



# ESS-Bilbao DTL project

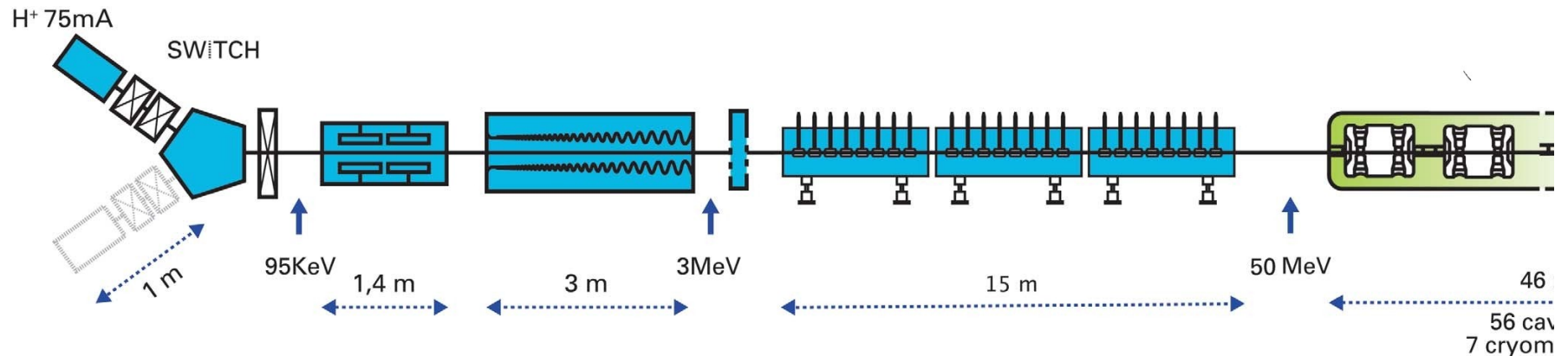


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ESS-Bilbao  
Geneve, 13/14.Sept.2011

# Outline

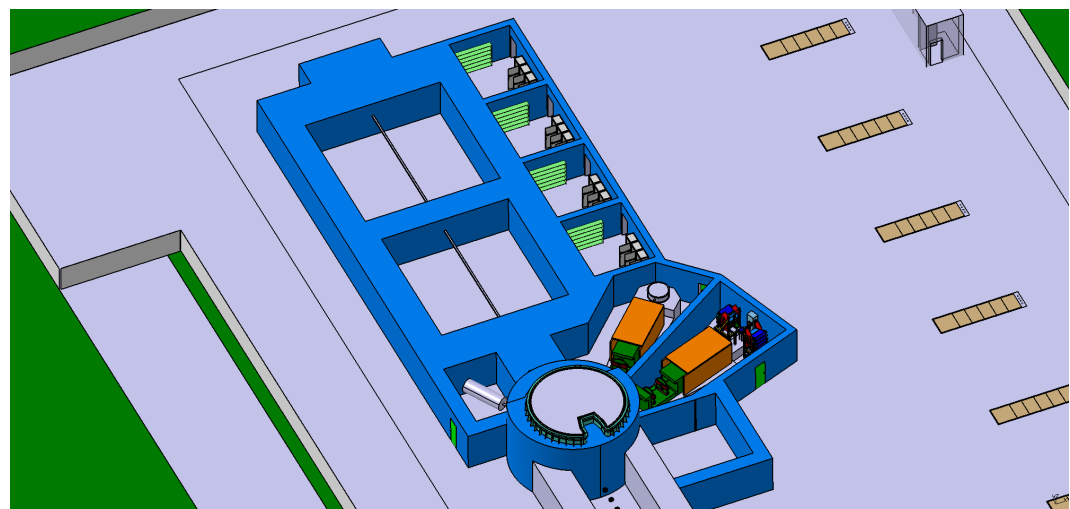
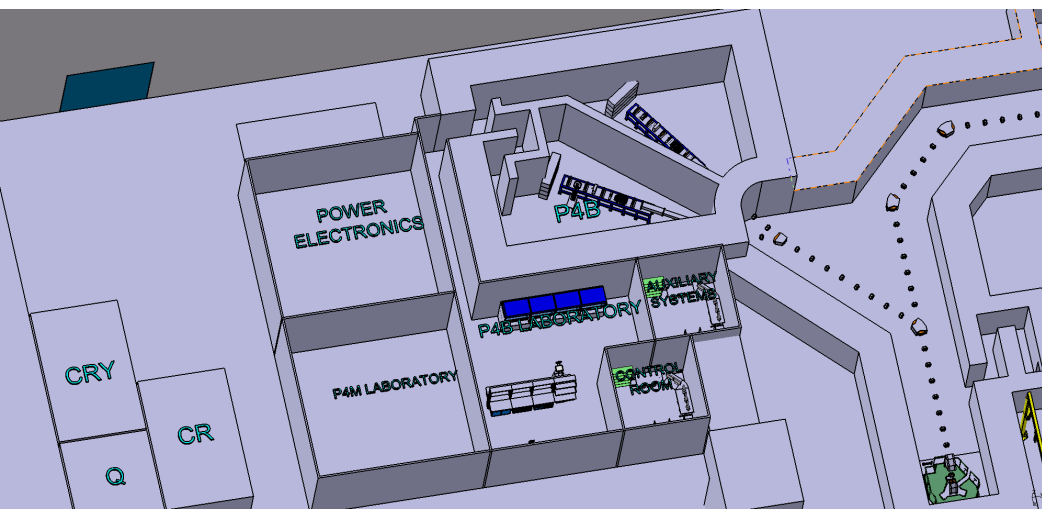
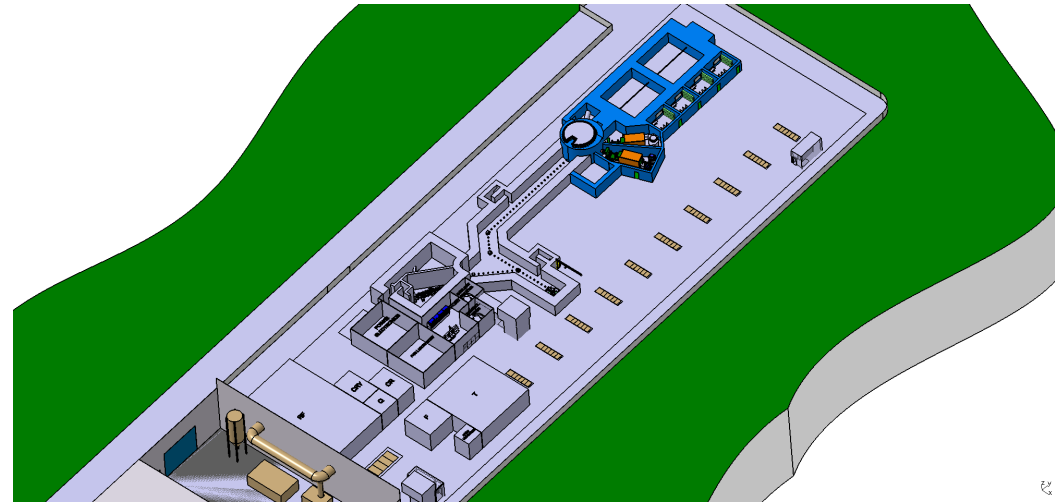
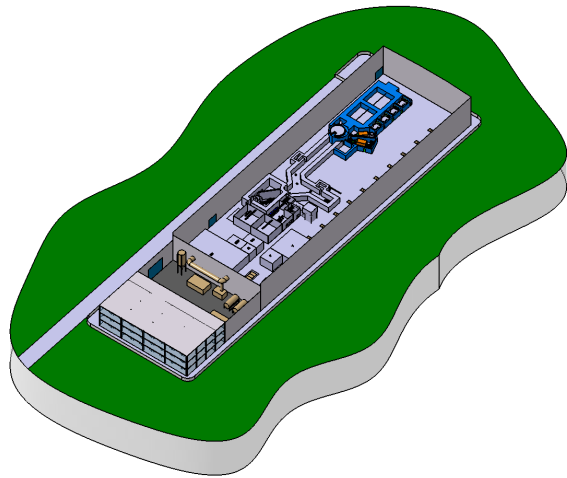
1. ESS-Bilbao project status
2. R+D activities (except beam dynamics)
3. Conclusions

# ESS-Bilbao linac project status

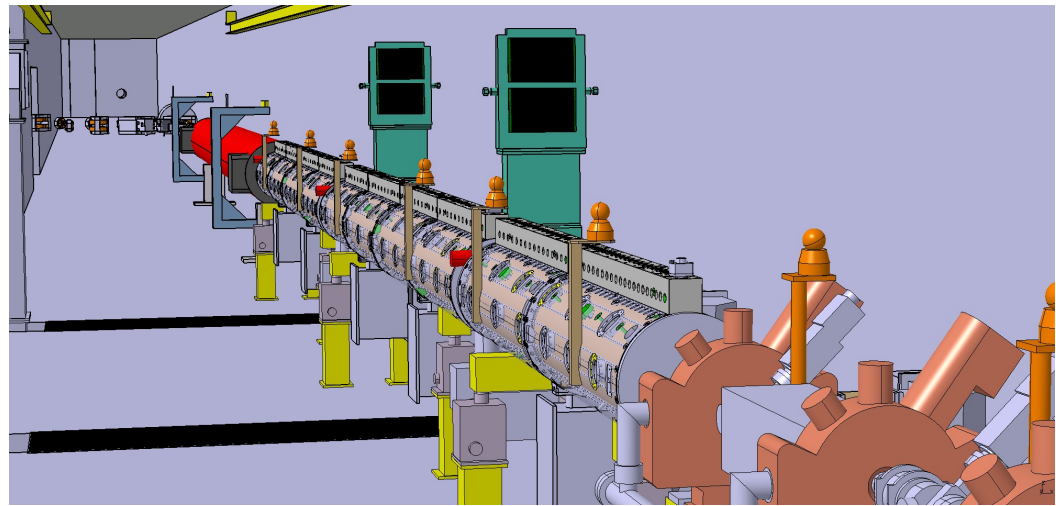
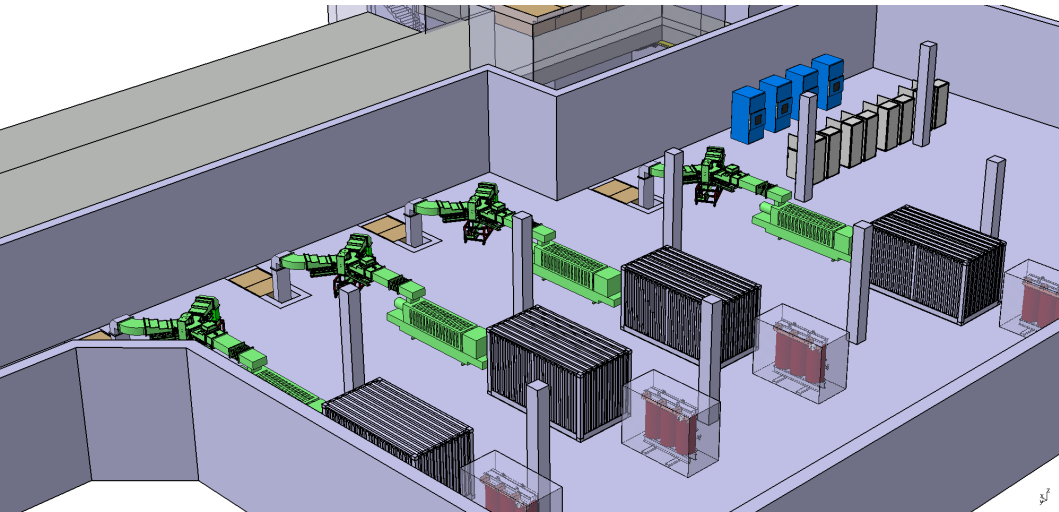
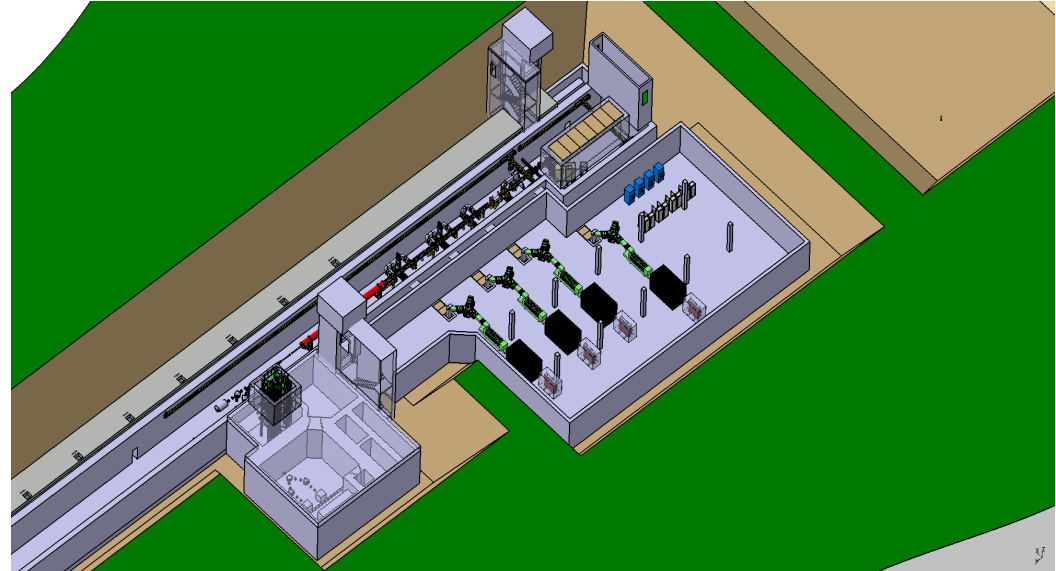
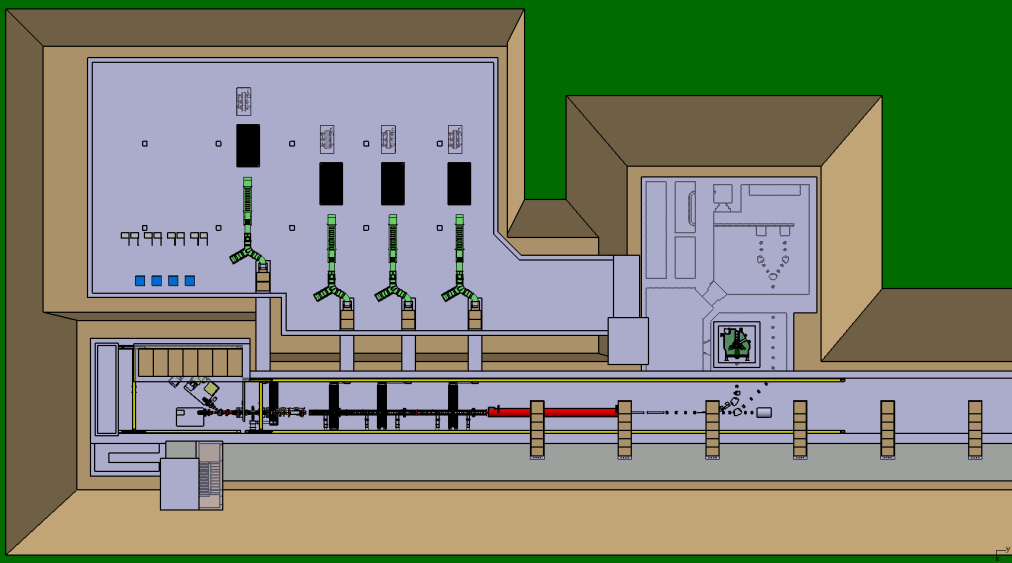


- **H<sup>+</sup> ion source** (ISHP, ECR source). Almost finished: all components fabricated, waiting for DC power supply.
- **LEBT**: Solenoids are being received
- **RFQ**: Cold model (1 m long) design finished, fabrication (in Aluminum) will start in october 2011. RF, thermal and power coupler design on course.
- **MEBT**: Work in parallel with ESS-S. Buncher cavity designed.
- **DTL**: Linac 4 desing. Mechanical fabrication on going. R&D activities on RF/thermal simulations, PMQs, beam dynamics.
- **Spokes**: DSR prototypes and cryomodule under design (collaboration with ESS-S).
- **Transfer lines and experiments**: Design finished.
- **Building and facilities**: Design almost finished.

# ESS-Bilbao Building

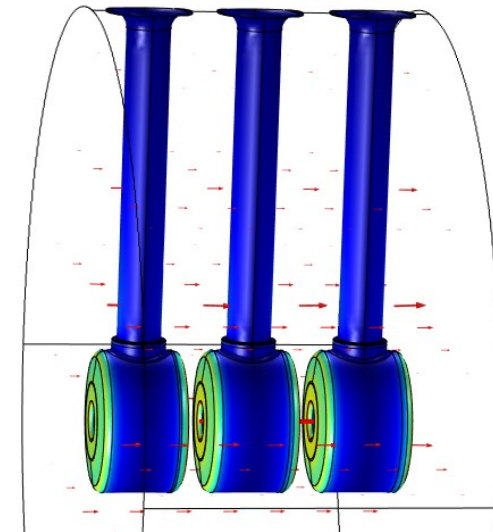
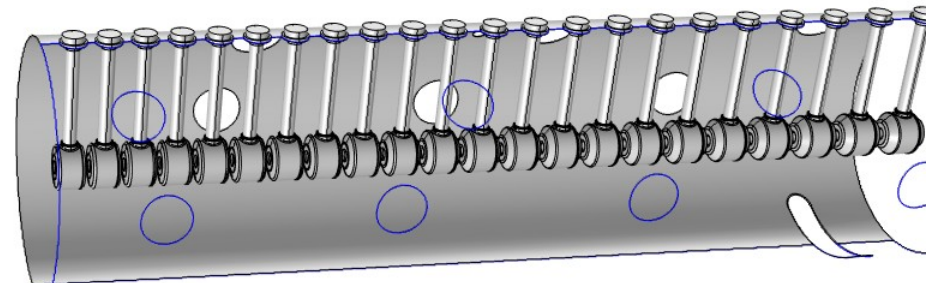


# ESS-Bilbao Building



# RF simulations

- Ongoing work:
- 3D simulations of DTs assembled on tanks.
- Cell by cell simulations
- Whole tanks (compute modes maps, study PCs, tuners...)
- DTs RF simulations for thermal/cooling computation

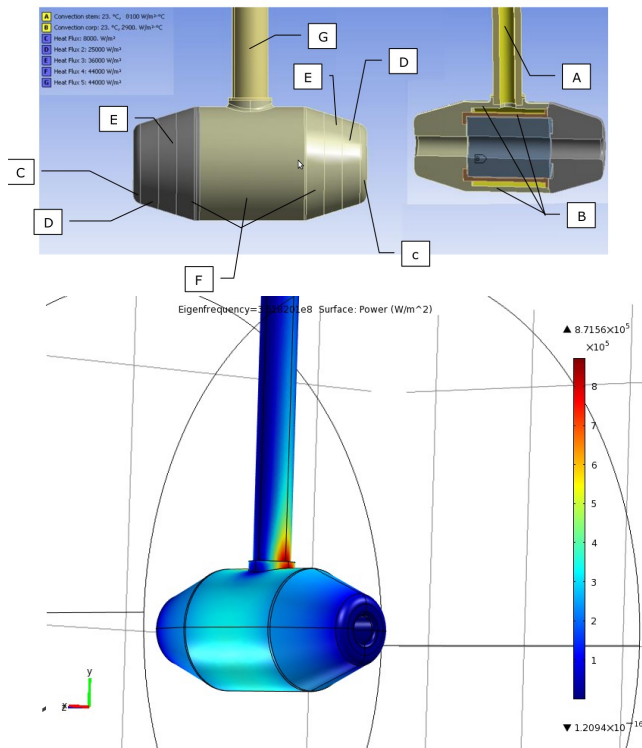


# Power losses

- Initial studies on power losses are being done:

	PSB	Low power SPL	High power SPL	ESS-Bilbao
Max. repetition rate	1.1 Hz	2 Hz	50 Hz	50 Hz
Beam pulse lenght	0.4 ms	1.2 ms	0.4 - 1.2 ms	2 ms
Duty cycle	0.044 %	0.24 %	2% - 6 %	10 %

- Linac4 DTL cooling is designed for 10%:



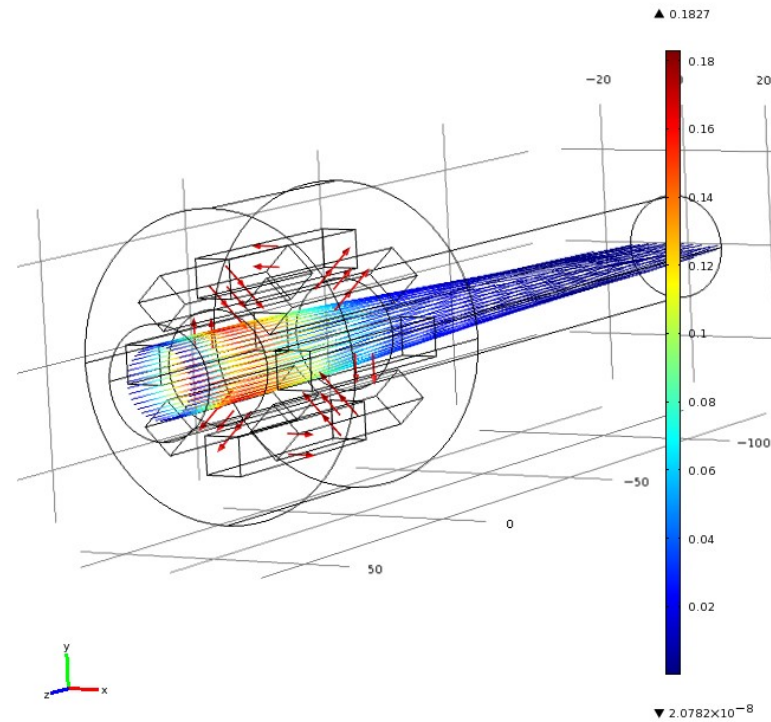
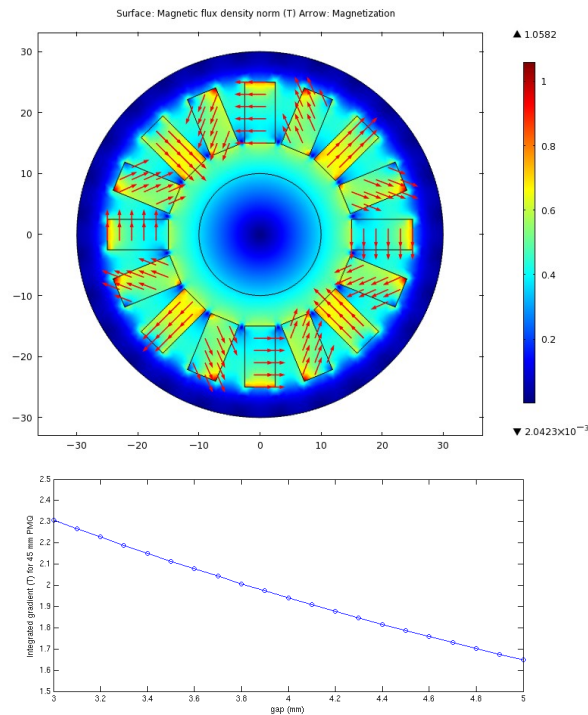
Zone	Linac4 10%	DT318s, 15%	DT318s, 10%
C	8000	6000	4000
D	25000	30000	20000
E	36000		
F	44000	45000	30000
G	44000	45000	30000

(Power loss in W/m<sup>2</sup>)



# PMQ activities

- PMQ (45/80 mm) magnetic simulations:



- Experimental activities: magnetic measurements test bench and magnet irradiation project (UPV/EHU), on progress.

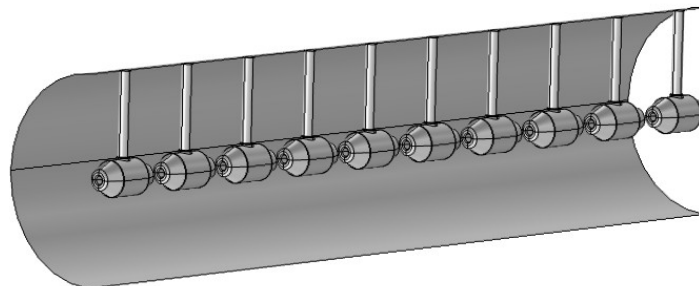
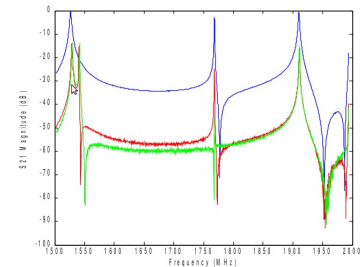
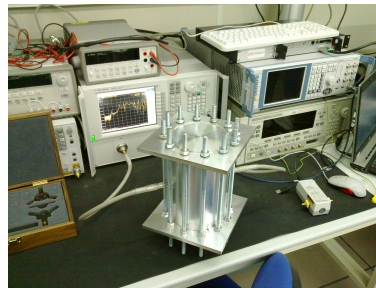


# Cold model

- To study EM behaviour, measurements, PCs, a cold model is being designed

- \* Based on Tank 3
- \* Scaled to 1/4
- \* freq=1.4 Ghz
- \* diam= 130 mm
- \* Number of DT: 10-20
- \* Material: Aluminium
- \* Including post couplers and tuners

First step: Build a pillbox of the same aluminium tube to validate material and processes:



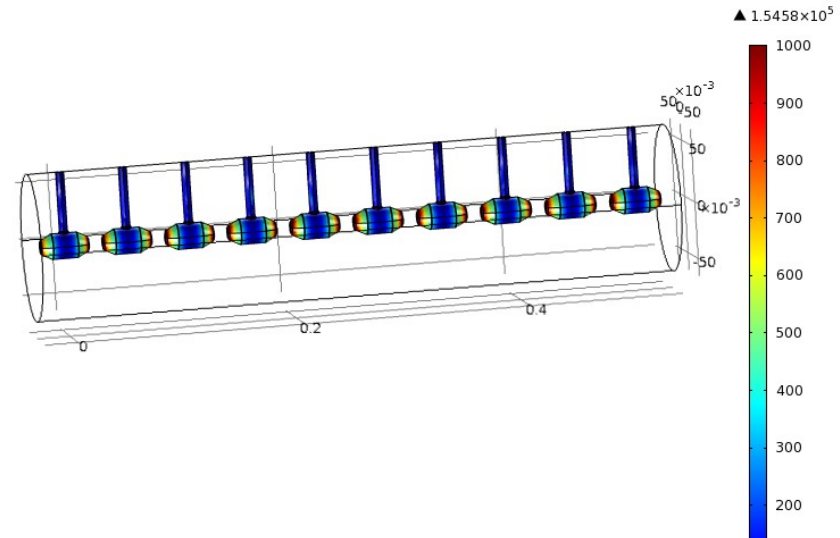
(Model example)

# Cold model, some examples

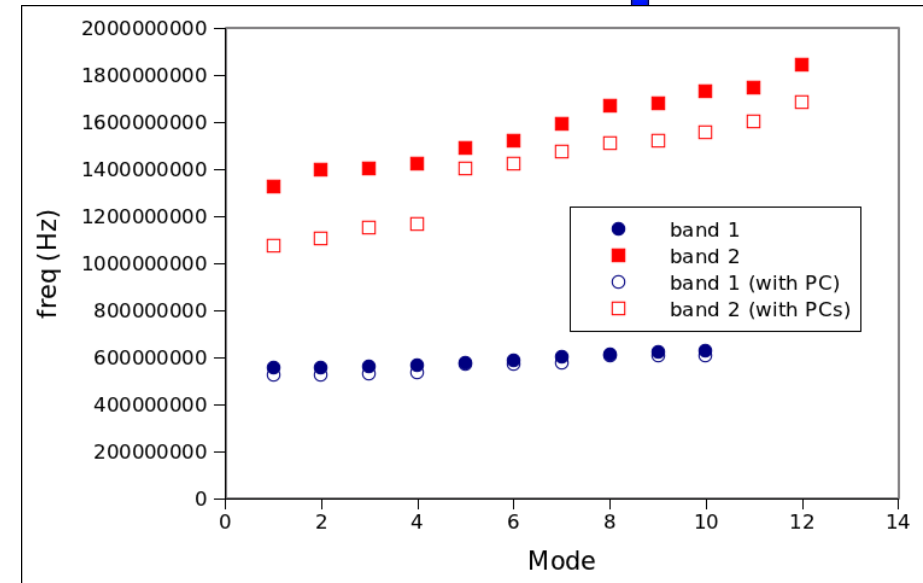
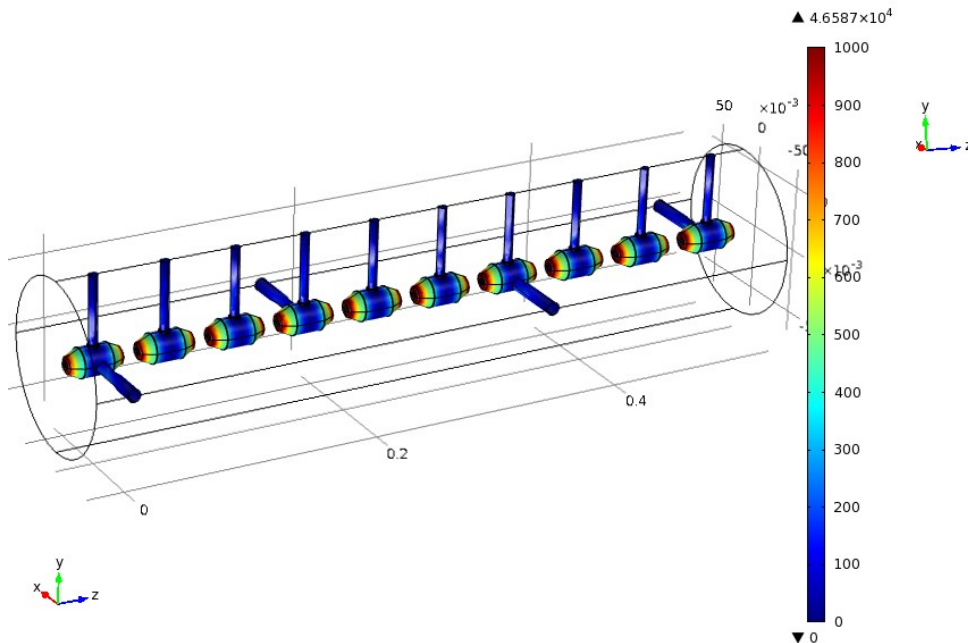


DT are simplified versions generated from revolution.

Eigenfrequency=1.397339e9 Surface: Electric field norm (V/m)



Eigenfrequency=1.399672e9 Surface: Electric field norm (V/m)



# Conclusions

- R+D activities on ESS-Bilbao DTL are a bit delayed respect to the mechanical fabrication, to take advantage of sinergies with linac4 fabrication.
- Activities are on going on RF simulations, PMQs characterization, beam dynamics and cold model.
- These activities will continue results are expected during 2012 (after RFQ activities are finished)