EucARD Plenary Annual Meeting

14-16 April 2010, RAL

WP10: SRF

for “Superconducting RF Technology”

O. Brunner (CERN), O. Napoly (CEA)

WP10-SRF Task and Responsibilities

WP 10 Organisation, version 07.04.10					
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		**S. Chel**	**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	S. Chel	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, IPJ Swie	**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, IPJ Swierk	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 applicati
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. von Reinen	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	IPJ	IPJ, 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 Annual Review

7-9 April 2010, Cockcroft Institute, Daresbury

45 Participants = 47 Registrants – 2 Visa Problems (@ LAL and FZD)

2 Coordinators + 6 Task Leaders – 1 Visa Problems (@ LAL)

14/15 Partner Institutes represented

WP10-SRF Annual Review

7-9 April 2010, Cockcroft Institute, Daresbury

Young Participants, including 6 PhD students

Ben Hall,	Lancaster University	T10.3
Anna Gustafsson,	Lancaster University, working at CERN	T10.4
Nawin Juntong,	Manchester University	T10.5
Chris Glasman,	Manchester University	T10.5
Pei Zhang,	Manchester University, working at DESY	T10.5
Thomas Fligsten,	Rostock University	T10.5
Jeniffa Rudolph,	HZ Berlin	T10.7

WP10-SRF 1st Annual Review : a Milestone

- **SC-RF Accelerator Technology attracts scientists from various backgrounds, and attracts young scientists, including PhD students, despite the “so many ‘SRF’ meetings”.**

- **The first WP10-SRF Annual Review milestone has been successfully passed from 2 standpoints:**

  - **Sociologically :** very good participation, spirit and organisation.

  - **Scientifically :** as I will try to demonstrate in the following.

- **Why ?**
  To my opinion, the reason is that SC-RF Accelerator Technology is a Technology of choice, with a big “Order Book” and, more important for us, a strong potential for future accelerators.

We try to push accelerator performance barriers !

Pushing Accelerator Performance Barriers

- High Gradient barrier (ILC, SPL, ESS, etc…) → Task 10.2, 10.4
- High Q0 barrier (efficiency, duty cycle) → Task 10.4
- High RF Power barrier (HPPAs) → Task 10.2, 10.8
- High Stability and Reliability barriers (ILC, XFEL, ADS) → Task 10.5, 10.6
- Low Beta barrier (e.g. IFMIF β=0.07) → Task 10.4
- Industrialization and cost barrier (ILC) → Task 10.8
- New Applications barrier:
  - Crab cavities (LHC, ILC) → Task 10.3
  - SC-RF Gun (eventually for polarized electrons) → Task 10.4, 10.7
  - Energy Recovery Linac (ALICE, …) → Task 10.5, 10.7

The only task which does push any barrier is Task 10.1 !

Task 10.1 : Coordination

- An acting Steering Group = WPC+WPDC+7 TL
- Steering Group Meetings: at least 2 / year + teleconferences following EuCARD SC.
- An External Scientific Evaluation Committee will be invited **at T0+2 Years and T0+4 Years** SRF Annual Reviews
- SRF plenary meetings: 1 / year, rotating venues at SRF labs, includes a SG meeting.

WP10 Deliverables: 15 units

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)
10.4.1	1	QE data for Pb/Nb deposited photo cathode samples	Report	Thin Films	DESY, IPJ	12
10.7.1	2	Results of slice measurements	Report	SCRF Gun	FZD, HZB	24
10.8.1	3	Test and operation of the coupler preparation procedure	Report	Coupler Development	CNRS-LAL	24
10.4.4	4	New thin film techniques for SC cavities and photocathodes	Demonstrator	Thin Films	ULANC	30
10.2.1	5	Results of SC proton cavity tests ($\beta = 1$ and $\beta = 0.65$)	Report	SPL cavities	CEA, CNRS-IPNO	33
10.7.2	6	Results for GaAs photocathodes	Report	SCRF Gun	FZD, HZB	33
10.3.1	7	LHC crab cavity final report	Report	Crab cavities	CERN	36
10.3.2	8	CLIC crab cavity final report	Report	Crab cavities	UNIMAN	36
10.3.3	9	LHC and CLIC LLRF final reports	Report	Crab cavities	ULANC	36
10.4.2	10	RF measurements on thin film deposited QWR prototype	Report	Thin Films	CERN	36
10.4.3	11	Cold test results for the test cavities w/out the deposited lead photo cathode	Report	Thin Films	DESY	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
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

T10.4 : Pb/Nb SC-RF Gun

Aim of the study (M36) : produce and test a fully SC RF Gun using SC Pb photocathode deposited on SC Nb 1-½ Cavity

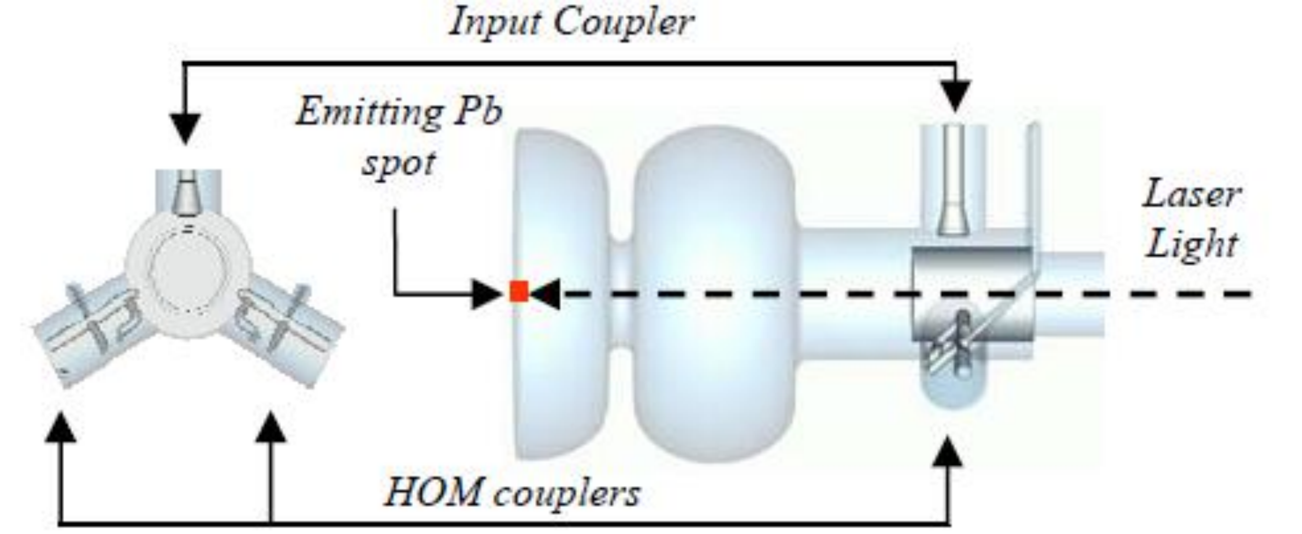


Figure 1: 1.6-cell SRF-injector cavity with 2 HOM couplers and an input coupler.

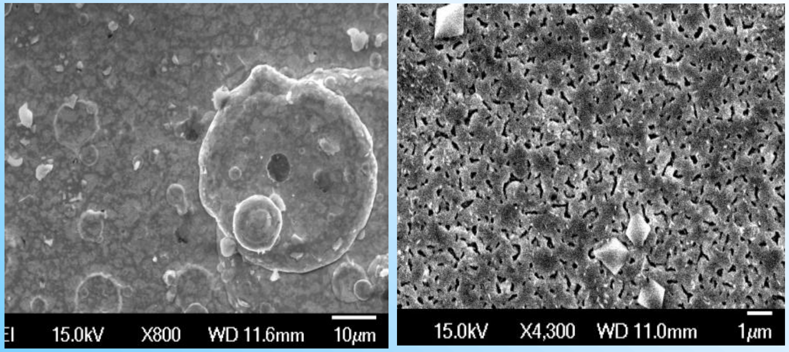
T10.4 : QE data for Pb/Nb deposited samples

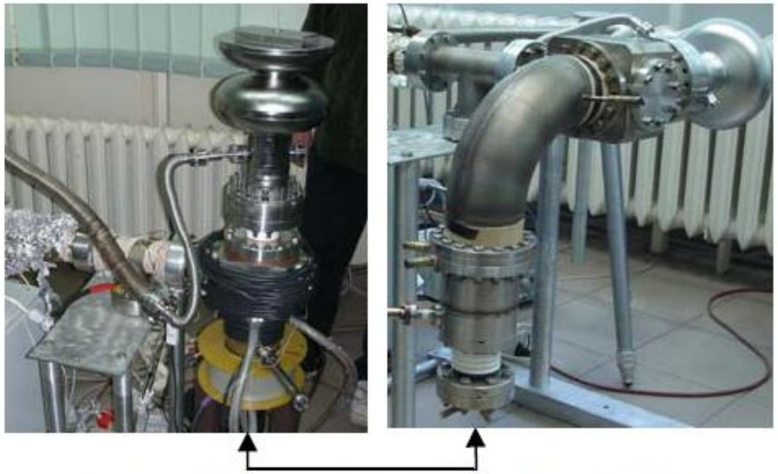
Eight samples have been produced with

- **different substrates (large vs. fine Nb grains)**
- **different coating parameters (straight vs. 90°)**

Table 2: Coating parameters

No	Time [s]	Nb type	Distance	Setup	Pump
1	1800	poly	1.6 cell	Straight	oil
2	1800	poly	1.6 cell	Straight	oil
3	1800	mono	1.6 cell	Straight	oil
4	2700	poly	1.6 cell	Bent	dry
5	2700	poly	1.6 cell	Bent	dry
6	2700	mono	0.5 cell	Bent	dry
7	2700	mono	0.5 cell	Bent	dry
8	6000	poly	1.6 cell	Bent	dry





Location of the heater with lead stub for plasma formation

Figure 2: Two arrangements for plasma arc-deposition with the injector cavity; straight (left) and with the 90°-bend (right).

T10.4 : QE data for Pb/Nb deposited samples

- **QE measurements and surface analysis performed at BNL**
- **QE data are shown for 2 samples, coated at 90° : QE > 0.2%**

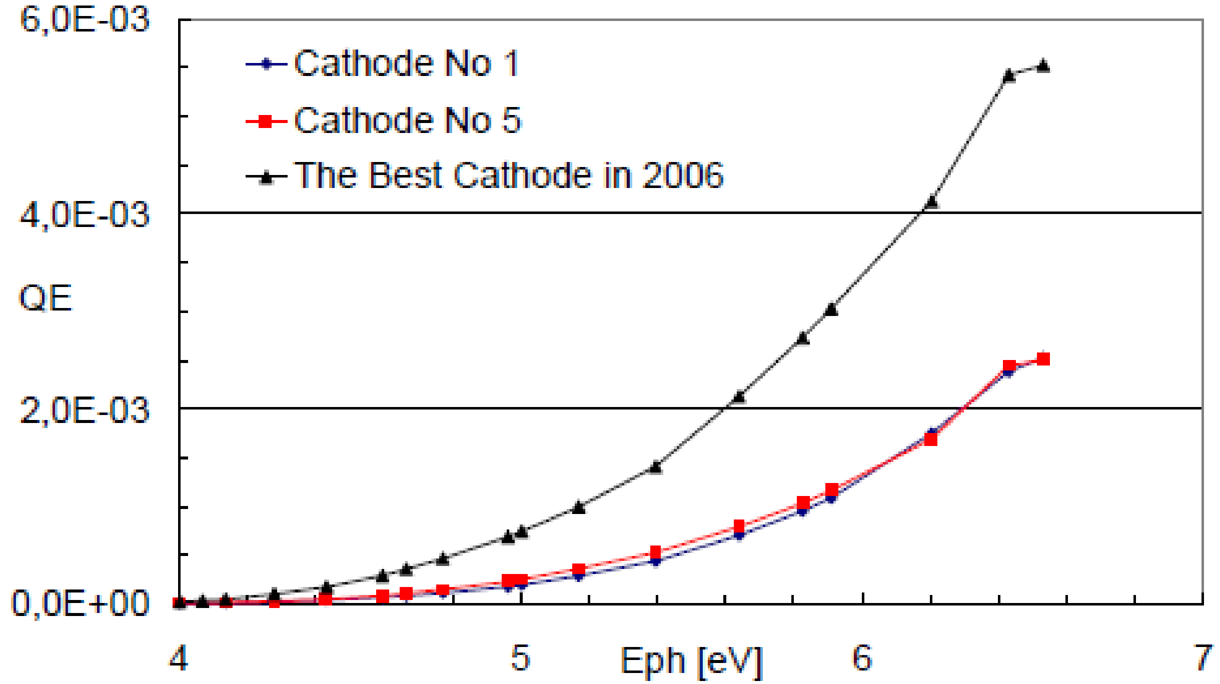


Figure 5: QE vs. photon energy for samples after the laser cleaning and for the best arc-deposited cathode measured in 2006 [3].

T10.4 : QE data for Pb/Nb deposited samples

- Pb layer needs to be thicker to resist Laser cleaning
- Modified bench at 30°, still OK to remove neutral droplets

Figure 8: New setup with 30°-bend.

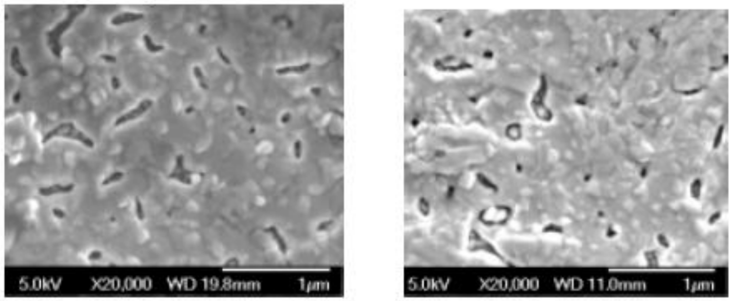


Figure 9: SEM images of cathode deposited with the 30°-bend, before (left) and after (right) laser cleaning.

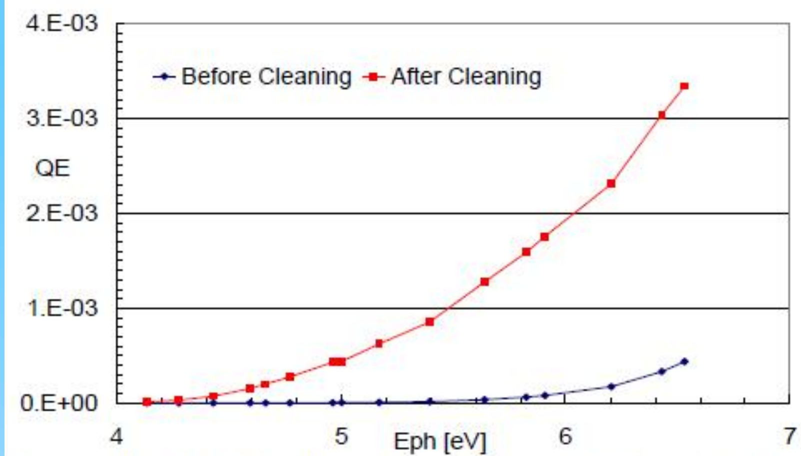


Figure 10: Spectral dependence of QE before and after laser cleaning.

Lead to progress : QE > 0.3 %

T10.4 : QE data for Pb/Nb deposited samples

- **Deliverable is reached from the point of view of technical achievements**
- **WP10 and Task 10.4 are suggesting an improved report to document the existing data.**

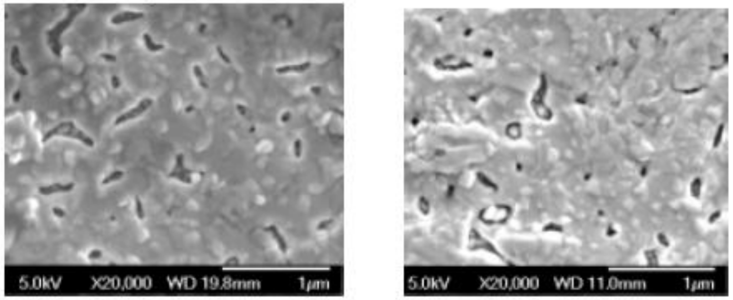


Figure 9: SEM images of cathode deposited with the 30°-bend, before (left) and after (right) laser cleaning.

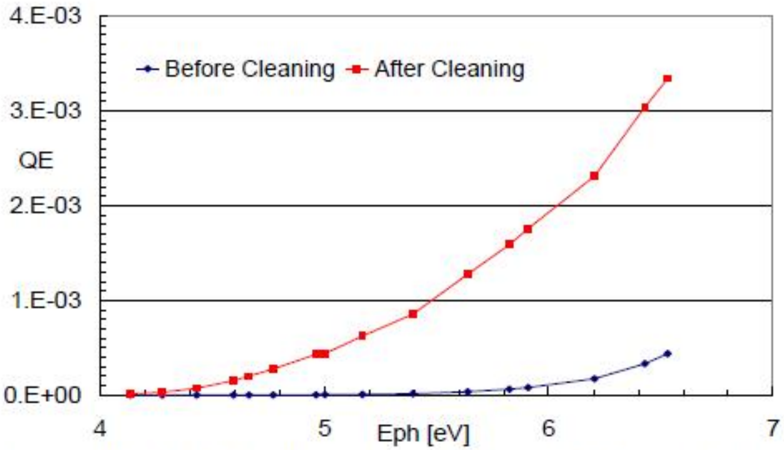


Figure 10: Spectral dependence of QE before and after laser cleaning.

Next steps :

- **improve recipe on samples**
- **coat (1 +) ½ cell cavity (M18)**

WP10 Milestones: 6 units due in April 2010

Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor (s)	Planned (in months)
10.1.1	1	Annual review SRF first year	Meeting	Coordination	CEA, CERN	12
10.2.2	2	Definition of cryomodule interface	Report	SPL cavities	CERN	12
10.3.1	3	LHC crab cavity specifications completed	Report	Crab cavities	CERN	12
10.3.4	4	CLIC crab cavity specifications completed	Report	Crab cavities	UNIMAN	12
10.4.1	5	Lead deposition on samples for photocathode development	Samples	Thin Films	IPJ	12
10.7.1	6	Preparation system for GaAs finished	Prototype	SCRF gun	FZD	12

T10.2 : Objectives and Achievements

Objective: feasibility study of 704.4MHZ SC cavities for SPL and ESS

- SC cavities parameters:

β = 0.65 @ 19MV/m ; β = 1.0 @ 25MV/m

- Cryomodule design:
  - -Integrate qualified components (tuners, power couplers,…)
  - -Integrate SPL and ESS machines specifics (slope, transport constraints,..)

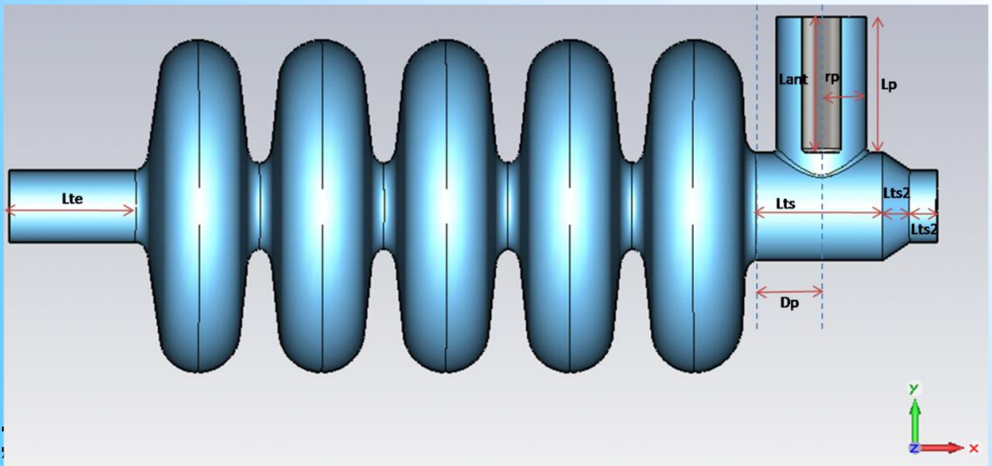
Achievements:

- RF design of β=0.65 and β=1.0 cavities are done.
- Decision to use common design of end tubes for both cavities.
- Studies to implement the tuner and the power coupler are in progress.
- Cavity interfaces will be defined in the 2nd quarter and detailed drawings will be ready.
- Study of EP station at Saclay is completed.
- Orders for cavity fabrication should be launched this summer.

T10.2 : Status of the β=0.65 cavity design

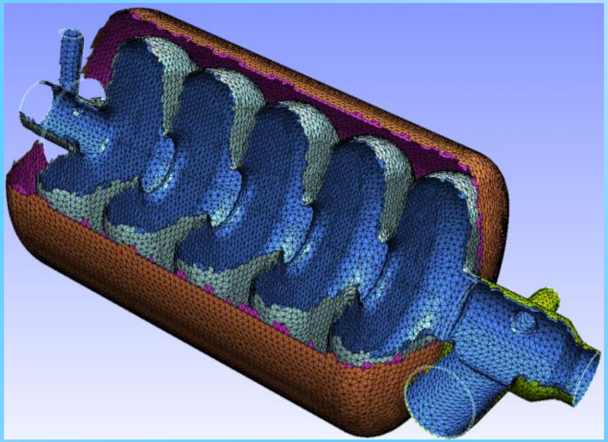
Reference parameters:

- Frequency: 704.4MHz
- Accelerating gradient: 19MV/m
- Number of cells per cavity: 5
- R/Q: 290Ω



Major achievements so far:

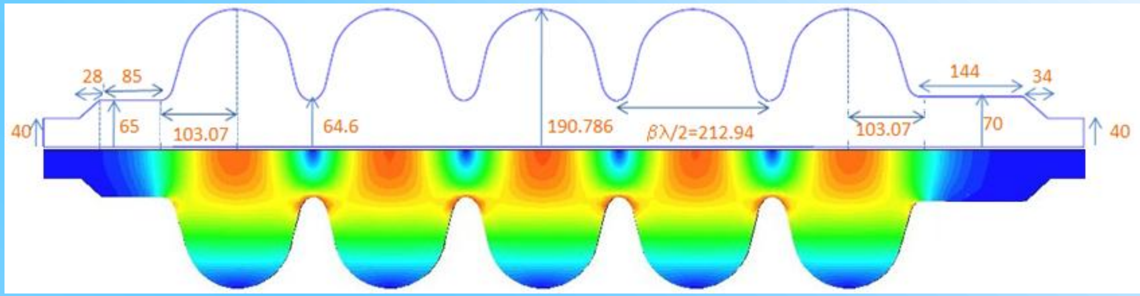
- RF design study of cavity optimized;
- Power coupler and antenna positioning to get $Q_{ext} = 10^6$;
- Mechanical design optimized (cavity wall thickness, stiffeners) to cope with Lorentz force detuning and vacuum and cryogenic conditions;
- Mechanical drawing of Tuner and He vessel done,
- Fully compatible interfaces with β = 1.0 cavities



T10.2: Status of the β=1.0 cavity

Reference parameters:

- Frequency: 704.4MHz
- Accelerating gradient: 25MV/m
- Number of cells per cavity: 5



Major achievements so far:

- Same as before with less advanced tuner and He tank designs
- Two power couplers successfully processed at 1 MW CW.

Next steps

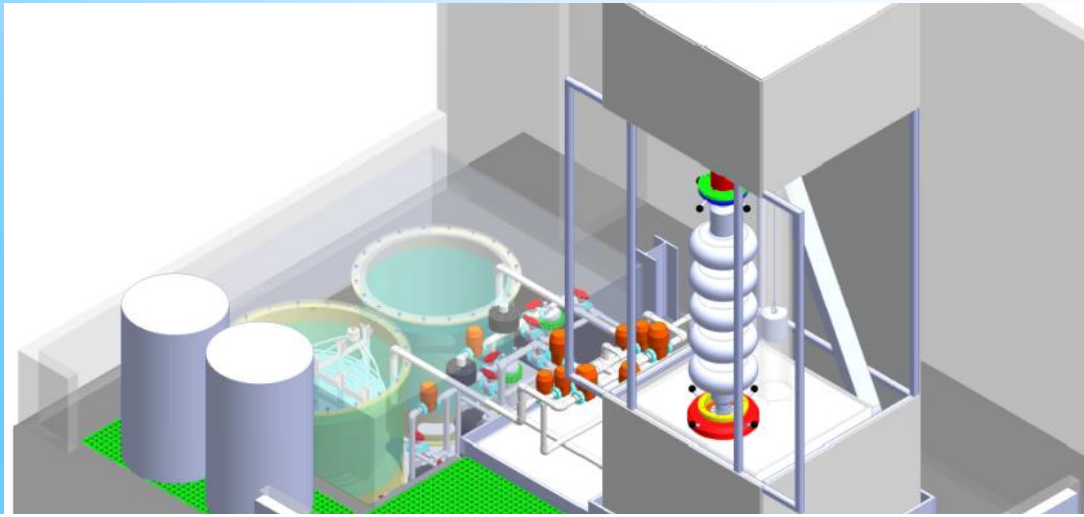
-Finalize detailed mechanical drawings

-Launch tendering offers for cavity fabrication

Task 10.2: Study of the vertical EP station

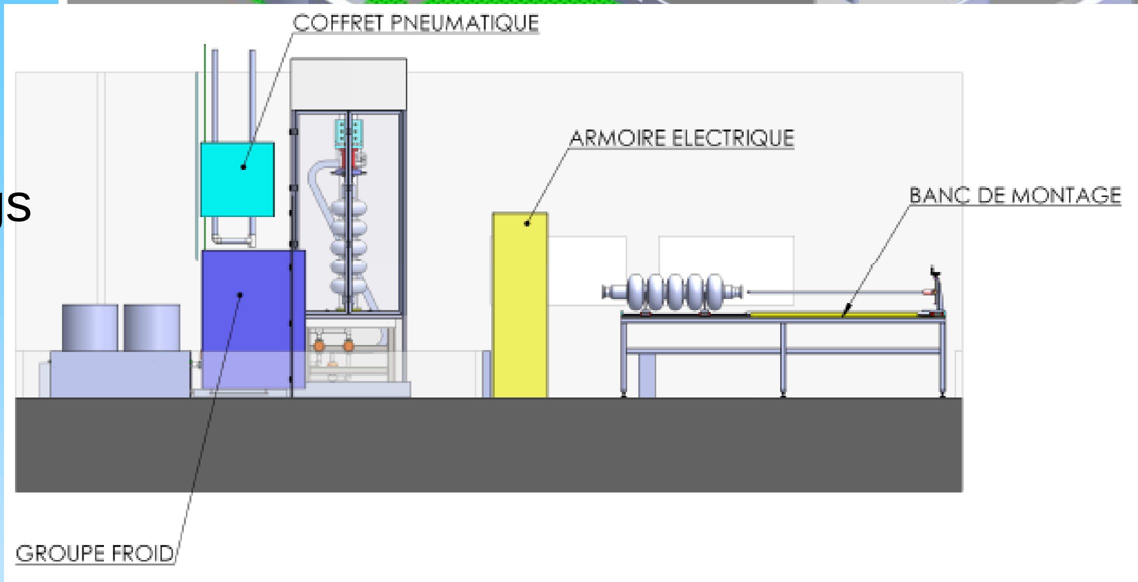
Study of required setup:

- Cavity length ~ 1.5 m
- Diameter = 382 mm
- Vertical (like Cornell Univ.)
- Fully automated process



Major achievements so far:

- detailed design study done, including specification documents & technical drawings
- cost study done and call for tender launched.



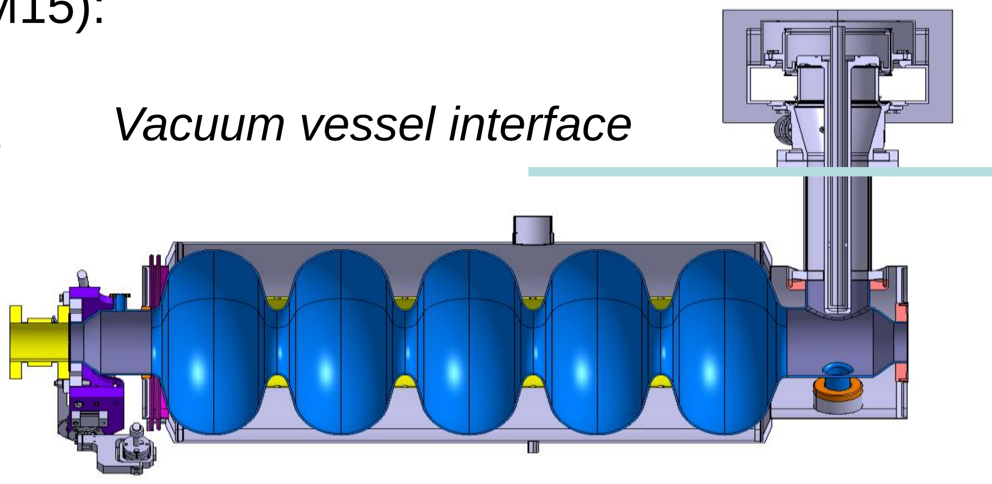
Task 10.2 : Definition of the interfaces cavity/cryomodule

Cavity Interfaces to be fixed soon (M15):

- He vessel
- Cavity support system in the cryostat
- Main coupler position (up or down)
- Tuner
- Pick-up antenna
- HOM couplers

are needed to launch

the prototype cavity fabrication.

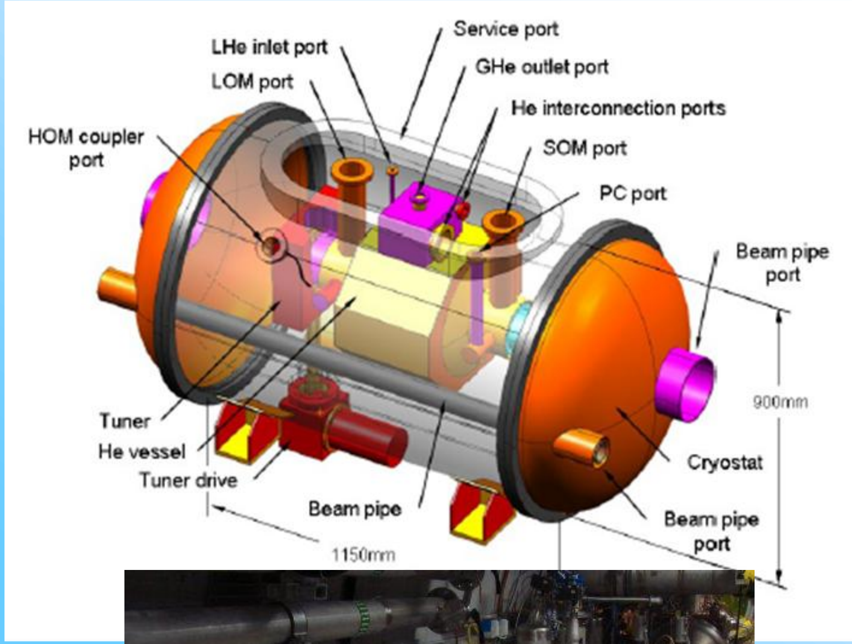


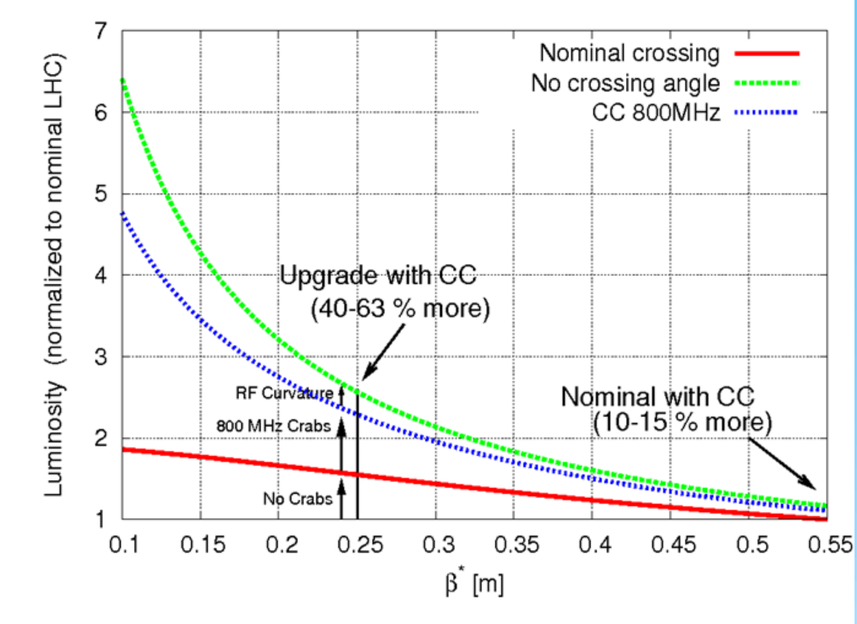
Outer interfaces are part of a more global program (SLHC, French exceptional contribution, ESS, …) and will be fixed at the end of the study

- Preliminary cryogenic distribution scheme proposed
- Cryogenic interfaces
- Alignment system for cavities
- Outer instrumentation flanges

Task 10.3: LHC-CC Integration @ CERN

- Strategy for LHC-CC:
  - KEK Crab Cavity in SPS
  - Compact cavities
  - 'Conventional' cavity in IR4
    - Cryogenics in IR4
    - Power Systems
    - Time scale for IR4 Global Scheme tests



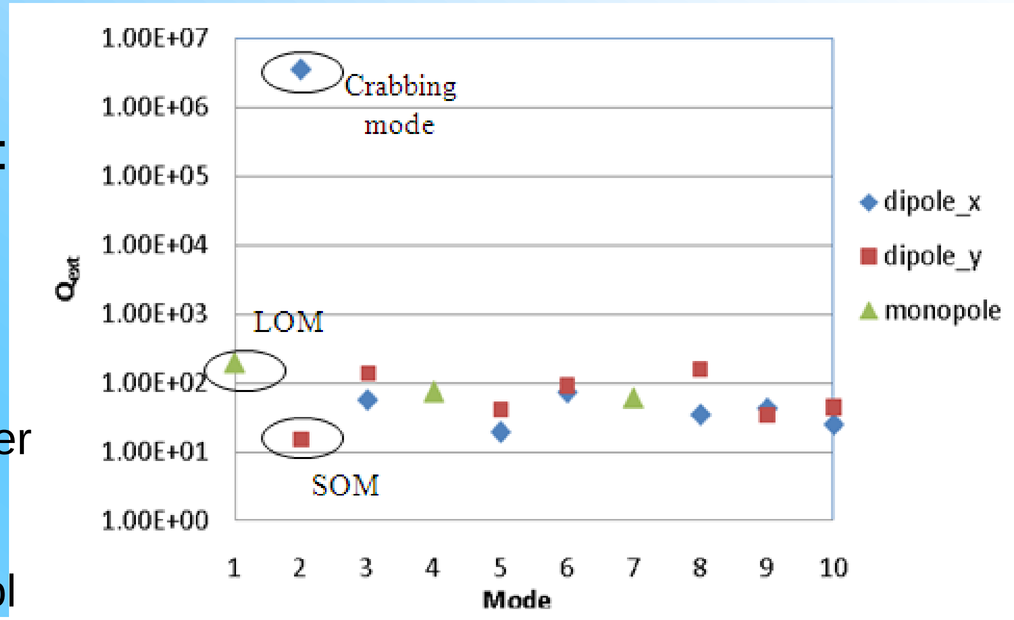


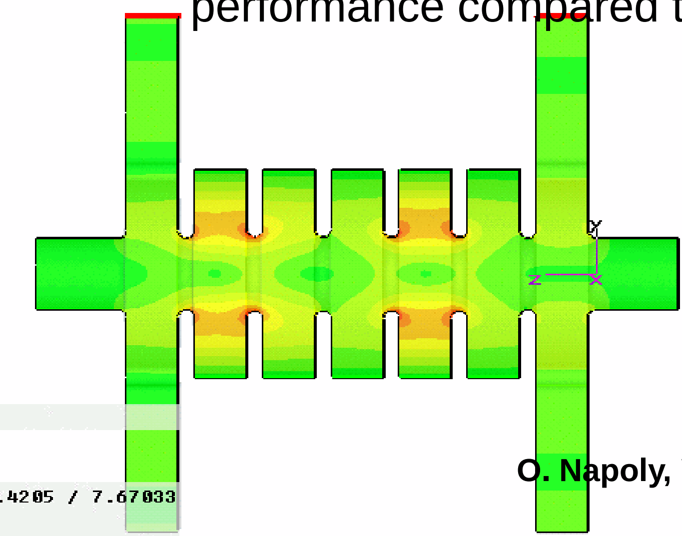
Task LHC-CC Development

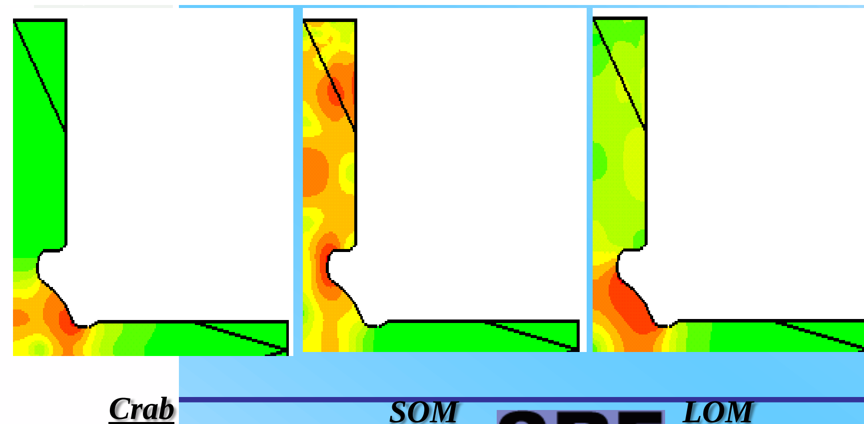
- Cf. G. Burt’s presentation at this Meeting.

Task 10.3: CLIC-CC Development

- Collaborators:
  - ULAN-CI, UMAN-CI and SLAC
- A 12 GHz, TW NC cavity adopted:
  - Synergic with main linac.
  - X-band cavity needs smaller transverse voltage for a given rotation angle.
  - Makes phase control tolerance larger than for sub harmonic frequencies.
  - TW mode allows better beam-loading correction and phase control performance compared to SW mode.







Task 10.3: CLIC-CC and LHC-CC LLRF Development

- Aim: study and design LLRF system for LHC-CC and CLIC-CC
- Major achievements so far:
  - LHC-CC:
    - LHC-CC phase control model established
    - Full digital system anticipated, based on ILC-CC R&D
    - Stability tolerance expected: <0.04% and 0.003° @ 8mrad
  - CLIC-CC:
    - Hybrid digital-analogue system anticipated.
    - Analogue adjustment during the bunch train.
    - Digital for train to train optimisation of control loop.
    - Timing tolerance expected: 6 fs.
    - Interferometer required between cavities (not funded in EUCARD).

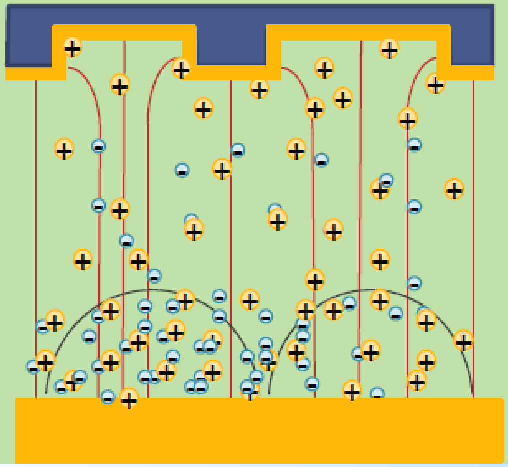
  - Synergetic with ILC development → rapid progress

Task 10.4 : High Power Impulse Magnetron Sputtering

- By applying pulses of high power the sputtered target material atoms are ionized

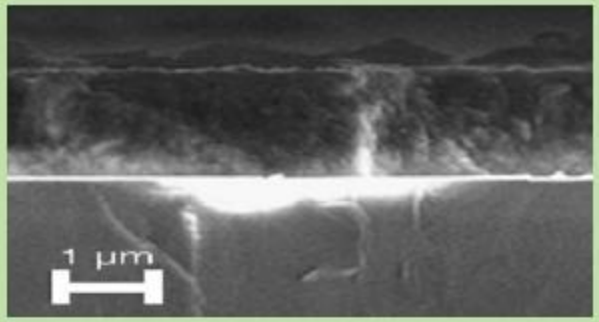
→ target material ions can be accelerated towards the substrate, higher kinetic energy upon arrival

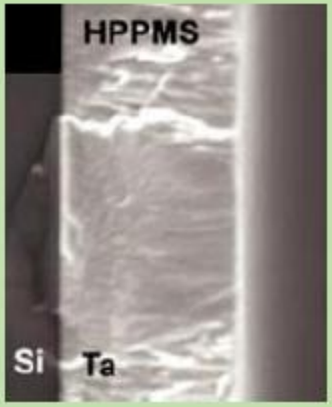
→ ions are directed to the surface, thus non-flat surfaces can be sputtered with good conformity of the film



PhD Thesis
A. Gustafsson
(Lancaster U. @ CERN)

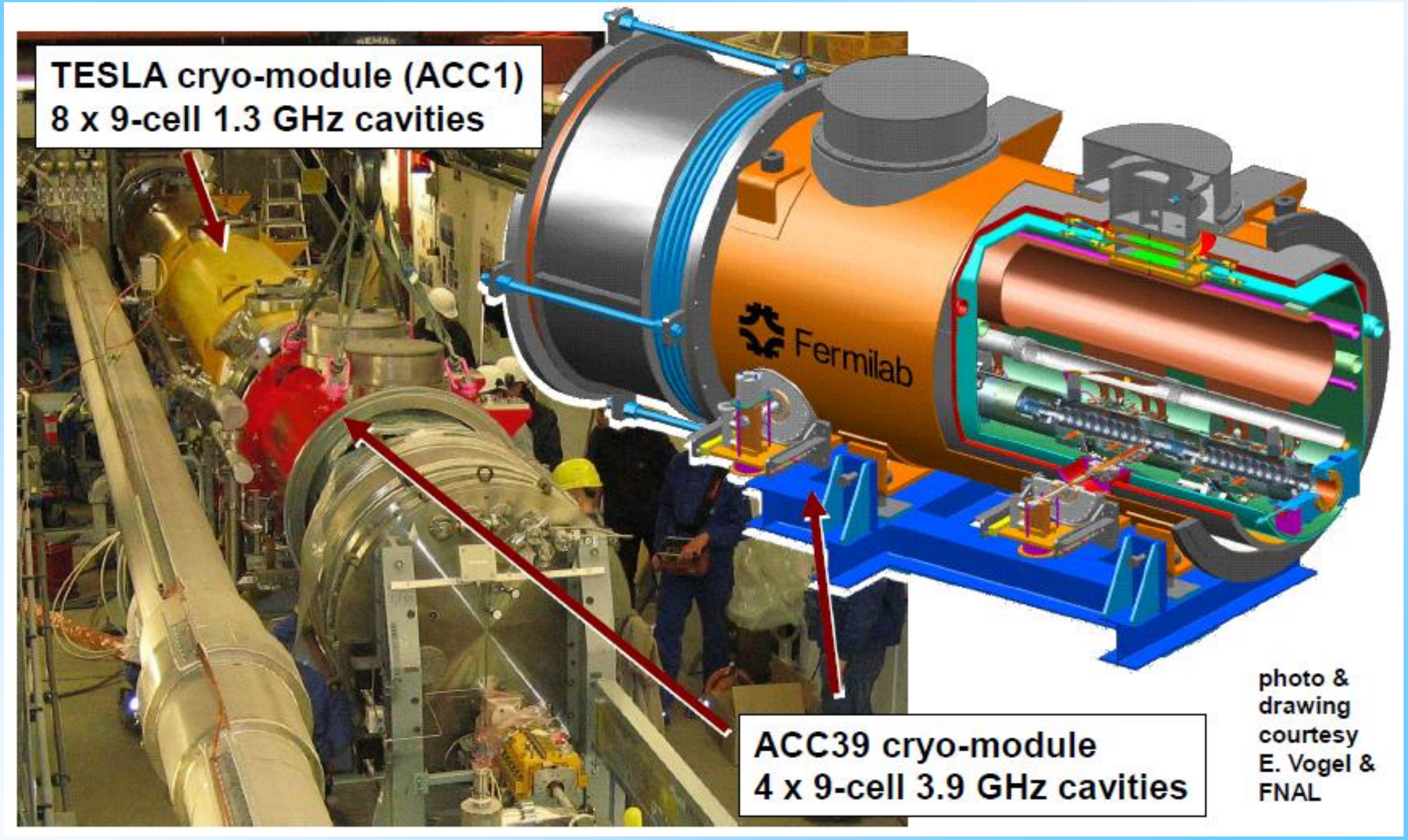
HiPIMS





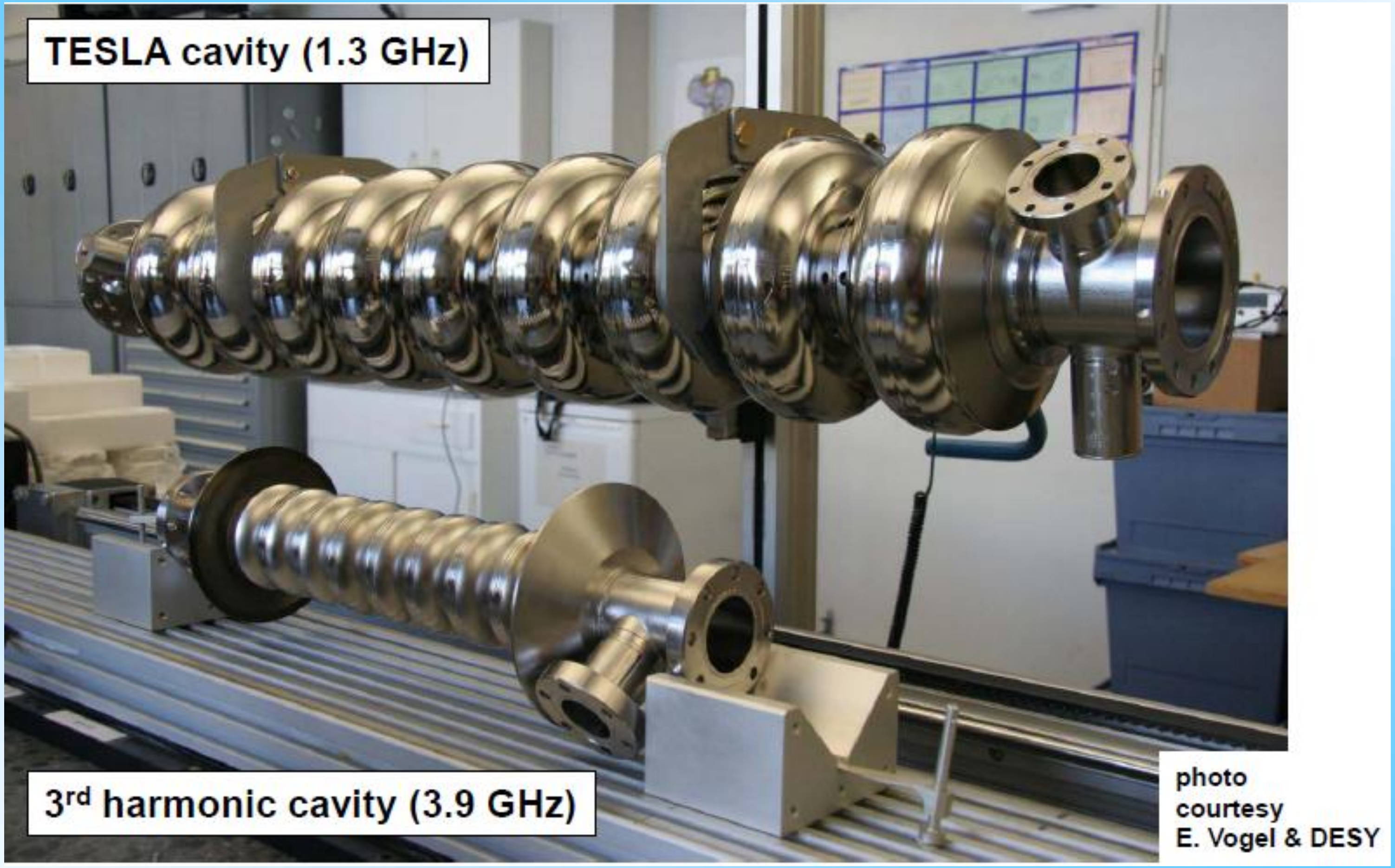
Task 10.5 : HOM Distribution

Aim : optimize beam centering through FLASH 3.9 GHz SC Module, built by FNAL, measured in RF test bench and installed on FLASH.



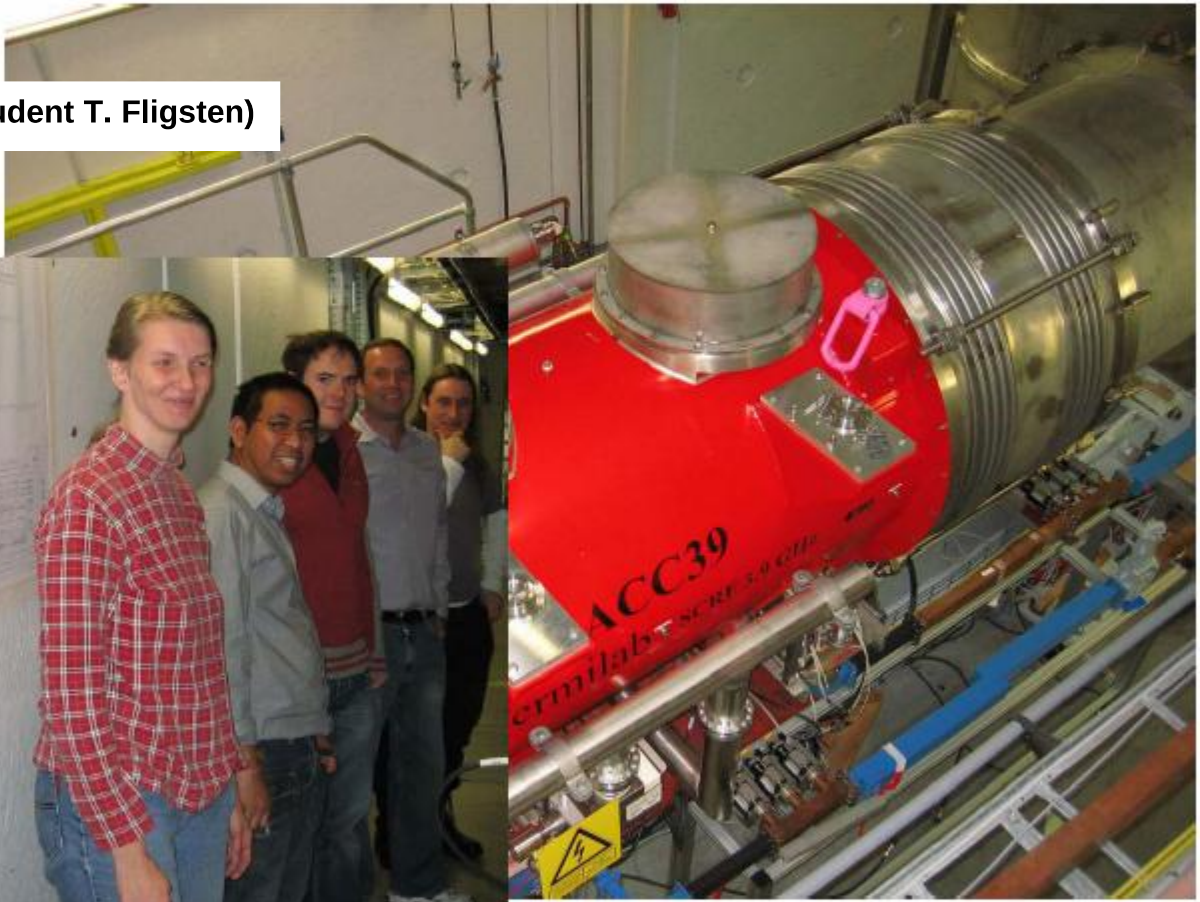
Task 10.5 : HOM Distribution

Dipole HOM are expected two orders of magnitude higher than in 1.3GHz cavities



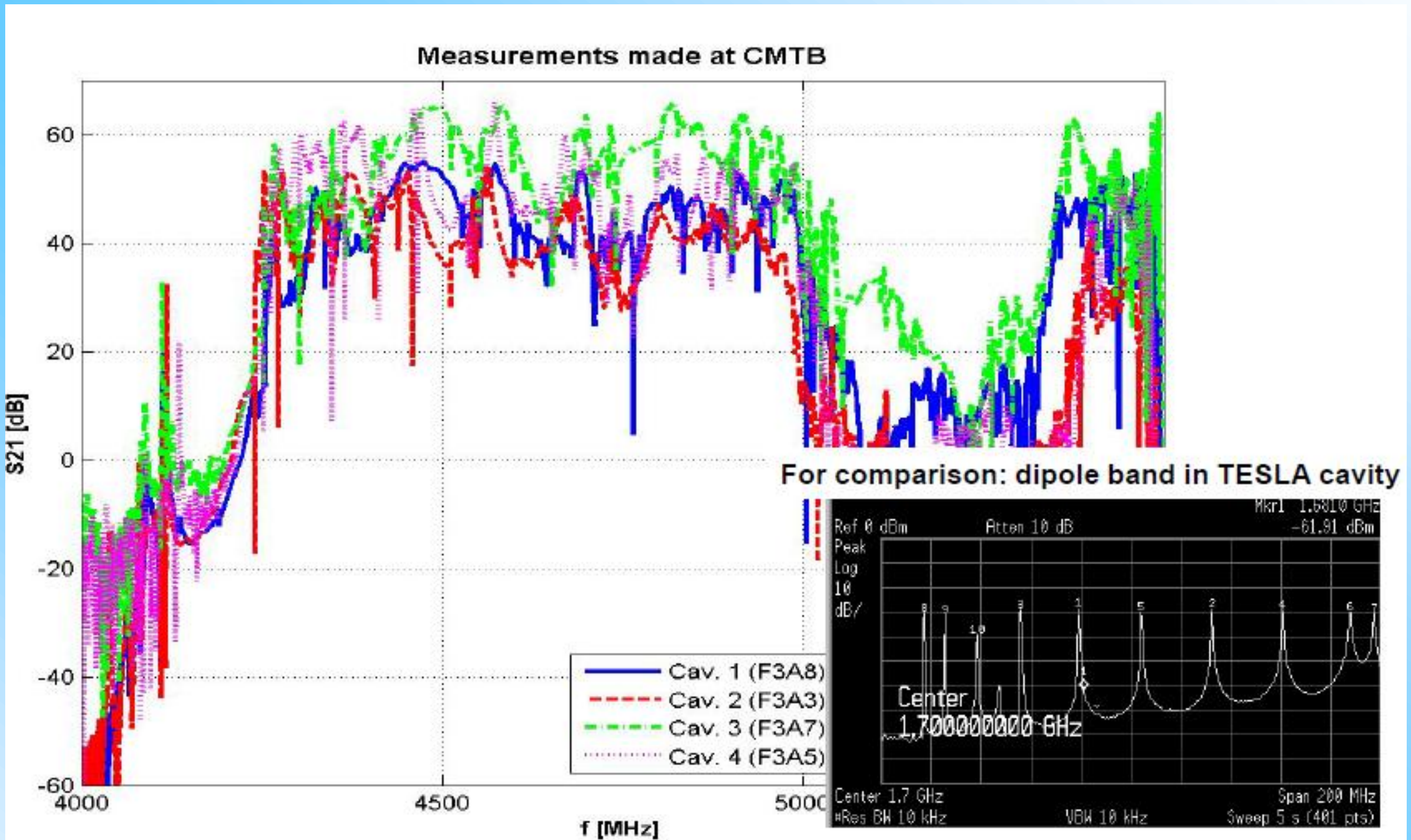
Task 10.5 : HOM Measurement Collaboration

Manchester University/
Cockcroft Institute
Rostock University (PhD student T. Fligsten)
Fermilab
DESY



courtesy
E. Vogel

Task 10.5 : Unexpected HOM Measurements



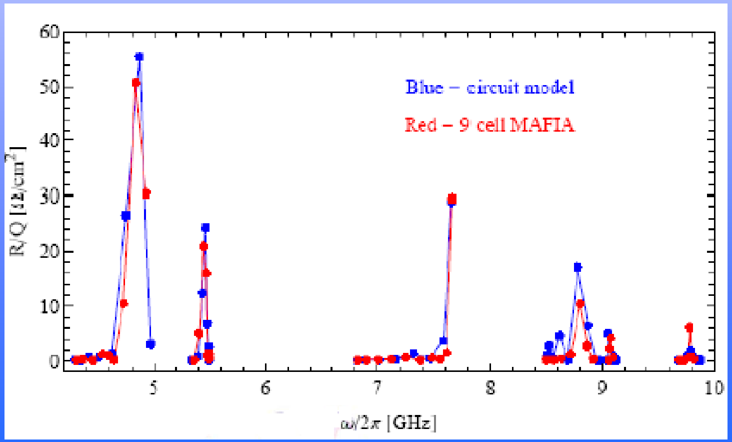
- Larger beam pipe diameter
  - ⇒ low cut-off frequency (~4.2 GHz)
    ⇒ most HOMs propagate in all cavities

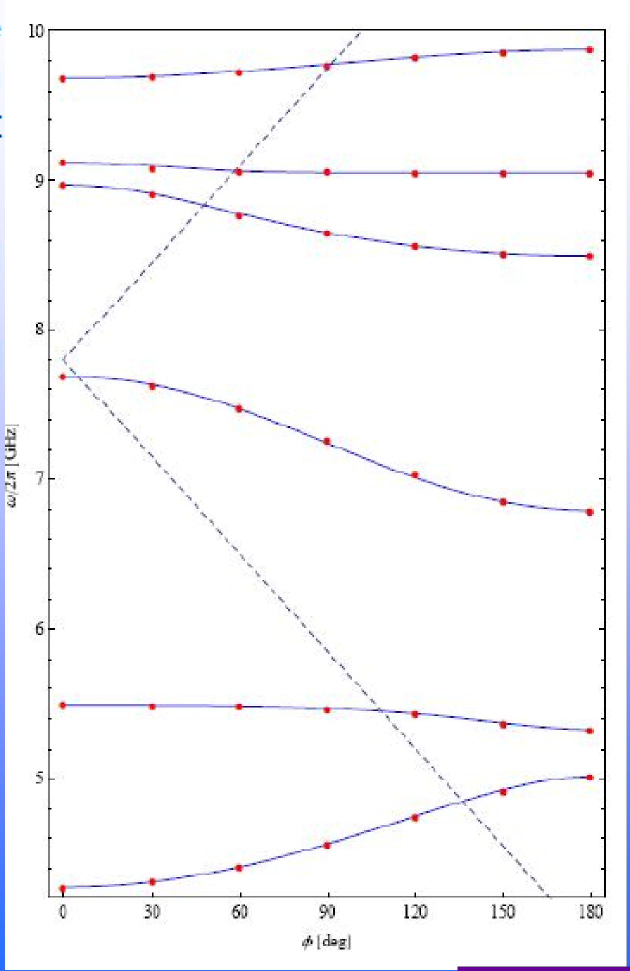
Task 10.5 : Successful Modeling of Dipole Modes in Single Cavity

Dipole circuit model (double chain) for the 3.9GHz cavity

- A study involving the circuit model applied to the dipole bands was conducted by N. Juntong, in which adjacent cell coupling was shown to be not sufficient to represent he band structure.

- 1st and 2nd bands are coupled (giving bands 1 and 2)
- 3rd and 4th bands are coupled (giving bands 3 and 4)
- 4th and 5th bands are coupled (to give band 5)
- 5th and 6th bands are coupled (to give band 6)





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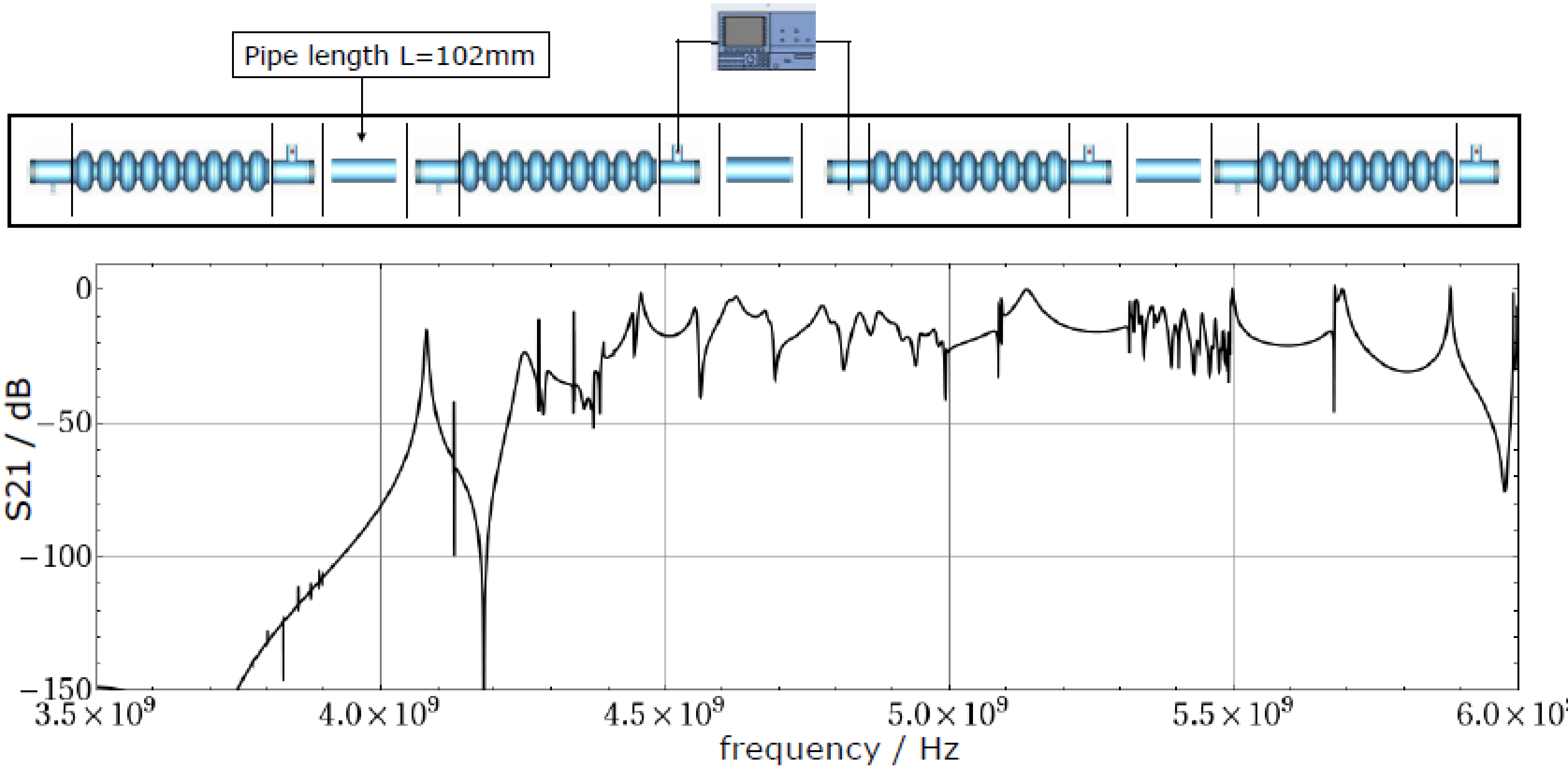
I.Shinton, EuCard2010, CI, 7/4/2010

MANCHESTER 1824

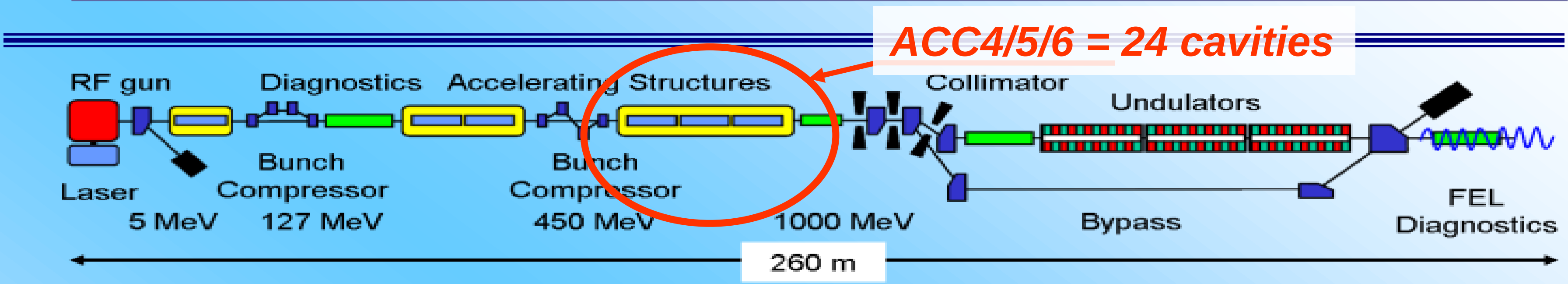
Task 10.5 : Preparing for Modeling of Dipole Modes in Cryomodule

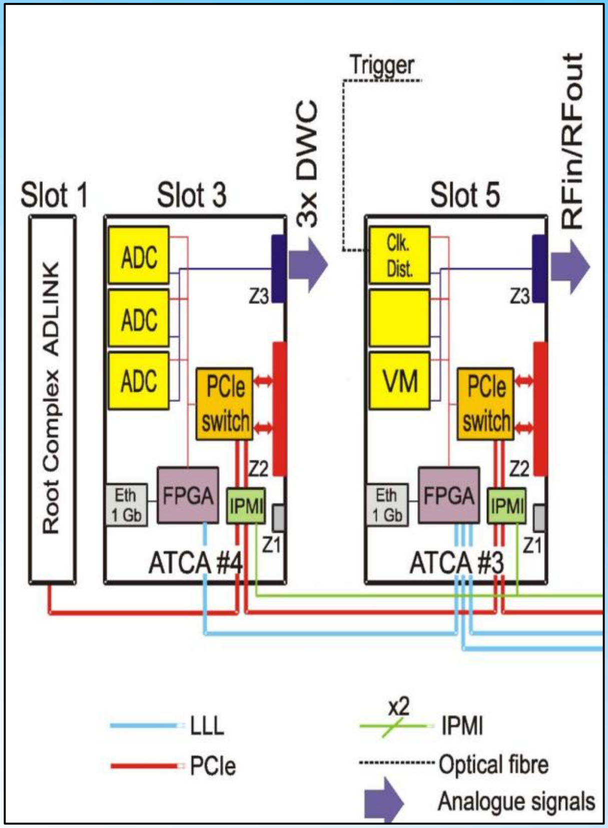
HOM to HOM transmission via beam pipe in string of four cavities

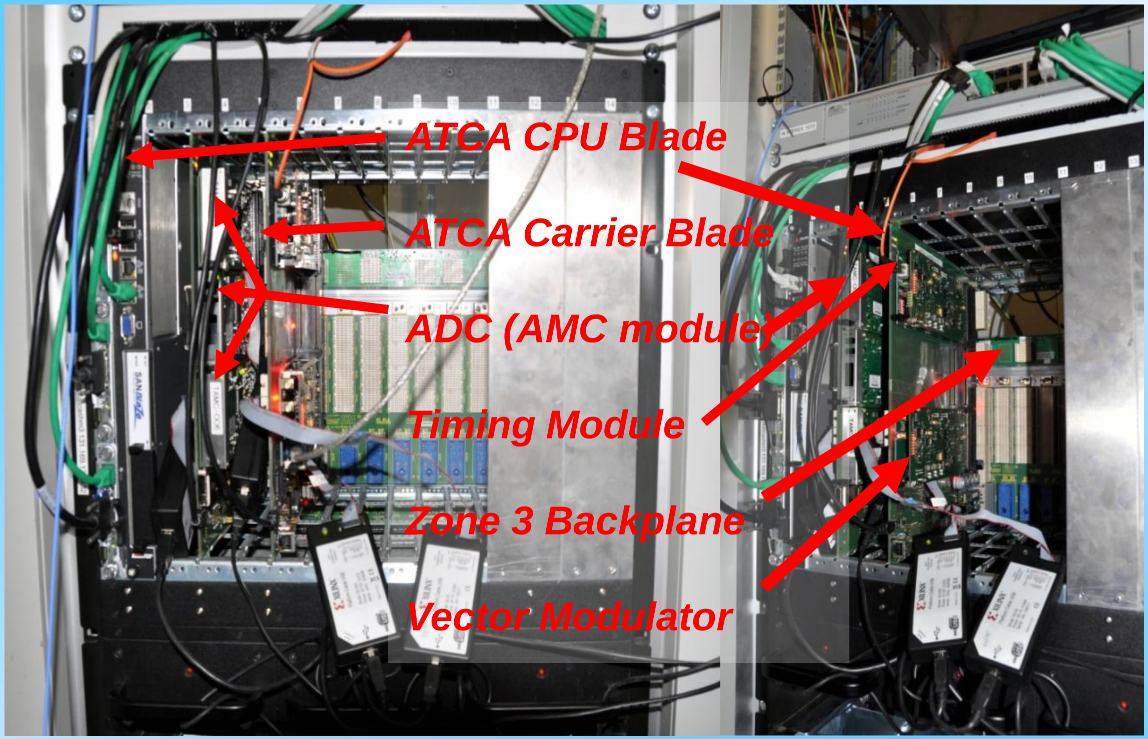


→ Modelling of entire module is needed!

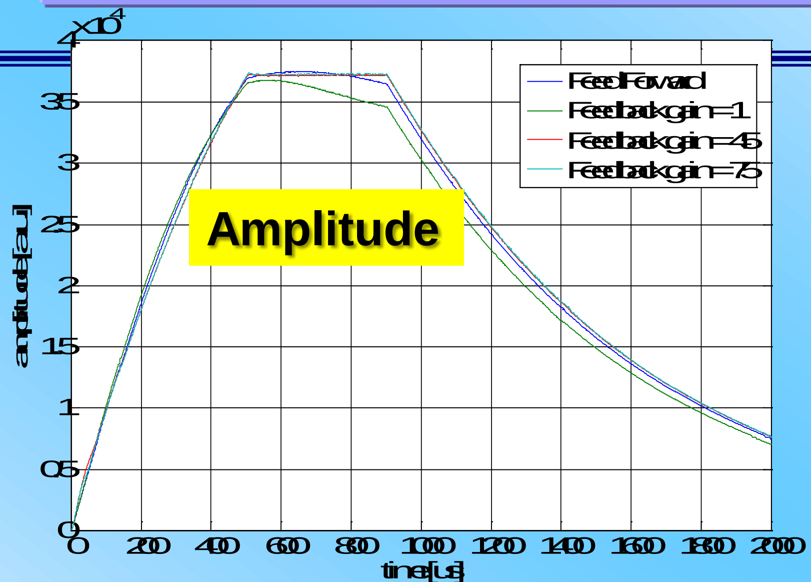
Task 10.6 LLRF : ATCA demonstration at FLASH

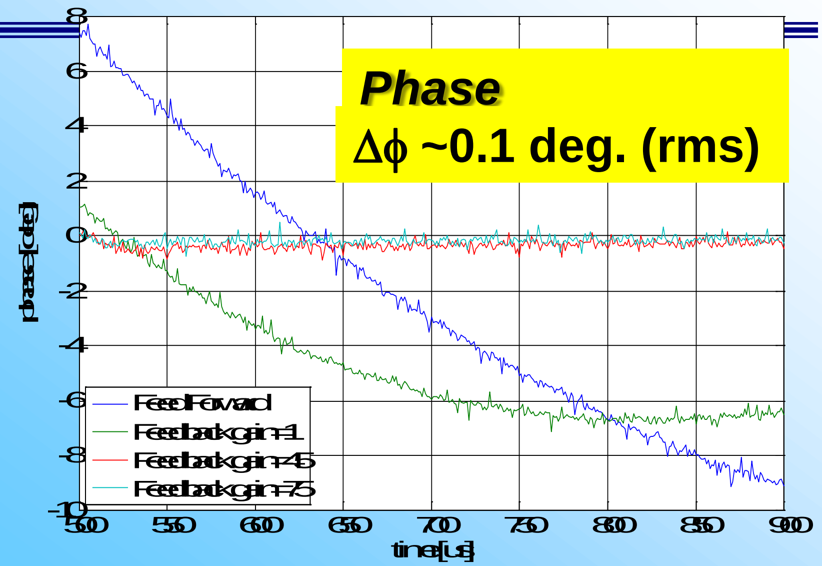


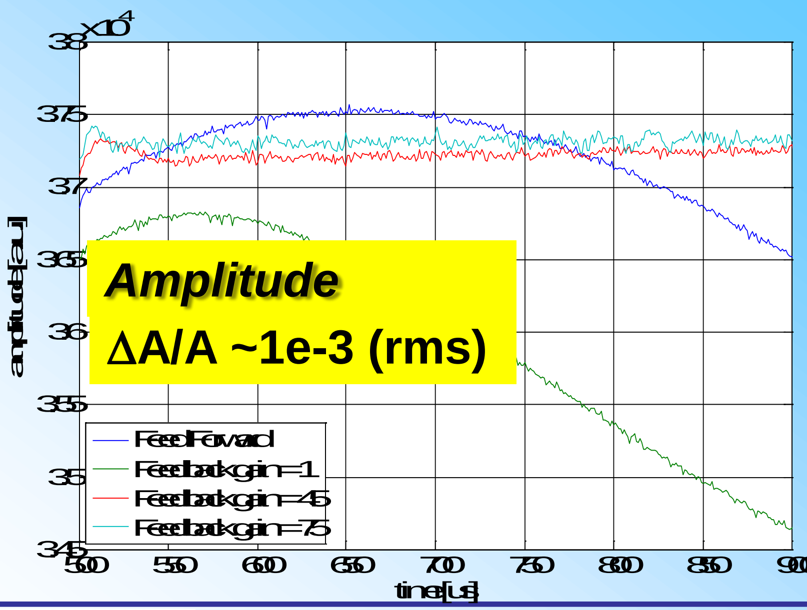


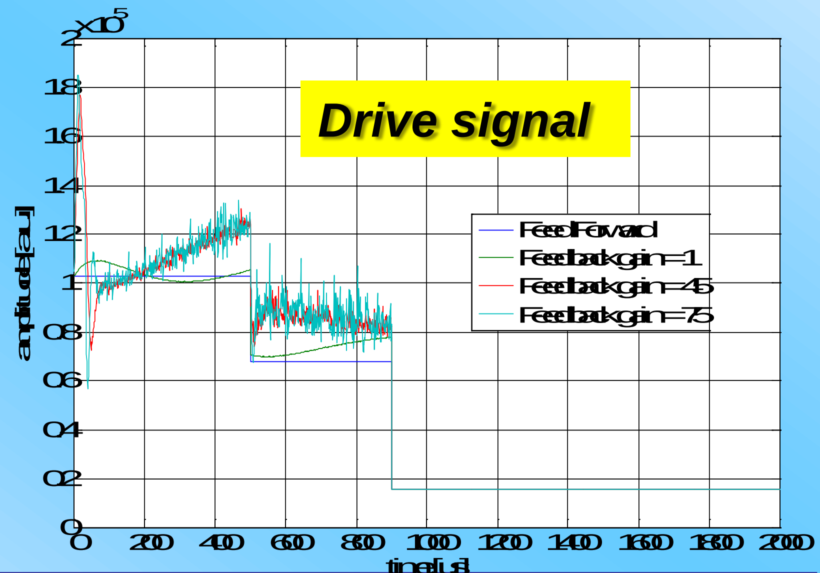


Amplitude and Phase Control









WP10.6 Achievements

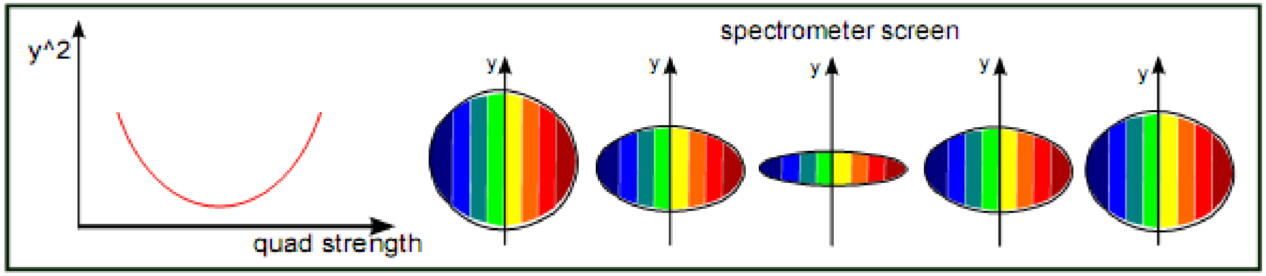
- Several ATCA based LLRF system components have been developed and prototyped (carrier board, AMC and RTM modules)

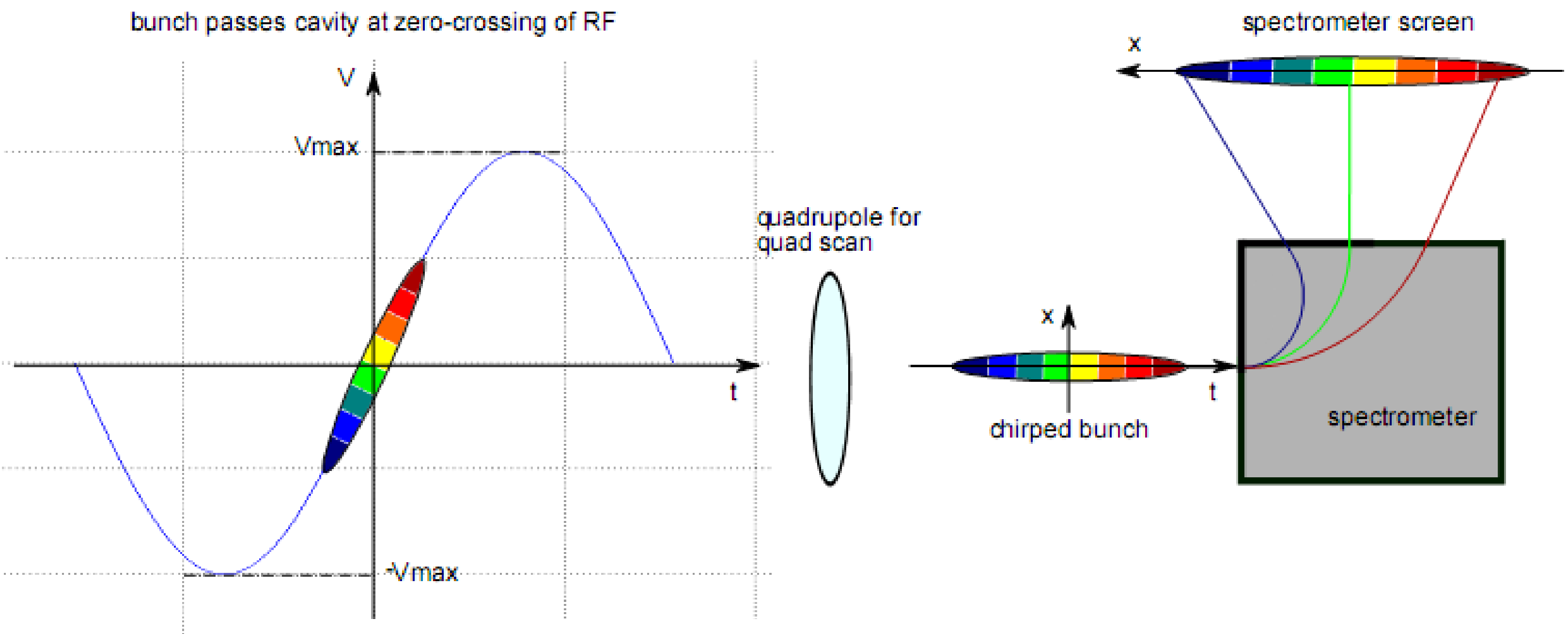
- The first demonstration of the LLRF system was performed at FLASH
  - It has verified that ATCA (Advanced Telecom Computing Architecture) standard can be employed for accelerator applications.
  - The performance is good enough for main linac LLRF control system. After system debugging, the performance is expected to improve.
  - Further tests are needed and are scheduled after FLASH shutdown.

- The EuCARD support enables close collaboration necessary for success of such multi-domain (analogue/digital/software) system like LLRF control.

WP10.7: Slice Diagnostics System on ELBE

PhD Thesis by
J. Rudolph (HZB)





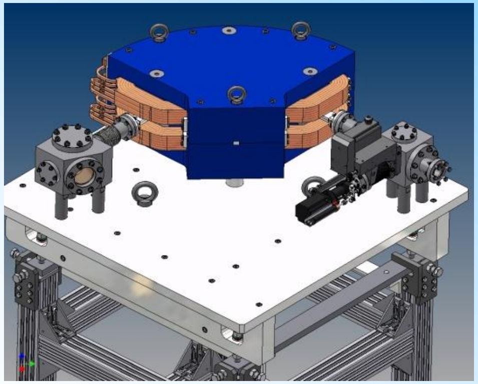
The basic principle of zero-phasing for slice diagnostics

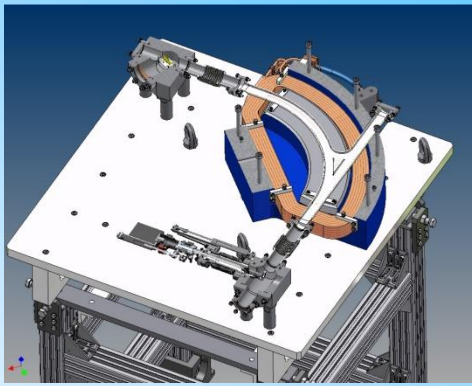
WP10.7: Slice Diagnostics System on ELBE

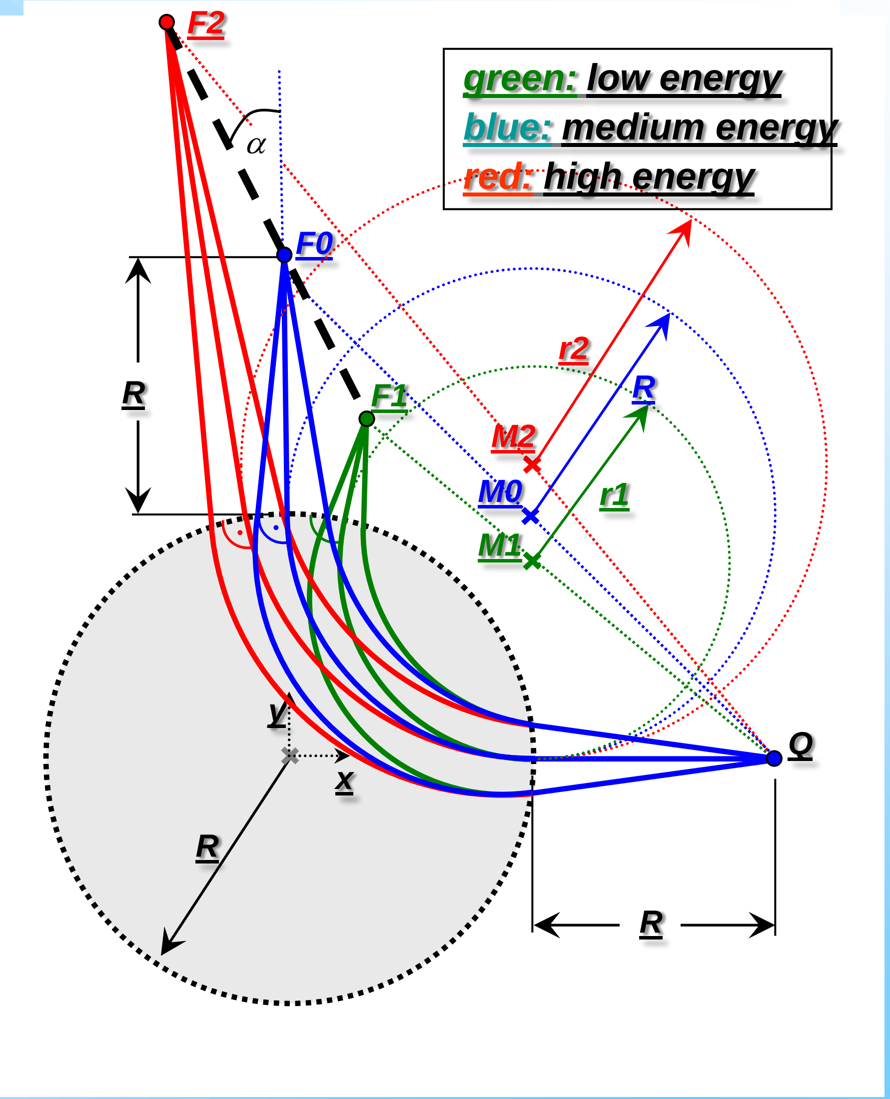
Browne-Buechner spectrometer

- Uniform field magnet with circular boundary of radius R and deflection angle of 90°
- Divergent source is focused onto a hyperbolic surface when placed a distance R from the boundary
- Reference energy particles are focused with image length equal to R
- Imaging properties hold true for broad range of energy

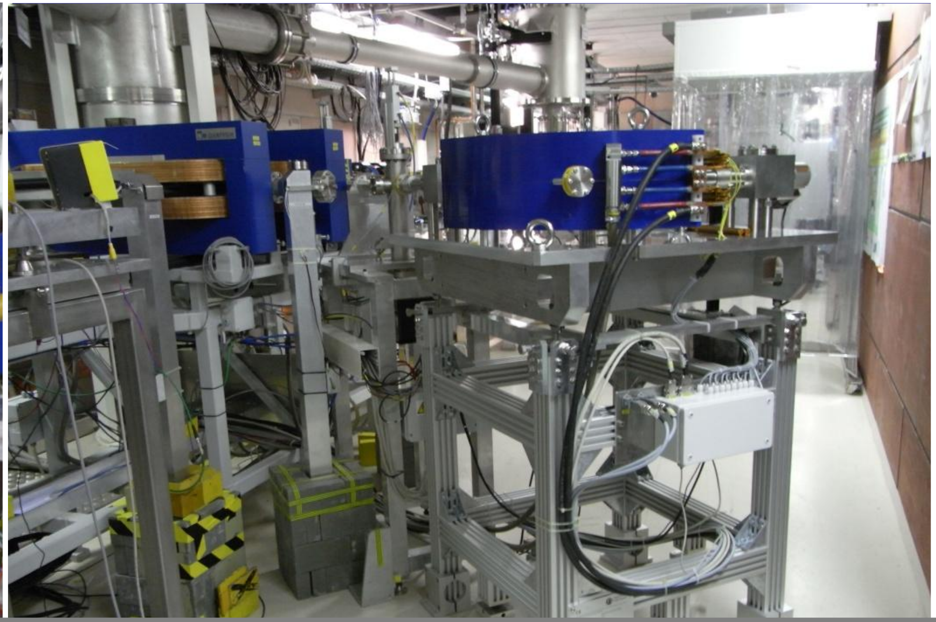
- **Ideal installing position: non-dispersive beamline section**

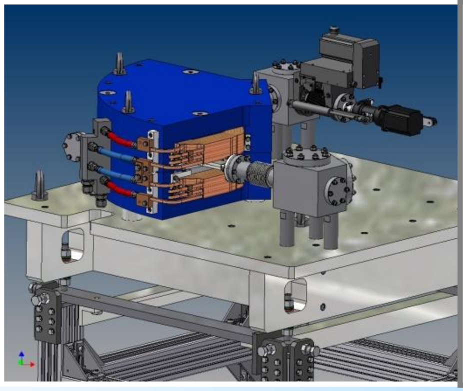


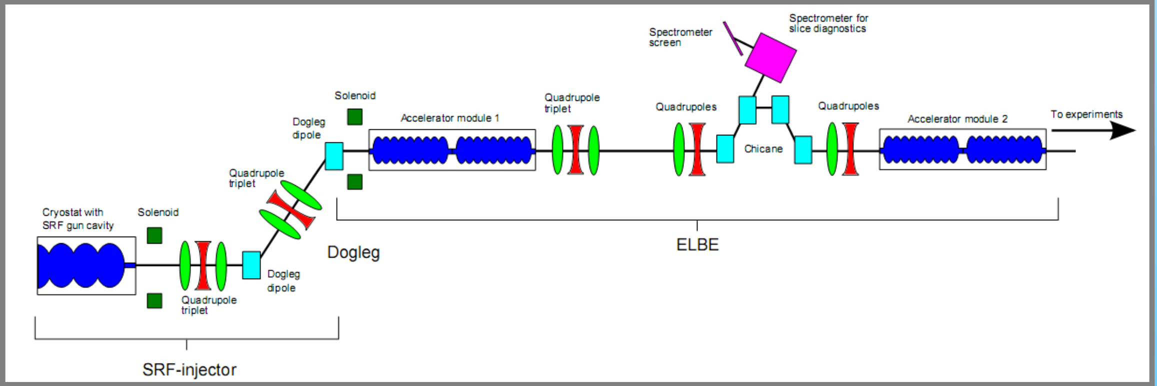




WP10.7: Slice Diagnostics System on ELBE

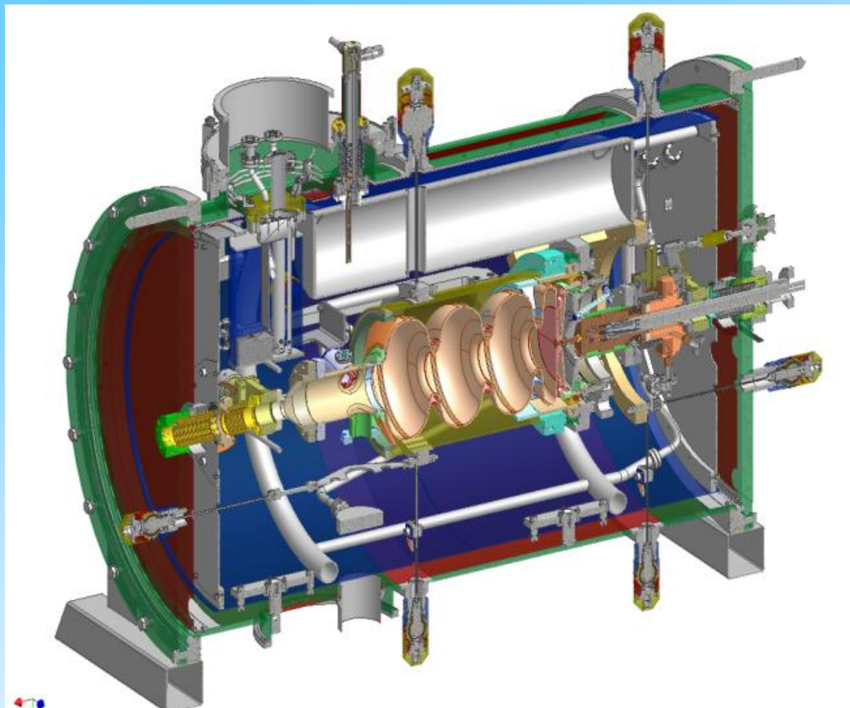




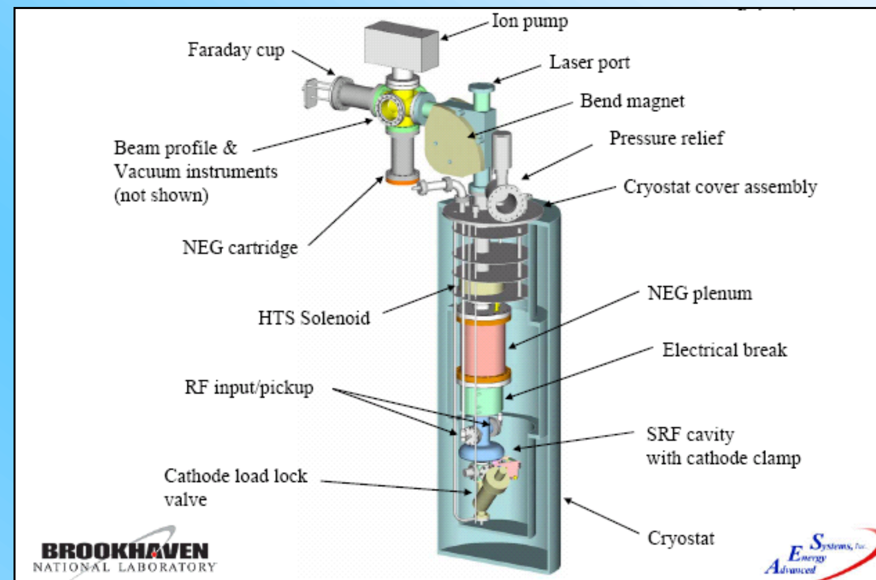


Optimal location for precise energy measurement requested by ELBE users. The spectrometer will have to be re-located for slice emittance diagnostics.

WP10.7: GaAs Photocathode



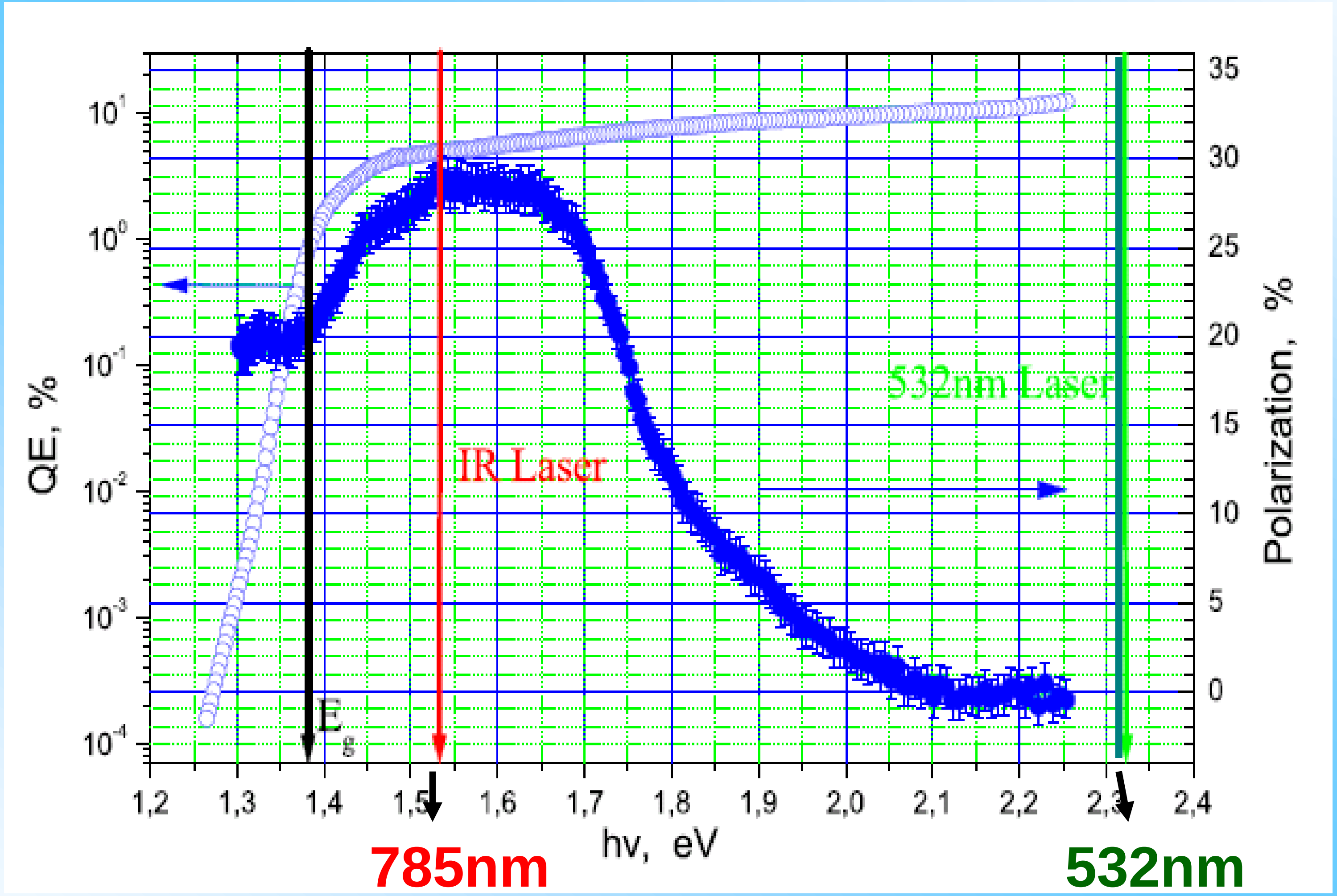
Motivation: high-brightness & high-average-current gun for polarized electrons



- **A SRF gun may provide the vacuum required for GaAs photo cathodes by the cryo-pumping of the cavity.**
- **In the RF field the ion back-bombardment is reduced compared to existing DC guns.**

A similar experiment will be carried out at BNL. Courtesy A. Burrill

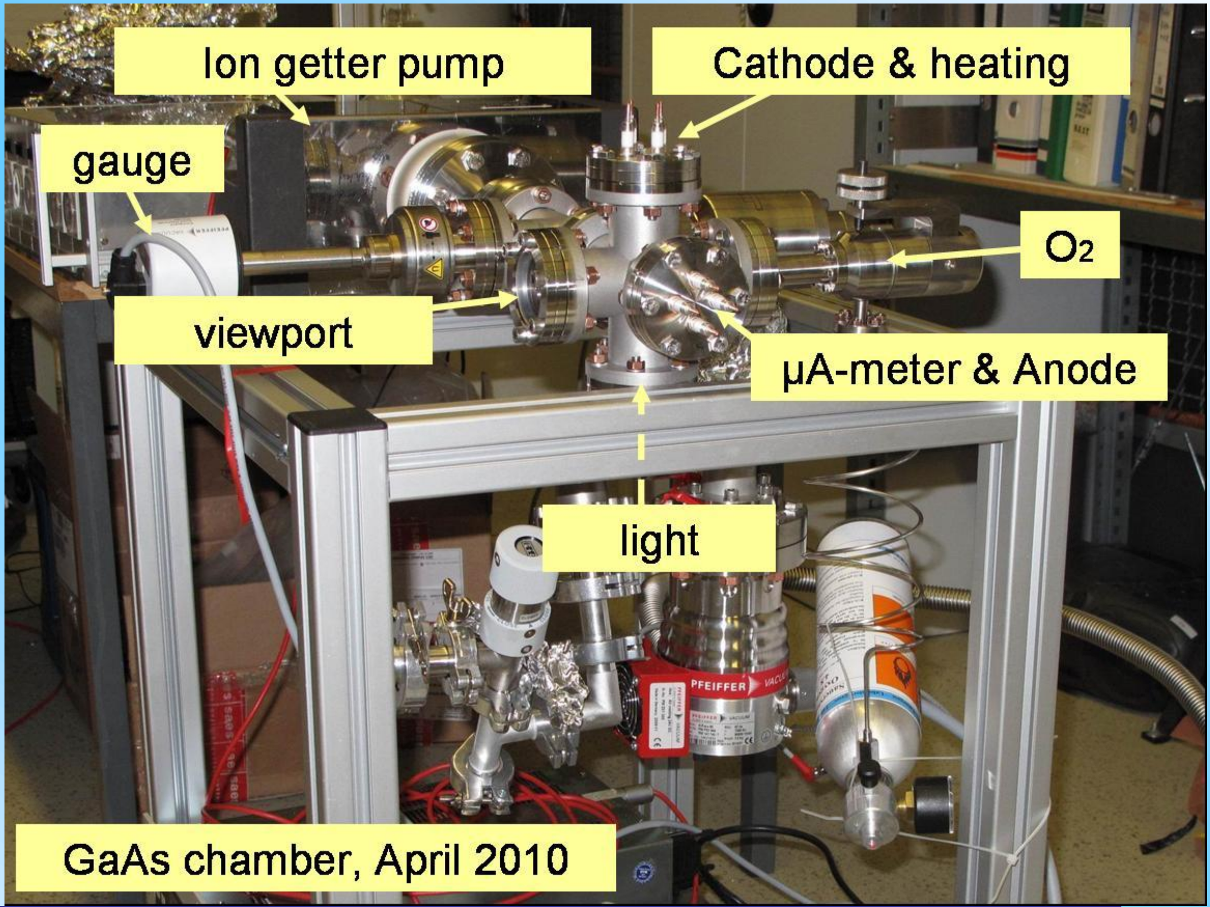
QE and polarization of Bulk GaAs



WP10.7: GaAs Preparation Chamber Milestone

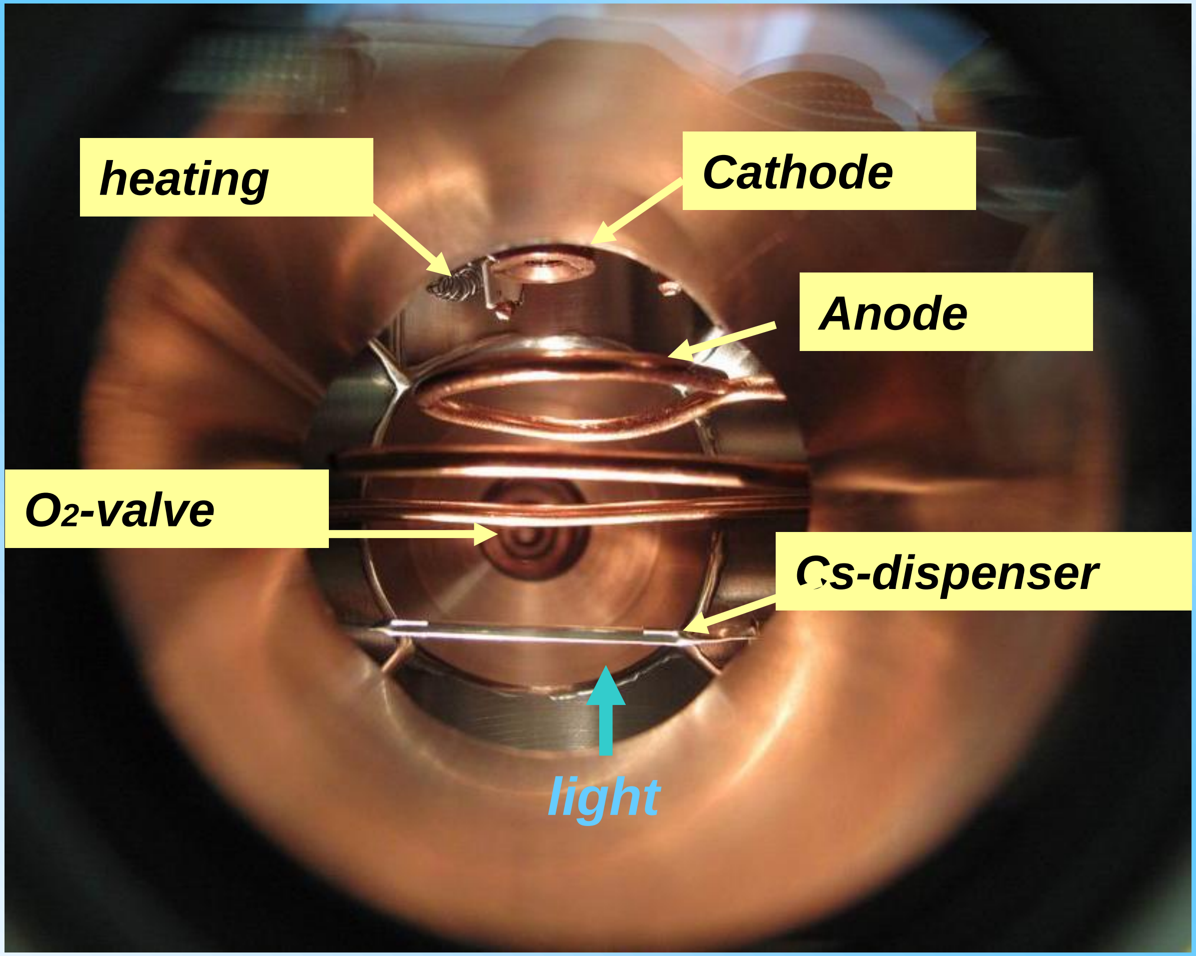
Ref.	N°	Milestone Name	Milestone Type	Task	Delivered by Contractor (s)	Planned (in months)
10.7.1	6	Preparation system for GaAs finished	Prototype	SCRF gun	FZD	12

The chamber dedicated to the preparation of GaAs photocathodes is fabricated



WP10.7: GaAs Test Chamber

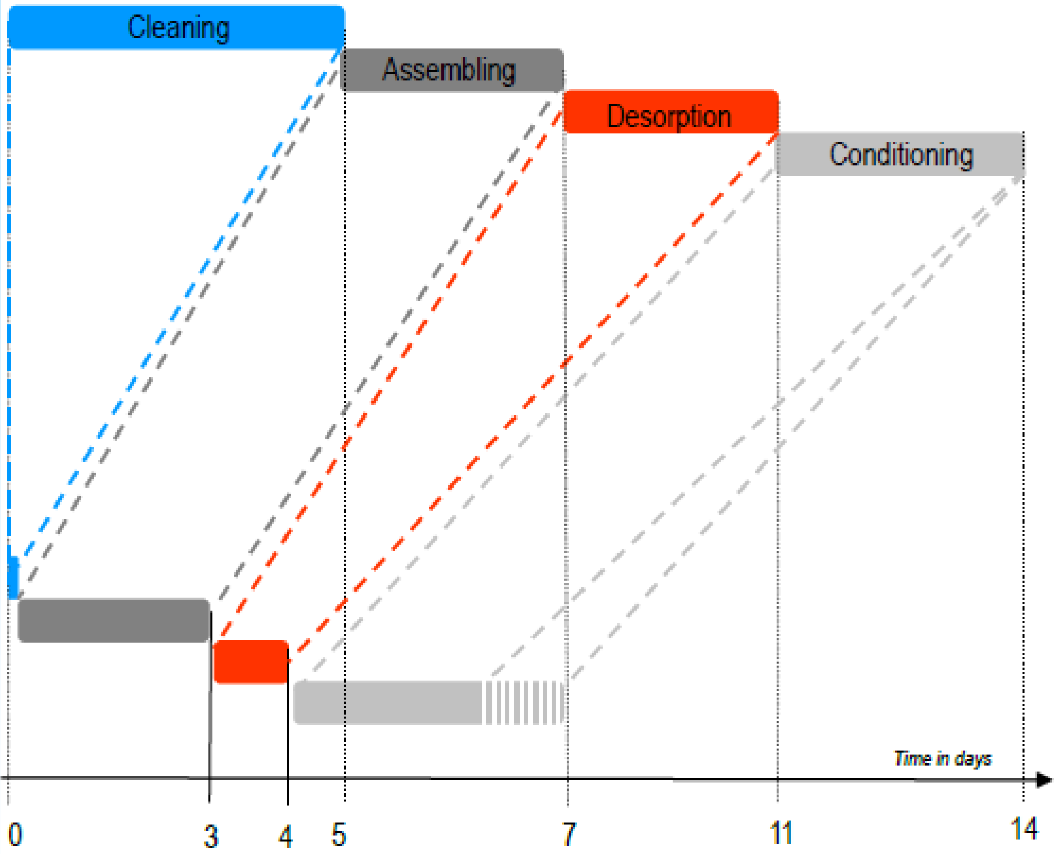
Inside the test chamber



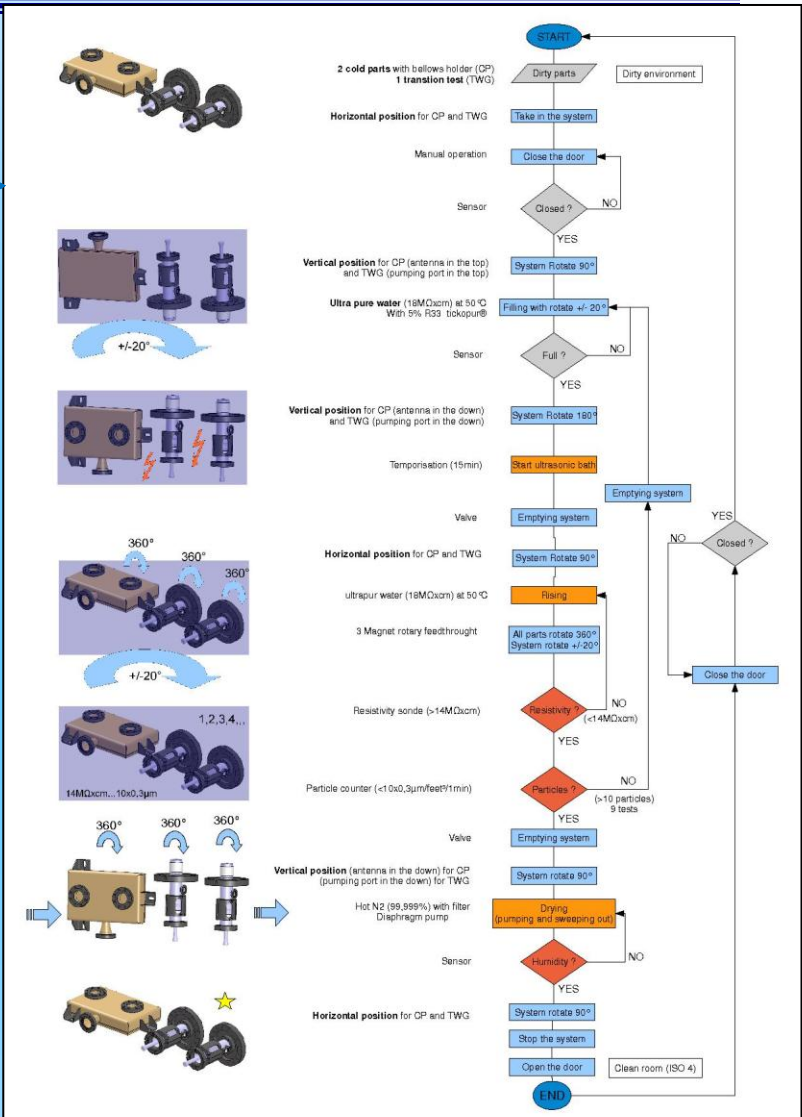
WP10.8: Coupler Development at LAL

Automatic Cleaning System

- Improvements in term of <u>quality</u>, <u>repeatability</u> & <u>time</u> for mass production



Assembly schedule

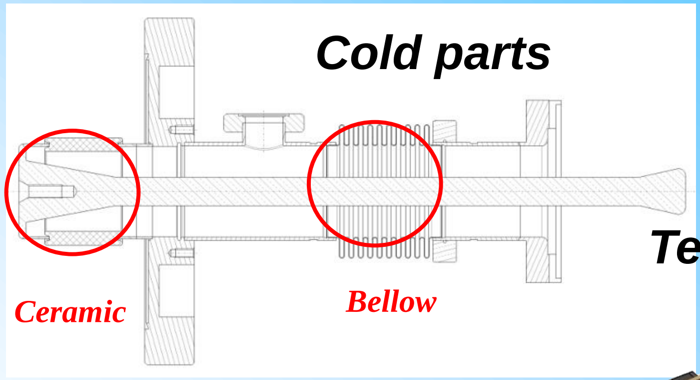


WP10.8: Coupler Development at LAL

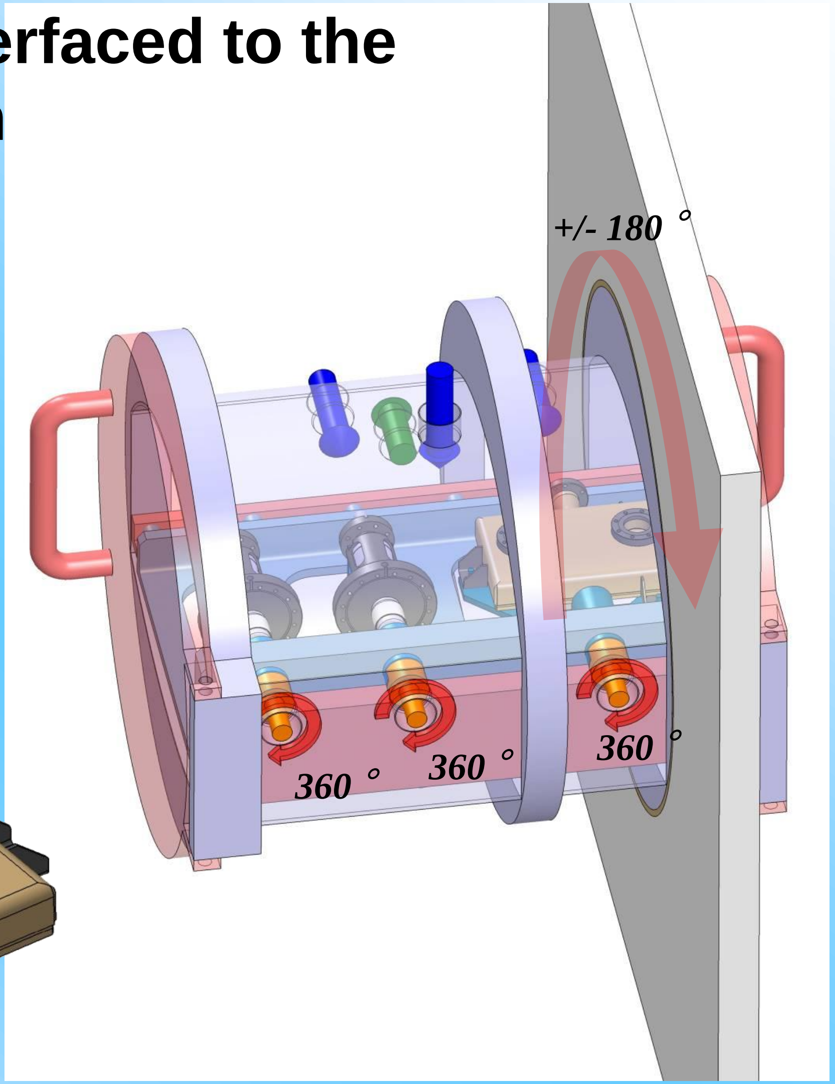
Automatic Cleaning System interfaced to the coupler assembly clean room

Motion:

- **A first rotation around the pieces axis**
- **A second rotation around the axis of the device**

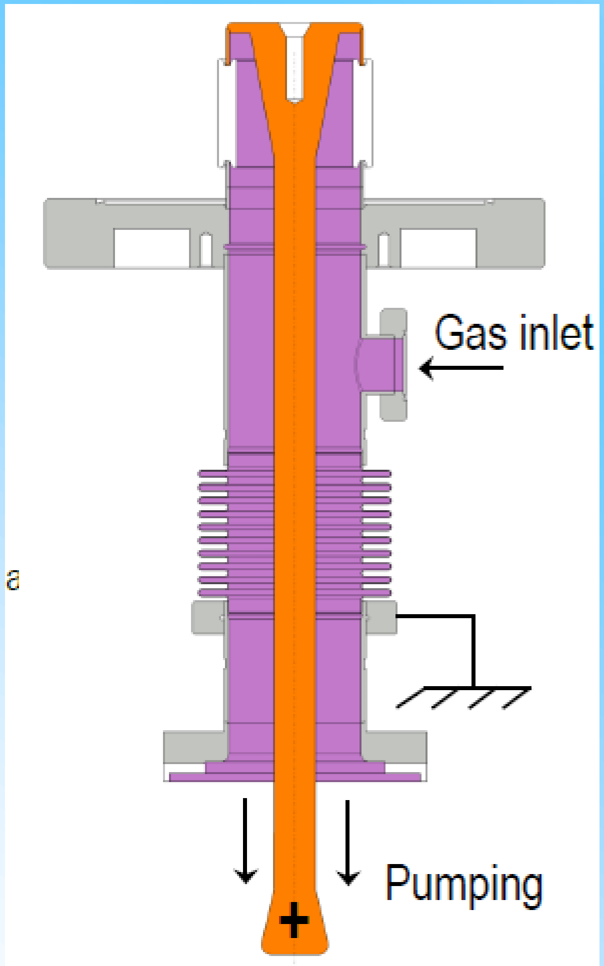


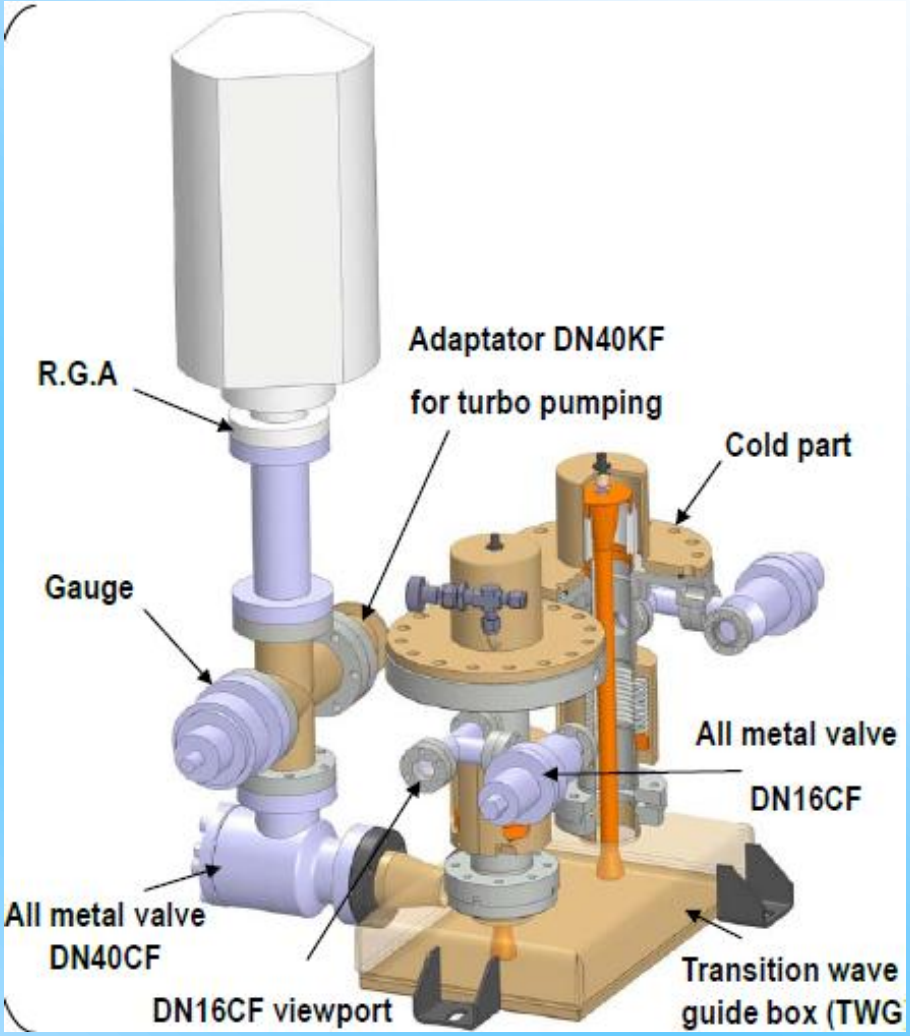
Test waveguide



WP10.8: Coupler Development at LAL

Plasma Discharge Cleaning





WP10-SRF Publications

1. **Status of LHC Crab Cavity Cryostat** / Brunner, O (CERN) ; Ciapala, E (CERN) ; Linnecar, T (CERN) ; Tuckmantel, J (CERN) ; Weingarten, W (CERN) ; Calaga, R (BNL) ; Peterson, T (FNAL) ; Poloubotko, V (FNAL) ; Solyak, N (FNAL) ; Yakovlev, V (FNAL)
   EuCARD-CON-2009-027. - 2009.
2. **NOVEL GEOMETRIES FOR THE LHC CRAB CAVITY** / Hall, B (Lancaster University) ; Burt, G (Lancaster University) ; Smith, J (Lancaster University) ; Rimmer, R (Jlab) ; Wang, H (JLab) ; Delayen, J (Jlab) ; Calaga, R (BNL)
   EuCARD-PUB-2009-022. - 2009.
3. **WAKEFIELD DAMPING FOR THE CLIC CRAB CAVITY** / Ambattu, P (Lancaster University) ; Burt, G (Lancaster University) ; Dexter, A (Lancaster University) ; Carter, R (Lancaster University) ; Khan, V (Manchester University) ; Jones, R (Manchester University) ; Dolgashev, V (SLAC)
   EuCARD-CON-2009-017. - 2009.
4. **NEW CAVITY SHAPE DEVELOPMENTS FOR CRABBING APPLICATIONS** / Burt, G (Lancaster University)
   EuCARD-CON-2009-016. - 2009.
5. **Software for Data Acquisition AMC Module with PCI Express Interface** / Szachowalow, S (Technical University of Lodz) ; Jablonski, G (Technical University of Lodz) ; Makowski, D (Technical University of Lodz) ; Butkowski, L (Warsaw University of Technology)
   EuCARD-CON-2010-012. - 2010.
6. **PCIExpress Communication Layer for ATCA-based Linear Accelerator Control System** / Kucharski, T (Technical University of Łodz) ; Piotrowski, A (Technical University of Łodz) ; Makowski, D (Technical University of Łodz) ; Jabłonski, G (Technical University of Łodz)
   EuCARD-CON-2010-011. - 2010.
7. **Interfaces and Communication Protocols in ATCA-Based LLRF Control Systems** / Makowski, D (Technical University of Lodz) ; Koprek, W (DESY) ; Jezynski, T (DESY) ; Piotrowski, A (Technical University of Lodz) ; Jabłonski, G (Technical University of Lodz) ; Jałmuzna, W (Technical University of Lodz) ; Simrock, S (DESY) Task 10.6: LLRF at FLASH
   EuCARD-PUB-2010-001.- 2010 Fulltext - Published in : IEEE TRANSACTIONS ON NUCLEAR SCIENCE: 56 (2009) , no. 5, pp. 7
8. **Distributed Radiation Monitoring System for Linear Accelerators based on CAN Bus** / Kozak, T (Technical University of Lodz) ; Makowski, D (Technical University of Lodz) ; Napieralski, A (Technical University of Lodz)
   EuCARD-CON-2010-010. - 2010.
9. **Digital Vector Modulator with Diagnostic Circuit for Particle Accelerator** / Tarnowski, S (Technical University of Łodz) ; Piotrowski, A (Technical University of Łodz)
   EuCARD-CON-2010-009. - 2010.
10. **Diagnostic Application for Development of Custom ATCA Carrier Board for LLRF** / Wychowaniak, J (Technical University of Lodz) ; Predki, P (Technical University of Lodz) ; Makowski, D (Technical University of Lodz) ; Napieralski, A (Technical University of Lodz)
    EuCARD-CON-2010-008. - 2010.
    Access to fulltext document Notice détaillée - Notices similaires

EuCARD/WP10-SRF Publications

11. **Development and Tests of PWM Amplifier for Driving the Piezoelectric Elements** / Matiulko, J (Technical University of Lodz) ; Poźniak, T
    EuCARD-CON-2010-007. - 2010.
12. **Compiler-level Implementation of Single Event Upset Errors Mitigation Algorithms** / Piotrowski, A (Technical University of Lodz) ; Tarnowski, S (Technical University of Lodz)
    EuCARD-CON-2010-006. - 2010.
13. **High Power Amplifiers Chain nonlinearity influence on the accelerating beam stability in free electron laser (FLASH)** / Cichalewski, w (Technical University of Łódź) ; Jałmużna, W (Technical University of Łódź)
    EuCARD-CON-2010-005. - 2010.
14. **A Novel Approach for Automatic Control of Piezoelectric Elements Used for Lorentz Force Detuning Compensation** / Przygoda, K (Technical University of Lodz) ; Pozniak, T (Technical University of Lodz) ; Napieralski, A (Technical University of Lodz) ; Grecki, M (DESY)
    EuCARD-CON-2010-004. - 2010.
15. **Evaluation of an ATCA Based LLRF System at FLASH** / Simrock, S (DESY) ; Butkowski, L (DESY) ; Grecki, M (DESY) ; Jezyński, T (DESY) ; Koprek, W (DESY) ; Jabłoński, G (Technical University of Łódź) ; Jałmużna, W (Technical University of Łódź) ; Makowski, D (Technical University of Łódź) ; Piotrowski, A (Technical University of Łódź) ; Czuba, K (Warsaw University of Technology)
    EuCARD-CON-2010-003. - 2010.
16. **Hot-plug Based Activation and Deactivation of ATCA FRU Devices** / Predki, P (Technical University of Lodz) ; Makowski, D (Technical University of Lodz)
    EuCARD-CON-2009-015. - 2009.
17. **TUNE SHIFT DUE TO CROSSING COLLISION AND CRAB COLLISION** / Sun, Y (CERN) ; Zimmermann, F (CERN) ; Tom´as, R (CERN)
    The use of crab cavities in the LHC may not only raise the luminosity, but it could also complicate the beam dynamics, e.g. [...]
    EuCARD-CON-2009-012. - 2009.
18. **Status of LHC Crab Cavity simulations and beam studies** / Calaga, R (BNL) ; De-Maria, R (BNL) ; Assmann, R (CERN) ; Barranco, J (CERN) ; Caspers, F (CERN) ; Ciapala, E (CERN) ; Linnecar, T (CERN) ; Metral, E (CERN) ; Sun, Y (CERN) ; Tom´as, R (CERN) *et al.*
    EuCARD-CON-2009-011. - 2009.
19. **THIRD HARMONIC CAVITY MODAL ANALYSIS** / Szczesny, B (The University of Manchester and Cockcroft Institute) ; Shinton, I R R (The University of Manchester and Cockcroft Institute) ; Jones, R M (The University of Manchester and Cockcroft Institute)
    EuCARD-CON-2009-010. - 2009.
20. **Development of a TE011 Cavity for Thin-Films Study** / Martinet, G (IPN, Orsay) ; Blivet, S (IPN, Orsay) ; Fouaidy, M (IPN, Orsay) ; Hammoudi, N (IPN, Orsay)
    EuCARD-CON-2010-002. - 2010.

WP10-SRF Publications

21. **The HIE-ISOLDE Superconducting Cavities: Surface Treatment and Niobium Thin Film Coating** / Lanza, G (CERN) ; Calatroni, S (CERN) ; Ferreira, L M A (CERN) ; Gustafsson, A E (CERN) ; Pasini, M (CERN) ; Trilhe, P (CERN) ; Palmieri, V (INFN/LNL, Legnaro)
EuCARD-CON-2010-001. - 2010.
22. **Characterization of superconducting multilayers samples** / Antoine, C Z (CEA, Irfu/SACM,Centre d'Etudes de Saclay 91191 Gif-sur-Yvette Cedex, France) ; Aguilal, A (CEA, Irfu/SACM,Centre d'Etudes de Saclay 91191 Gif-sur-Yvette Cedex, France) ; Berry, S (CEA, Irfu/SACM,Centre d'Etudes de Saclay 91191 Gif-sur-Yvette Cedex, France) ; Bouat, S (CEA, INAC, 17 Rue des Martyrs, 38054 Grenoble-Cedex-9, France) ; Jacquot, J F (CEA, INAC, 17 Rue des Martyrs, 38054 Grenoble-Cedex-9, France) ; Villegier, J C (CEA, INAC, 17 Rue des Martyrs, 38054 Grenoble-Cedex-9, France) ; Lamura, G (LAMIA, Physics Departement, Genoa University Via Dodecaneso 33, 14146 Genova, Italy) ; Gurevich, A (National High Magnetic Laboratory, Florida State University,1800 E. Paul Dirac Dr., Tallahassee, FL 32310, USA)
EuCARD-CON-2009-006. - 2009.

WP10 Deliverables: 15 units

Ref.	N°	Deliverable Name	Deliverable Type	Task	Delivered by Contractor (s)	Planned (in months)
10.4.1	1	QE data for Pb/Nb deposited photo cathode samples	Report	Thin Films	DESY, IPJ	12
10.7.1	2	Results of slice measurements	Report	SCRF Gun	FZD, HZB	24
10.8.1	3	Test and operation of the coupler preparation procedure	Report	Coupler Development	CNRS-LAL	24
10.4.4	4	New thin film techniques for SC cavities and photocathodes	Demonstrator	Thin Films	ULANC	30
10.2.1	5	Results of SC proton cavity tests (β = 1 and β = 0.65)	Report	SPL cavities	CEA, CNRS-IPNO	33
10.7.2	6	Results for GaAs photocathodes	Report	SCRF Gun	FZD, HZB	33
10.3.1	7	LHC crab cavity final report	Report	Crab cavities	CERN	36
10.3.2	8	CLIC crab cavity final report	Report	Crab cavities	UNIMAN	36
10.3.3	9	LHC and CLIC LLRF final reports	Report	Crab cavities	ULANC	36
10.4.2	10	RF measurements on thin film deposited QWR prototype	Report	Thin Films	CERN	36
10.4.3	11	Cold test results for the test cavities w/out the deposited lead photo cathode	Report	Thin Films	DESY	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
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

Conclusions

WP10 is proud to deliver the ~~Ultimate~~ only EuCARD deliverable (so far).

EuCARD Work package	# Deliverable(s)
1	0
2	0
3	0
…	0
7	0
8	0
9	0
10	**1**
11	0
12	0
13	0

Conclusions

- ***All Tasks are "en ordre de marche".***
- ***One partner is very "quiet".***
- ***Many challenging***
  - ***RF designs,***
  - ***Developments,***
  - ***Realizations,***
  - ***Beam experiments (FLASH, ELBE)***

ahead of us.