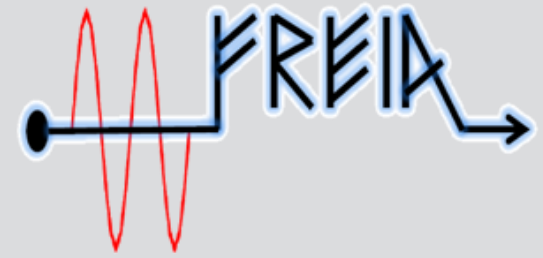




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ESS weekly meeting (2022 W05)

A. Miyazaki et al

FREIA Planning		2022-01-19		2022												
		January					February				March			Apr		
Equipment	Responsible	3	10	17	24	31	7	14	21	28	7	14	21	28	4	11
		week #														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Liquefier & 2K pumps	Esat		█	█	█	█		█	█			█	█			
RF power stations	Mykhailo		█		█		█		█		█		█		█	
Cryomodule test stan	Akira		█	CM07	█	█	CM08	█	█	█	CM09	█	█	█	█	█

We are here

CM07 to ESS

CM09 from Orsay

CM08 to ESS

CM10 from Orsay

- Optimistic planning without any contingency
- We aim at testing three modules before the Easter holidays



W04 & W05 progress & W06 planning



week		W04											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		24-jan		25-jan		26-jan		27-jan		28-jan		29-jan	30-jan
		m	a	m	a	m	a	m	a	m	a		
present CM	CM07	4K filling; 2K pumping	CTS test	piezo and heat load		CTS test with Beckhoff PLC; heat load		heat load		start warming	vent insulation vacuum	warming up	
next CM	CM08												
next next CM	CM09	preparation at Orsay											

week		W05											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		31-jan		01-feb		02-feb		03-feb		04-feb		05-feb	06-feb
		m	a	m	a	m	a	m	a	m	a		
previous CM	CM07	warming up completed	disconnect vac pumps	disconnect cryogenics	swap modules	N2 filling	out going test	waiting in the box		activate shock sensor	waiting in the box		
present CM	CM08	doorknob mounting				waveguide connection	connect cryo lines	connect vacuum pumps	pumping vacuum				
next CM	CM09	preparation at Orsay							departure from Orsay		transport		

We are here

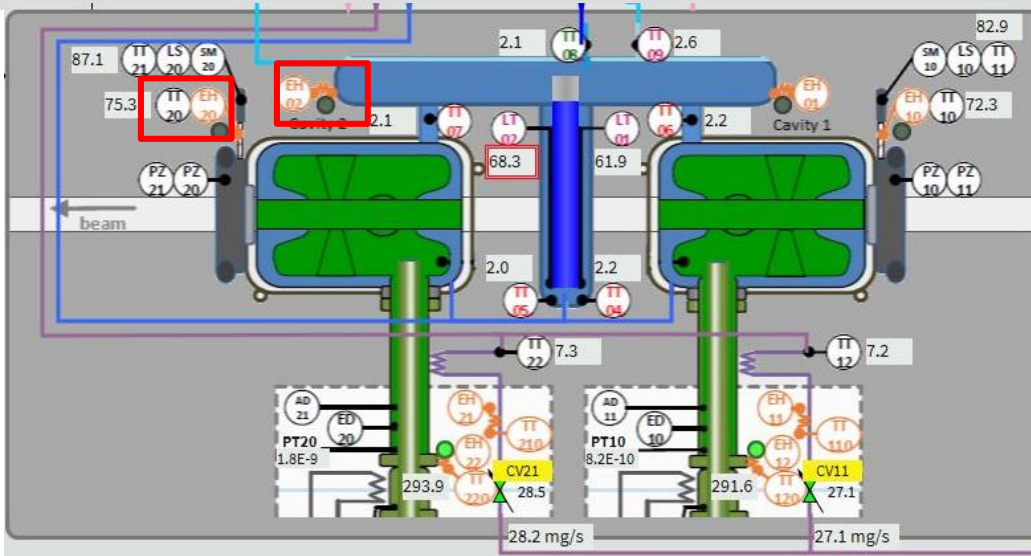
week		W06											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		07-feb		08-feb		09-feb		10-feb		11-feb		12-feb	13-feb
		m	a	m	a	m	a	m	a	m	a		
previous CM	CM07	departure to ESS		preparing report				publish report					
present CM	CM08	coupler warm conditioning						purging	N2 cooling				
next CM	CM09	9:00		transport from Orsay				arrival at UU		reception test			

What time?



- LT02 is touching the ground only at cold
- At warm, no problem was observed
- Similar observation in the elliptical modules (IFJPAN)
- Is it possible to fix this in ESS?

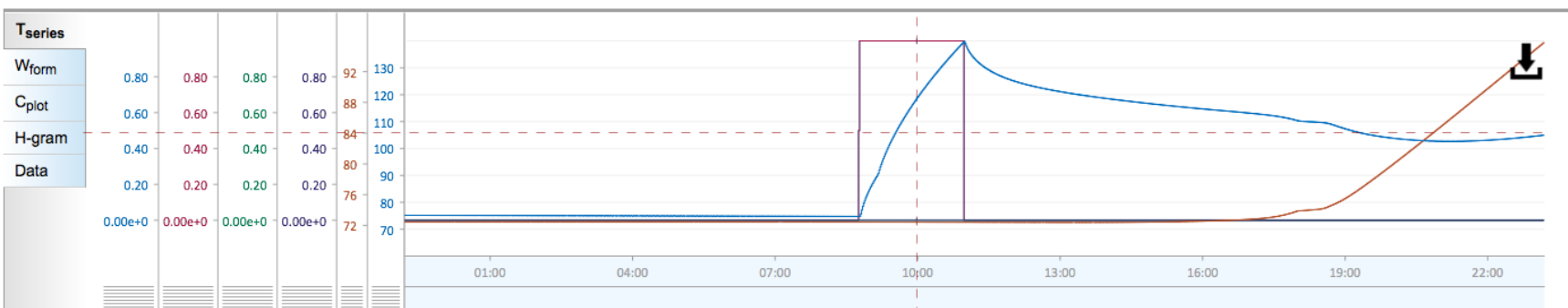
CM07: EH02 and EH20 seem swapped inside



- EH02 heated up TT20 indicating EH20 is wrongly connected
- No issues were found outside the module (CM08 was OK)
- Cable swapping inside CM07 similar to the first CM02 test

Del	Plot	Name	DBRType	Units	Processing	Scale	Time (local)	Value	Notes
x	<input checked="" type="checkbox"/>	CM-CM:EH01:sHtrOn	DBR_SCALAR_ENUM	undefined		linear	2022-01-28 09:58:11		1
x	<input checked="" type="checkbox"/>	CM-CM:EH02:sHtrOn	DBR_SCALAR_ENUM	undefined		linear	2022-01-28 09:58:11		1
x	<input checked="" type="checkbox"/>	CM-CTS:EH10:sHtrOn	DBR_SCALAR_ENUM	undefined		linear	2022-01-28 09:58:11		0
x	<input checked="" type="checkbox"/>	CM-CTS:EH20:sHtrOn	DBR_SCALAR_ENUM	undefined		linear	2022-01-28 09:58:11		0
x	<input checked="" type="checkbox"/>	CM-CTS:TT10:sRdV	DBR_SCALAR_DOUBLE	K		linear	2022-01-28 09:58:11	72.41601171212822	
x	<input checked="" type="checkbox"/>	CM-CTS:TT20:sRdV	DBR_SCALAR_DOUBLE	K		linear	2022-01-28 09:58:11	118.41299019607843	

WINDOW SIZE: 1 year 1 month 2w 1w 2.5 d 1d 18h 12h 8h 4h 2h 1h 30m 10m 5m 1m 30s END: 2022-01-28 23 :11 :40 NOW < > AUTO



CM07: CAVIN reached 12 MV/m



FREIA SPOKE HIGH POWER TEST_Cav 1
time: 16:25:53

Configuration | Calibration and pulse parameter setting | Phase shifter and Gain control | PNA | Scope | decay measurement | heat load measurement | LFD measurement

High speed (10Ms/s) Transfer speed
Standard (50 kSample) FFT buffer size

Pause Single ● status

select for decay measurement

Display
 Time and Frequency
 Phase and Magnitude
 Buffer
 Last data only
 Buffer data

Amplitude Time
Chart length: 400000

unwrap phase
Reference for phase: 5761 - Ch1
 Show buffers

Amplitude Time

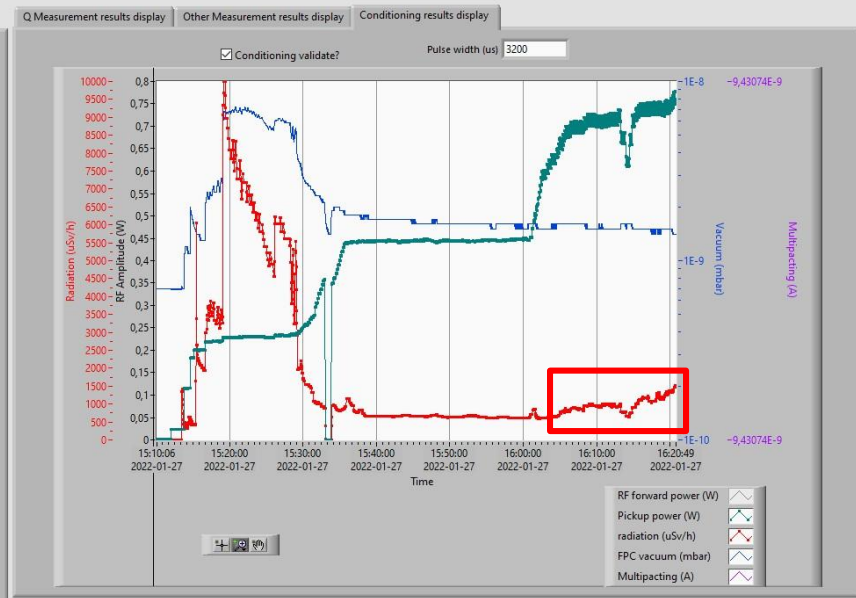
PID control | Apaptive FF | Offsets | Feed forward | Cavity model | FFT | Delay

Quench detection Scale

Measure Tau at Time Tau set Enable Reset Quench Warning

Tau [μs] Quench_Warning

FPGA setup
 Mode: Real IO Mixer freq [MHz]: 352.2 Trigger: Trigger input
 Output mixer frequency [MHz]: 352.2 Period: 0
 Output enabled
 Output delay: 0 ns
 Output delay delta: 0 ps

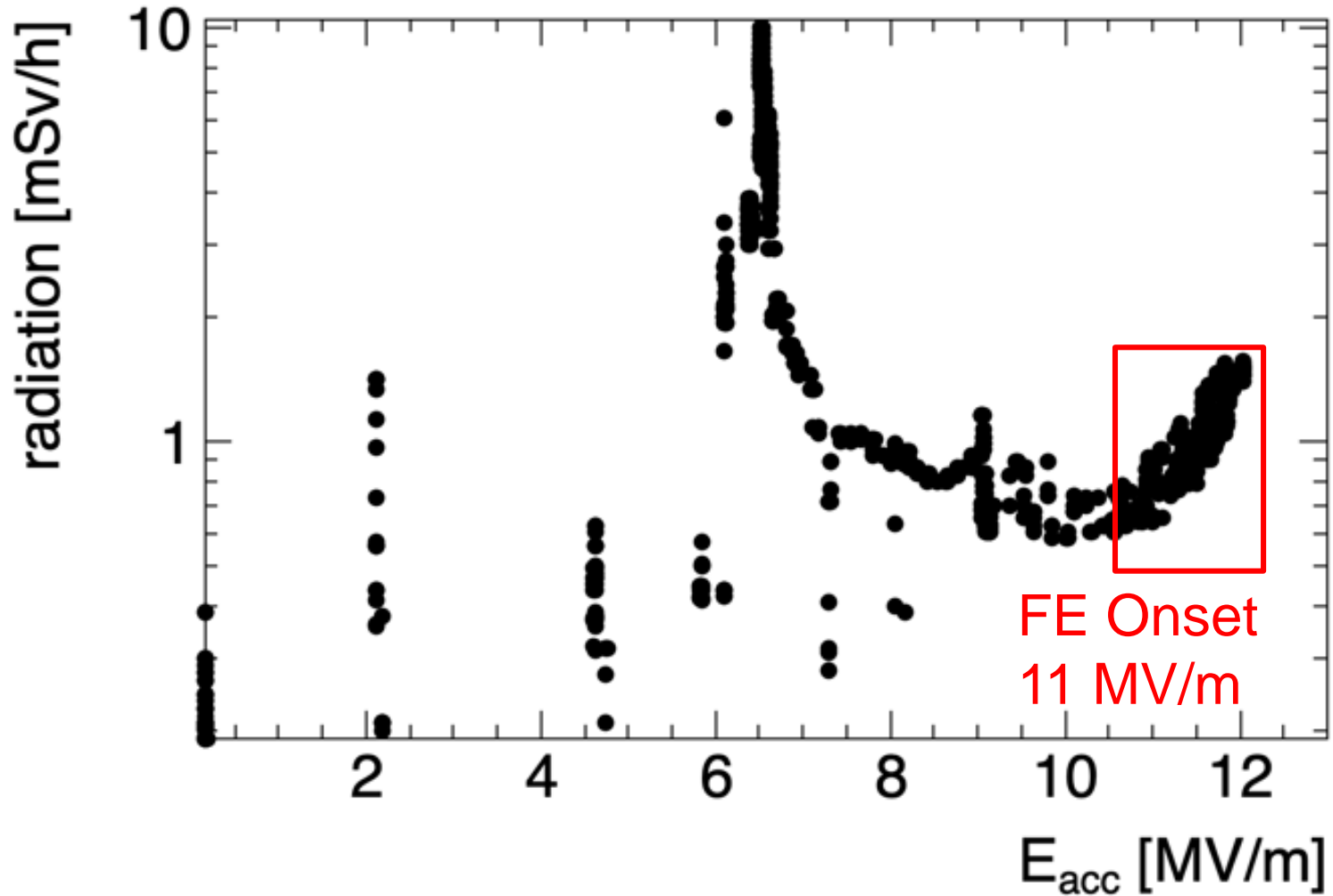


Pf_max (dBm) 85,0682	Pf_max (W) 321236	P_total (W) 0	QL 183300	Ct 1,78E+11
Pr_max (dBm) 89,2628	Pr_max (W) 843887	P_static (W) 0	real time frequency_fc 0E+0	
Pt_max(dBm) 28,914	Pt_max (W) 0,778758	P_heater (W) 0	Pc_dynamic(W) 0	
			Vc_ave (MV) 0	

Pf_max (W)	Q0_Dynamic	Eacc_Dynamic	Eacc_pk_Pt	Eacc_pk_Pf
321236	0	0	12,0121	15,6759

TT04	TT06	PT02	PT03	Radiation	PT10	PT20
2,16054	2,16413	9999	30,9	1510	1,4E-9	2,7E-9

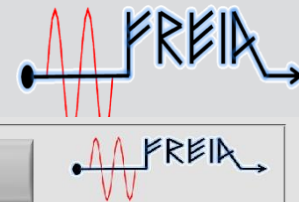
Mild field emission was observed





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CM07: CAVOUT reached 12 MV/m



FREIA SPOKE HIGH POWER TEST_Cav 2

time: 16:40:01

HELP QUIT

Configuration Calibration and pulse parameter setting Phase shifter and Gain controller PNA Scope decay measurement heat load measurement LFD measurement

Pause

Single

status

High speed (10Ms/s) Transfer speed

Standard (50 kSample) FFT buffer size

select for decay measurement

Display
 Time and Frequency
 Phase and Magnitude
Buffer
 Last data only
 Buffer data

Time

Amplitude

Chart length

400000

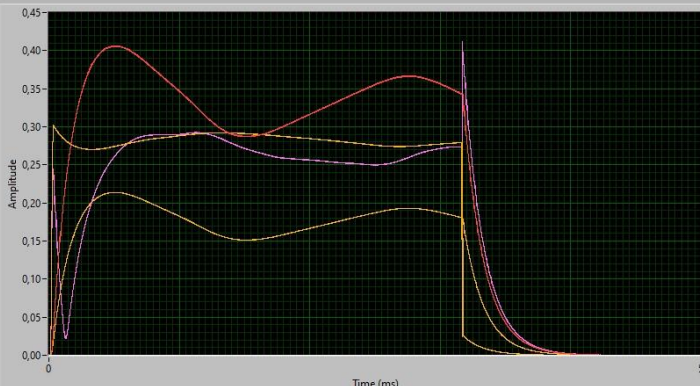
unwrap phase
Reference for phase
5761 - Ch1

Show buffers

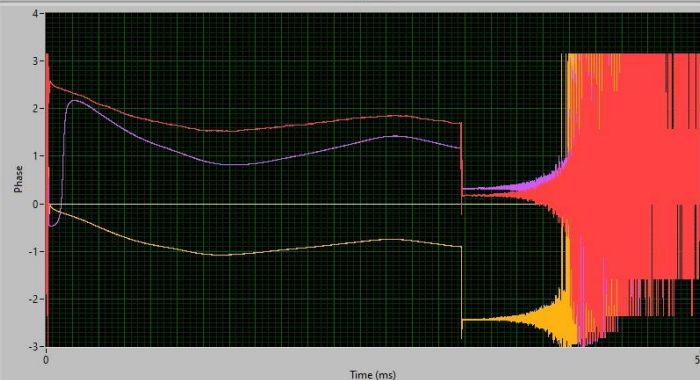
Time

Amplitude

- 5785 - Ch0I
- 5785 - Ch0Q
- Ch1I cavity
- Ch1Q cavity
- 5785 - Ch1I
- 5785 - Ch1Q
- 5761 - Ch0I
- 5761 - Ch0Q
- 5761 - Ch1I
- 5761 - Ch1Q
- 5761 - Ch2I
- 5761 - Ch2Q
- 5761 - Ch3I
- 5761 - Ch3Q



- Ch0
- Ch1 cavity
- Ch1
- Ch0
- Ch1
- Ch2
- Ch3



FPGA setup

Mode: Real IO Mixer freq [MHz]: 352 Trigger: Trigger input

Output mixer frequency [MHz]: 352 Period: 0

Output enabled:

Output delay: 0 ns

Output delay delta: 0 ps

PID control

Offsets

Feed forward

Cavity model

FFT

Delay

Scale

Adaptive FF

Quench detection

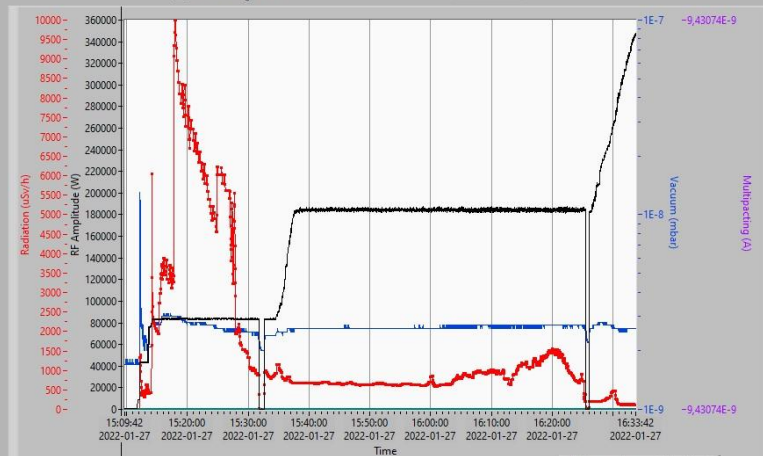
Measure Tau at Time: 32200 Tau set: 120 Enable: Reset Quench Warning:

Tau [us]: 160,941 Quench Warning:

Q Measurement results display Other Measurement results display Conditioning results display

Conditioning validate?

Pulse width (us) 3200



RF forward power (W)

Pickup power (W)

radiation (uSv/h)

FPC vacuum (mbar)

Multipacting (A)

Pf_max (dBm)	Pf_max (W)	P_total (W)
85,4003	346765	0
Pr_max (dBm)	Pr_max (W)	P_static (W)
88,2873	674105	0
Pt_max (dBm)	Pt_max (W)	P_heater (W)
28,2232	0,664227	0

QL 175900 Qt 2,1E+11

real time frequency_fc 0E+0

Pc_dynamic(W) 0

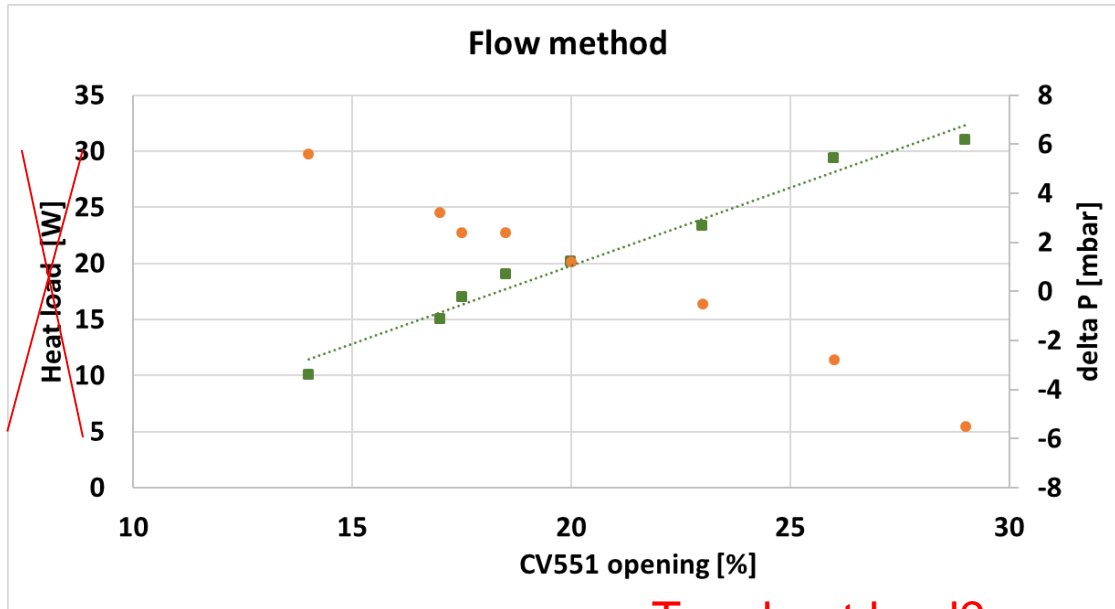
Vc_ave (MV) 0

Pf_max (W)	Q0_Dynamic	Eacc_Dynamic	Eacc_pk_Pt	Eacc_pk_Pf
346765	0	0	12,0634	15,9547

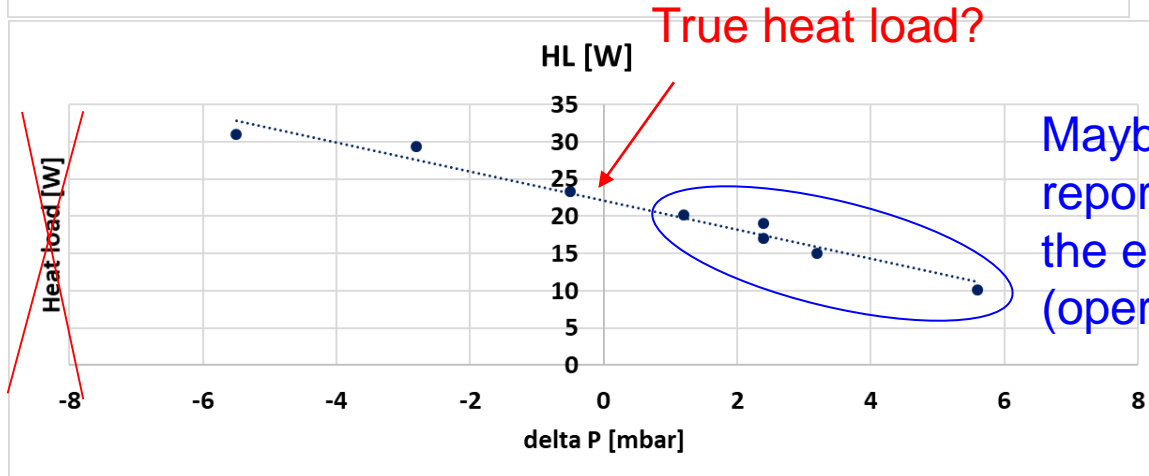
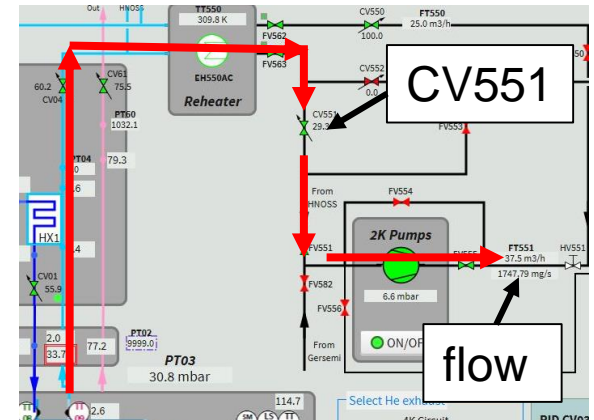
TT05	TT07	PT02	PT03	Radiation	PT10	PT20
2,01885	2,05486	9999	31,4	124	1E-9	2,6E-9

8

Systematic issue in static heat load



GHe exhaust



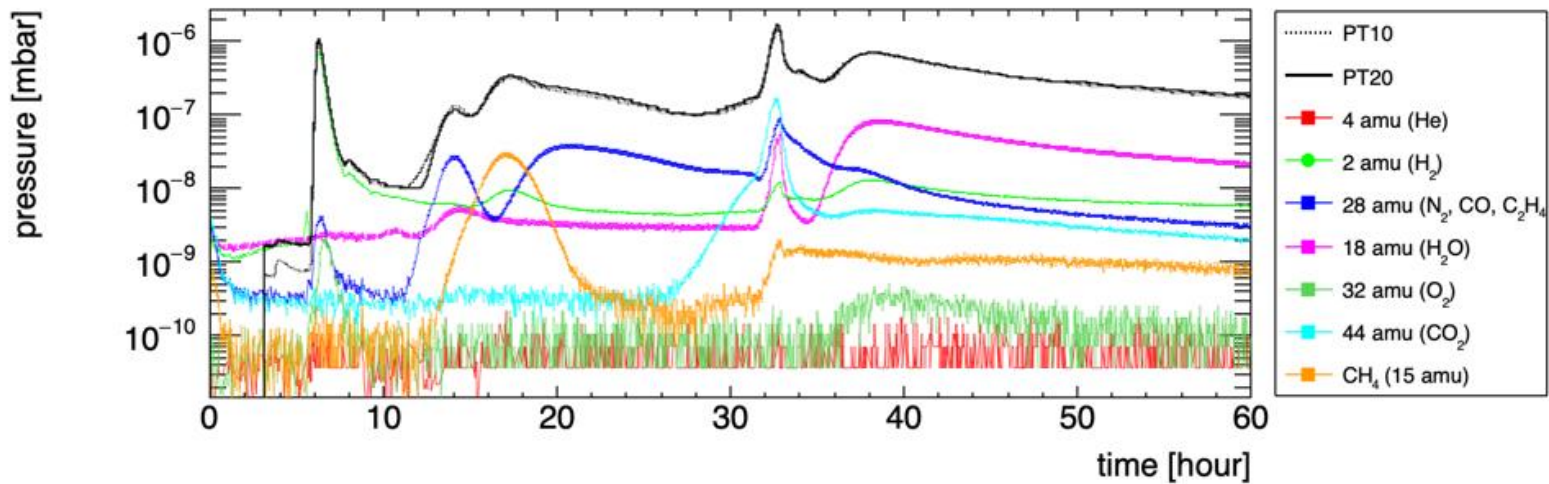
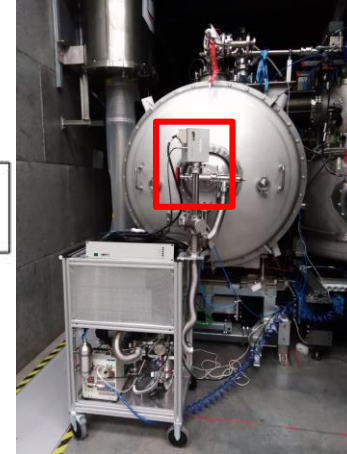
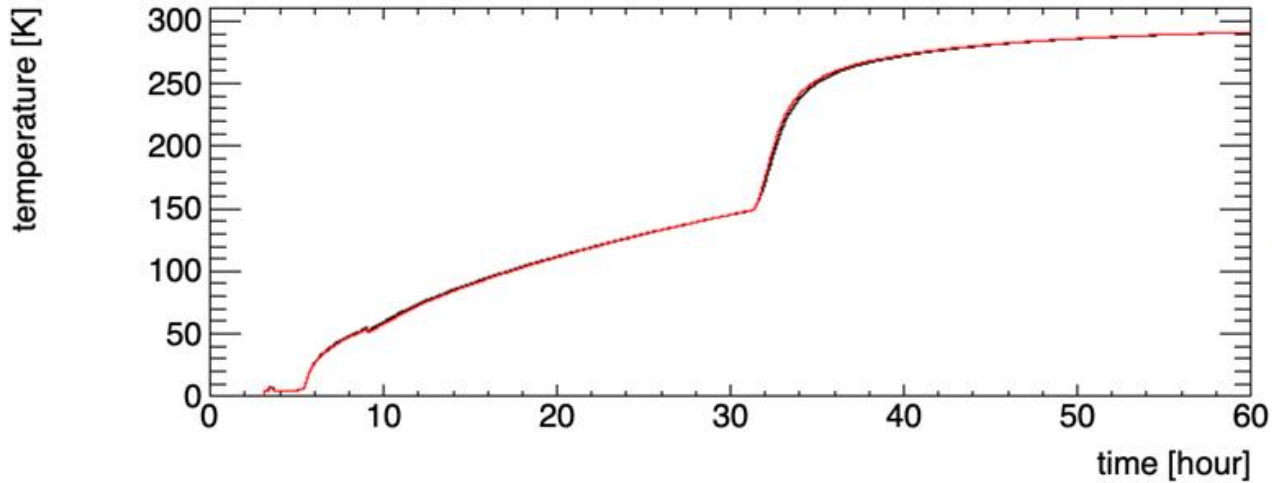
Maybe the reason why we reported lower heat load in the early stage modules (operator dependent)

Dynamic heat load is a relative measurement so reported small values are not affected by this findings in static heat load

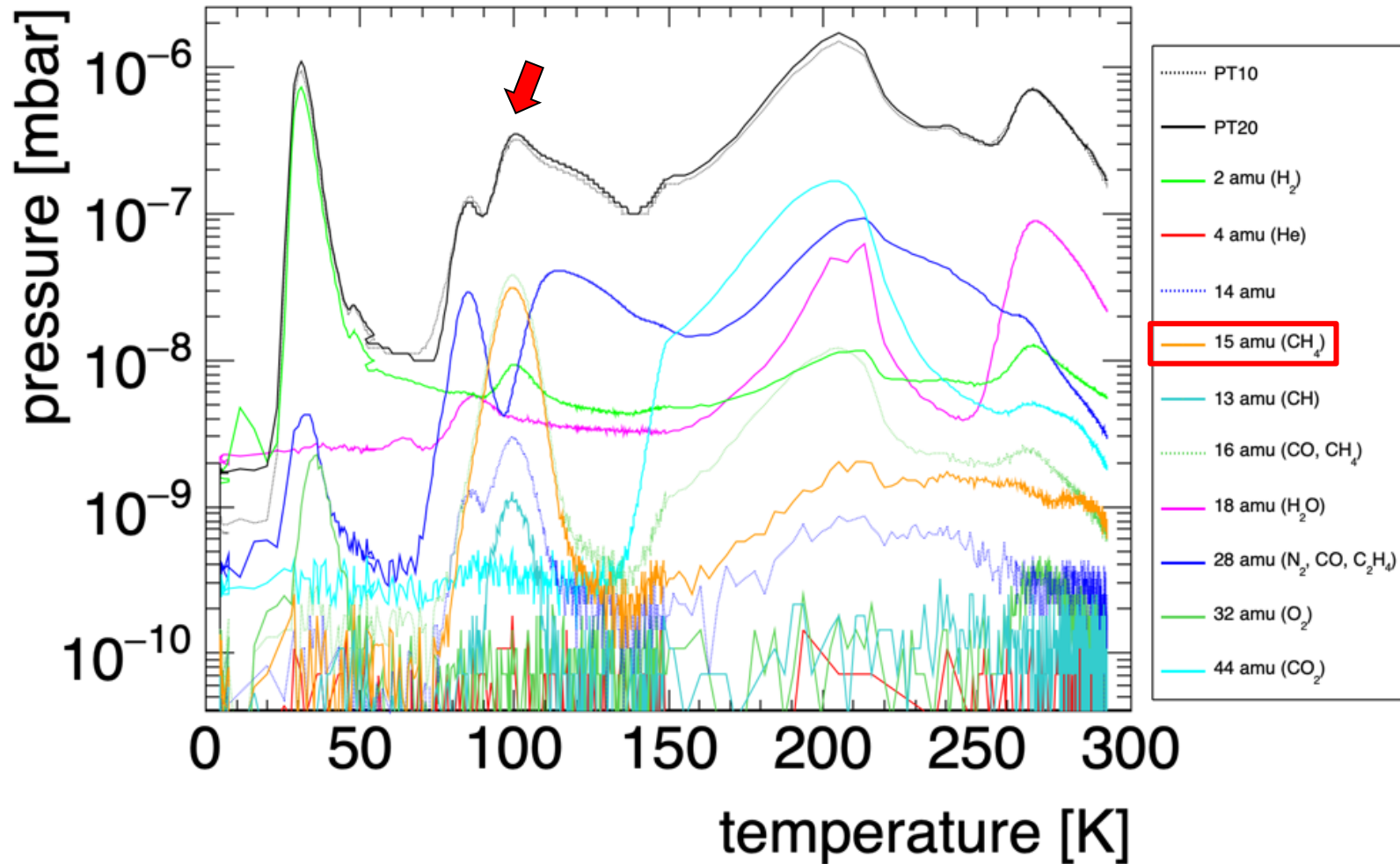
CM07: out-gassing during warming up

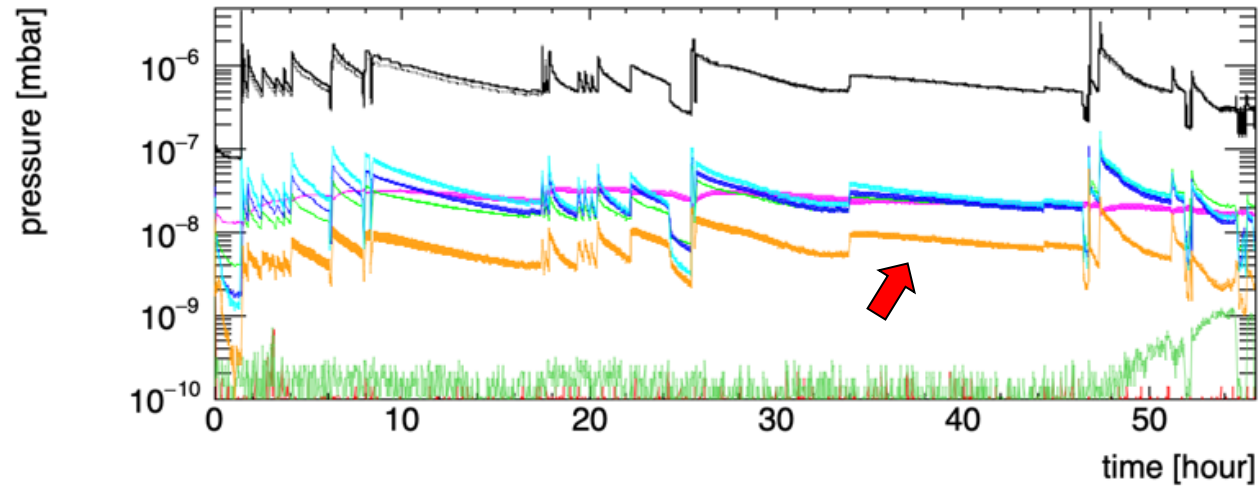
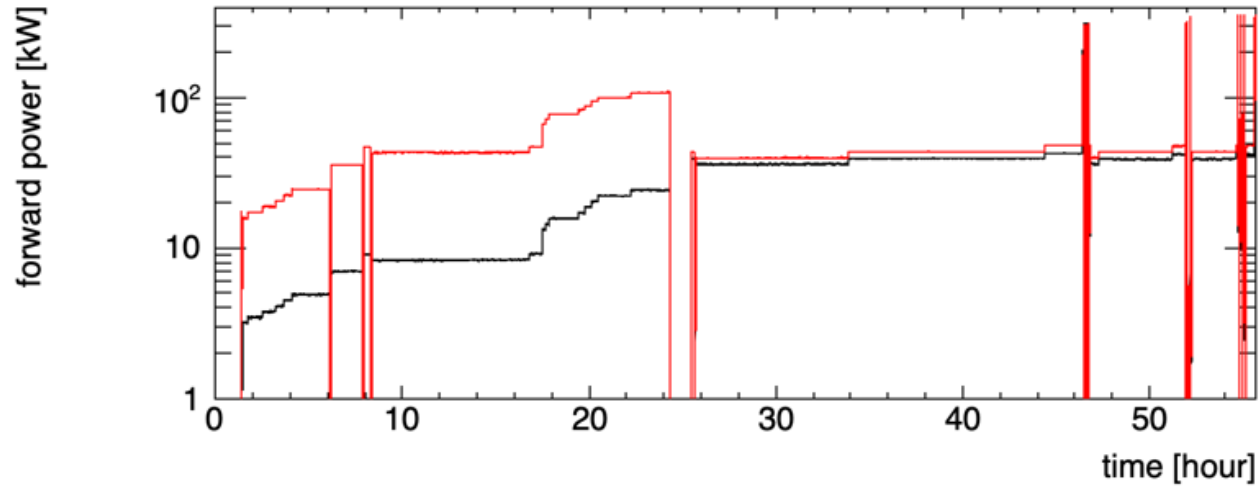


RGA



CM07: out-gassing temperature

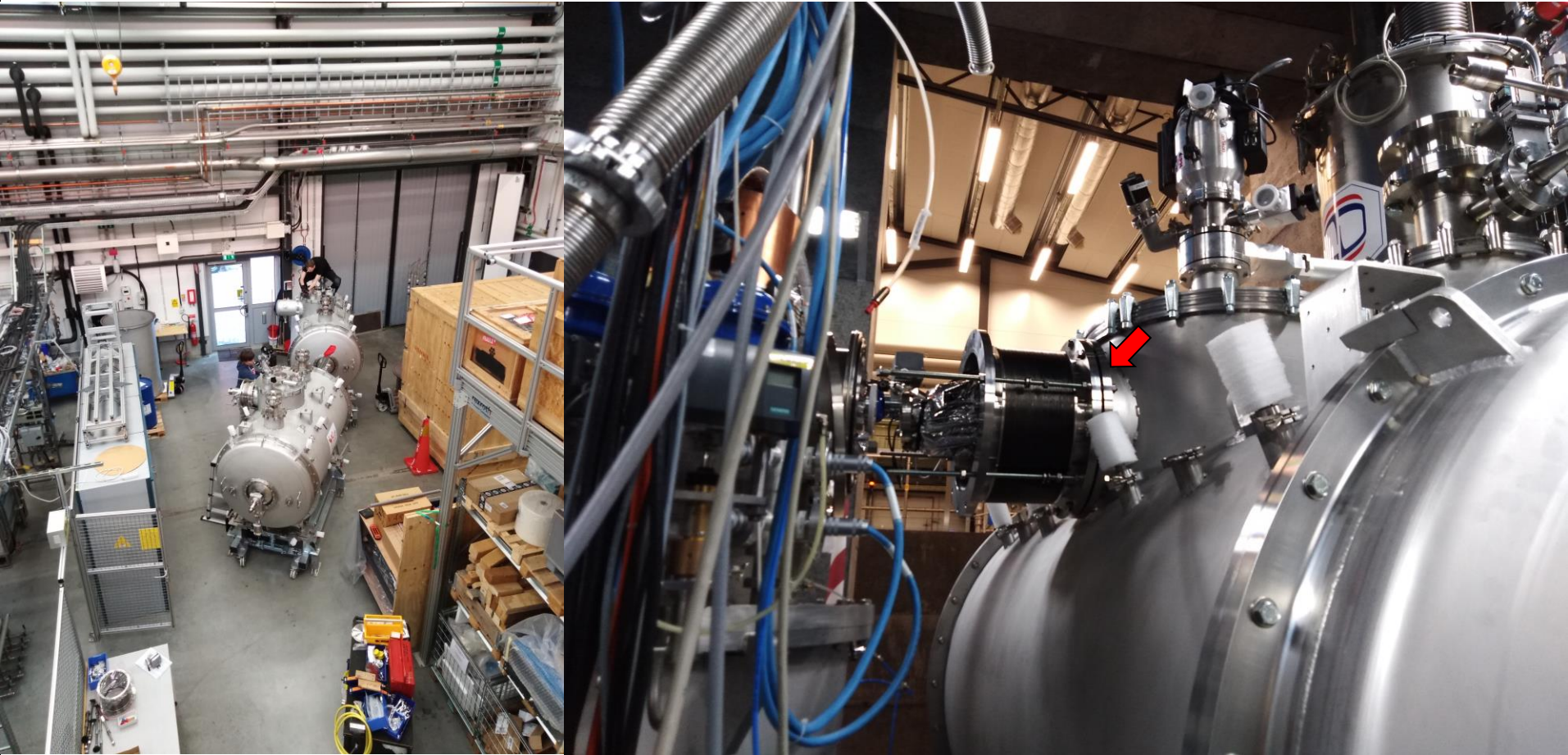




CM07: almost ready for shipping



- Final LEMO check
- Activate shock sensors



- The flange for CM02 did not fit so we open the CM08 pallet and fit the flange
- The fitting is very tight. Something changed before CM06 and after CM07?