



ESS weekly meeting (2021 W50)

A. Miyazaki et al.



General planning



FREIA Planning	2021-12-08											20	22							
			Nov	veml	ber			Dece	mbe	r			Já	inua	ry			Febr	ruary	/
Equipment	Responsible	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28
	week #	t #	#	#	46	47	#	49	50	51	#	1	2	3	4	5	6	7	8	9
Liquefier & 2K pump	Esat																			
RF power stations	Mykhailo																			
Cryomodule test sta	Akira	CN	/03				CN	л06						CN	107			CN	108	
I	1 1	I	:	•	Ne a	are	he	re ⁄	/	I					R	est	tar	i t		

- CM06 has been shipped to ESS
- CM07 is under preparation
- CM08 has just arrived



W49 & W50 progress & W51 plan (?)



wee	k							W49					
		M	ON	Т	UE	V	VED	Т	HU	FRI		SAT	SUN
date	e	06-	dec	07	-dec	08	B-dec	09	-dec	10-d	ec	11-dec	12-dec
		m	а	m	а	m	а	m	а	m	а		
present CM	СМ06	RF conditi	oning of FE	heat load again	start warming up	warn	ning up	break insulation vacuum	warr	ning up complet	ed		
next CM	СМ07					VNA rec	eption test	doo	rknob mountin	g & water leak cł	neck		
next next CM	CM08						prepara	tion at Orsay					
wee	k							W50					
		M	ON	Т	UE	V	VED	Т	HU	FRI		SAT	SUN
date	5	13-	dec	14-	-dec	15	-dec	16-	-dec	17-de	ec	18-dec	19-dec
		m	а	m	а	m	а	m	а	m	а		
previous CM	СМ06	disconnect cryogenic lines	swap modules, doorknob	filling dry N LEM	V2, outgoing O test	out-going VNA test	shock sensors activated, box closed	departure to rep	e ESS / publish ports	arrival a	ıt ESS		
present CM	СМ07	7 dismounting connect cryogenic lines		ogeniclines	vacuum pu	mp mounting			vacuum pumping				
next CM	СМ08	departure	from Orsay					recepti moi	on at UU rning	reception test	LEMO / VNA		

We are here

wee	.k							W51					
		М	ON	-	TUE	W	/ED	Т	ΓHU	FI	રા	SAT	SUN
date	e	20-	dec	21	L-dec	22	-dec	23	3-dec	24-	dec	25-dec	26-dec
		m	а	m	а	m	а	m	а	m	а		
	CN 407	fix f	ange	connect ci	ryogenic line	beam vacuu	m connection	close	d valves				
present Civi				Beckho	ff driver test								
next CM	СМ08					S	the d	rive	r con	ning	to u	s?	3



New year planning



wee	k							W01					
		M	ON	-	TUE	W	/ED		THU	FR	I	SAT	SUN
date	è	03-	-jan	04	l-jan	05	-jan	0	6-jan	07-j	an	08-jan	09-jan
		m	а	m	а	m	а	m	а	m	а		
present CM	СМ07												
next CM	CM08												

wee	k							W02					
		MC)N	Т	UE	W	/ED		THU	FR		SAT	SUN
date	e	10-j	an	11	-jan	12	-jan	1	3-jan	14-j	an	15-jan	16-jan
		m	а	m	а	m	а	m	а	m	а		
nrocont CM	CN407	restart power	station, water					couplery	arm conditionin	a			
present Civi		coo	ing					couplet w		Б			
next CM	СМ08												

wee	k							W03					
		M	NC	Т	UE	V	NED	-	THU	FR	I	SAT	SUN
date	2	17-	jan	18-	-jan	19	9-jan	20	D-jan	21-j	an	22-jan	23-jan
		m	а	m	а	m	а	m	а	m	а		
present CM	СМ07	N2 co	ooling	LHe cooling	4K fi	lling	coupler cold conditioning	2K pumping	RF calibration interlock setup	MP condi	tioning	thermaliz	ation of CTS
next CM	CM08												



CM06: doubt in TT04 and TT05 \rightarrow Any answers





Grease and flange...any answers?





The grease on the module is as received We do not add grease there because it is too much from the beginning We added grease on safety valve section when we investigated leak there Small amount of grease too keep O-rings fresh unavoidably exist in our 2K infrastructure







CM06 reports: ready for publishing

10 Cub



ATRIUM-433620

Date : 27/08/2021



FREIA Department of Physics and Astronomy Uppsala University

Summary of CM06 test

Report time: 20211216

Vacuum

date	2021-11-11	2021-12-06	2021-12-14
Temperature (K)	300	2	300
Beam vacuum (mbar)	5.1e-3	4e-10	<5e-4
Isolating vacuum (mbar)	1000	3.2e-7	1000

Cavity performance

			CAV_IN	CAV_OUT	Target
Cavit	y name		DSPK-18	DSPK-22	-
f ₀ at v	varm (MHz)		351.545	351.551	
f ₀ at 2	K (MHz) @ witho	ut CTS engaged	352.098	352.113	352.090 - 352.174
Qext			1.82e5	1.77e5	1.75e5 - 2.85e5
Q _t (fr	om Orsay)		2.10e11	1.55e11	
Max I	E _{acc} (MV/m)		12	12	>9
Field	emission onset (M	V/m)	-	9	-
Q.@9	9MV/m		>1.63e9	>1.63e9	>1.5e9
P.@9	MV/m (W)		<2.0	<2.0	2.5
Dyna	mic heat load for C	CM@9MV/m (W)	15.25+	+/-1.0	
Static	heat load for CM	(W)	16.85+	+/-1.0	
df/dF	P (Hz/mbar)		-16.06	-16.27	<20
	Stepper motor ²⁾	motor steps	875200	755200	-
	setting for	motor position (mm)	1.71	1.48	
	frequency	driving current (A)	0.6	0.6	0.6
	Limit switch posi	tion (steps)	-7880	-6060	
	Stepper motor tuning	(Hz/ step)	0.161	0.170	0.145 +/- 0.027
CTS	sensitivity in linear region	(kHz/ mm)	82.6	87	-
	Piezo1 tuning	unipolar	555.923	612.720	>640
	range (Hz)	bipolar	679.865	798.560	
	Piezo1 tuning ser	nsitivity (Hz/V)	2.780	3.221	-
	Piezo2 tuning	unipolar	489.099	484.610	>640
	range (Hz)	bipolar	604.728	603.520	
	Piezo2 tuning ser	nsitivity (Hz/V)	2.425	2.554	-
LFD(@9MV/m in open	loop (Hz)	360	230	-

	Cables	verifica	tion CM06	at IJCLab	vt	_	Cab	les verif	licatio
S	ocket asse	mbly		Verfled by: I	I. Pierens	Sc	cket asse	embly	
Socket name	Sensor / Actuator type	PID name	Serial number	Electrical value (O) (before shipping)	C/MC	Socket name	Sensor / Actuator type	PID name	Serial n
	Centox	TT04	X138143	78,06	с		Centox	1114	
	Cerrox	TT05	X139132	64,1	c		Cernox	TT05	
	Cernox	TT06	X120005	66,78	c		Centox	11114	
	Cernox	TT07	X139131	66,85	C		Centox	TW	
	Cernox	TT08	X129200	55,44	C		Centox	TTH	
100	Cernox	TT09	X139178	65,3	c	LON	Centox	1109	
	PT100	TT10	PT45	109,01	c		PT100	1110	
	PT100	TT11	PT48	100,11	c	-	PT100	1111	-
	Cernos	1112	X129179	62,12	c	-	Centrax	1112	-
-	P1100	1120	P151	109	c	_	PT100	1120	
	P1100	1121	P162	100,7	C	_	P1100	11M	-
	Cerrox	1122	X138028	60	c		Centox	1122	-
PT Coupler	PT100	11120	PTC10	10./	c	PT Cospier	PT100	11120	-
		11220	P1C22	10.0	0		-	11220	-
		EHUI	EHU1/	80.0	c	_		EHUT	-
LC02	Heaters	EHIZ	6HUB	100	0	LC02	Heaters	EPHN2	
		EHTO	_	14.02	0	-		0/00	-
	Manual America	0410		240401240001	0		Marine concerns	9410	-
	a limit recent	1.810		215	0	-	a limit sectory	1.810	-
LC03	Maine samare	94/20		2 56(AB)/2 65(CD)	c	LCB	Marine sensore	8820	
	a limit sensor	L920		2.31	C		a line sensor	L 520	-
LC07	Liquid Helium	LT01	7337	368,81	c	LOW	Liquid Helium	LT01	
	Level Sensor	LT02	7338	369,4	c		Level Sensor	LT02	
Socilet name	Sensor / Actuator type	PID name	Serial number	Electrical value (µP) (before shipment)	C/NC	Socket name	Sensor / Actuator type	PID name	Seria' n
		PZ10		12.89	c			PZ18	
104	60.000	PZ11		211	c	1001	Activation .	PZ11	
	~4400	PZ20		12:00	C	COM	~ 0005	PZ20	
		PZ21		\$2.50	C			PZ21	

Cables verification

Coupling test

						C	ONFIG	
Cryomodule								CM06
Location	Hall 106	@IJCLab			U	U		
Date	2021-	08-05	2021-	10-26	2021-	12-01	2021	-12-15
VNA model	R&S	ZVB8	Agilen	t PNA	Agiler	X PNA	Agile	nt PNA
T* (C)	2	1	not me	eaured	2	K	2	0,8
Pcavity (mbar)			4,60	E-03	1,50	E-09	UR	<5e-4
Pinsulating vacuum (mbar)	Т	A	1,008	+03	2,60	E-07	1,00	E+03
Pcryolines (mbar)	Т	A	10	00	3),9	1	000
	RF measureme before	ents @ T=300K testing	RF measureme before	ents @ T=300K testing	RF measuren during	the test	RF measurem after	ents @ T=300P testing
Cavity location	Cavity IN	Cavity OUT	Cavity IN	Cavity OUT	Cavity IN	Cavity OUT	Cavity IN	Cavity OUT
Cavité	SPK-DSPK-18	SPK-DSPK-22	SPK-DSPK-18	SPK-DSPK-22	SPK-DSPK-18	SPK-DSPK-22	SPK-DSPK-18	SPK-DSPK-2
Coupleur	SPK-CPL-11	SPK-CPL-20	SPK-CPL-11	SPK-CPL-20	SPK-CPL-11	SPK-CPL-20	SPK-CPL-11	SPK-CPL-20
Manchette	SPK-DWT-28	SPK-DWT-26	SPK-DWT-28	SPK-DWT-26	SPK-DWT-28	SPK-DWT-26	SPK-DWT-28	SPK-DWT-26
S11 (off resonance)	-0.18	-0.22	-0.02	-0.07			-0.07	-0.05
S11 (@ resonance)	-0.88	-0.95	-0.7	-0.79			-0.78	-0.79
S21 (@ resonance)	-84.9	-82.9	-84.1	-82.52	-75.96	-72.51	-84	-82.38
Frequency (MHz)	351.543	351,550	351.545	351.551			351,559	351.562
Frequency @ 2K (MHz)	352 126	352 138			352 098	352 113		
Shift (MHz)	0.583	0.588			0.553	0.562		
Bandwidth (kHz)	39.6	39.8	38.83	39.06	2.07	2.13	39.14	39.447
Oloaded	8877	8832	9054	9000	170275	165387	8982	8912
For information								
S11 pick-up cable	-1.85	-1.85						
(measurement @ reception)								
S11 pick-up cable	1.77	1.00	0.40		0.07	1.00		
(measurement on CM)	-1,77	-1,82	-3,43	-3,5	-2,07	-1,92	-3,65	-3,47
Qt (calculated)	3,00E+11	3,00E+11						
Qt								
(measurement in vertical test @	2.10E+11	1.55E+11						
2K)		() () () () () () () () () ()						
	Results (und	der coupled)	Results (und	ter coupled)	Results (ov	er coupled)	Results (un	der coupled)
S11 (corrected)	-0,70	-0,73	-0,7	-0,7	0,0	0,0	-0,7	-0,7
S21 (corrected)	-83,9	-81,9	-82,4	-80,7	-74,9	-71,6	-82,1	-80,6
Qext (measured on CM @ 300K)	2,29E+05	2,19E+05	240472	226272			228870	218251
Qext (measured on CM @ 2K)					170275	165387		
Facinformation								
Oast (calculated with CST Studio)	2,19E+05	2,05E+05						
Gent (Calculated With CST Studio)								
Qt (measured on CM)	3,39E+11	2,20E+11	2,36E+11	1,70E+11			2,31E+11	1,68E+11
Ot (measured on CM @ 2K)					2,12E+13	9,45E+12		
Qo	9235	9203	9408	9373			9349	9291
G (Otm)	121	121	134	122			122	122

- 1 - H						-	
	1			OUT			
	cavity		SPK-DGPK-18	Out cavity :	SPK-DSPK-22		
c	oupler		SPK-CPL-11	Coupler	SPK-CPL-20		
D	ouble wall tube		SPK-DWT-16	Double wall tube	SPK-DWT-18		
1	uning System		SPK-TUN-XX	Tuning System	SPK-TUN-XX		
			Specification or measured value @ Orsay (before shipping)	Measured values	C/NC	Measured values @ Lund	C/NC
E	xternal Q						
C	avity "IV"		1.75E+05< QL<2.85E+05	1,82E+05	0		To be complet
c	avity 'OUT'		1.75E+05< QL<2.85E+05	1,77E+06	c		To be complet
E	requency min @ 2K (tuning syst	em OFF)					
6	avity "IN"	MHz	>352.089 <352.175	352,098	c		To be complet
c	avity 'OUT'	MHz	×352.089 <352.175	352,113	c		To be complet
E	acc max						
¢	avty 1N	MV/m	\$12	12	с		To be complet
0	avity 'CUT'	MV/m	£12	13,4	c		To be complet
H	eat losses						
s	tatic losses (RF OFF)	W	-4	16.85 +/- 1.0	NC		To be complet
D E	ynamic losses (RF ON, acc+9MV/m)	w	<13	15,25 +/ 1,0	NC		To be complet
P	ressure sensitivity						
C	avity 'IN'	Hz/mbar	<20	16,05	C		To be complet
c	avity "OUT"	Hz/mbar	<20	16,27	С		To be complet
ī	orenz forces detuning factor				-		
C	avty 'IN'	Hz/(MV/m) ²	>-8	-4,44	С		To be complet
C	avity 'OUT'	Hz/(MV/m) ^a	>-8	-2,84	C		To be complet
T	uning sensitivity						
6	avty 'IN'	Hz/step	0.145 +/- 0.027	0.161	С		To be complet
	avty 'OUT'	Hz/step	0.145 +/- 0.027	0.17	C		To be complet
P	iezo detunino for KLz-8 Hz/MV(im)						
- E	avity 1M	Hz	>640	1178	C		To be complete
- E	any m	144		1714			To be complet
Ľ	eny vvi	Πź	-040	1241	U U		To be complet
Ě	acuum	1					
10	sutation vacuum eam vacuum (coupler gauge of	mbar	<10 ⁴	3,20E-07 4.00E-10	с с		To be complet
8	auty 11V) eam vacuum (coupler gauge of auty 101171	mbar	<10 ⁴	1,30E-09	с		To be complet

Performance

	VACU	UM GAUGE OF CAVIT	Y STRING /	AT UU
Date	Time	Pfeiffer TPG2020 (mbar	Limit	Name of controller
2021-10-21	10:00	4,40E-03	1,00E-01	C.Svanberg
2021-10-22	09:15	4,40E-03	1,00E-01	C.Svanberg
2021-10-25	09:00	4,60E-03	1,00E-01	C.Svanberg
2021-10-26	08:50	4,60E-03	1,00E-01	C.Svanberg
2021-10-27	09:00	4,60E-03	1,00E-01	C.Svanberg
2021-10-28	08:50	4,70E-03	1,00E-01	C.Svanberg
2021-10-29	12:05	4,70E-03	1,00E-01	C.Svanberg
2021-11-01	08:00	4,80E-03	1,00E-01	C.Svanberg
2021-11-02	09:00	4,90E-03	1,00E-01	C.Svanberg
2021-11-03	09:30	4,90E-03	1,00E-01	C.Svanberg
2021-11-04	09:00	4,90E-03	1,00E-01	C.Svanberg
2021-11-05	09:05	4,90E-03	1,00E-01	C.Svanberg
2021-11-08	09:30	5,00E-03	1,00E-01	C.Svanberg
2021-11-09	17:00	5,00E-03	1,00E-01	C.Svanberg
2021-11-10	09:30	5,00E-03	1,00E-01	C.Svanberg
2021-11-11	10:30	5,10E-03	1,00E-01	C.Svanberg
2021-12-14	10:30	UR	1,00E-01	A. Miyazaki
2021-12-15	11:15	UR	1,00E-01	A. Miyazaki

To be circulated after this meeting₇

ATRA.M-433620

Date : 27/08/202

n CM06 at UU



CM06 departure & CM08 arrival







CM07's flange seems distorted



The CM07 flange does not fit the bellow's supporting flange (originally with CM02 and used for all the other modules)

The CM07 flange seems like distorted to be an elliptical shape 0.5-1 mm in diameter

We need to slightly mil the ring flange to fit CM07

