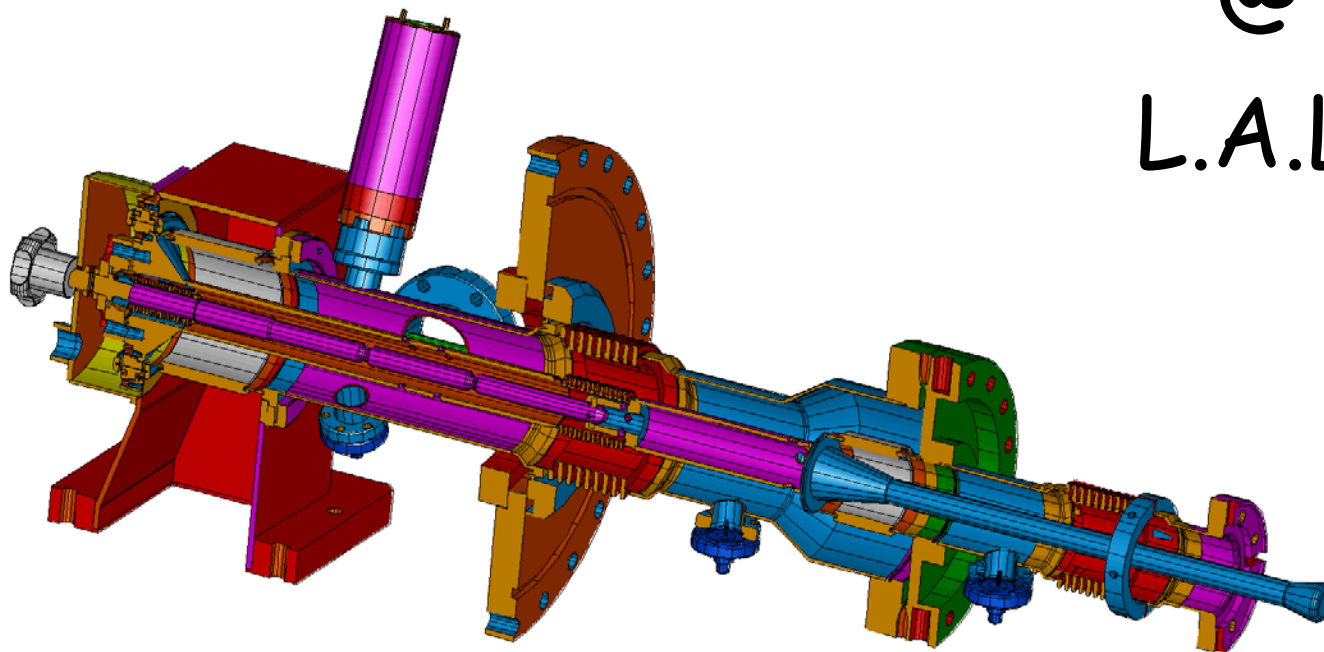


Power Couplers Program

@

L.A.L.



Different activities

- Manufacture of 30 TTF-III Couplers in Industry for VUV-FEL. Pre-conditioning at room temperature.
 - Design, construction and test of new proto-type power couplers: TTFV, TW60.
 - Industrialisation studies of the Coupler for the European X-Ray Free Electron Laser (1000 couplers !!!).
-

- Design and construction/acquisition of TiN coating bench.
- Conditioning studies ~ 10 couplers
- Associated studies (surfaces, vacuum, mechanics..etc)

- **Manufacture of 30 TTF-III Couplers in Industry for VUV/FEL - Installation.**
This experimental set-up will be used for all the others activities

Class 10 clean room



Klystron/modulator



Vacuum furnace



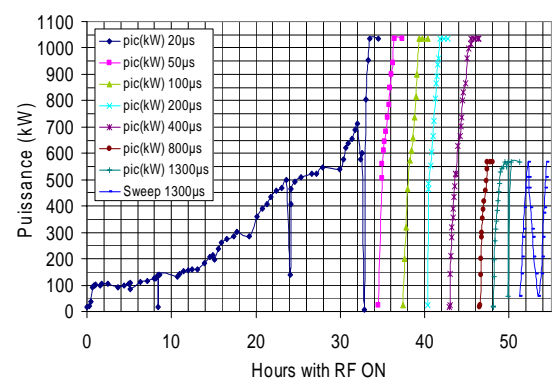
Ultra-pure water production



Reception, cleaning mounting
Conditioning and tests

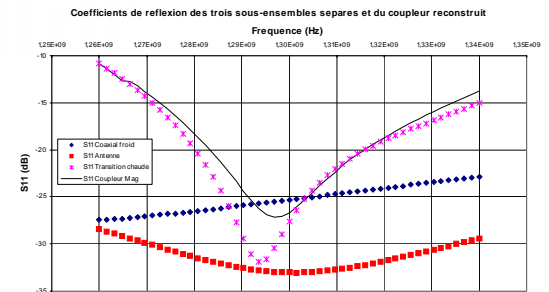
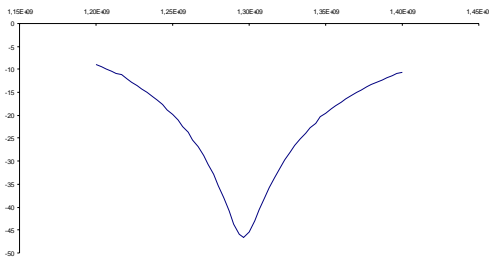
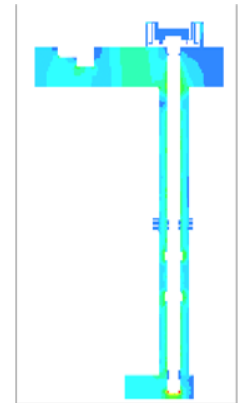
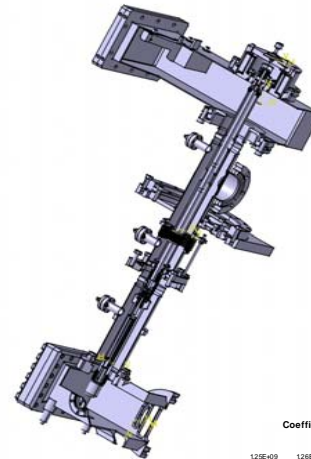
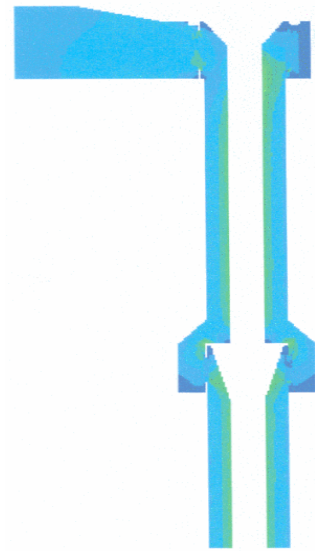
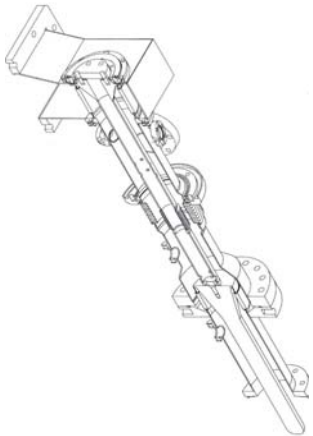


Power increase with time during RF Conditioning



Design, construction and test of new proto-type power couplers (TTFV , TW60).

Study, simulations & design. Setting up the call for tenders and evaluation of offers.

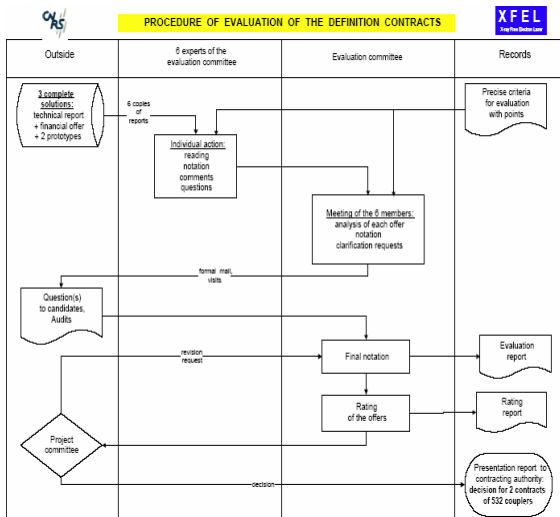


Industrialisation studies of the Coupler for the European X-Ray Free Electron Laser

- Thermal studies, tolerances, simulations.
- Setting up the call for tenders and evaluation of offers.
- Define the procedure for quality control and final decision

Principle of "Definition contract for industrialisation studies"

- Essentially intellectual work:
 - Define all manufacturing processes
 - Risk analysis (process, logistics)
 - Determine cost in series and justify
- Produce validation models and 2 prototypes



Particularities

- several contracts will be awarded on the same subject: **3 contracts are financed**
- 2 teams will be selected after final evaluation
- contracts for manufacturing 2 series of 532 XFEL couplers will be awarded without new call for tenders
- the 2 contracts may be awarded to a single company




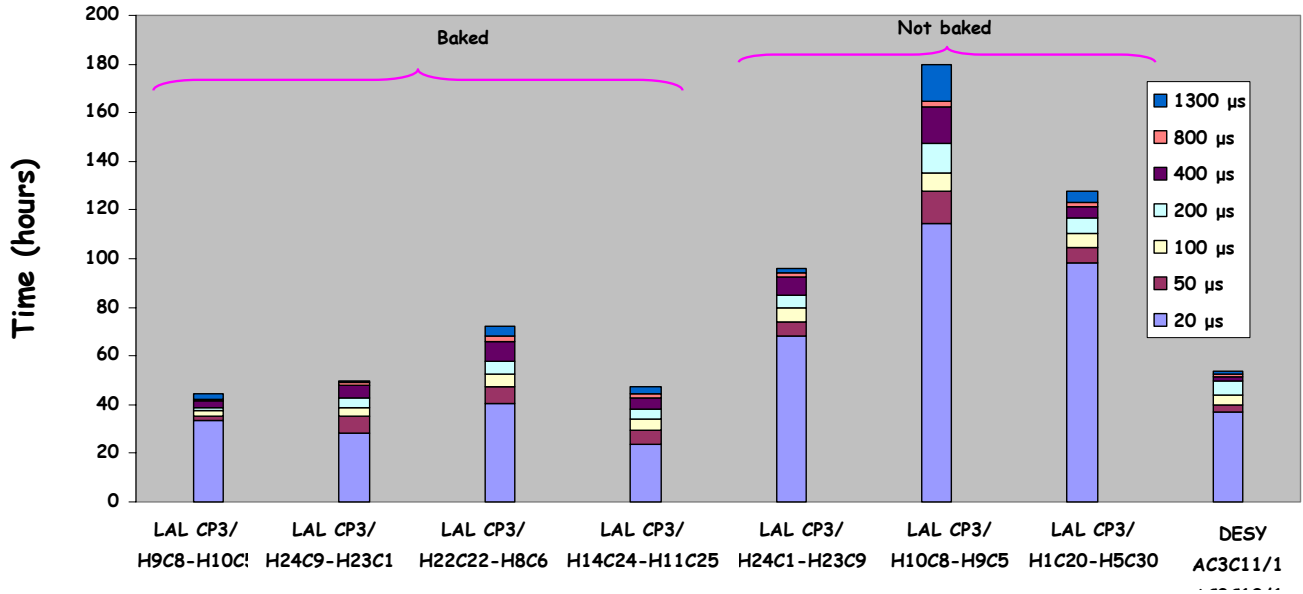
Alessandro Variola, LAL-ORSAY
ILC European Regional meeting, OXFORD

Advancement

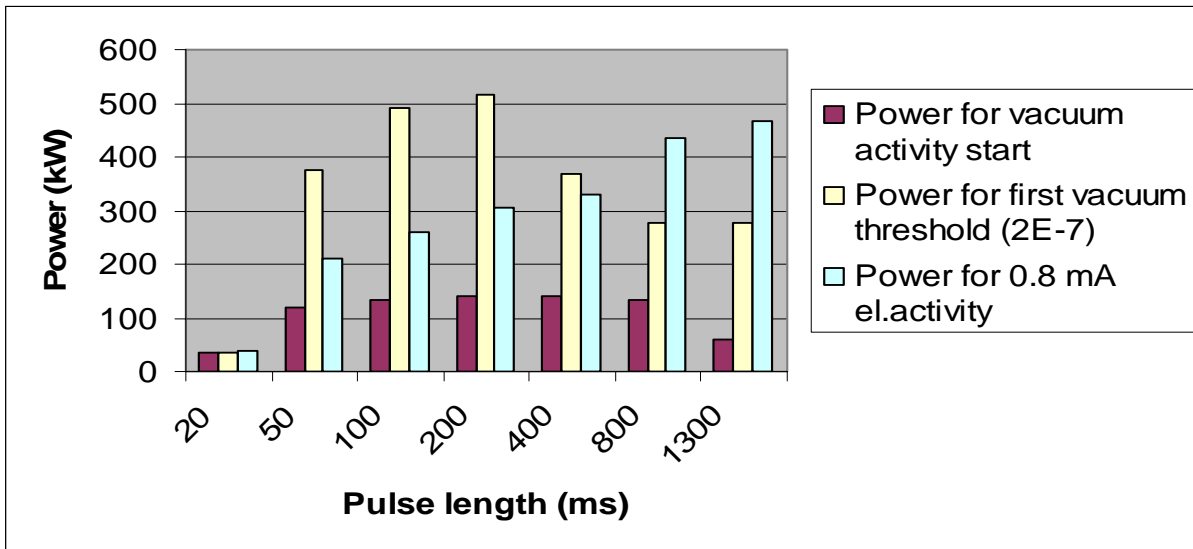
- **Conditioning:**
 - Agreement with DESY for the quality procedure (very extensive documentation)
 - Communication : Web site => reports, conditioning advancement, internal notes, measurements, minutes
 - Improvement of the technical equipment and of quality assurance for the assembly procedure: 1) Water resistivity measurement on the outgoing flux 2) New particle counter 3) Increased ultra pure water reservoir 4) Continuous RGA spectrum acquisition 5) Modified vacuum system to assure a delivery of the cold part under sealed vacuum 6) Box and supports for delivery
 - Start of the conditioning of the VUV-FEL couplers in "continuous mode" testing both with and without "in situ baking".
 - First results produced and ongoing data analysis (see next page...)

First results

- 6 pairs already conditioned (1 pair/~ 3 weeks)
- 1) Without in situ baking: conditioning time = ~ 134 h av. (94 @ 20 μ s)
- 2) With "in situ" baking: conditioning time = ~ 53 h av. (31 @ 20 μ s)
but ~ 4 days for baking @ 130 degrees T
- Oven pre-baking @ 130 degrees. No visible effect. New test changing the gasket (annealed copper) and baking in oven at much higher T. If still no effect => directly to "in situ" baking
- Almost no interlocks with the present conditioning procedure.
Increase ramp speed (modifying thresholds, shorten waiting time @ fixed power) or rep. rate?
- With in situ baking the "RF on" time can be reduced at ~ 50 h
RF = 



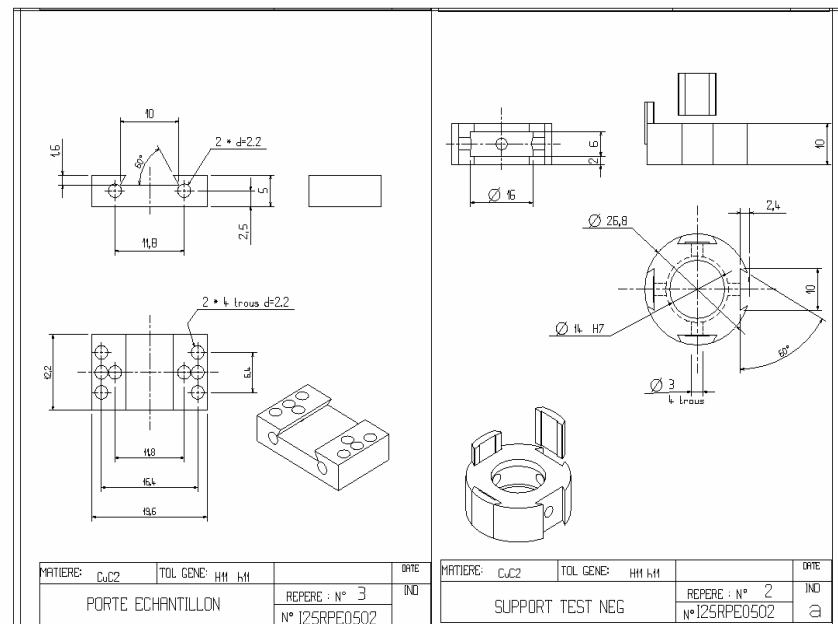
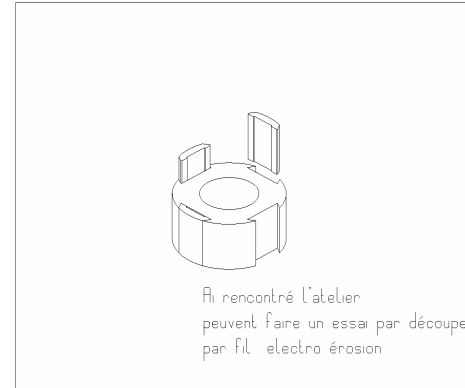
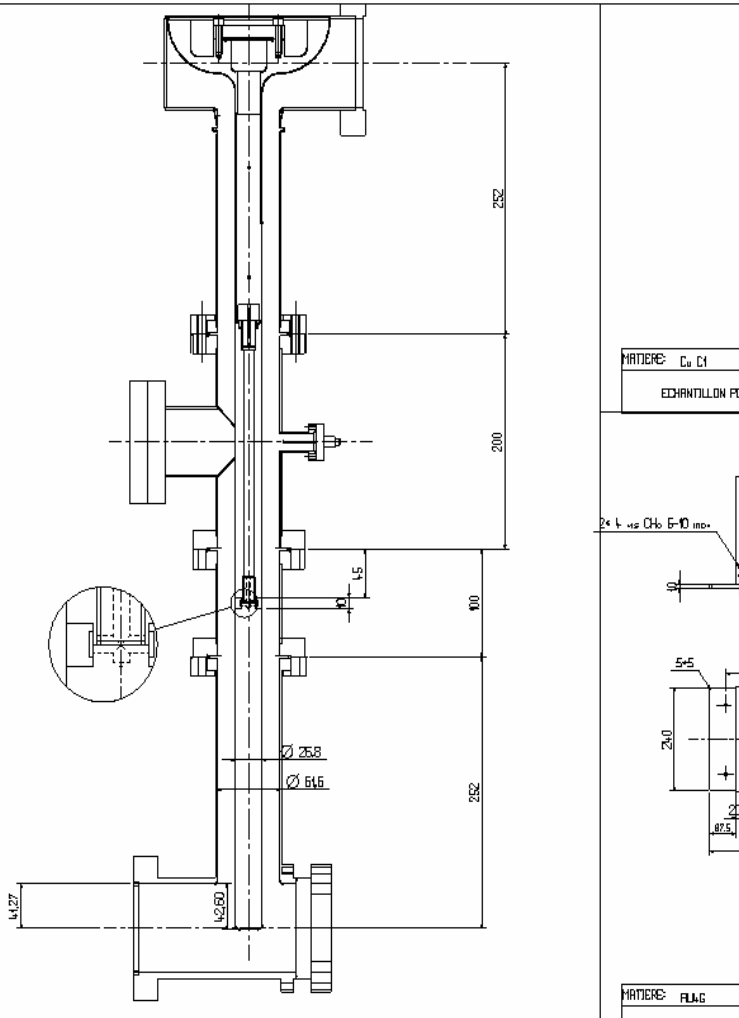
Couplers



10 "spare" couplers for different measurements

- Some ideas for Conditioning Studies :
 - Memory effect (Couplers stored)
 - DC bias sweep to provoke multipactor
 - Argon discharge cleaning
 - Ceramics coated with Zr-Va-Ti
 - Fully Ti or TiN coated coupler (Couplers ready to be coated - Ti @ CERN if possible)
 - Effect of different environments on re-conditioning times (vacuum, N₂,....)
 - Establish maximum limits for interlock thresholds @ rep. rate
 - Effect of assembly of warm part in class 10 clean room
 - Central antenna as an e⁻ pick-up
 - And other ideas are discussed.....

TEST - Coupler (NEG, Surface analysis etc)

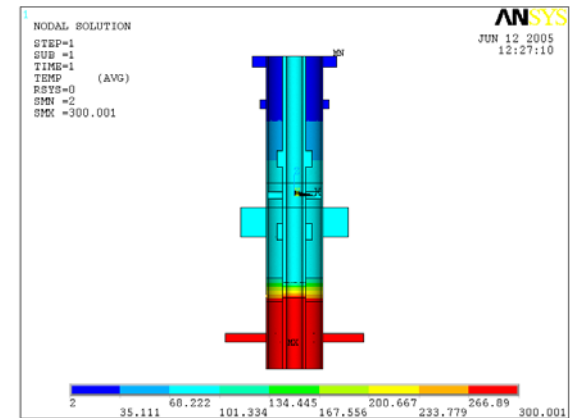
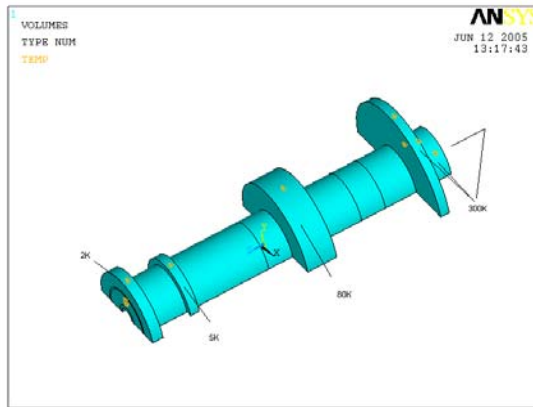
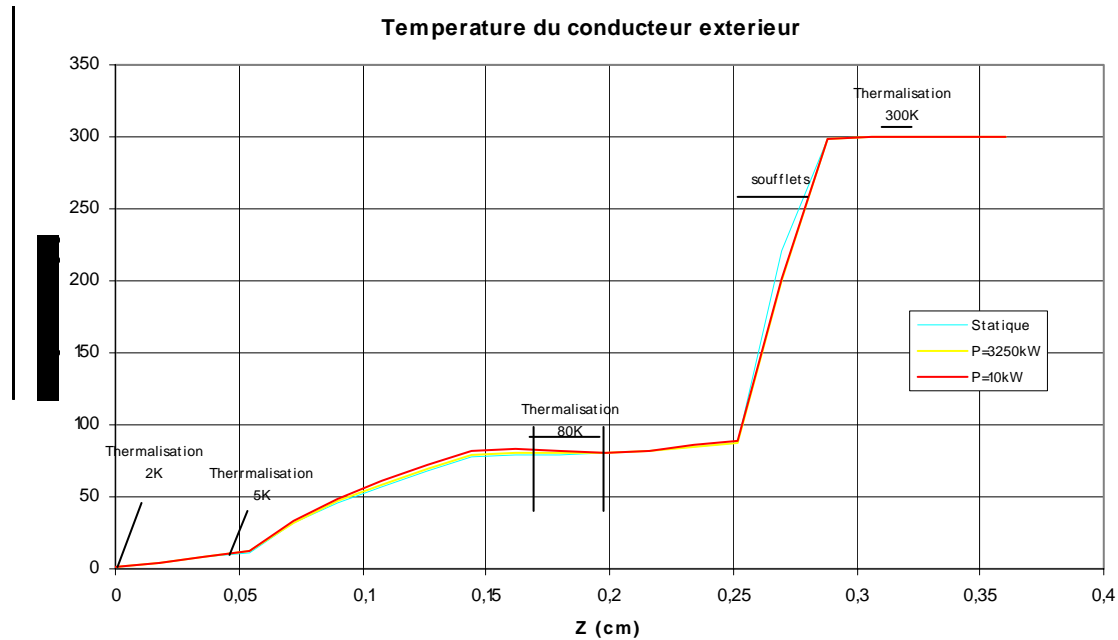


• New Prototypes

- TTF V call for tender published
Industries proposal analyzed
Assignment of the contract to ACCEL
- TW60 call for tender published
Industries proposal analyzed
Assignment of the contract ACCEL

One year for delivery...we hope to receive, test and validate the models before summer 2006. In the meanwhile thermal & multipacting studies and simulations will be carried out

Thermal studies-ANSYS (P.Lepercq)



XFEL industrialisation

- We obtain a third contract
- The call for tender has been published
- A procedure for the contract following has been established
- A final decision for the composition of the committee that will evaluate the contractors is foreseen soon.

Others....

- TiN team decided. Offers received from different industries, process=>sputtering
- Ideas for conditioning measurements evaluated and some project already started (**memory effect**)
- On going Data Analysis
- Surface activity proposed (**Samples mechanics in construction**)
- NEG (**Test Coupler in construction**)

Conclusions & Outlook

- The power coupler activity is a priority in the accelerator activity of LAL.
- We have progressed in the definitions of the quality procedures and started the conditioning of the VUV FEL couplers. We have improved some technical aspects to increase the quality assurance. First results are being analyzed.
- A full communication bridge between LAL and DESY has been established. Full documentation is on the WEB.
- TTF V & TW60 => Assigned
- TTF III - XFEL industrialization : 3 contracts, call for tender already published and proposals received.

HFSS-ANSYS

