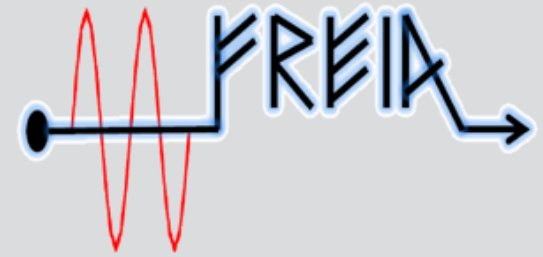




UPPSALA
UNIVERSITET

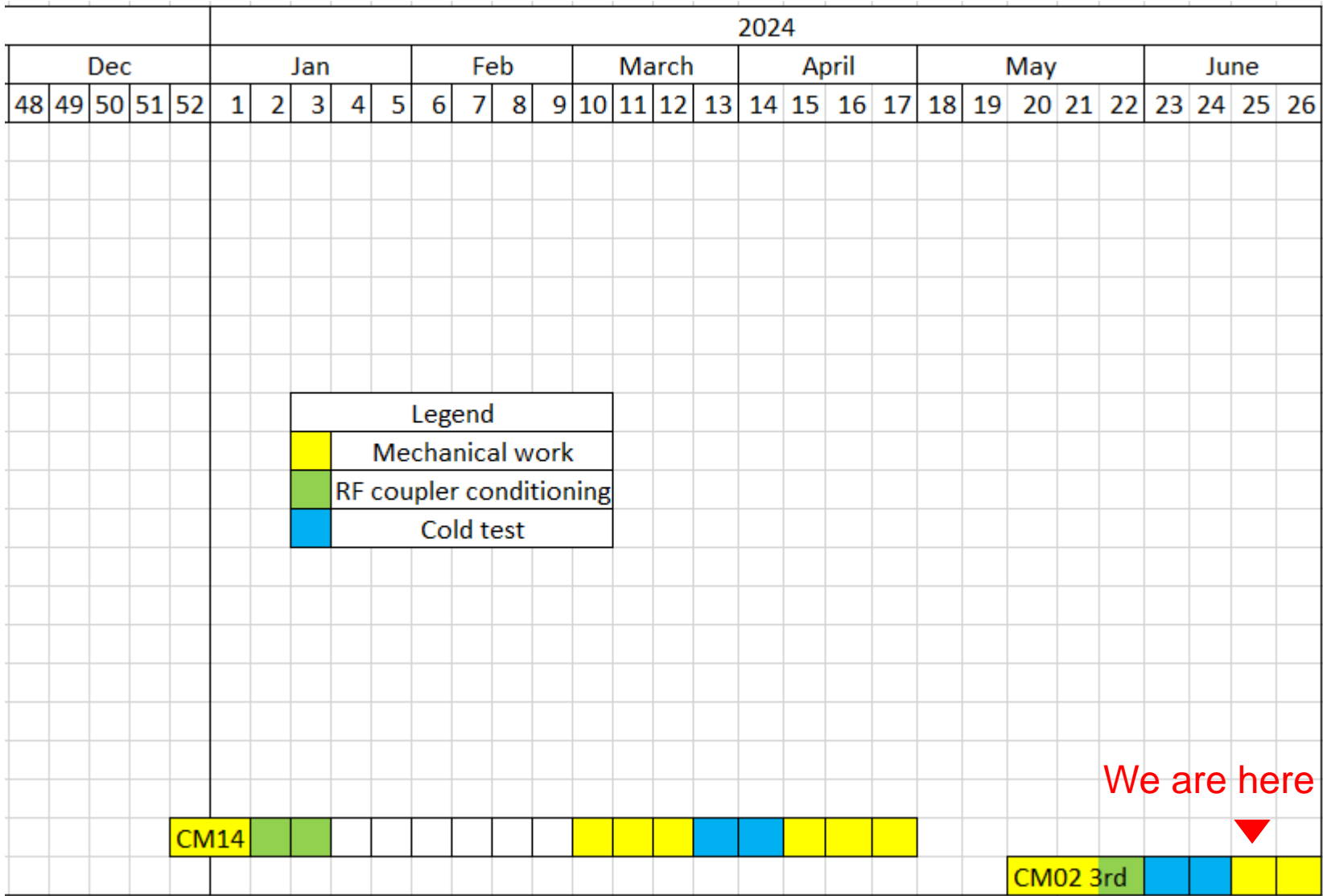


ESS weekly meeting (2024 W25)

FREIA team



Global planning





CM02 3rd: Cav1 at 8.5MV/m



FREIA SPOKE HIGH POWER TEST_Cav 1

time: 12:54:16

HELP QUIT



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

Pause Single

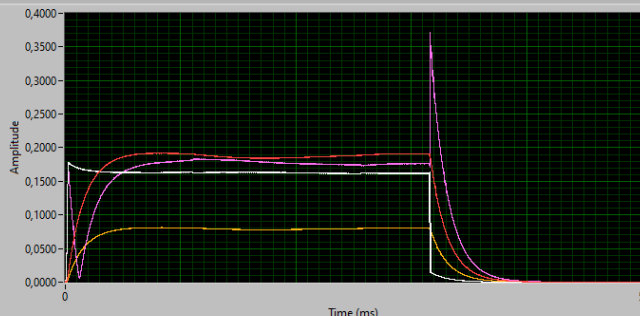


High speed (10Ms/s) Transfer speed

Standard (50 kSample) FFT buffer size

select for decay measurement

- 5782 - Ch0
- Trans_Q-det
- 5782 - Ch1
- 5761 - Ch0
- Forward
- Reflected
- Transmitted



Display

- Time and Frequency
- Phase and Magnitude

Buffer

- Last data only
- Buffer data

Amplitude Time

Chart length

400000

unwrap phase

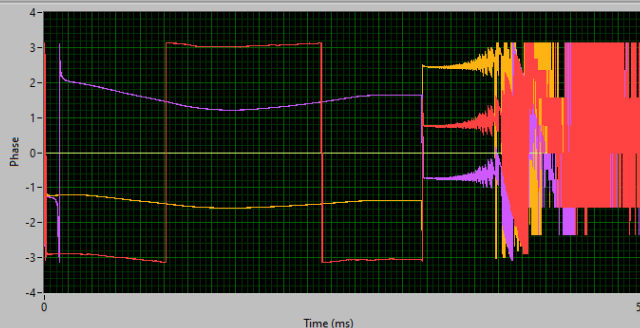
Reference for phase

5761 - Ch1

Show buffers

Amplitude Time

- 5782 - Ch0
- Trans_Q-Det
- 5782 - Ch1
- 5761 - Ch0
- Forward
- Reflected
- Transmitted



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]

144,885

Quench_Warning

Scale

FPGA setup

Mode: Real IO

Mixer freq [MHz]: 352,21

Trigger: Trigger input

Output mixer frequency [MHz]: 352,21

Period: 0

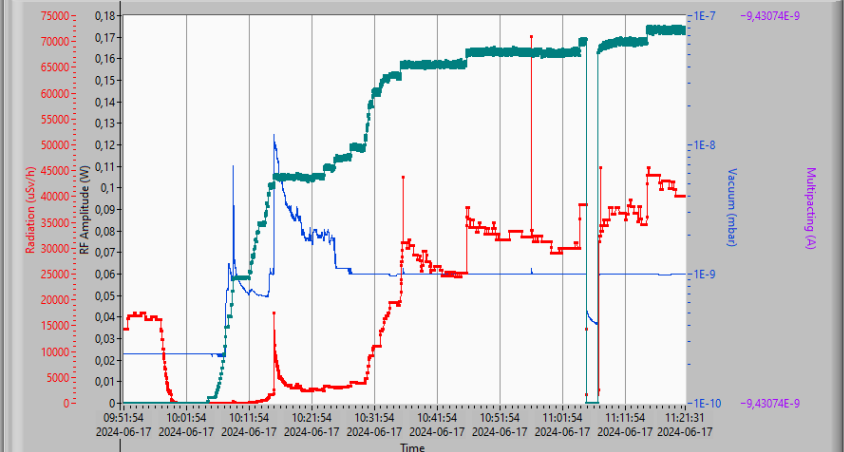
Output enabled:

Output delay: 0 ns

Output delay delta: 0 ps

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)	Qt_Toms Method
81,4294	138975	0	5,26181
Pr_max (dBm)	Pr_max (W)	P_static (W)	Qt_fr_PrefL_max
87,6937	587986	0	6,21922
Pt_max(dBm)	Pt_max (W)	P_heater (W)	Qt_fr_Pforw_eoc
22,4179	0,174498	0	4,63181
			QL_fr_Decay
			162273

Qt 156000 Qt 4E+11

real time frequency_fc 0E+0

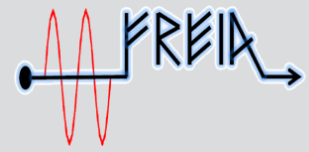
Pc_dynamic(W) 0

Vc_ave (MV) 0

Pf_max (W)	Q0_Dynamic	Eacc_Dynamic	Eacc_pk_Pt	Eacc_pk_Pf
138975	0	0	8,53351	9,51194

TT04	TT06	PT02	PT03	Scale_fact_Integr	Prefl_eoc	Prefl_max
2,197	2,09731	9999	31,1	0,00035566	0,0316082	0,141578
	Radiation	PT10	PT20	Scale_fact_Prefl	Pforw_eoc	Decay Integral
	40100	1E-9	4,3E-10	0,28446	0,0254532	96,7277
				Scale_fact_Pforw	Ptrans_eoc	
				1,17839	0,0064756	

CM02 3rd: Cav2 at 9MV/m



FREIA SPOKE HIGH POWER TEST_Cav 2

time: 11:06:39

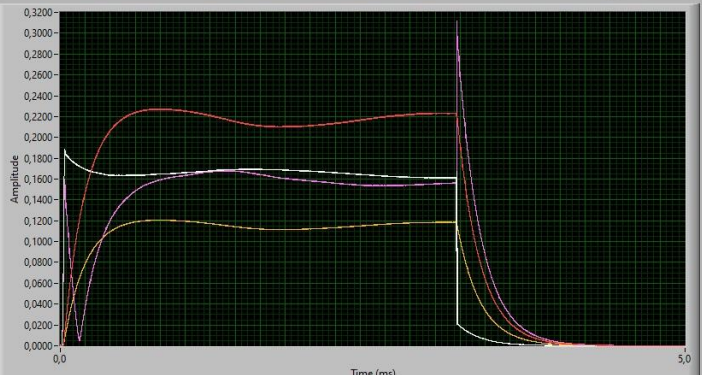
HELP QUIT



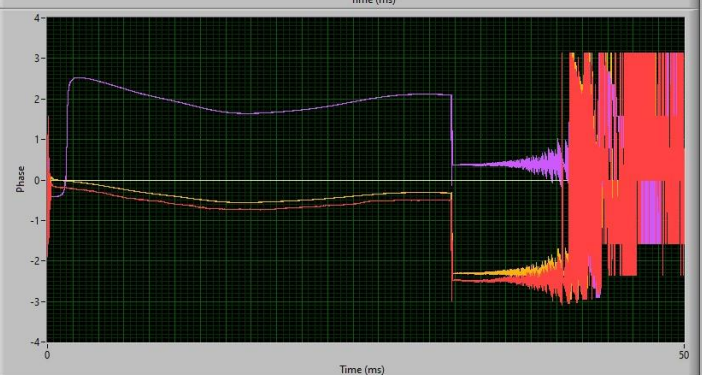
Configuration Calibration and pulse parameter setting Phase shifter and Gain controller PNA Scope decay measurement heat load measurement LFD measurement

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

- 5785 - Ch0
- Trans_Q-det
- 5785 - Ch1
- 5761 - Ch0
- Forward
- Reflected
- Transmitted



- 5785 - Ch0
- Trans_Q-det
- 5761 - Ch1
- 5761 - Ch0
- Forward
- Reflected
- Transmitted



select for decay measurement

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

Time Amplitude

Chart length 400000

unwrap phase Reference for phase 5761 - Ch1

Show buffers Time Amplitude

FPGA setup

Mode: Real IO Mixer freq [MHz]: 352.21 Trigger: Trigger input

Output mixer frequency [MHz]: 352.21 Period: 0

Output enabled

Output delay: 0 ns

Output delay delta: 0 ps

PID control Offsets Feed forward Cavity model FFT Delay Scale

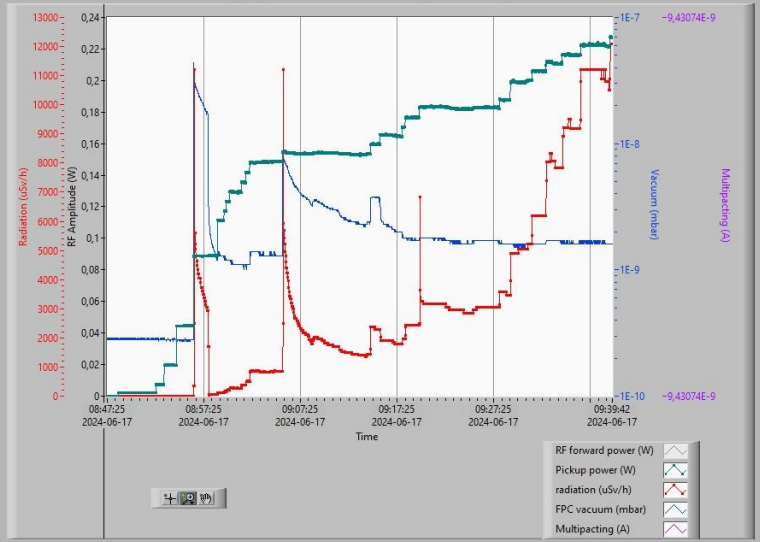
Adaptive FF Quench detection

Measure Tau at Time: 31900 Tau set: 120 Enable: Reset Quench Warning:

Tau [µs]: 181.6 Quench Warning:

Q Measurement results display Other Measurement results display Conditioning results display

Conditioning validate? Pulse width (µs) 3200



- RF forward power (W)
- Pickup power (W)
- radiation (µSv/h)
- FPC vacuum (mbar)
- Multipacting (A)

Pf_max (dBm)	Pf_max (W)	P_ttotal (W)	Ct_Toms Method
81,3702	137094	0	3,62653
Pr_max (dBm)	Pr_max (W)	P_static (W)	Ct_fr_Prefl_max
86,048	402528	0	3,34733
Pt_max (dBm)	Pt_max (W)	P_heater (W)	Ct_fr_Pforw_eoc
23,5575	0,226855	0	3,56363
			QL_fr_Decay
			202221

QL 192000 Ct 3,43E-11

real time frequency_fc 0E+0

Pc_dynamic(W) 0

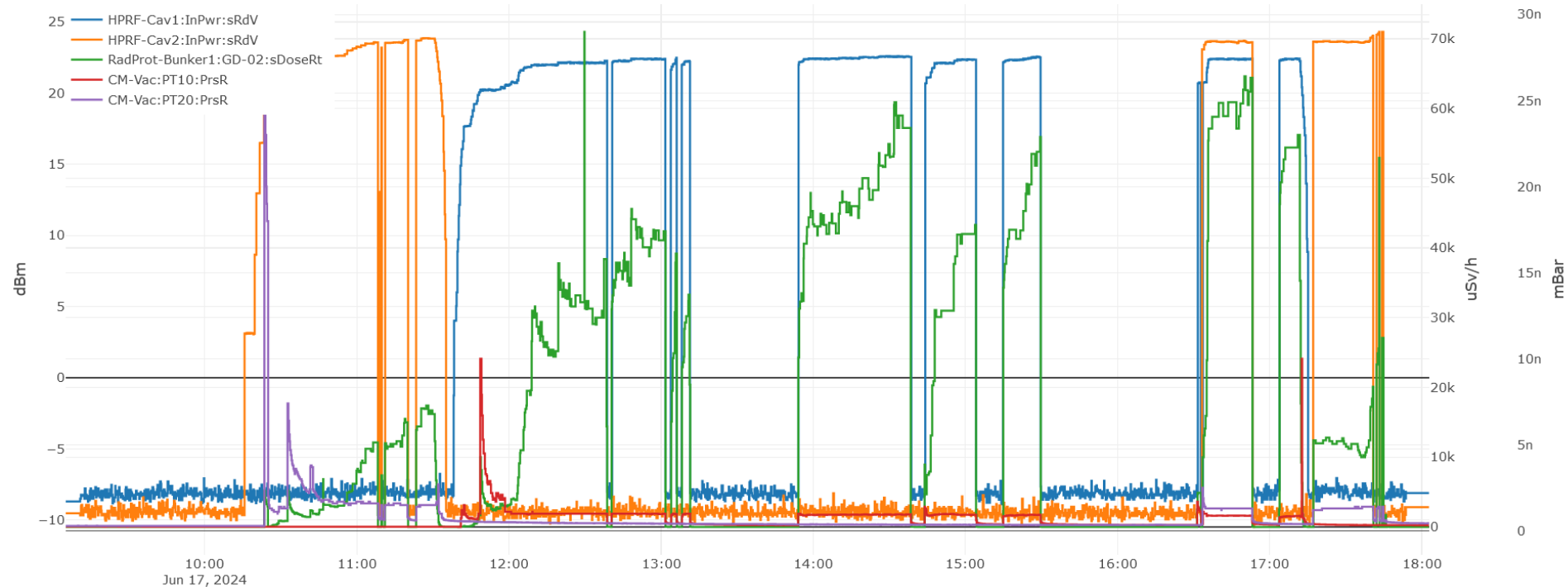
Vc_ave (MV) 0

Pf_max (W)	Q0_Dynamic	Eacc_Dynamic	Eacc_pk_Pt	Eacc_pk_Pf
137094	0	0	9,00998	10,4809

TT05	TT07	PT02	PT03	Scale_fact_Integral	Prefl_eoc	Prefl_max
2,60757	-39,7499	9999	31,1	0,0006046	0,0246731	0,0971443
	Radiation	PF10	PT20	Scale_fact_Prefl	Pforw_eoc	Decay Integral
	12100	2,4E-10	1,6E-9	0,48357	0,0259128	84,4224
				Scale_fact_Pforw	Ptrans_eoc	
				1,93	0,0140339	



CM02 3rd: Cav1

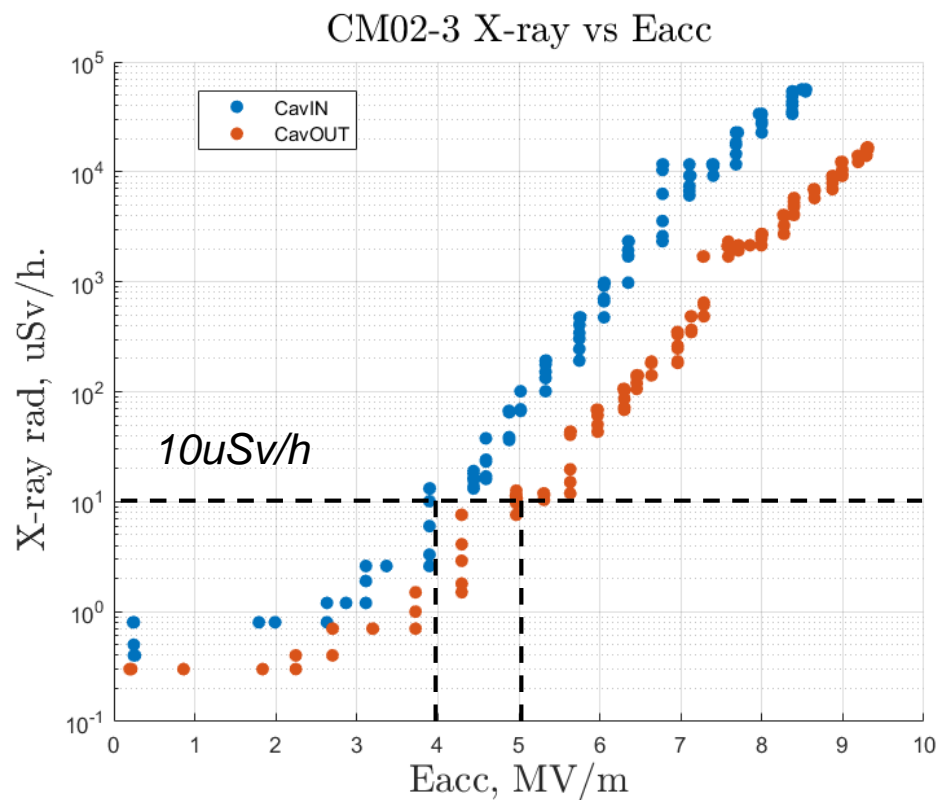
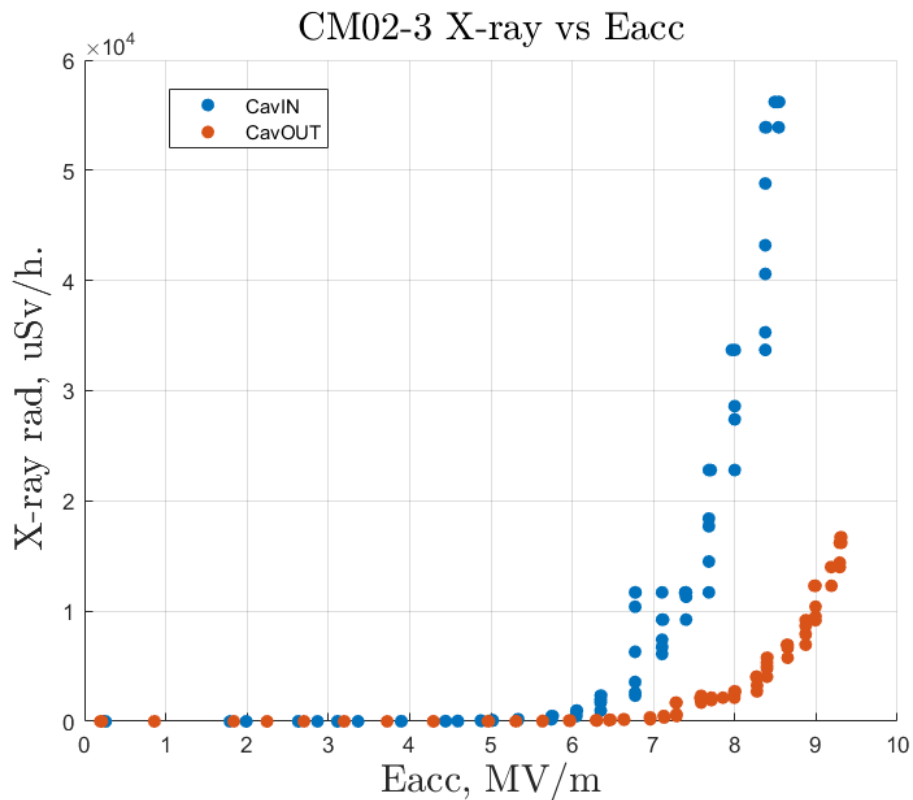


	Cav1 [MV/m]	Cav2 [MV/m]
Max gradient	8.63	9.8
Max stable gradient	8.5	9.6

	Qt 4E11 (VT)	Qt 5.2E11 (FREIA TPM)
Cav1 gradient	8.63	9.8



CM02 3rd: FE onset





CM02 3rd: Heat loads



	Static	Dynamic	Dynamic	Dynamic
Cav In	0	8.5 MV/m	8.5 MV/m	0
Cav Out	0	9 MV/m	0	9 MV/m
Heat Load [W]	16.79	34.09	34.08	21.1
σ	0.38	1.37	1.27	1.1
LT01 min	58.75	48.44	48.54	52.65
LT02 max	61.07	60.7	61.59	60.90
PT03 min	31.10	30.90	31.00	31.10
PT03 max	31.20	31.2	31.20	31.40