1.