



ESS spoke CM02 (2nd run) /CM04/CM05
weekly meeting
202103018
Han Li



- CM04 delivery
- CM05 arrival
- CM02 installation
- FPC warm conditioning
- Test plan

CM04:

- Mount and activate shock sensors ✓
- Packing ✓
- Delivery (CM04 and one empty box) ✓

CM05:

- CM05 and it's jumper bellow ✓
- Only one shock sensor
- Incoming test
- Mounting the doorknob
(in two weeks' time, 30th and 31st March)



CM05 arrival

- The main screws that fixing CM on the frame are missing!
- Some displacement has been observed
- Will check with shock sensor data

Beam vacuum:
1.2E-3 mbar





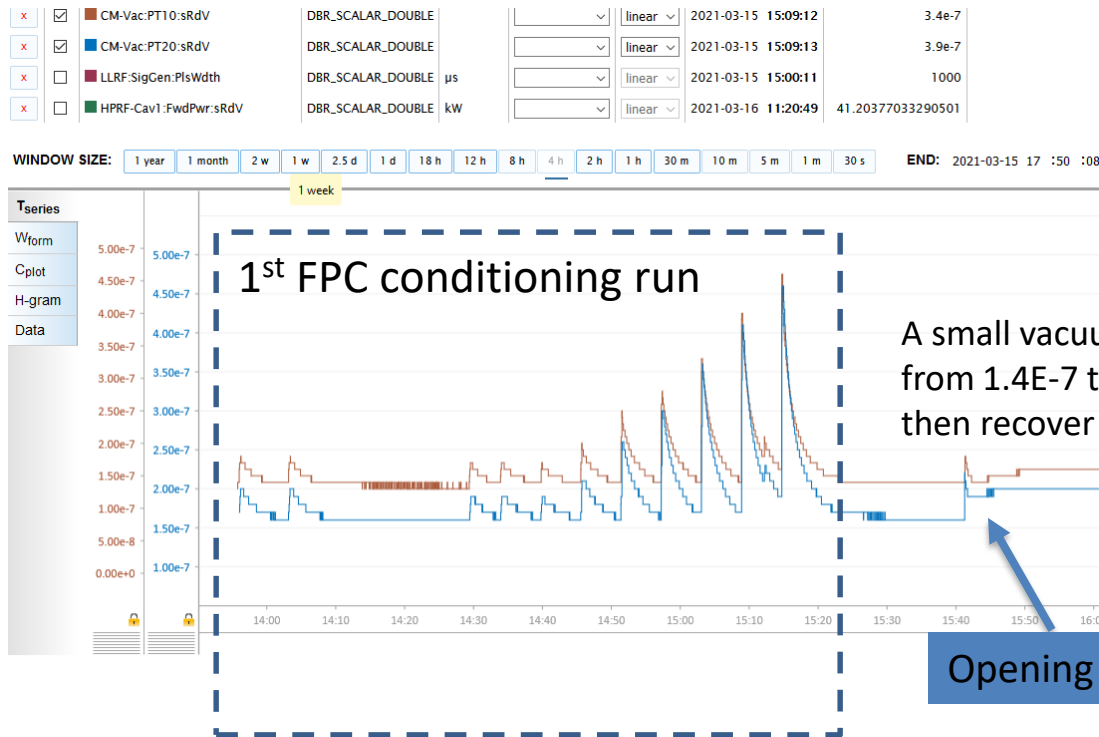
Hardware:

- Doorknob ✓
- Sensors and gauges: arc detector, electron pickup ✓
- Waveguide bellows mounting ✓
- Safety valve mounting ✓
- Pressure gauge mounting ✓
- Turbo-pump mounting for insulation vacuum ✓
- Cryogenic jumper ✓
- View ports for alignment ✓
- Beam vacuum pumping cart connection ✓
- FPC water cooling pipe connection ✓
- Cabling: arc, e-pickup, lemo connector... ✓
- CM alignment checking with insulation vacuum ✓
- Close bunker ✓

Ready for RF measurement



- Connect two pumping carts on both sides.
- Connect compress gas to both gate valves.
- Both gate valves are fully open after pipe leak check.
- The gate valve (CAV_IN) is fully open before the FPC warm conditioning
- The gate valve (CAV_OUT) is fully open during the FPC warm conditioning



Hardware setting:

- Two pumping carts on both sides ✓
- Amplifier in the power supply for Electrosys section 2 is fixed ✓
 - ✓ First aid by homemade welding
 - ✓ Substitute components has arrived

FPC conditioning:

- FPCs' conditioning are done by FREIA auto conditioning program
- Test with RF station and coupler (off resonance) up to around 400kW @ 3.2ms
- Using e- pickup and arc interlock for FPC
- Frequency for off resonance conditioning : 353 MHz

Parameter	value
Loop control time (s)	1
Pulse repeat rate (Hz)	14
Vacuum upper limit (mbar)	5e-6
Vacuum lower limit (mbar)	5e-7
Initial pulse length (μs)	50
pulse length step	50μs, 100μs, 250μs, 500 μs, 1ms, 2 ms, 3.2ms
Vacuum hardware interlock (mbar)	1e-5
e- pickup interlock (mA)	2

4 conditioning runs:

Before FPC conditioning :vacuum baseline $1.5E-7$ mbar@ FPC1 & $1.7E-7$ mbar@ FPC1

1. Main run : from 50us to 3.2 ms only 1.5h, outgassing at 76 dBm less then $5E-7$ mbar

After FPC conditioning :vacuum baseline $1.6E-7$ mbar

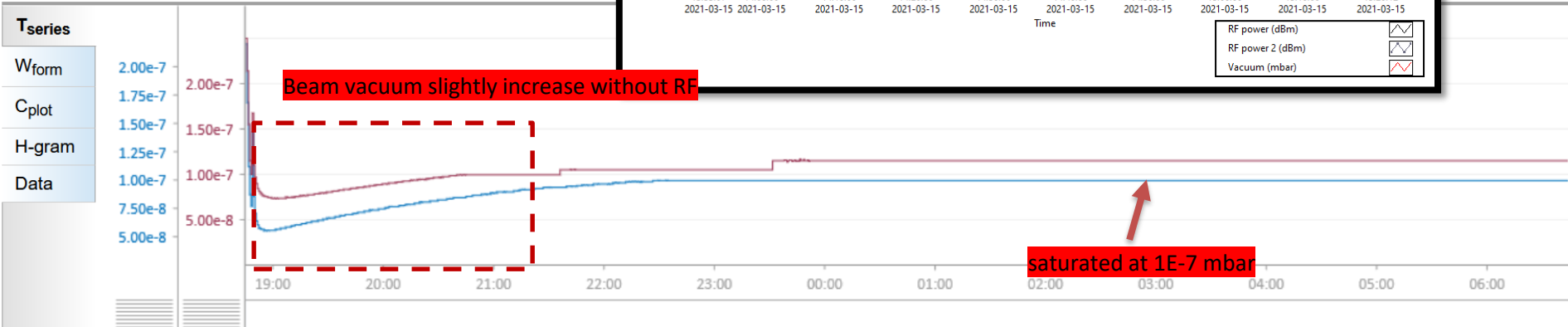
2. Auto cycle run 2# at 3.2 ms: 3.5 h, outgassing at 76 dBm

After FPC conditioning :vacuum baseline $5.5E-8$ mbar

A small beam vacuum increase after RF stop: from $5.5E-8$ to $1E-7$ mbar (stabilized)

Del	Plot	Name	DBRType	Units	Process
<input type="checkbox"/>	<input checked="" type="checkbox"/>	CM-Vac:PT10:sRdV	DBR_SCALAR_DOUBLE		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	CM-Vac:PT20:sRdV	DBR_SCALAR_DOUBLE		
<input type="checkbox"/>	<input type="checkbox"/>	HPRF-Cav1:FwdPwr:sRdV	DBR_SCALAR_DOUBLE	kw	

WINDOW SIZE: 1 year 1 month 2 w 1 w 2.5 d 1 d 18 h 12



3. Auto cycle run 2# at 3.2 ms: 5h, outgassing at 76 dBm
After FPC conditioning :vacuum baseline 3E-8 mbar
4. Auto cycle run 3# at 3.2 ms: 1h, outgassing at 76 dBm
After FPC conditioning :vacuum baseline 1.6E-8 mbar

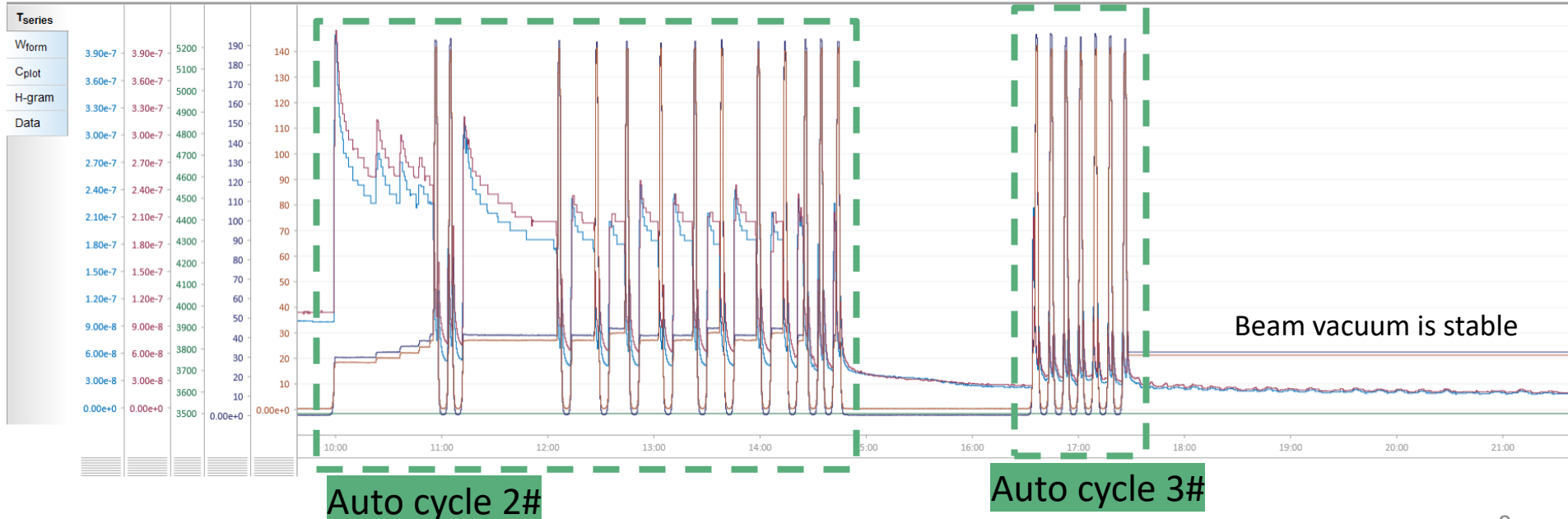
Actual FPC warm conditioning
time: 11 h

Thanks to :

- ✓ the FPC conditioning at last test run
- ✓ well kept of beam vacuum

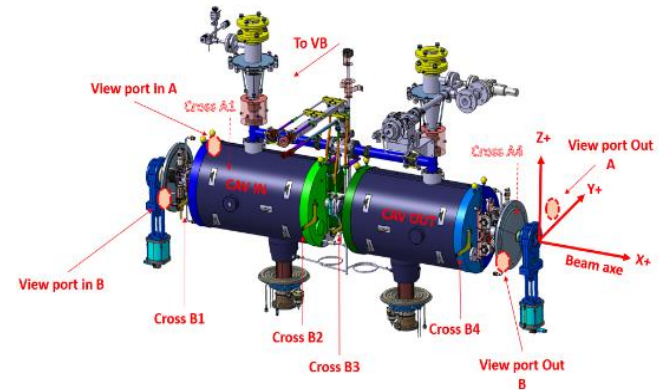
Del	Plot	Name	DBRType	Units	Processing	Scale	Time (local)	Value	Notes
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<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CM-Vac:PT20:sRdV	DBR_SCALAR_DOUBLE			linear	2021-03-16 12:41:02	2.05e-7	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	LLRF:SigGen:PlsWidth	DBR_SCALAR_DOUBLE	µs		linear	2021-03-16 12:41:02	3500	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	HPRF-Cav1:FwdPwr:sRdV	DBR_SCALAR_DOUBLE	kW		linear	2021-03-16 12:41:02	44.48789333809561	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	HPRF-Cav2:FwdPwr:sRdV	DBR_SCALAR_DOUBLE	kW		linear	2021-03-16 12:41:02	29.946677343851093	

WINDOW SIZE: 1 year 1 month 2 w 1 w 2.5 d 1 d 18 h 12 h 8 h 4 h 2 h 1 h 30 m 10 m 5 m 1 m 30 s END: 2021-03-16 21 :38 :14 NOW < >



- Test with insulation vacuum at room temperature
- Will check at 2 K and after warm up

date			
20210315			
Measurement at room temperature	Side B	Y (mm)	Z (mm)
	View port in B	/	/
	Cross B1	0.87 (red)	0.41 (red)
	Cross B2	0.53 (red)	0.25 (red)
	Cross B3	0.50 (red)	0.81 (black)
	Cross B4	0.84 (red)	0.06 (red)
	View port out B	/	/



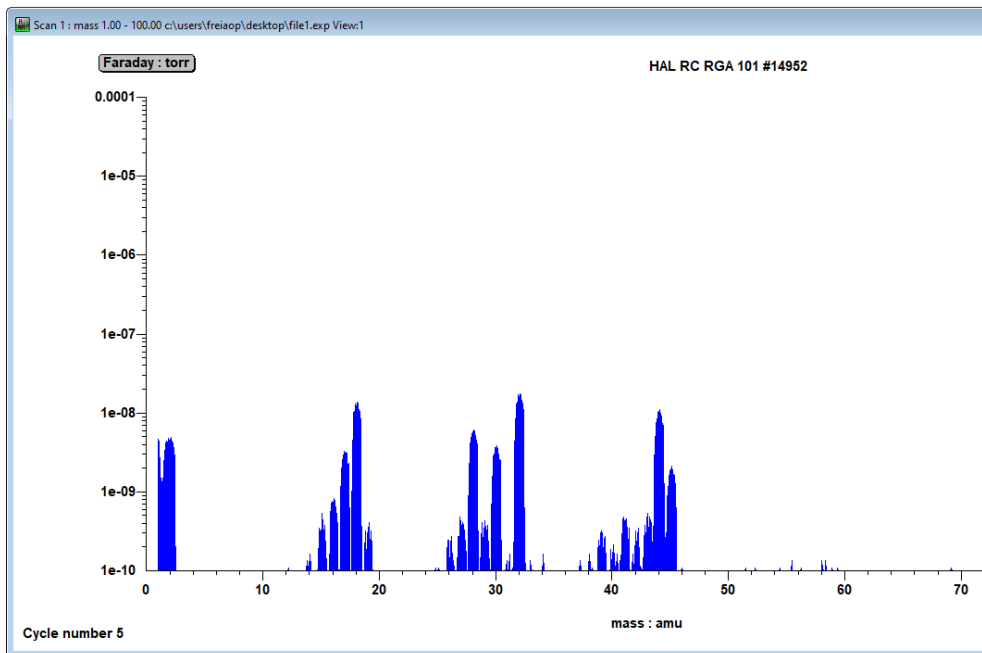


Leak test

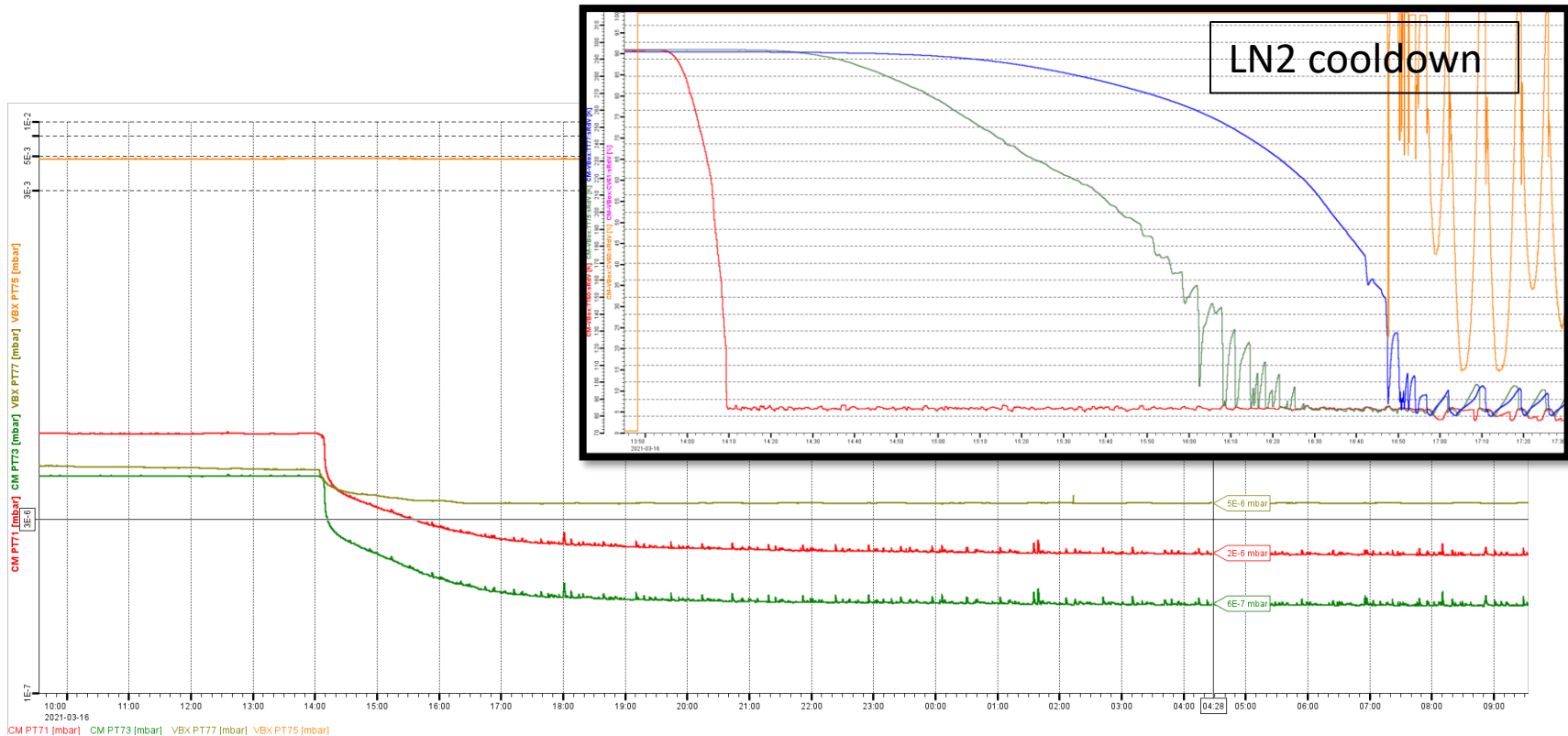


- Connect RGA to the beam vacuum
- Connect leak detect to the insulation vacuum
- Check the RGA analysis during helium circuit purging
 - ✓ No pressure change in beam vacuum
 - ✓ No helium signal

No leak has been observed for CM02



- LN2 cooldown for thermal screen shield
 - ✓ 3h from the beginning of the cooldown with LN2 until CV60 started to regulate (when TT77 is <96 K)
 - ✓ Insulation vacuum is Ok, around 5E-6 mbar
 - 4 K cooldown will start tomorrow
- Keep the CM02 around 4K during the weekend



- 5 out of 9 heaters are malfunctional for the water cooling system
- Replace the new heaters
- Cool down will be implemented after repairing





Test item	time	comment
CM04 Warm up (RGA connect) CM02 arrival	15 th -21 th Feb.	
CM04 Leak test /alignment at warm CM02 unpack, incoming test	22 th Feb.	
CM04 Disconnect, packing	23 th -26 th Feb.	
CM02 installation CM04 Disconnect, packing, shipment	1 st - 12 th Mar.	
CM02 FPC warm conditioning	15 th -17 th Mar.	CM02
CM alignment measurement	16 th Mar.	CM02
Heater repair	18 th	
CM cooldown to 4 K	19 th Mar.	CM02
CM cooldown to 2 K	22 th Mar.	CM02
FPC cold conditioning	23 rd Mar.	Simultaneously
CTS test	24 th -25 th Mar.	CTS measurement
Cavity conditioning (on resonance) Heat load/Q measurement	29 th -31 st Mar.	Open loop
Warm up	1 st -4 th Apr.	
alignment at warm	5 th Apr.	
Disconnect, packing, shipment	6 th -14 th Apr.	