EucARD Annual Meeting

25-27 April 2012, WUT Warsaw

WP10 - SRF

“SC RF technology for higher intensity proton accelerators & higher energy electron linacs”

O. Napoly (CEA)

WP10-SRF Task 'Patchwork'

WP 10 Organisation, version 01.04.12					
Task	Subtask	task / subtask leader	leading laboratory	participating laboratories	Task description
10,1		**O. Napoly, O. Brunner**	**CEA**	CEA, CERN	**SRF Coordination and Communication**
10,2		**F. Peauger**	**CEA**	CEA, CERN, CNRS,	**SPL Cavities**
	10.2.1	G. Orly	IPN-Orsay	CNRS	Design and fabrication of β = 0.65, 704 MHz elliptical cavity.
	10.2.2	F. Peauger	CEA	CEA	Design and fabrication of β = 1, 704 MHz elliptical cavity.
	10.2.3	V. Parma	CERN	CERN, CEA, CNRS	Study of interfaces between the cavity and the cryomodule.
10,3		**P. McIntosh**	**STFC**	STFC/Daresbury,UNIMAN,ULANC,CERN	**Crab cavities**
	10.3.1	F Zimmerman	CERN	CERN, ULANC	Design, build and test a single LHC crab cavity.
	10.3.2	R.M. Jones	UNIMAN	UNIMAN	Design, build and test a single CLIC crab cavity.
	10.3.3	A Dexter	ULANC	ULANC	Design, build and test a LLRF and synchronization systems.
10,4		**S. Calatroni**	**CERN**	CI, CEA, CERN, CNRS/IPNO, DESY, INFN-LNL, NCBJ	**Thin Films**
	10.4.1	S. Calatroni	CERN	INFN-LNL, CERN	Improve the Nb sputtering technology for low beta cavities.
	10.4.2	J. Sekutowicz	DESY	DESY, NCBJ	Perform arc sputtering of photo cathodes (Pb).
	10.4.3	R. Seviour	CI	CI, CEA, CERN, CNRS/IPNO, INFN-LNL	Research on new technologies for thin film depositing of superconductors for SC cavity applications.
10,5		**R.M. Jones**	**UNIMAN**	DESY, UNIMAN, UROS	**HOM Distribution**
	10.5.1	N. Baboi	DESY	DESY	Development of HOM based beam position monitors (HOMBPM).
	10.5.2	R.M.Jones	UNIMAN	UNIMAN	Development of HOM Cavity Diagnostics and ERLP (HOMCD).
	10.5.3	U. van Rienen	UROS	UROS	Measurement of HOM Distributions and Geometrical Dependences (HOMDG).
10,6		**M. Grecki**	**DESY**	DESY, TUL, IPJ, WUT, IFJ-PAN	**LLRF at FLASH**
	10.6.1	T. Jezynski	DESY	DESY, TUL, WUT	Development of ATCA carrier boards with FPGA and DSP
	10.6.2	D. Makowski	TUL	TUL, DESY, WUT	Development of AMC and RTM modules required IO functionality
	10.6.3	M. Grecki	DESY	DESY, TUL, IFJ-PAN	ATCA implementation of cavity resonance control
	10.6.4	J. Szewinski	NCBJ	NCBJ, DESY	Development of beam based longitudinal feedbacks for the ATCA based LLRF system
10,7		**J. Teichert**	**FZD**	FZD, HZB	**SCRF gun at ELBE**
	10.7.1	T. Kamps	HZB	HZB, FZD	Slice diagnostics system
	10.7.2	R. Xiang	FZD	FZD	Improvement of preparation chamber for GaAs photo-cathodes
	10.7.3	J. Teichert	FZD	FZD, HZB	SCRF gun experimental tests
10,8		**W. Kaabi**	**LAL-Orsay**	LAL	**Coupler Development at LAL**
	10.8.1	W. Kaabi	LAL-Orsay	LAL	Cleaning studies on samples
	10.8.2	M.Lacroix	LAL-Orsay	LAL	Automation of coupler washing

WP10-SRF Fifteen Institutes

Krakow

Swierk

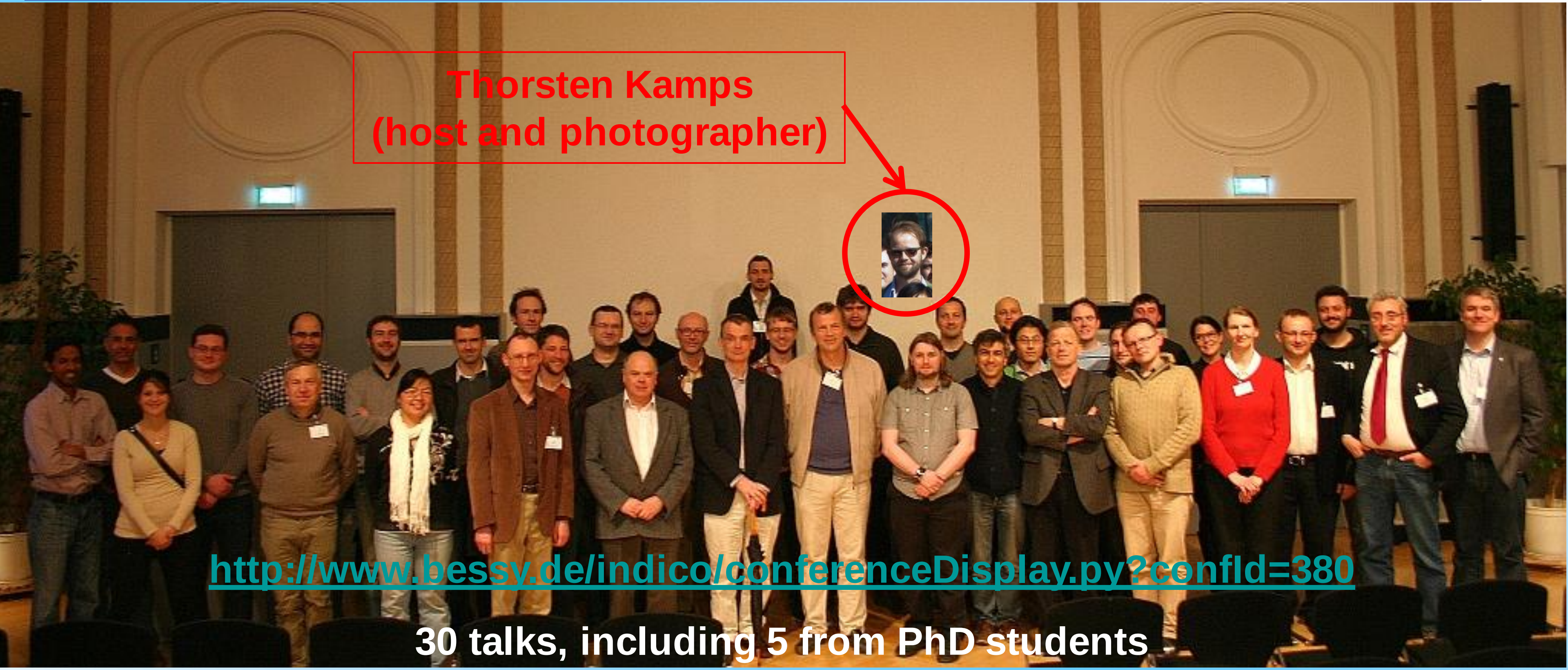
WP10-SRF 3rd Annual Review
29-30 March 2012, HZB, Berlin

45 Participants, including the 2 Coordinators + 6 Task Leaders (1 excused)

13/15 Partner Institutes represented

WP10-SRF 3rd Annual Review

29-30 March 2012, HZB, Berlin



Ben Hall,	Lancaster University	T10.3
Ben Woolley,	Lancaster University	T10.3
Pei Zhang,	Manchester University, working at DESY	T10.5
Thomas Fligsen,	Rostock University	T10.5
André Arnold,	HZD Rossendorf	T10.7

WP10.1: Coordination and Communication

➢ *Deliverable:*

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.1.1	14	SRF web-site linked to the technical and administrative databases	Web-Site	Coordination	CEA, CERN	48	

Proposal to *link to TTC Infrastructure database under construction*

+ Database on SRF Accelerators in Europe, linked to the TTC server.

SCRF Accelerators / Europe [29=5+11+4+9]										
Name	Particles	# cavities		Type	Material	Gradient	Mode	T	Status	Location
HERA	electrons, positrons	16	500 MHz	β=1 elliptical 4-cell	Nb	4.0 MV/m	CW	4.2 K	de-commissioned	DESY
LEP200	electrons, positrons	16 272	352 MHz	β=1 elliptical 4-cell	Nb Nb/Cu	5 MV/m 7 MV/m	CW	4.5 K	de-commissioned	CERN
LISA	electrons	4	500 MHz	β=1 elliptical 4-cell	Nb	6 MV/m	pulsed	4.2 K	de-commissioned	LN Frascati
MACSE	electrons	5	1.5 GHz	β=1 elliptical 5-cell	Nb	10 MV/m	CW	1.8 K	de-commissioned	CEA-Saclay
Tandem PA	ions	16 34	81 MHz 135 MHz	β=0.085 helix λ/2 β=0.085 helix λ	Nb	2.2 MV/m	CW	4.2 K	de-commissioned	CEA-Saclay
ALICE	electrons	2 2	1.3 GHz	β=1 elliptical 9-cell β=1 elliptical 9-cell	Nb	3-5 MV/m 13.5 MV/m	pulsed	2 K	operation	Daresbury
ALPI	ions	2 12 50 58	80 MHz 80 MHz 160 MHz 160 MHz	β=0.0255 RFQ β=0.055 QW β=0.13 QW β=0.13 QW	Nb Nb Pb/Cu Nb/Cu	2-3 MV/m 4 MV/m 2.7 MV/m 4.8 MV/m	CW	4.5 K	operation de-commissioned	LN Legnaro
DIAMOND	electrons	2	500 MHz	β=1 elliptical 1-cell	Nb	6.5 MV/m	CW	4.5 K	operation	Oxford
ELBE	electrons	1 4	1.3 GHz	β=1 elliptical 3½-cell β=1 elliptical 9-cell	Nb	8 MV/m 9 MV/m	CW	2 K	operation	HZDR
ELETTRA	electrons	1	1.5 GHz	β=1 elliptical 2-cell	Nb	5 MV/m	CW	4.5 K	operation	Trieste
FLASH	electrons	56 4	1.3 GHz 3.9 GHz	β=1 elliptical 9-cell	Nb	20-30 MV/m 14.5 MV/m	pulsed	2 K	operation	DESY
ISOLDE	ions	12 20	101 MHz	β=0.063 QW β=0.103 QW	Nb/Cu	6 MV/m	CW	4.5 K	operation	CERN
LHC	protons, ions	16	400 MHz	β=1 elliptical 1-cell	Nb/Cu	6 MV/m	CW	4.5 K	operation	CERN
S-DALINAC	electrons	1 1 10	3 GHz	β=0.85 elliptical 2-cell β=1 elliptical 5-cell β=1 elliptical 20-cell	Nb	5 MV/m 5 MV/m 5 MV/m	CW	2 K	operation	Darmstadt
SLS	electrons	1	1.5 GHz	β=1 elliptical 2-cell	Nb	5 MV/m	CW	4.5 K	operation	PSI
SOLEIL	electrons	4	352 MHz	β=1 elliptical 1-cell	Nb/Cu	6 MV/m	CW	4.2 K	operation	SOLEIL
BERL inPro	electrons	1 3 3	1.3 GHz	β=1 elliptical 1½-cell β=1 elliptical 2-cell β=1 elliptical 7-cell	Nb	20 MV/m 18 MV/m	CW	2 K	construction	HZB
E-XFEL	electrons	808 8	1.3 GHz 3.9 GHz	β=1 elliptical 9-cell	Nb	24 MV/m 15 MV/m	pulsed	2 K	construction	Hamburg
IFMIF-EVEDA	D+	8	175 MHz	β=0.094 HW	Nb	4.5 MV/m	CW	4.5 K	construction	Rokkasho
SPIRAL2	D+, ions	12 14	88 MHz	β=0.07 QW β=0.12 QW	Nb	6.5 MV/m 6.5 MV/m	CW	4.2 K	construction	GANIL
ESS	protons	28 64 112	352 MHz 704 MHz 704 MHz	β=0.5 double spoke β=0.7 elliptical 5-cell β=0.9 elliptical 5-cell	Nb	8 MV/m 15.5 MV/m 18.2 MV/m	pulsed	4.5 K	design	Lund
EURISOL	protons, deutons	16 56 36 14	176 MHz 176 MHz 352 MHz 704 MHz 704 MHz 704 MHz	β=0.009 HW β=0.015 HW β=0.3 triple spoke β=0.47 elliptical 5-cell β=0.65 elliptical 5-cell β=0.78 elliptical 5-cell	Nb	4.7 MV/m 5.2 MV/m 5.8 MV/m MV/m MV/m MV/m	CW	4.2 K	design	-
ILC 500	electrons, positrons	16 900	1.3 GHz	β=1 elliptical 9-cell	Nb	35 MV/m	pulsed	2 K	design	-
LUNEX5	electrons	16	1.3 GHz	β=1 elliptical 9-cell	Nb	25 MV/m	pulsed	2 K	design	SOLEIL
LHeC ERL	electrons	944	721 MHz	β=1 elliptical 5-cell	Nb	20 MV/m	CW	2 K	design	CERN
MYRRHA	protons	8 48 34 60	176MHz 352 MHz 704 MHz 704 MHz	CH DTL β=0.35 single spoke β=0.47 elliptical 5-cell β=0.65 elliptical 5-cell	Nb	4 MV/m 6 MV/m 8 MV/m 11 MV/m	CW	2 K	design	SCK Mol
POLFEL	electrons	?	1.3 GHz	β=1 elliptical 9-cell	Nb	25 MV/m	pulsed	1.8 K	design	-
SPL	protons, H-	60 192	704 MHz	β=0.65 elliptical 5-cell β=1 elliptical 5-cell	Nb	19 MV/m 25 MV/m	pulsed	?	design	CERN
TRASCO	protons		704 MHz		Nb		pulsed		design	-

SRF Accelerators in Europe or involving EU labs:

5 de-commissioned,
11 in operation,
4 in construction,
9 under design.

SRF Superconducting Radio Frequency

WP10.2: SC Cavities for Proton Linac

Participants in the task: CEA/Saclay
CERN
IN2P3/IPN-Orsay

Target:
Eacc=19 and 25 MV/m for respectively β=0.65 and β=1 in vertical cryostat

Objective:
Demonstrate the feasibility of 704.4 MHz sc cavities at the specified performances (gradient)

- IPN/Orsay: Design and fabrication of β=**0.65** 704 MHz 5-cells elliptical cavity equipped with a Titanium helium reservoir.
Preparation and assembly in clean room and test in vertical cryostat.

- CEA-Saclay: Design and fabrication of β=**1** 704 MHz 5-cells elliptical cavity. Preparation of the cavity and assembly in clean room and test in vertical cryostat. Development of a vertical EP station and new HPR station. Upgrade of field-flatness set-up suited to the cavity size and weight

Milestones #2: Fabrication of cavities (P - M30)
Deliverable #1: Results of SC proton cavity tests (R - M33)

- CERN : Study of interfaces between the cavity and the cryomodule.

Milestones #1: Definition of cryomodule interface (R - M12)

WP10.2: SC Cavities for Proton Linac

➢ *Deliverables:*

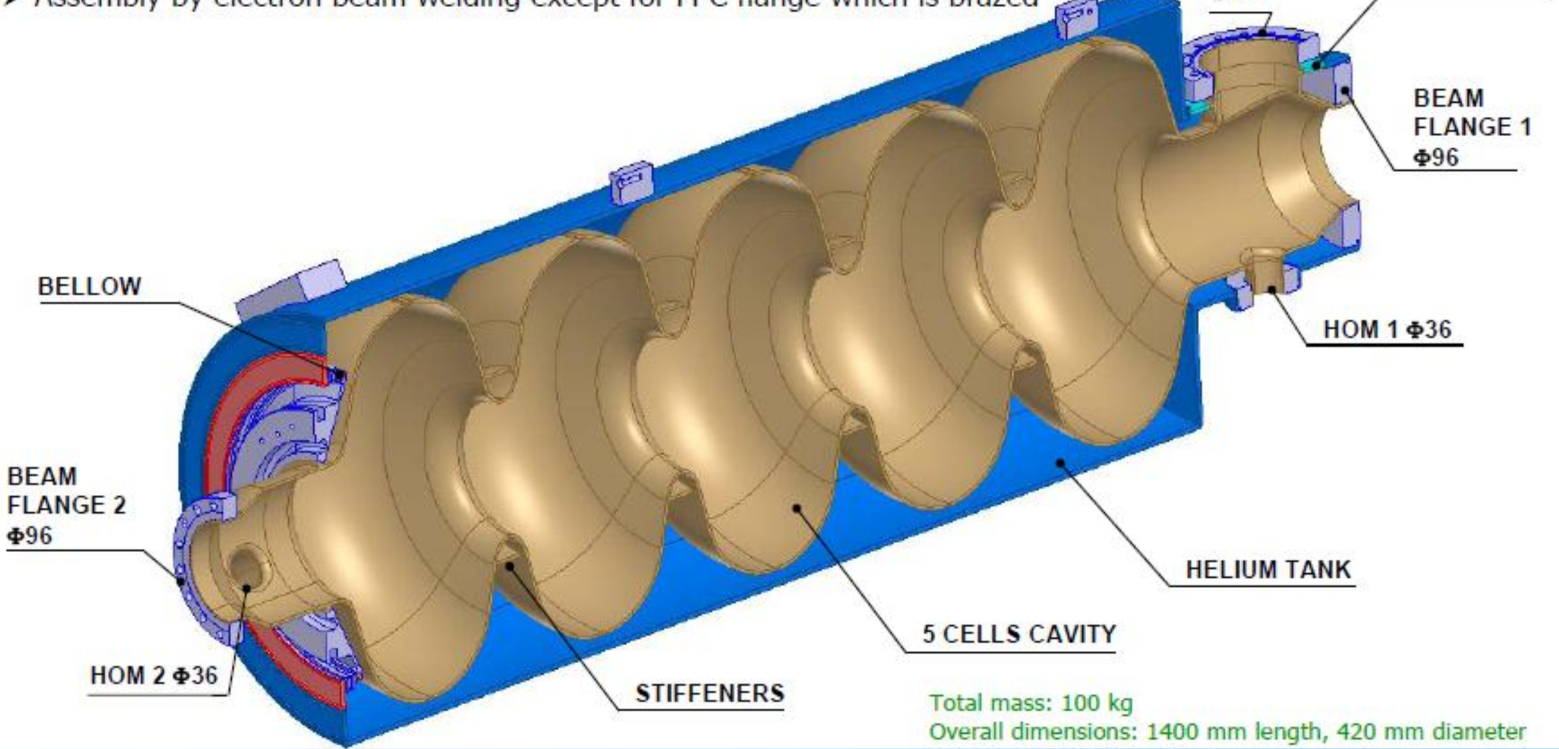
Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.2.1	5	Results of SC proton cavity tests (β = 1 and β = 0.65)	Report	SPL cavities	CEA, CNRS-IPNO	33	45

- Both cavities are under fabrication, delivery delayed to October 2012.
- Vertical EP and RF tests are expected in December 2012
- Results hopefully for the last Annual Meeting, M48

WP10.2: SC Cavities for Proton Linac

Irfu — Engineering design of β=1 cavity and helium tank

- Half cells, beam pipes and ports in pure Niobium RRR > 300
- He tank in Titanium
- Beam flanges in NbTi with Helicoflex joints or hexagonal aluminium joints
- HOM and pick-up flanges in Ti with CF joints
- FPC flange in Stainless steel - compatible with existing power couplers
- Assembly by electron beam welding except for FPC flange which is brazed



Total mass: 100 kg
Overall dimensions: 1400 mm length, 420 mm diameter

WP10.2: SC Cavities for Proton Linac

HORIZONTAL VS VERTICAL ELECTROPOLISHING

Horizontal electropolishing

Pros:
- Good evacuation of gases (cavity half filled)
- Demonstrated efficiency
- Large range of parameters

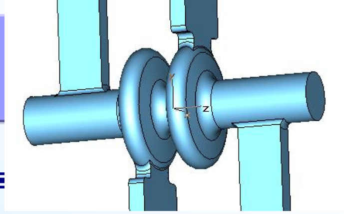
Cons:
- Complicated process
- Rotary seals
- Switching of the cavity
- Low removal rate

Vertical electropolishing

Pros:
- Simple process
- Low floor surface
- Improved safety
- Higher removal rate

Cons:
- Sensitive to fluid dynamics
- Proper parameters to be determined

WP10.3: LHC and CLIC Crab Cavities



Goals:

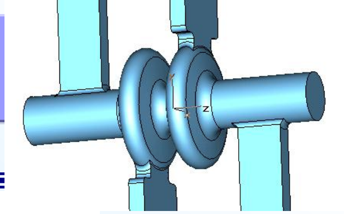
- Design, build and test a single LHC and CLIC crab cavity structure, including input coupler, mode couplers and tuners.
- Design, build and test a LLRF and synchronization system that meets the crab cavity phase and amplitude control specifications for LHC and CLIC.

➢ Deliverables:

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.3.1	7	LHC crab cavity final report	Report	Crab cavities	CERN	36	40
10.3.2	8	CLIC crab cavity final report	Report	Crab cavities	UNIMAN	36	40
10.3.3	9	LHC and CLIC LLRF final reports	Report	Crab cavities	ULANC	36	40

All deliverables have been extended and it is anticipated that all tasks for 10.3 can be completed by M40.

WP10.3: CLIC Crab Cavity

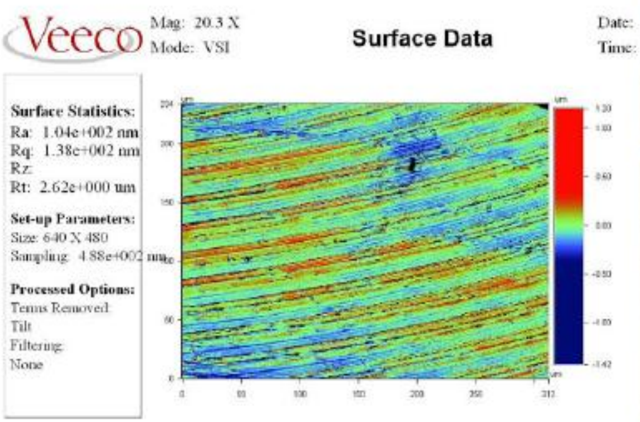


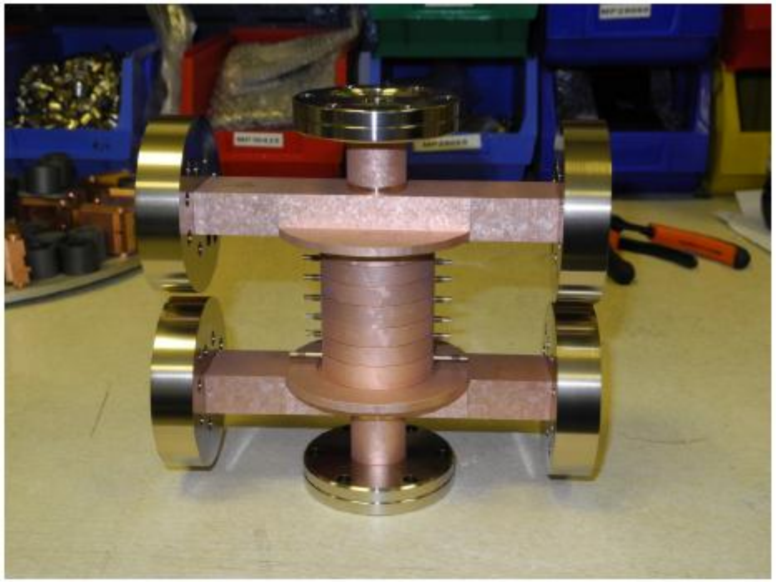
LANCASTER UNIVERSITY

The Cockcroft Institute of Accelerator Science and Technology

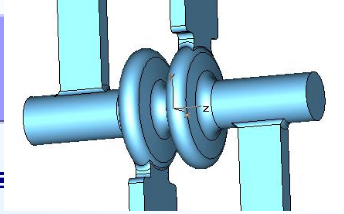
Prototype 1 – UK Built

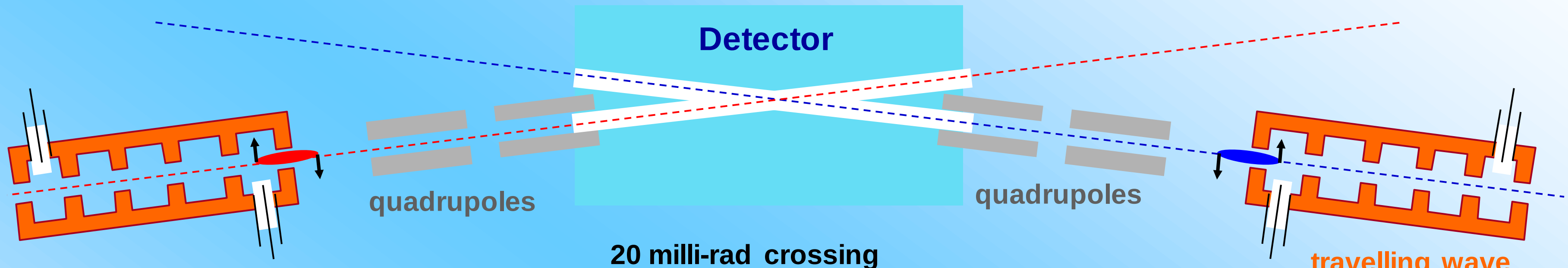
The 1st CLIC crab cavity prototype has been manufactured by Shakespeare Engineering in the UK.
Tolerance and surface roughness on single parts have been measured and are acceptable.
RF testing is commencing next week.





WP10.3: CLIC Crab Cavity LLRF

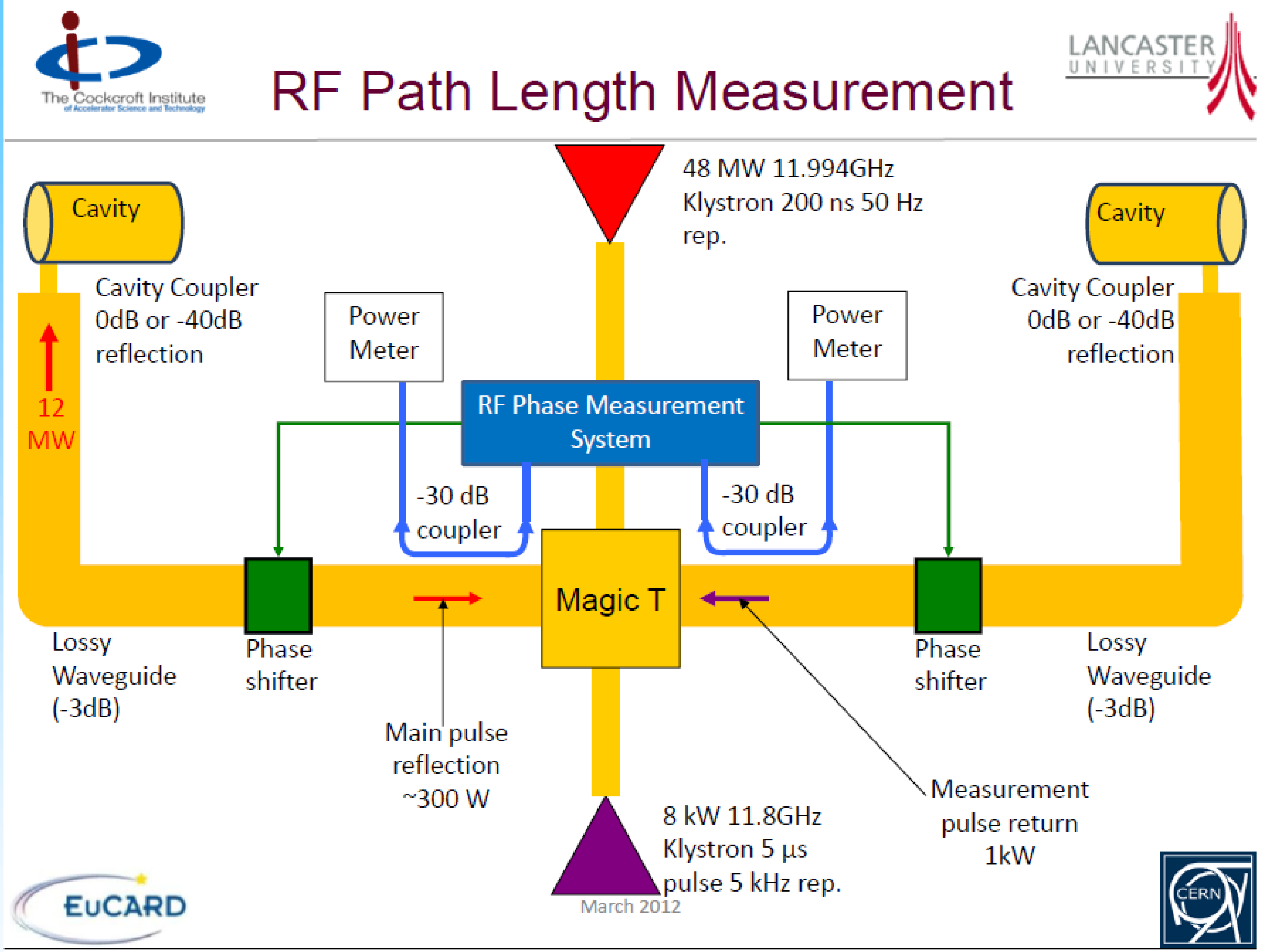




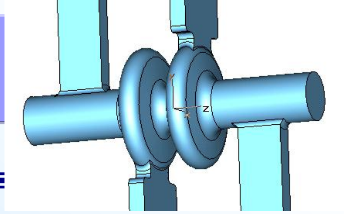
Target max. luminosity loss fraction S	f (GHz)	σ_x (nm)	θ_c (rads)	ϕ_{rms} (deg)	Δt (fs)	Pulse Length (μs)
0.98	12.0	45	0.020	0.0188	4.4	0.156

So need RF path lengths identical to better than $c\Delta t = 1.3\ \mu m$

WP10.3: CLIC Crab Cavity LLRF



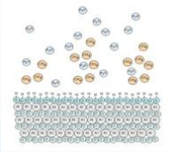
WP10.3: CLIC and LHC Crab Cavity LLRF

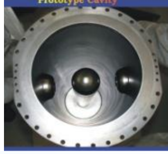


Future Steps:

- CLIC LLRF: will complete reports for prototype phase measurement systems developed during EuCARD for September 2012.
- LHC LLRF: a short study of crab cavity LLRF system will undertaken starting May 2012 to compliment work undertaken during the initial stages of EuCARD.

WP10.4: Thin Films





➢ Deliverables:

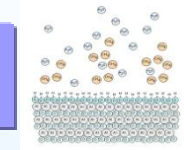
Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.4.1	1	QE data for Pb/Nb deposited photo cathode samples	Report	Thin Films	DESY, NCBJ	12	14
10.4.4	4	New thin film techniques for SC cavities and photocathodes	Report	Thin Films	ULANC	30	42
10.4.2	10	RF measurements on thin film deposited QWR prototype	Report	Thin Films	CERN	36	48
10.4.3	11	Cold test results for the test cavities w/out the deposited lead photo cathode	Report	Thin Films	DESY	36	

D10.4.2: postpone to M48

D10.4.3: *cf. Robert Nietubyc's Highlight Talk*

D10.4.4: should sum up the coating techniques for SC cavities and photocathodes. Six more months will be welcome to assert the quality of the document.

WP10.4: QWR for HIE Isolde

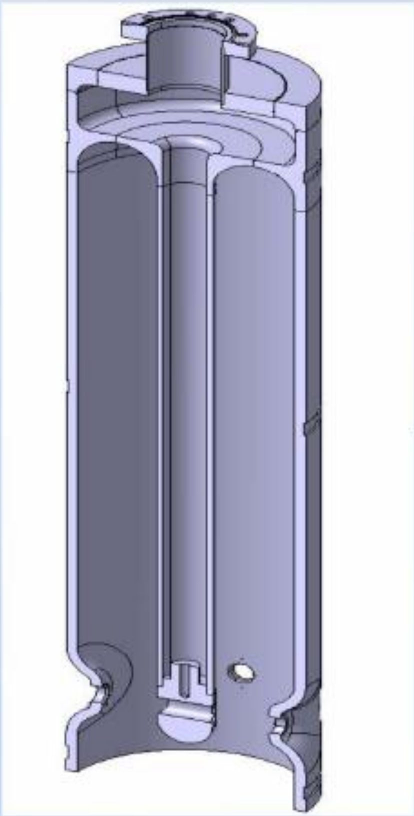


Quarter Wave Resonators (QWRs)

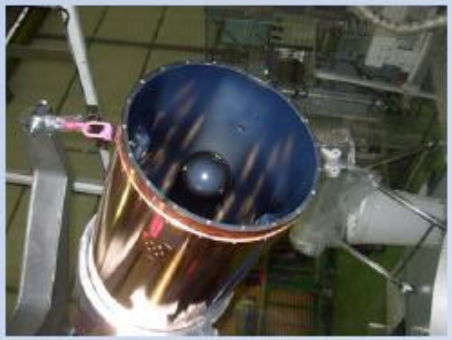
12 Low-β cavity

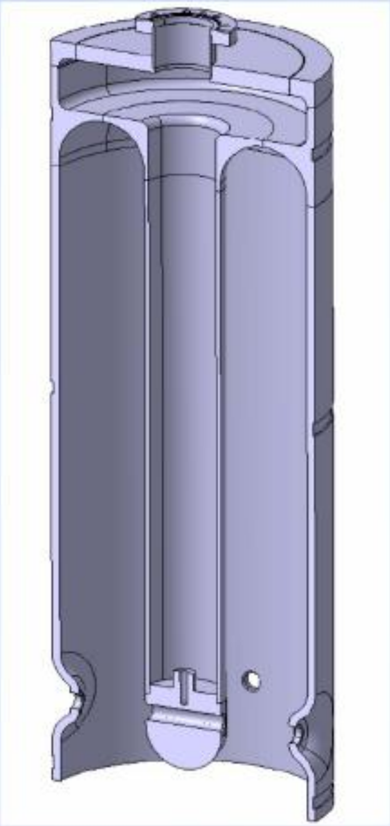
Nb\Cu technology

20 High-β cavity



101.28	f (MHz)	101.28
50	Inner Cond. Diam (mm)	90
195	Outer Cond Diam (mm)	300
6	Designed Gradient (MV/m)	6
3.2×10^8	Q_0 for 6MV/m at 7W	5×10^8
5.4	Epk/Eacc	5.6
80	Hpk/Eacc (Oe/MV/m)	96

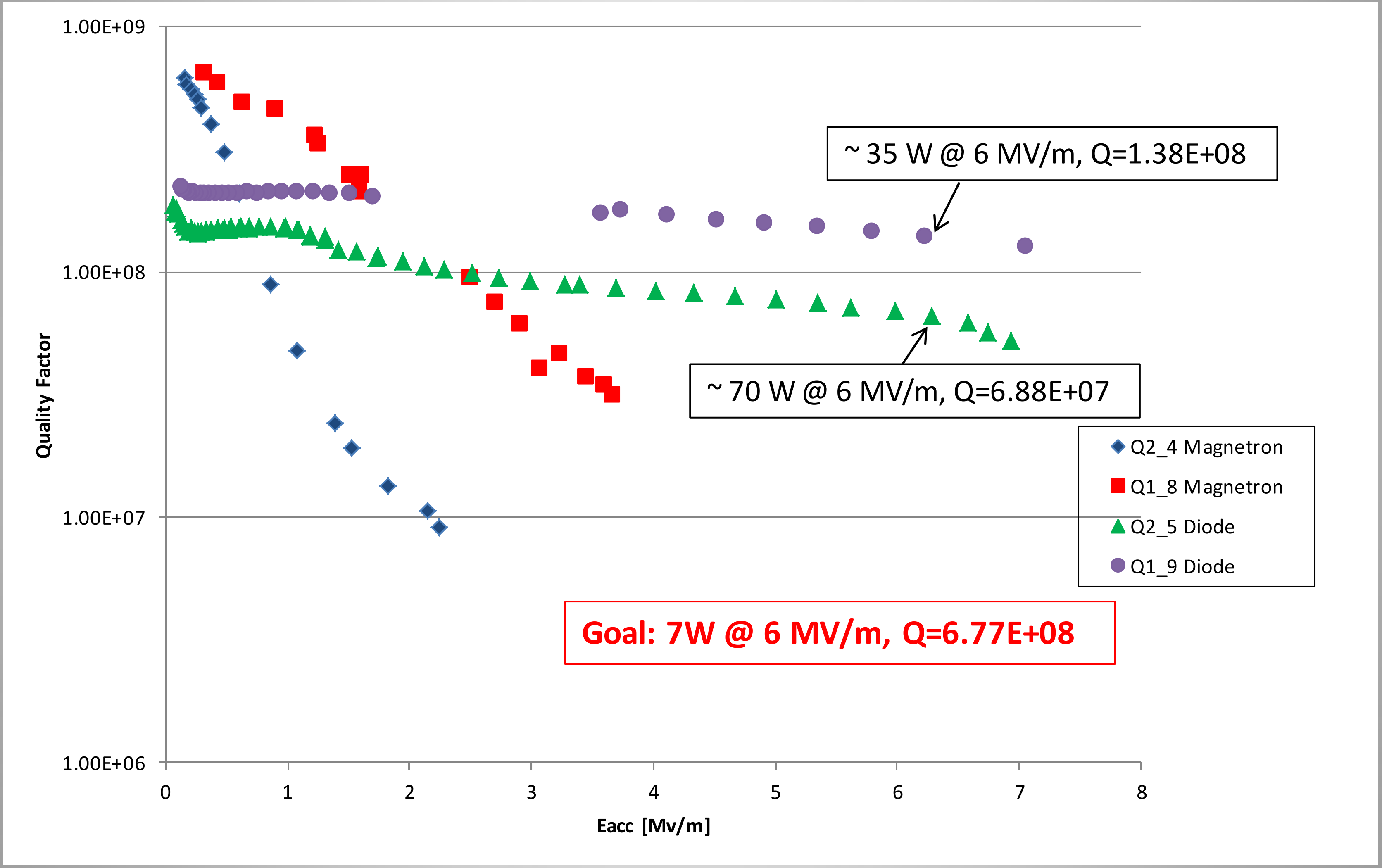




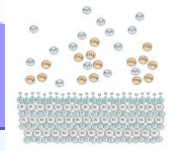
Cavity testing (since last EuCARD SRF)

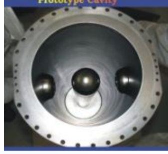
	Q2.4	Q1.8	Q2.5	Q1.9	Q1.10
Type	Magnetron	Magnetron	Diode	Diode	Diode
Coated	September 2011	November 2011	November 2011	January 2012	March 2012
Nominal pressure	8×10^{-3} mbar	8×10^{-3} mbar	1.3×10^{-1} mbar	1.5×10^{-1} mbar	1.6×10^{-1} mbar
Nominal power	1 kW	2 kW	2 kW	4 kW	4 kW
Coating time	8h	4 h	16 h	8h	8h
RF test	Done	Done	Done without and with In seal of tuning plate	Done	Tbd
Comments	Baseline magnetron coating No sputter etching	No cooling 380°C NEG assisted pumping	No cooling 480°C NEG assisted pumping	No cooling 580°C NEG assisted pumping	No cooling 600°C NEG assisted pumping Helicoflex seals

RF Measurements 4.5K



WP10.4: Thin Films





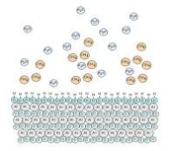
Coating

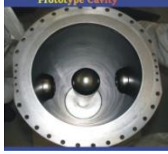
- Implement pre-heating of the cavity prior to coating.
- Follow up on the high-temperature coating option
- Next coating runs are focussed on increasing power
- Iterate on critical sputtering parameters
- Coating turnaround time can be as low as two weeks

The main goal is to finalize the coating parameters

- Goals set by the project:
  - on-specs by mid 2012
  - Production coatings start Q1 2013

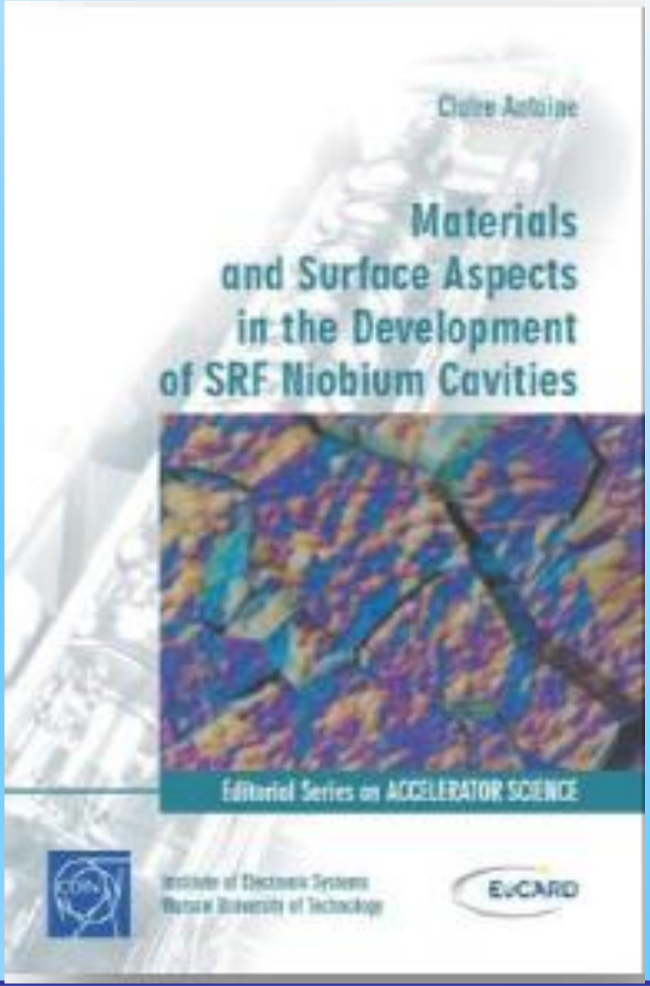
WP10.4: Thin Films



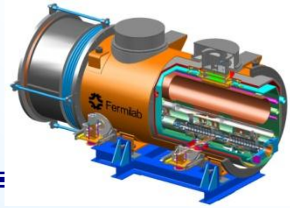


Magnetron sputtering facility at INFN/Legnaro

Monograph touching upon New Thin film Techniques



WP10.5: HOM Distribution

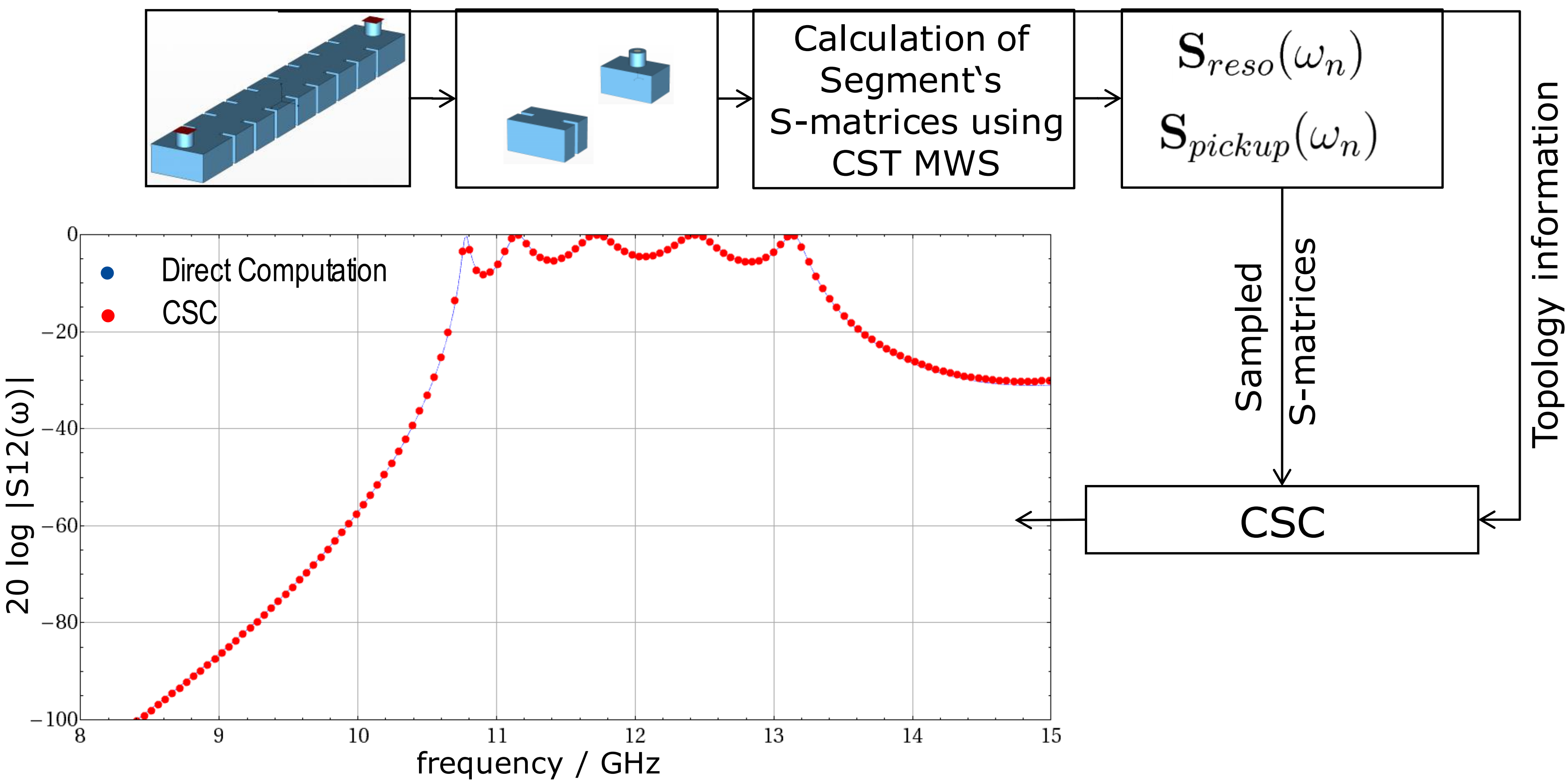


➢ Deliverables:

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.5.2	12	Report on HOM experimental methods and code	Report	HOM distribution	UNIMAN	40	
10.5.1	15	HOM electronics and code to probe beam centring on 3.9 GHz cavities	Report	HOM distribution	DESY	48	

D10.5.1and D10.5.2 : Deliverables 10.5.1 and 10.5.2 are on schedule.

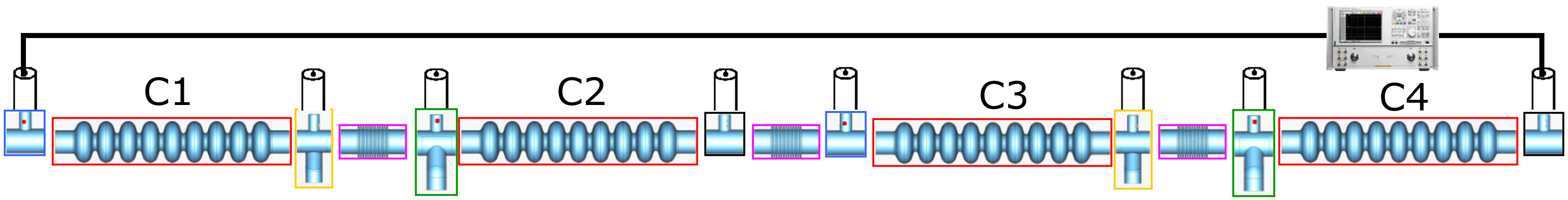
Example Coupled S-Parameter Calculation*

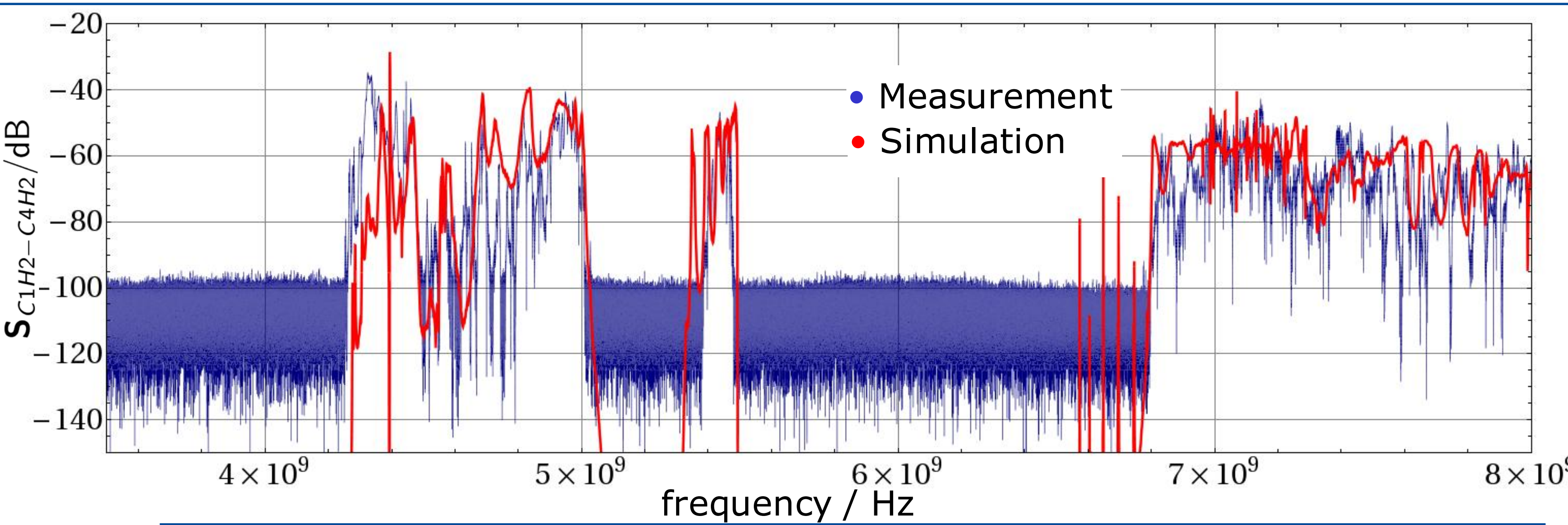


*H.-W. Glock, K. Rothemund, U. van Rienen: "CSC - A System for Coupled S-Parameter Calculations", TESLA-Report 2001-250

Recap last talk

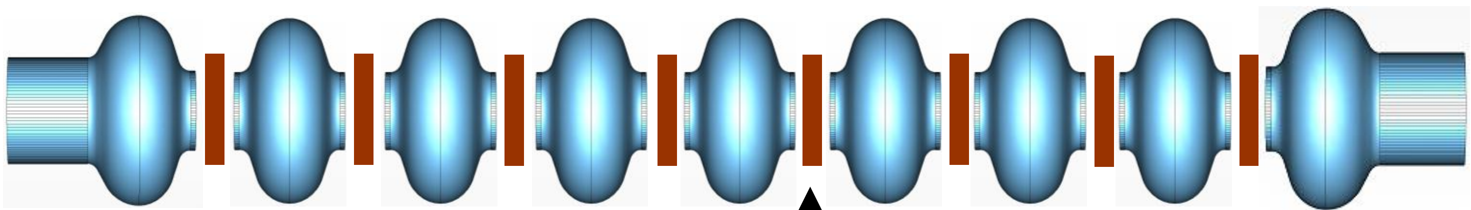
Model Validation ACC39



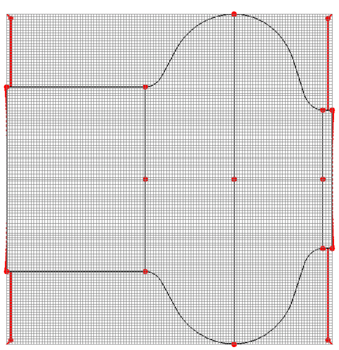


Need to consider the whole string instead of individual cavities since HOMs can propagate through entire string

Third Harmonic Cavity composed of Single Cells

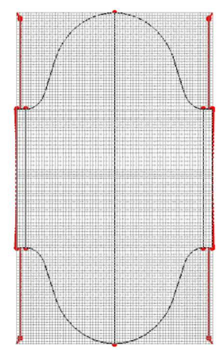


Endcell



- 3,090,528 hexahedral cells
- 8 modes excited on port P1
- 20 modes excited on port P2
- computing time*: 3h 5 min

Midcell



- 3,130,608 hexahedral cells
- 20 modes excited on both ports
- computing time*: 6h 18 min

*using CST MWS FR solver

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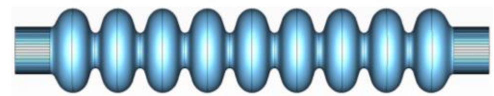
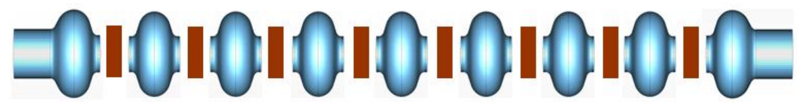
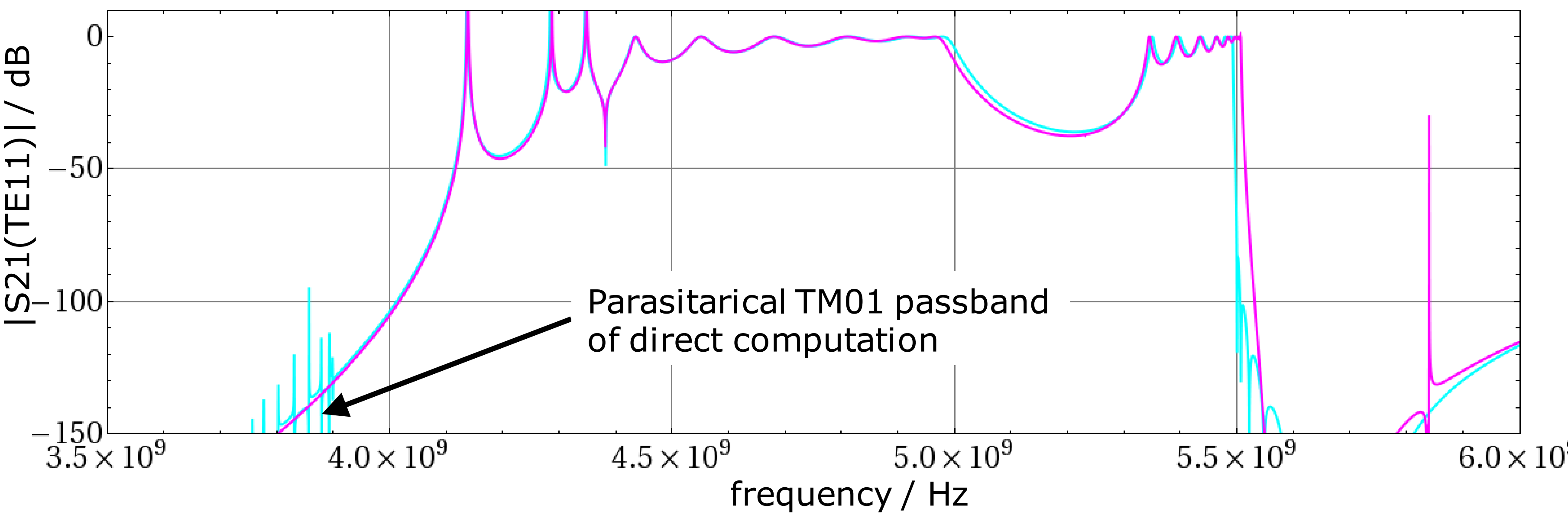
Comparison: Direct vs. Coupling

Direct computation with N=8,12 Mio hexahedral mesh cells, computing time FR solver: T=11h

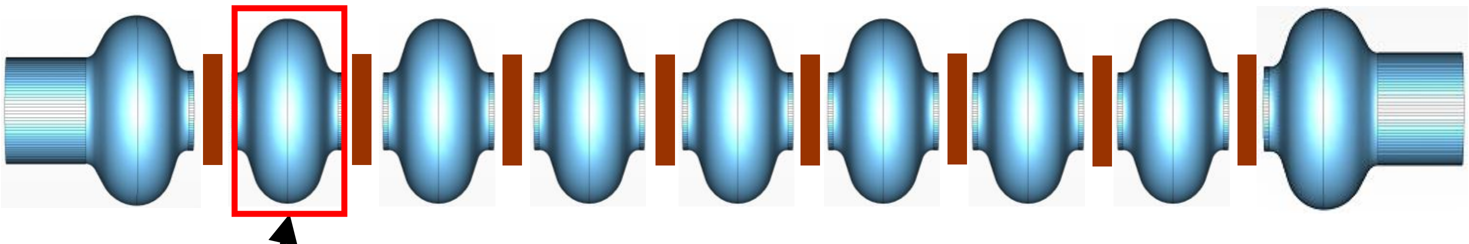


CSC coupling of mid- and end cell elements (only TE11 mode is considered), computing time CSC: couple of seconds

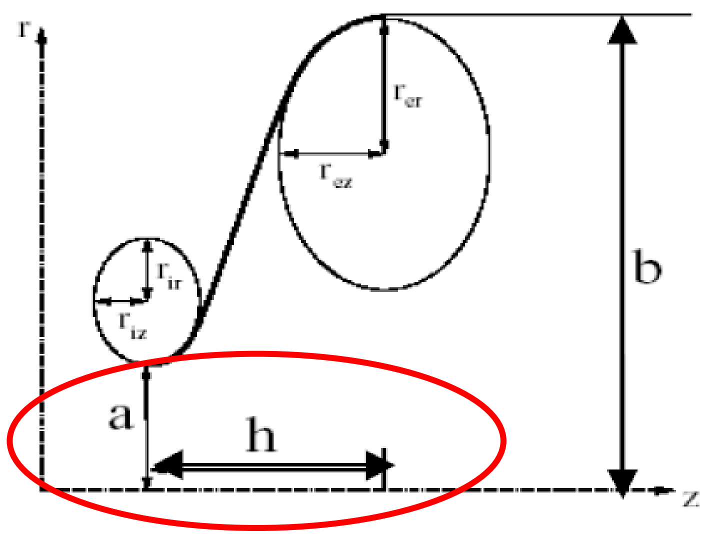




Perturbation of a Single Cell in the Resonator

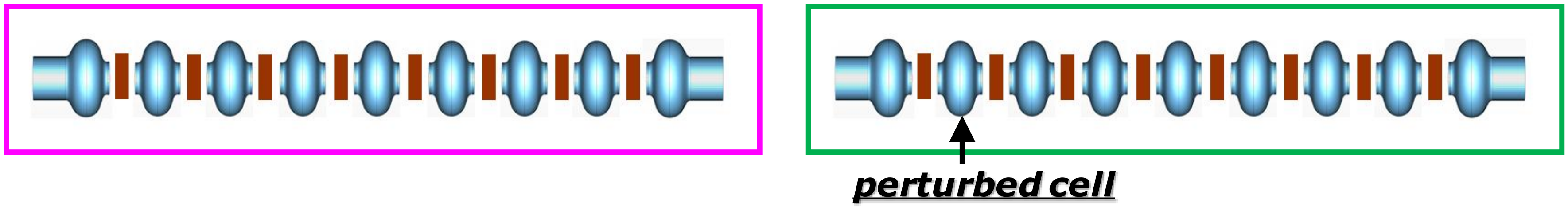


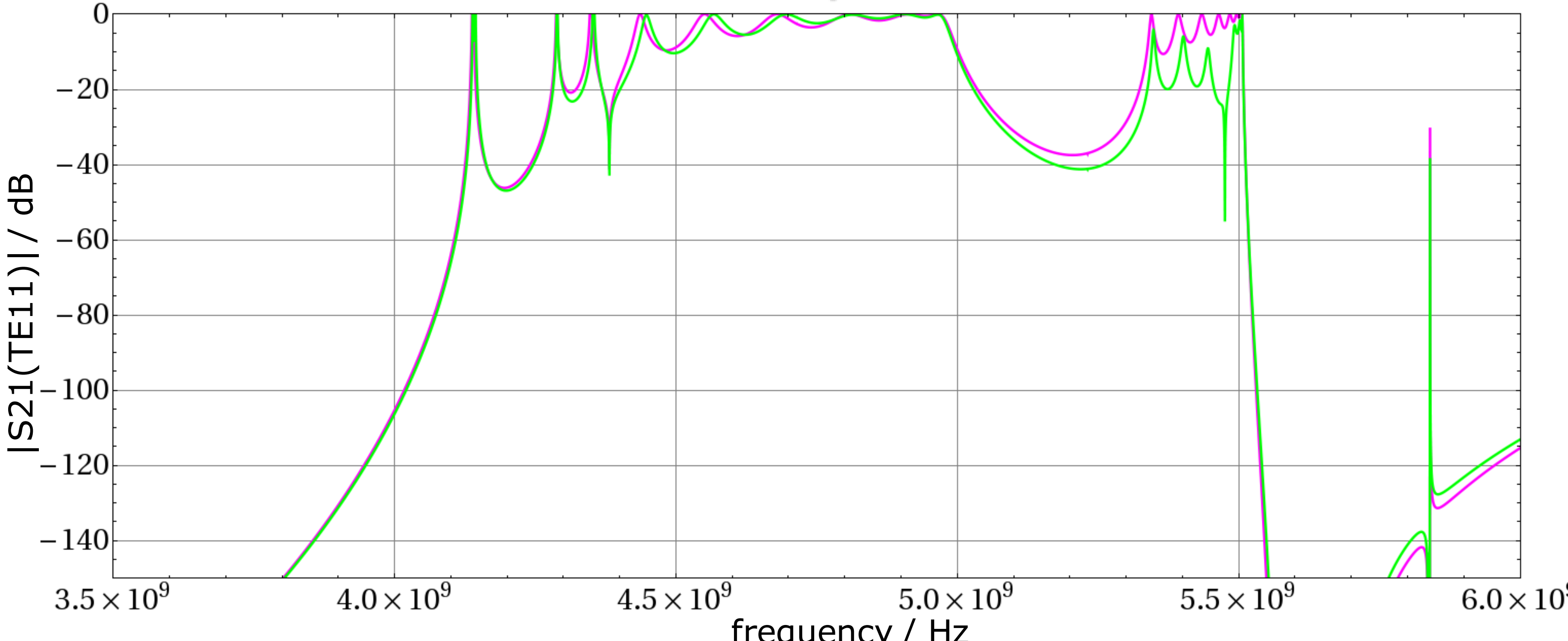
Length of mid cup is 18.2167 mm
instead of 19.2167 mm!



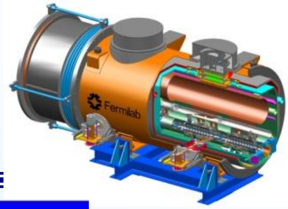
Source: T. Khabibouline et al.: Higher Order Modes of a 3rd Harmonic Cavity with an Increased End-cup Iris. TESLA-FEL 2003-01, May 2003

Influence of Pertubed Cell Position on HOM (1/4)

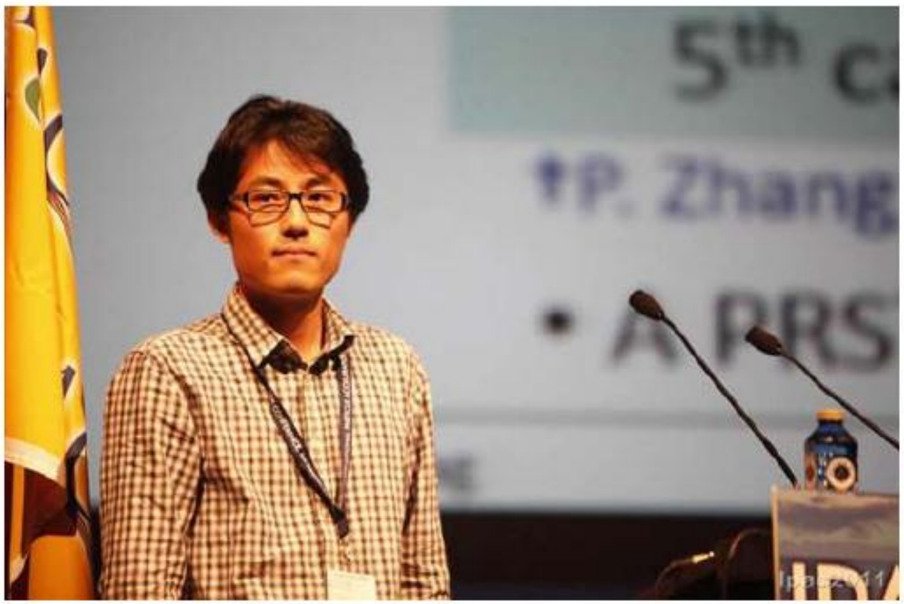




WP10.5: HOM Distribution



EPS-AG Thesis Prize



- Pei Zhang, a Cockcroft Institute Ph. D. student at the University of Manchester and working at DESY, has been selected for Ph.D. thesis prize at the IPAC 2011 in San Sebastian, Spain.
- This prize is awarded to a student registered for a PhD or diploma in accelerator physics or engineering or to a trainee accelerator physicist or engineer in the educational phase of their professional career, for the quality of work and promise for the future.
- His contribution can be found in the SPMS session (THPPA00) in the conference (JACoW) website, cited as *"Study of Beam Diagnostics with Trapped Modes in Third Harmonic Superconducting Cavities at FLASH*

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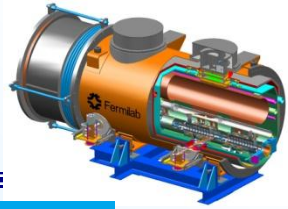
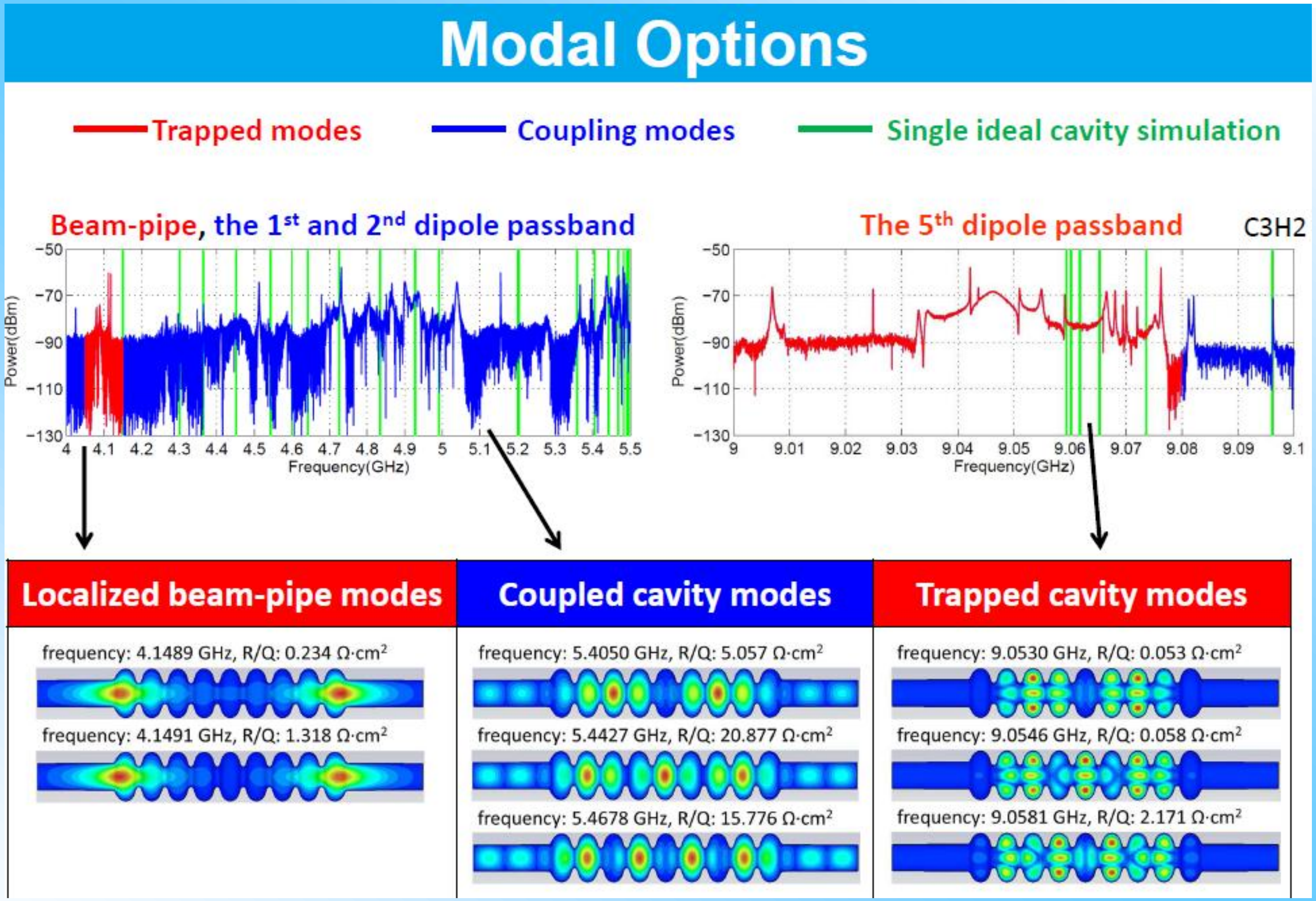
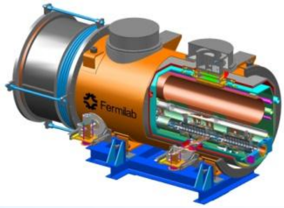
WP10.5: HOM Distribution





WP10.5: HOM Distribution



- **Electronics prototype tested with FLASH beam**

Resolution	Beampipe	D1	D2	D5
x (µm)	50 – 100	20 – 30	10 – 25	40 – 50
y (µm)	100 – 150	40 – 60	30 – 40	40 – 80

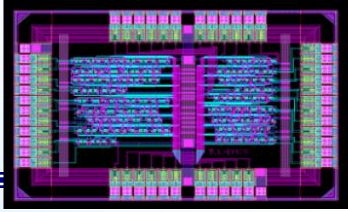
①BPM resolution: 20 µm. ②Resolution varies among couplers

- **Decision made for the final HOM electronics**

Band	Center frequency	Bandwidth	# of channels
D2	5460 MHz	100 MHz	2
D5	9058 MHz	40MHz	6

- **Final electronics is being built**
  - Analog module: Fermilab Digital module: DESY
  - Expected by the end of 2012
- **Next step**
  - HOMBPM performance study and calibration stability

WP10.6: LLRF at FLASH



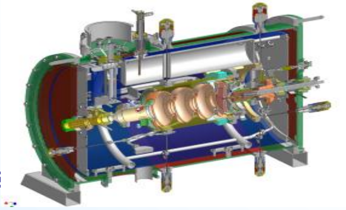
➢ Deliverables:

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.6.1	13	Report on system test and performance	Report	LLRF at FLASH	DESY	42	48

M10.6.1: The complete test and report shifted to M48

cf. *M. Grecki and K. Czuba's Highlight Talk*

WP10.7: SC RF Gun at ELBE



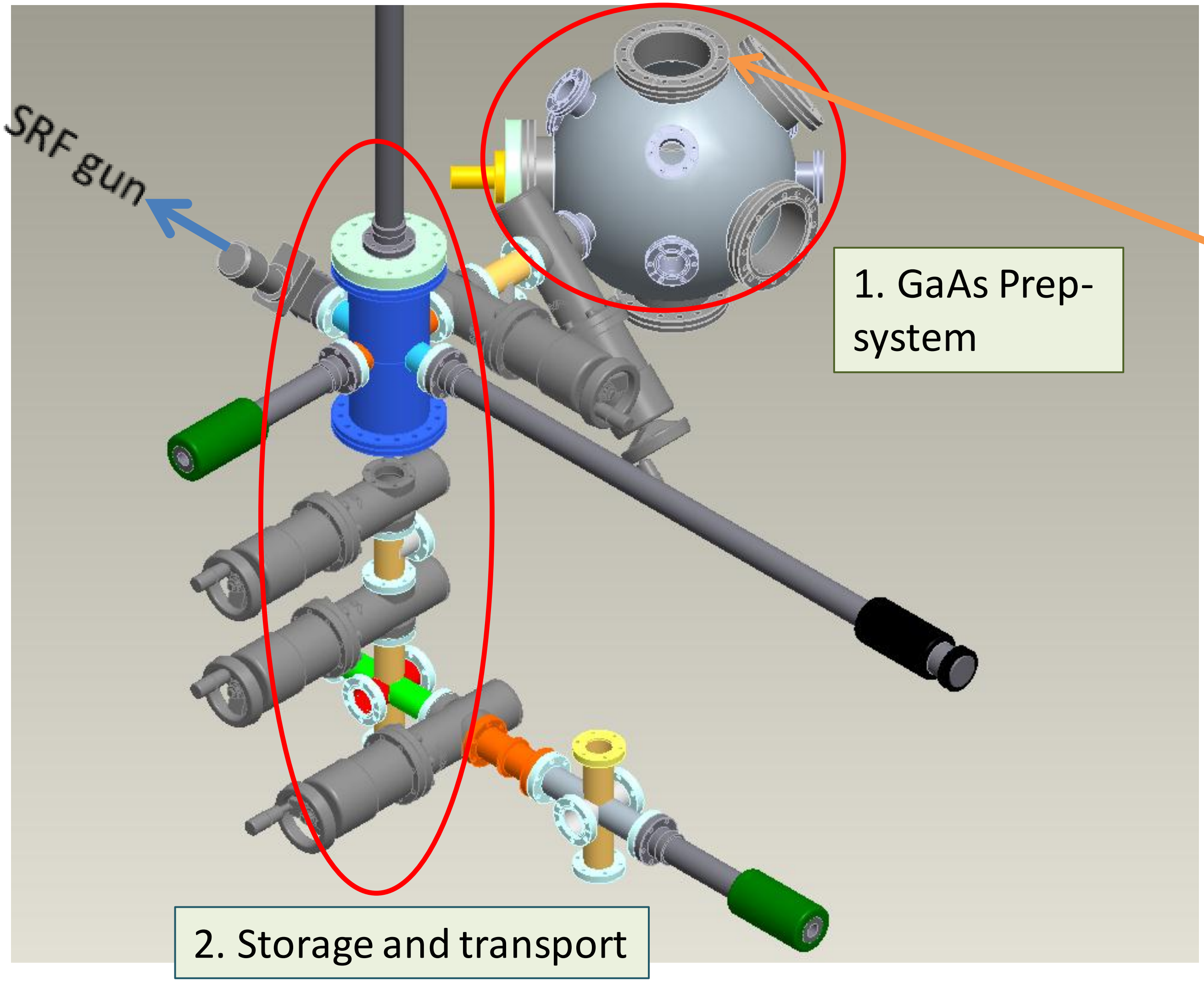
➢ Deliverables:

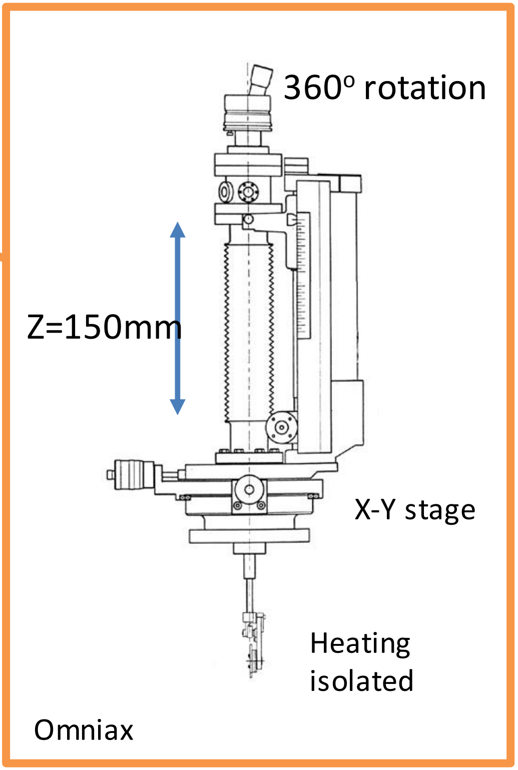
Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.7.1	2	Results of slice measurements	Report	SCRF Gun	FZD, HZB	24	26
10.7.2	6	Results for GaAs photocathodes	Report	SCRF Gun	FZD, HZB	33	48

D10.7.2 : *The situation for the GaAs photo cathode is unsatisfactory. The first preparation system, small and mainly assembled of standard vacuum components, did not deliver good results. Since end of 2011, focus is on a new preparation system.*

Postpone the date for D10.7.2 to month 48.

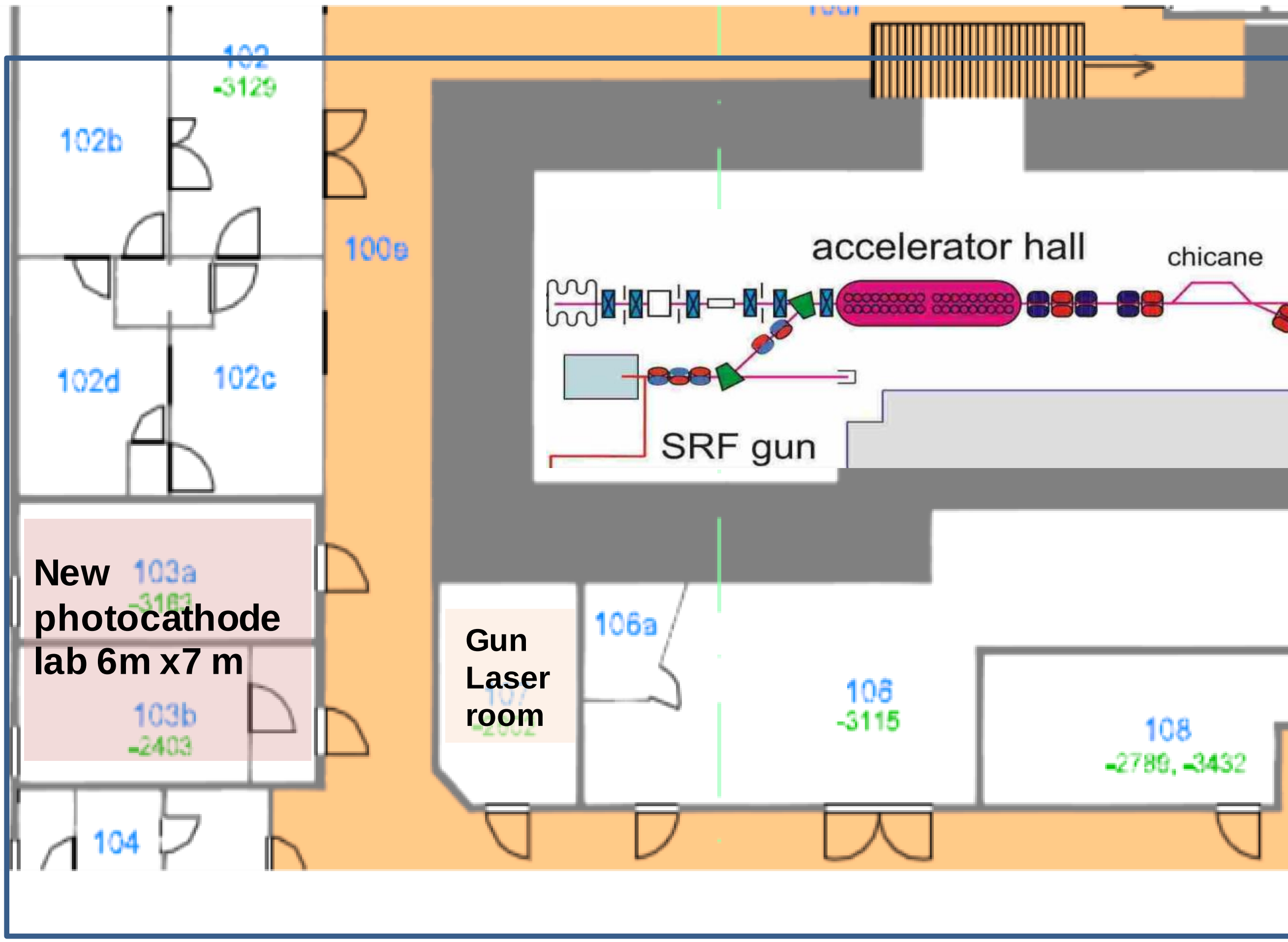
1. New preparation chamber / transfer system





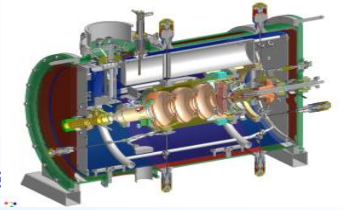
Member of the Helmholtz Association
Rong Xiang I r.xiang@hzdr.de I www.hzdr.de

New laboratory for GaAs preparation system



Rong Xiang I r.xiang@hzdr.de I www.hzdr.de

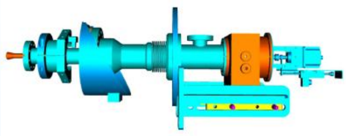
WP10.7: GaAs Photocathodes



Next Steps:

- Finish GaAs preparation chamber (Summer 2012)
- Vacuum test in the new laboratory
- Bulk GaAs activation experiments (End of 2012)
- Optimize transfer system
- Test activated-bulk-GaAs in SRF gun
- QE, life time, dark current, thermal emittance……

WP10.8: RF Coupler Cleaning at LAL



➢ Deliverables:

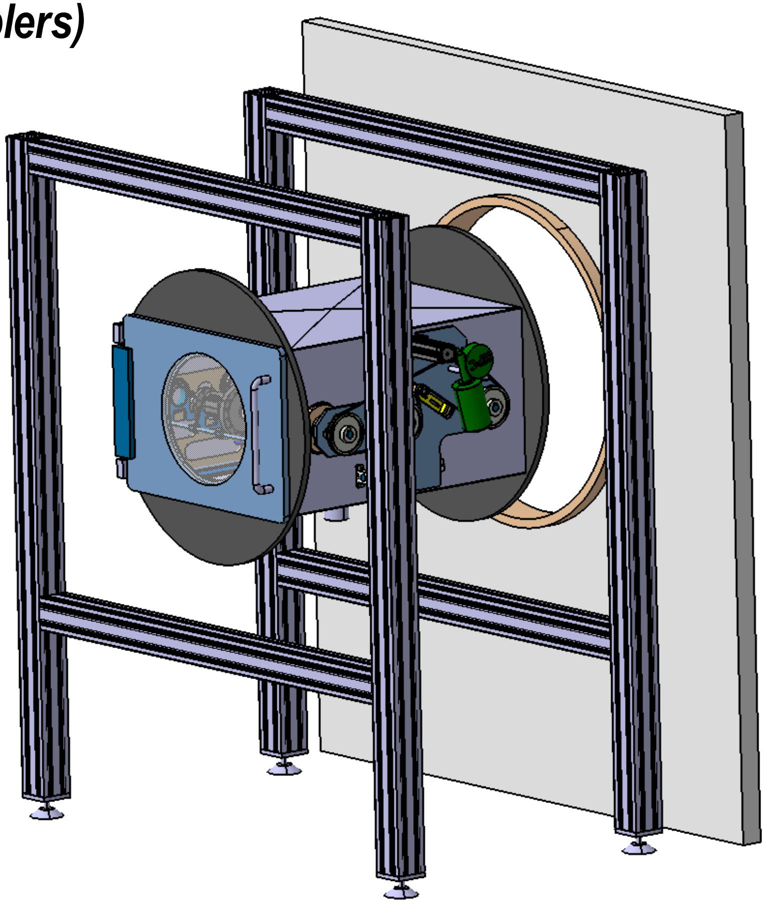
Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.8.1	3	Test and operation of the coupler preparation procedure	Report	Coupler Development	CNRS-LAL	24	48

D10.8.1 : The report for results and analysis must be shifted to the end of EuCARD program (M48).

Eucard WP 10.8.2 : Couplers at LAL-Orsay

A.L.I.C.E.

Automate de Lavage Integré pour Coupleurs Electromagnétiques
(Integrated Washing-Drying Robot for RF Couplers)



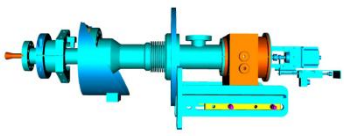
Who is A.L.I.C.E ?

- A.L.I.C.E.'s technical functions
  - Airlock function
  - US Cleaning function
  - Rinsing function
  - Drying function
- A.L.I.C.E.'s overview

How is A.L.I.C.E. ?

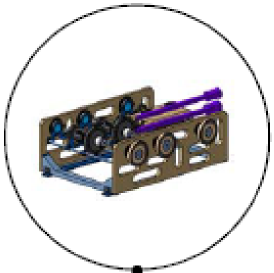
- A.L.I.C.E.'s progress

WP10.8: RF Coupler Cleaning



A.L.I.C.E. overview

A.L.I.C.E.

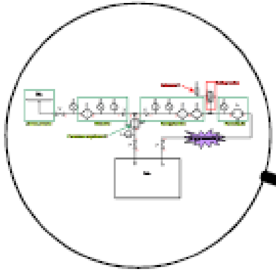


Internal mechanic

Design : in progress

Drawings : not started

Realisation : not started

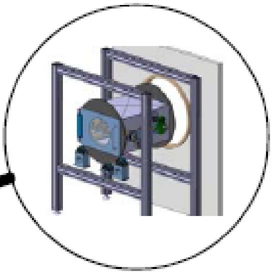


Pneumatic network

Definition : complete

Benchmark : in progress

Integration : in progress

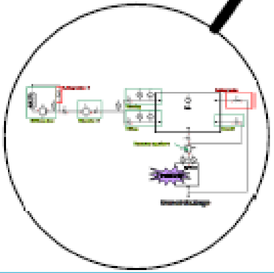


External mechanic

Design : in progress

Drawings : not started

Realisation : not started

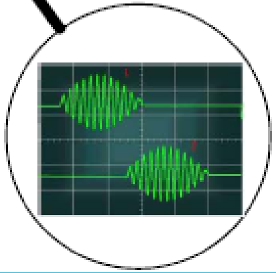


Hydraulic network

Definition : complete

Benchmark : in progress

Integration : in progress



US system

Definition : complete

Benchmark : complete

Integration : in progress

WP10-SRF: Fifteen Deliverables

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)	Achieved (in months)
10.4.1	1	QE data for Pb/Nb deposited photo cathode samples	Report	Thin Films	DESY, NCBJ	12	14
10.7.1	2	Results of slice measurements	Report	SCRF Gun	FZD, HZB	24	26
10.8.1	3	Test and operation of the coupler preparation procedure	Report	Coupler Development	CNRS-LAL	24	48
10.4.4	4	New thin film techniques for SC cavities and photocathodes	Report	Thin Films	ULANC	30	42
10.2.1	5	Results of SC proton cavity tests (β = 1 and β = 0.65)	Report	SPL cavities	CEA, CNRS-IPNO	33	45
10.7.2	6	Results for GaAs photocathodes	Report	SCRF Gun	FZD, HZB	33	48
10.3.1	7	LHC crab cavity final report	Report	Crab cavities	CERN	36	40
10.3.2	8	CLIC crab cavity final report	Report	Crab cavities	UNIMAN	36	40
10.3.3	9	LHC and CLIC LLRF final reports	Report	Crab cavities	ULANC	36	40
10.4.2	10	RF measurements on thin film deposited QWR prototype	Report	Thin Films	CERN	36	48
10.4.3	11	Cold test results for the test cavities w/out the deposited lead photo cathode	Report	Thin Films	DESY	36	36
10.5.2	12	Report on HOM experimental methods and code	Report	HOM distribution	UNIMAN	40	
10.6.1	13	Report on system test and performance	Report	LLRF at FLASH	DESY	42	48
10.1.1	14	SRF web-site linked to the technical and administrative databases	Web-Site	Coordination	CEA, CERN	48	
10.5.1	15	HOM electronics and code to probe beam centring on 3.9 GHz cavities	Report	HOM distribution	DESY	48	

Thank You for Your Attention