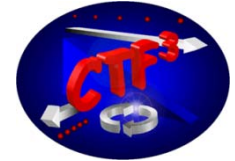


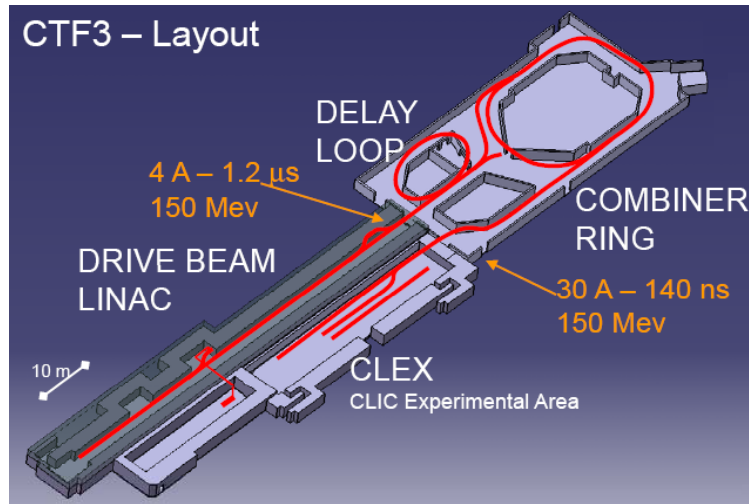
# Status and Commissioning Plans for



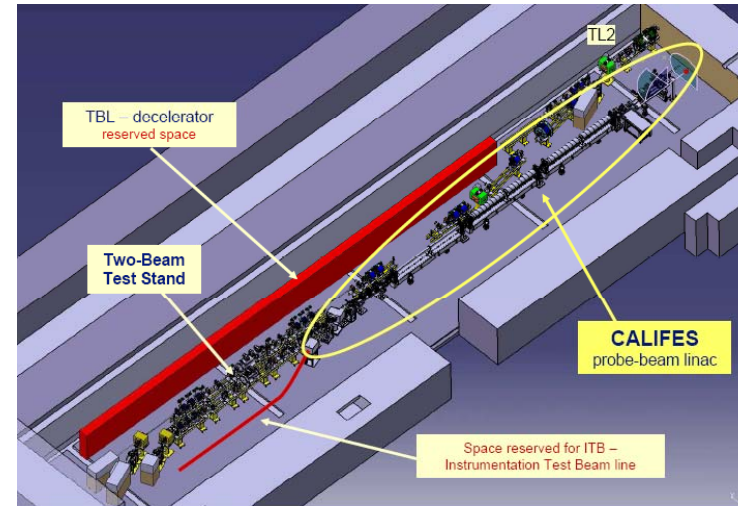
# What is CALIFES ?



## Probe beam LINAC for the TBTS



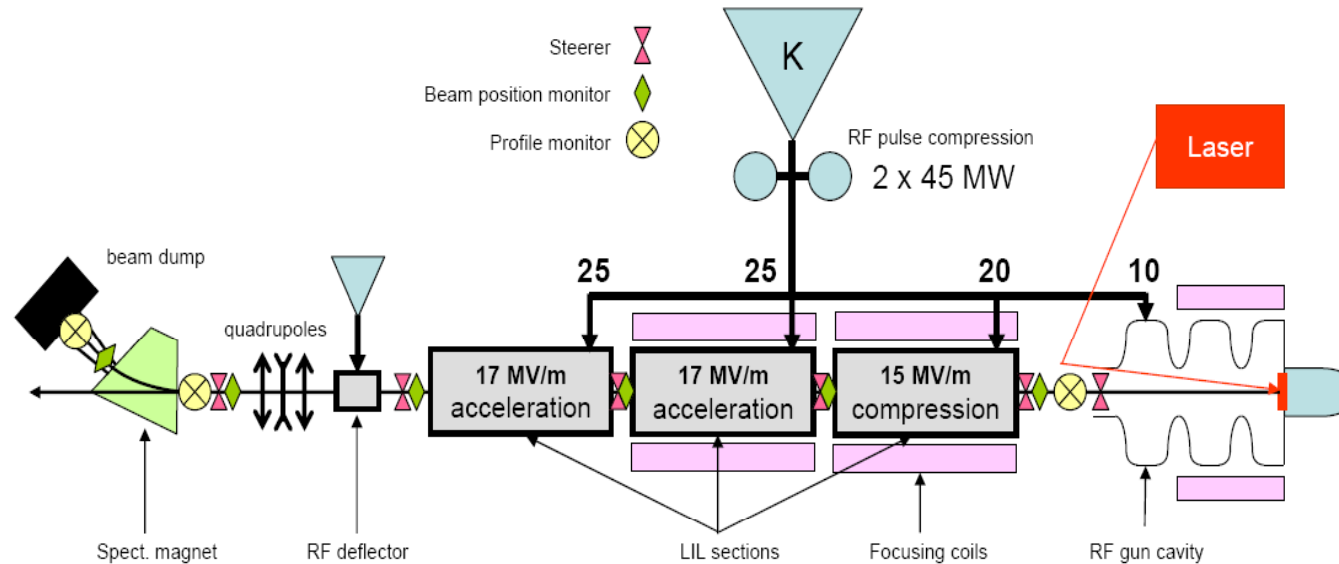
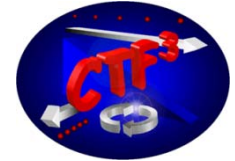
The CTF3 Facility



Inside the CLEX building

### CALIFES specifications:

- Energy :  $\sim 177$  MeV
- Energy dispersion :  $\pm 2\%$
- Emittance :  $<20 \pi$ mm.mrad
- Bunch charge : 0.6 nC
- Bunch train : 1 – 32 – 226
- Bunch spacing : 0.667 ns
- Bunch length : 0.75 ps
- repetition rate : 5 Hz



Based on:

- Photo-injector (LAL Orsay)
- Laser line (using the same laser than for Drive Beam)
- 3 former LIL accelerating structures
- A single klystron 43 MW, RF distributed to the structures and the gun
- A complete set of diagnostics

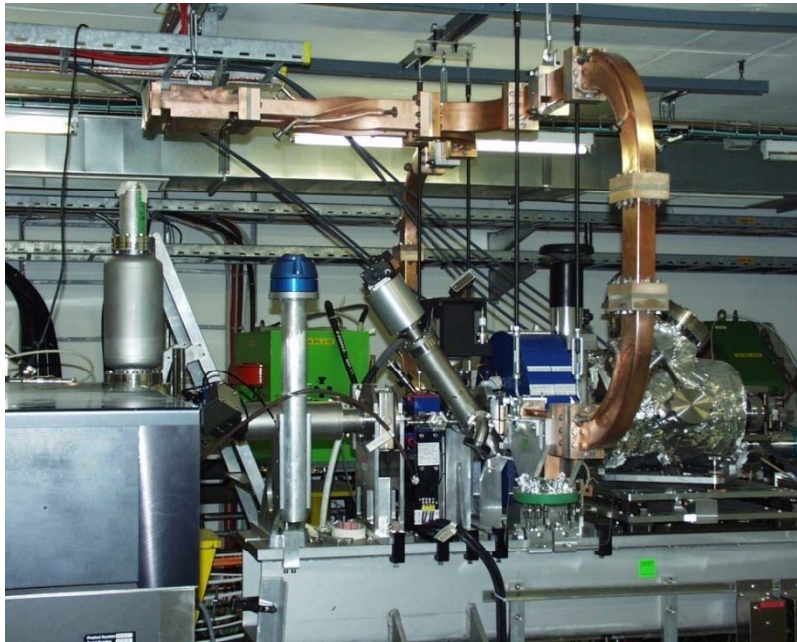
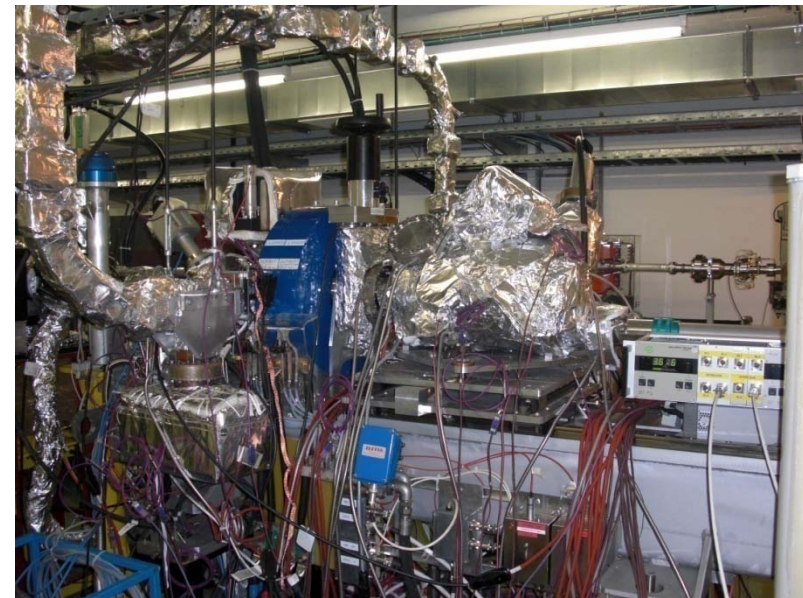


Photo-injector and preparation chamber

Presently in baking

Constructed by LAL Orsay  
 Bunch : 6 ps  
 Energy : 5 MeV  
 RF power : 7 MW  
 2 ½ cells – standing wave

Cs<sub>2</sub>Te photo-cathode produced in  
 CERN preparation chamber



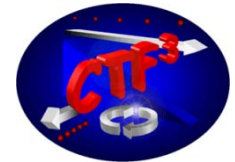


Downstream view

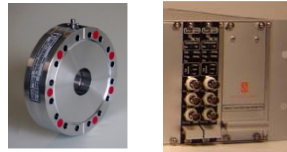


Upstream view

Installation completed (alignments proven to be a difficult task)  
 RF conditioning started week 38 up to 43 MW -1 $\mu$ s  
 Will be resumed after baking and EMC problems solved



1 Impulse Current Transformer (Bergoz)

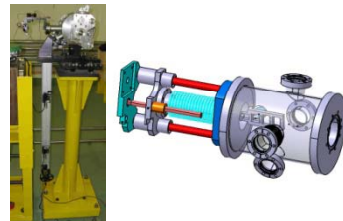


6 Re-entrant cavity BPM



See Claire Simon's Talk: Wed. 15/10 16.30  
Instrumentation: BPM using a Re-entrant Cavity

3 Optical Profile Monitors (YAG and OTR screens)



1 Deflecting Cavity



Interfacing with CERN  
Control/Command under  
progress

1 quadrupole triplet



1 analysis dipole

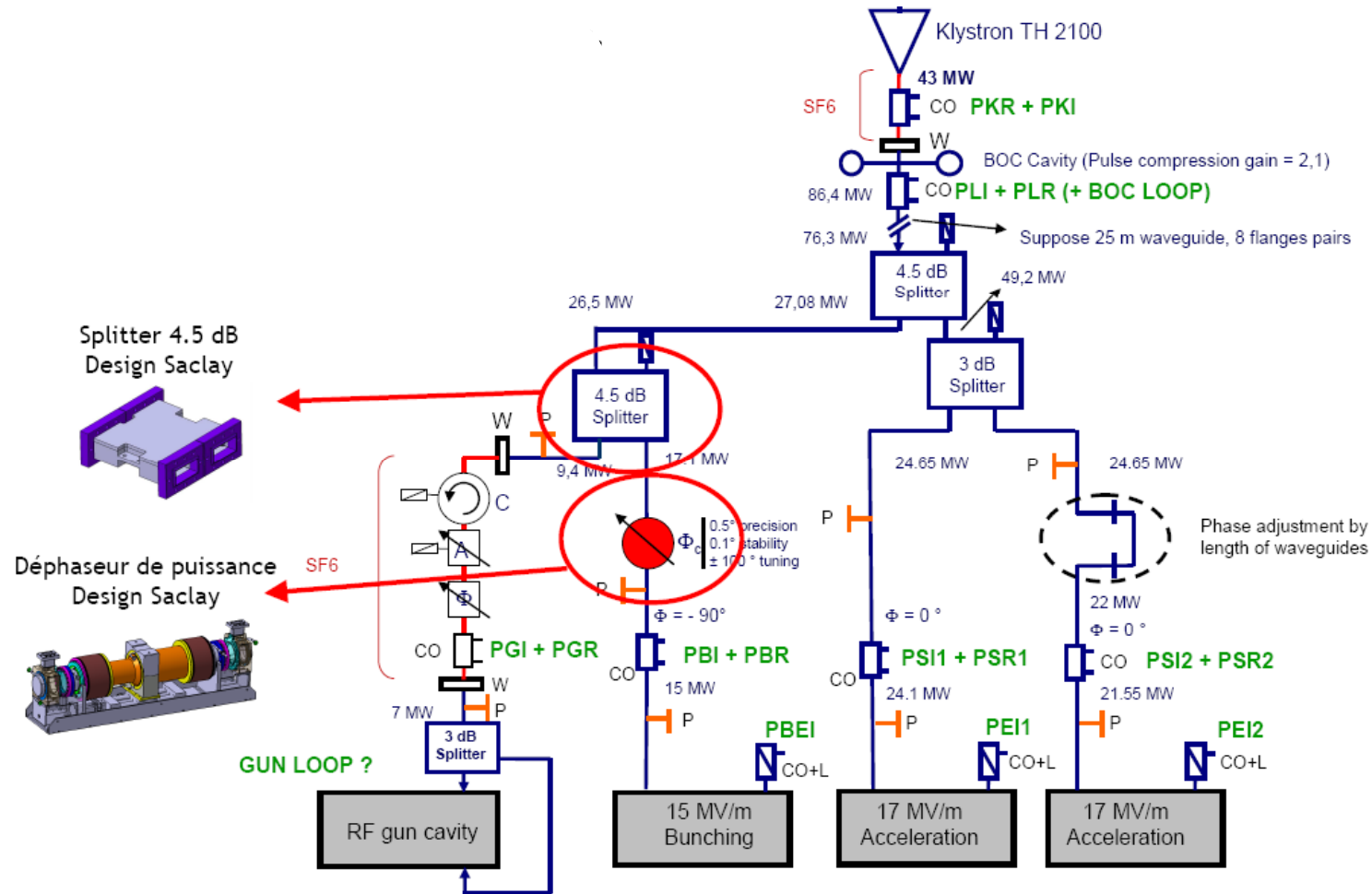
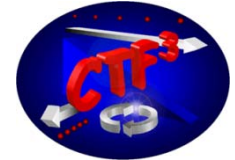
1 Faraday Cup



1 RF Pick-up

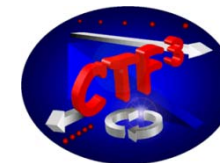
Still to be developed

See Anne Dabrowski's Talk: Wed. 15/10  
14.00 Instrumentation: Longitudinal Beam  
Diagnostics at CTF3



CALIFES RF network break down

# The RF network 2/2



In CLEX Gallery



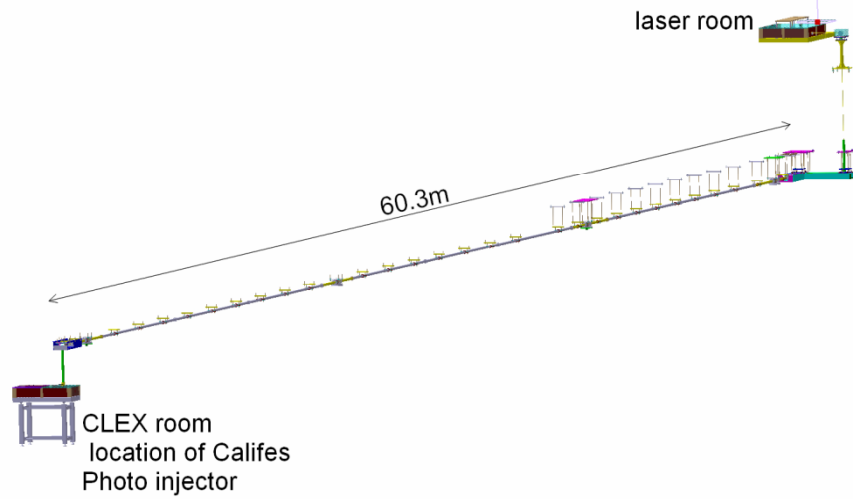
In CLEX tunnel



Power Phase Shifter elements

Power shifter  
brazing and fine  
machining still to be  
achieved

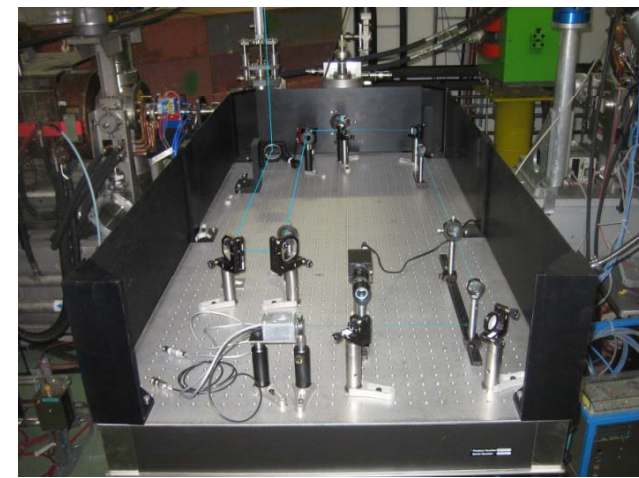




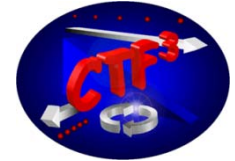
UV Laser transport under vacuum



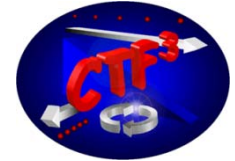
Laser-room table with pulse picker and conversion crystals



CLEX-room table

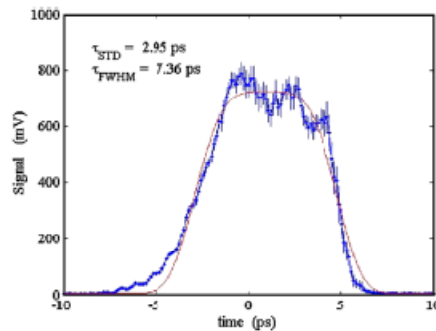


- RF conditioning to be achieved by end of October
  - Control/Command to be fully operational soon
  - Can start without power phase shifter (installed during winter shutdown)
  - Laser energy per pulse has now been greatly improved
  - Photo-cathode prepared from the 3<sup>rd</sup> of November
- ➔ Commissioning from the 10/11/08 up to 15/12/08



## Laser system:

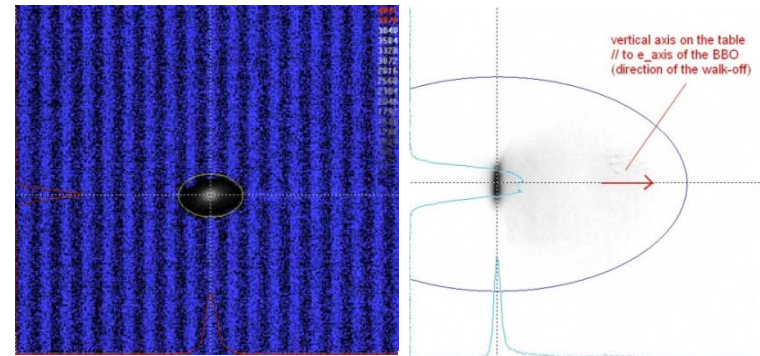
- UV Pulse Time profile measurement



Measurement with a scanning cross correlator on LCLS

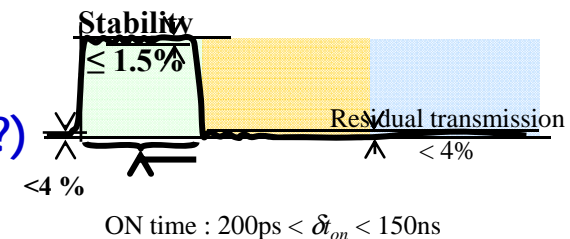
→ Not yet foreseen , usefull ?

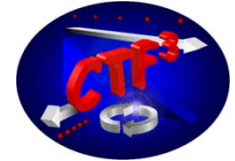
- UV Pulse Transverse profile measurement



Measurement with a camera on virtual cathode

- Number of pulses selection: 1, 32, 226 (control of pulse picker)
- Pulse energy tuning
- Repetition rate selection (5 Hz)
- Laser stability (measurement of beam current ?)



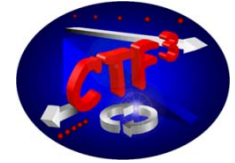


## RF gun

- Monitoring of vacuum level, water temperature, frequency tuning
- Beam current measurement
- Beam transverse profile
- Beam position
  - **no energy measurement, nor emittance at the gun output**
    1. Scan the RF phase vs. bunch charge
    2. Scan the RF phase vs. beam position/profile
    3. Scan the coils current vs. beam emittance
    4. Scan the laser position on photocathode vs. QE
    5. Monitor the QE vs time

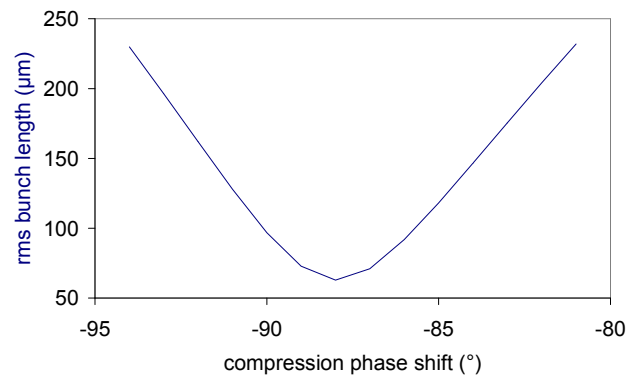
## RF system

- RF amplitude and phase stability vs. time for each signal coming from: modulator, klystron, BOC, RF gun, LIL1, LIL2, LIL3
- Scan RF phase vs. energy and energy spread
- Scan RF phase vs. bunch length

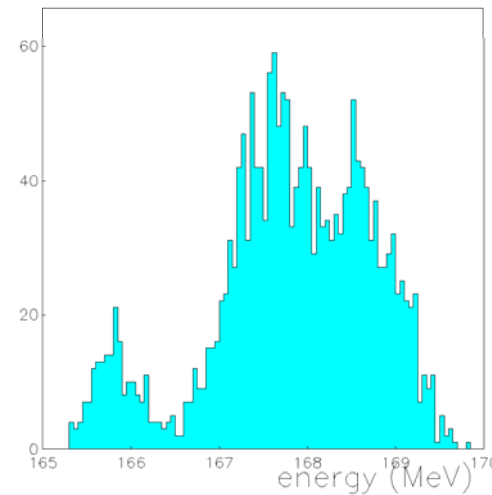


## Beam dynamics

- Scan RF phase vs. energy and energy spread
- Scan RF phase vs. bunch length
- Quad scan for emittance measurement
- Beam losses from gun to end of line
- Beam loading effects : pulse charge vs. energy spread
- Time resolved energy using deflecting cavity and spectrum magnet

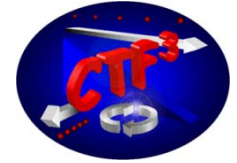


Pulse length vs. LIL1 RF phase



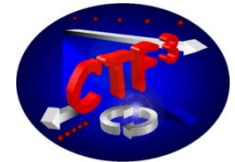
Energy spread

*Simulation Aline*



And after CALIFES achievement ?

CEA involvement in CLIC/CTF3  
will of course continue



- **Long term mission (2 years)**
  - at CERN for CALIFES commissioning and further CTF3 activities.
  
- **12 GHz test stand: (604 k€ - 25 FTE months)**

See Franck Peauger's Talk: Th. 16/10  
10.30 High-Power RF Test Areas : Design & Planning  
Progress of the CERN Klystron Test Area

  - Modulator: purchase with CERN specifications (3 industrials already short listed), manufacturing management, factory tests, installation at CERN
  - pulse compressor: design study and specification (3 possible solutions under study : SLED2, BOC or innovative SLED), manufacturing drawings and management, installation at CERN,
  - purchase of RF components
  
- **CLIC Module (249 k€ - 6 FTE months)**

See Franck Peauger's Talk: Th. 16/10  
14.00 Wakefield Monitor Development &  
Test in the TBTS

  - Design and fabrication of damped structures equipped with Wakefield Monitors and the associated electronics to be tested on TBTS in 2010.
  
- **Test Beam Line (218 k€ - 5 FTE months)**
  - 12 GHz RF network components for 8 PETS