UPPSALA
UNIVERSITET

ESS weekly meeting (2023 W03)

A. Miyazaki et al

CM09 2nd reports are ready

FREIA
Department of Physics and Astronomy
Uppsala University

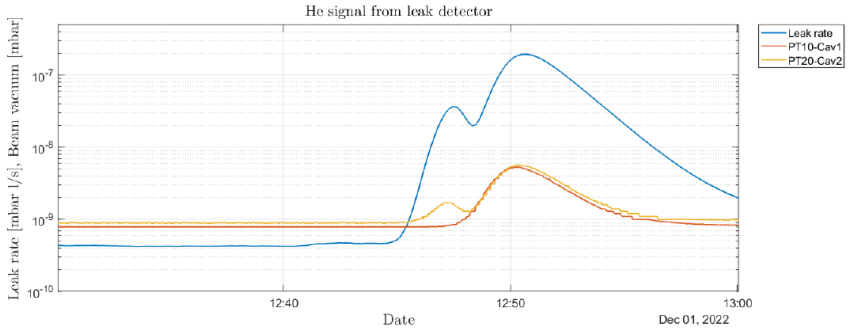
Summary of CM09 2nd test

Report time: 20230119

Appendix 3 (Leak detector data)

We observed substantial amount of helium signal during warming up in the beam vacuum that indicates leak. After detailed investigation, we concluded that the size of the leak is so small that it would not matter to the cryomodule operation if the leak will not grow in the future. The helium signal was substantial because helium gas from a very small leak was accumulated in the cold surface below 10 K. Therefore, the helium signal was approximately proportional to the period when the cavities exposed to the temperature below 10 K. We did not find any correlation to the superfluid helium operation. All these behaviors were consistently observed by Penning gauges, a residual gas analyzer, and a helium leak detector.

3rd thermocycle:



	Performances	ATRIUM-733233
		Date : XX/XX/XXXX

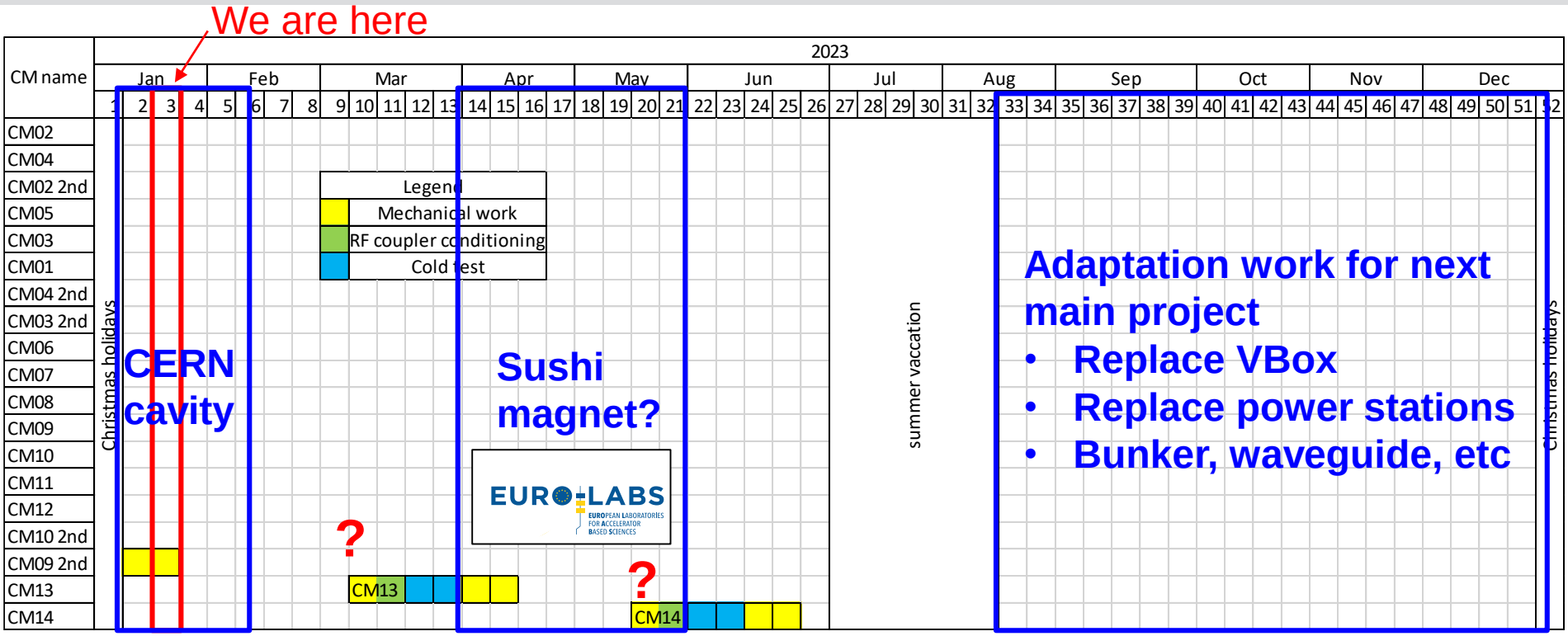
CM09 Configuration			
IN		OUT	
In cavity	SPK-DSPK-25	Out cavity :	SPK-DSPK-27
Coupler	SPK-CPL-16	Coupler	SPK-CPL-17
Double wall tube	SPK-DWT-21	Double wall tube	SPK-DWT-13
Tuning System	SPK-TUN-14	Tuning System	SPK-TUN-17

		Specification or measured value @ Orsay (before shipping)	Measured values @ UU	C / NC	Measured values @ Lund	C / NC
External Q						
Cavity "IN"		1.75E+05< QL<2.85E+05	1,86E+05	C		To be completed
Cavity "OUT"		1.75E+05< QL<2.85E+05	1,99E+05	C		To be completed
Frequency min @ 2K (tuning system OFF)						
Cavity "IN"	MHz	>352.089 <352.175	352,139	C		To be completed
Cavity "OUT"	MHz	>352.089 <352.175	352,123	C		To be completed
Eacc max						
Cavity "IN"	MV/m	≤12	12	C		To be completed
Cavity "OUT"	MV/m	≤12	12	C		To be completed
Heat losses						
Static losses (RF OFF)	W	<8	19,12 +/- 0,67	NC		To be completed
Dynamic losses (RF ON, Eacc=9MV/m)	W	<13	20,32 +/- 0,43	NC		To be completed
Pressure sensitivity						
Cavity "IN"	Hz/mbar	<20	17,3	C		To be completed
Cavity "OUT"	Hz/mbar	<20	16,3	C		To be completed
Lorenz forces detuning factor						
Cavity "IN"	Hz/(MV/m)²	>-8	-3,518518519	C		To be completed
Cavity "OUT"	Hz/(MV/m)²	>-8	-4,691358025	C		To be completed
Tuning sensitivity						
Cavity "IN"	Hz/step	0,145 +/- 0,027	0,169	C		To be completed
Cavity "OUT"	Hz/step	0,145 +/- 0,027	0,174	C		To be completed
Piezo detuning for KL=-8 Hz/(MV/m)²						
Cavity "IN"	Hz	>640	1216	C		To be completed
Cavity "OUT"	Hz	>640	1227	C		To be completed
Vacuum						
insulation vacuum	mbar		4,80E-07	C		To be completed
Beam vacuum (coupler gauge of Cavity "IN")	mbar	<10⁻⁸	5,70E-10	C		To be completed
Beam vacuum (coupler gauge of Cavity "OUT")	mbar	<10⁻⁸	8,90E-10	C		To be completed

We performed final leak test of the insulation vacuum due to ESS' findings in CM08 →

Final Leak test of CM09 at UU				
Name of controllers	Carl S, Iaroslava P		Date	2022-12-20
Method	injection			
Données				
Testing elements	Pressure	admissible leak rate	measured leak rate	Pumping time
Cryostat	<1.0 E10-3	Leak rate <	<1.0E-11	2h
Comments			Conclusion	C
			Visa	CS	Date	2022-12-29

Global planning of 2023



- HL-LHC crab cavity is under the test with an external funding in January
- CM13 in March?
- An external user is in queue to test their magnet (two months)
- CM14 in June?
- FREIA will go forward