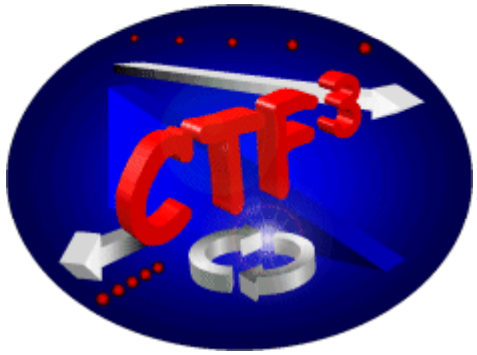
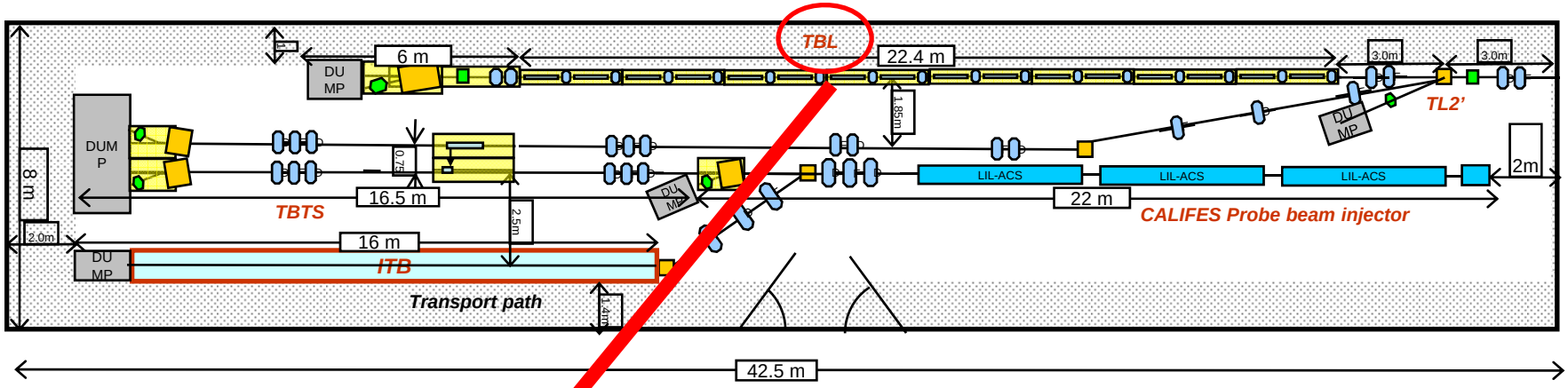


TBL BPM: mechanics and PCBs electronics

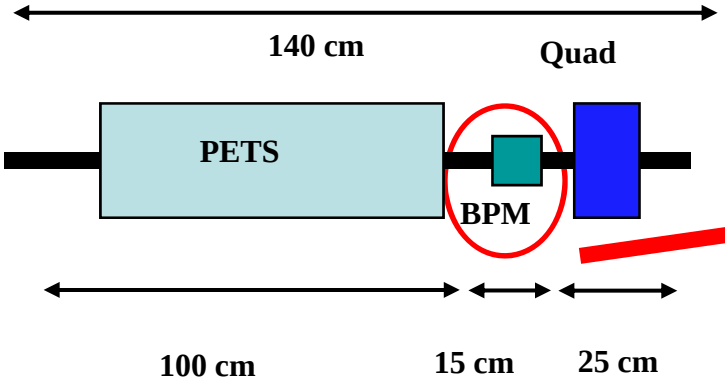
A. Faus-Golfe,
J.J García
J.V. Civera

Location of BPM´s in TBL:

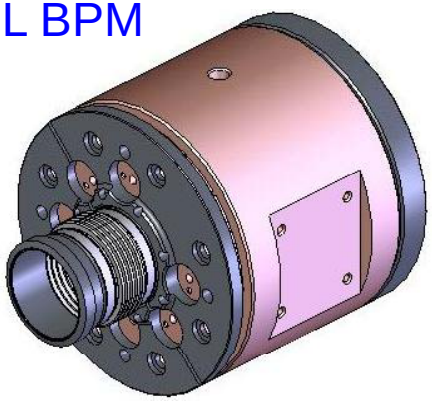
Layout of the CLEX building with TBL



Schematic of a TBL cell



View of a TBL BPM



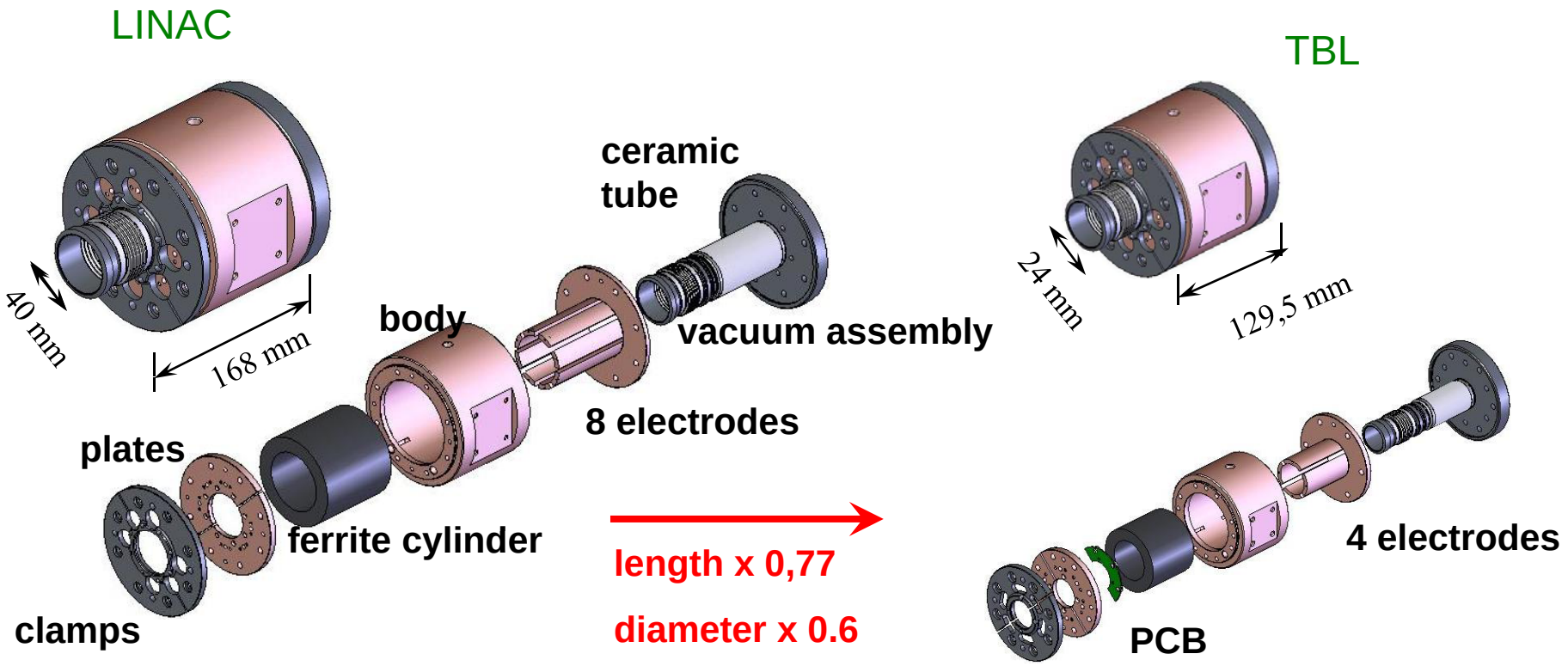
scaled version of linac BPM's to fit the size of the PETS geometry

Beam and BPM Parameters in TBL

Beam parameters in TBL	
Beam current range	1- 32 A
Bunch train duration	20-140 ns
Nominal beam energy at injection in TBL	150 MeV
Micro bunch spacing	83 ps (12 GHz)
Micro bunch duration (fwhm)	4-20 ps
Micro bunch charge	0.6-2.7 nC
Repetition frequency	0.83 Hz – 50 Hz
Typical radiation levels	<1000 Gray/year
Emittance	150 μm
BPM parameters	
BPM analog bandwidth (BPM with associated electronics)	10 kHz -200 MHz
Beam position range of interest	+/- 5 mm horizontal and vertical
Beam aperture diameter	24 mm
Overall mechanical length	129.5 mm
Number of BPM's in TBL	16
Resolution at maximum current	<5 μm
Overall precision	<50 μm

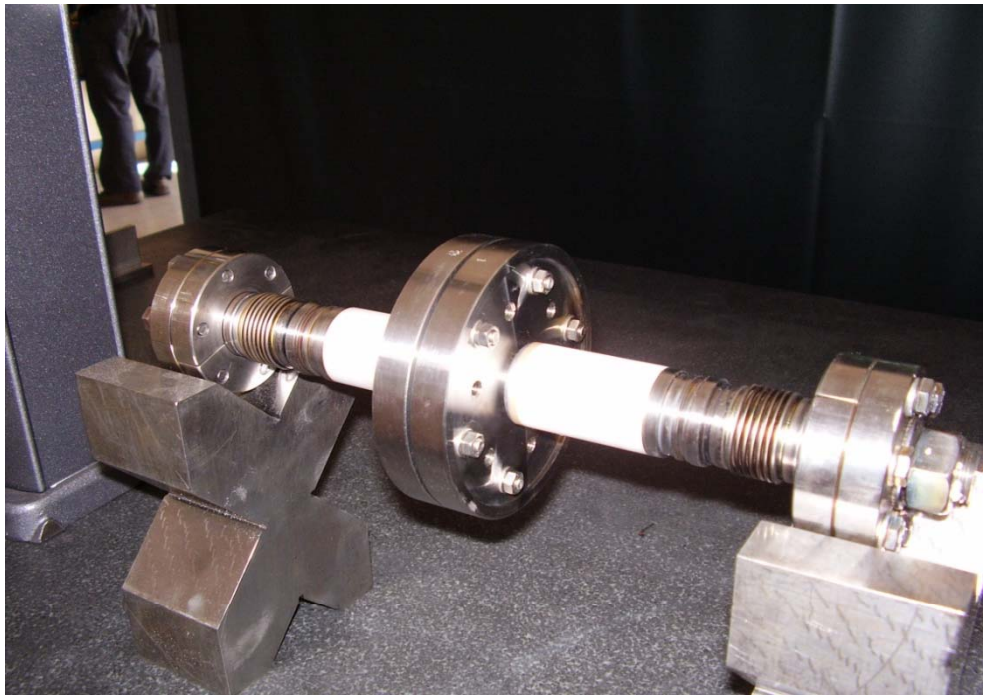
Mechanical Design of Prototypes

We have developed a 3D CAD/CAM model (Computer Assisted Design / Computer Assisted Manufacturing) based on linac BPM's design.



Mechanical Construction of Prototypes

Mechanical construction of BPM main parts has involved special fabrication processes as: Electron Beam Welding (EBW), brazing of Kovar and stainless steel with ceramics, metal hydroforming for bellows and Titanium coating (by sputtering).



Jigs for EBW

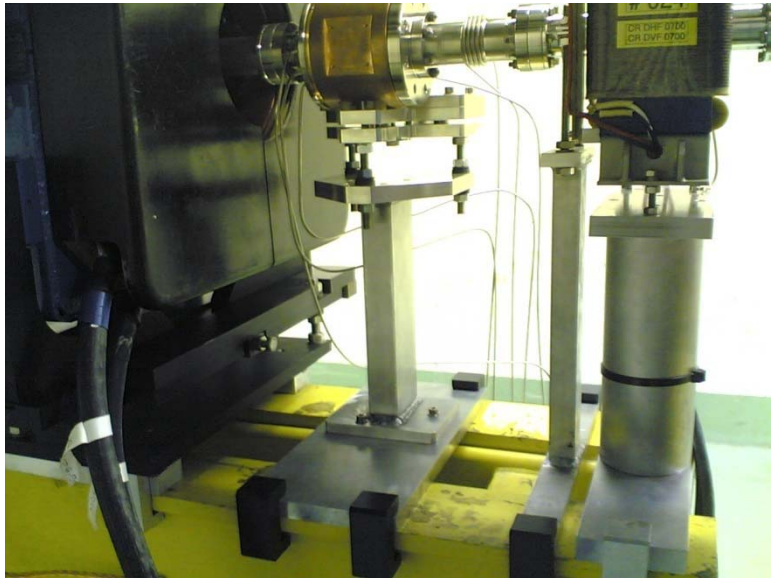
Parts of BPM before assembly

Mechanical Design of BPM Supports

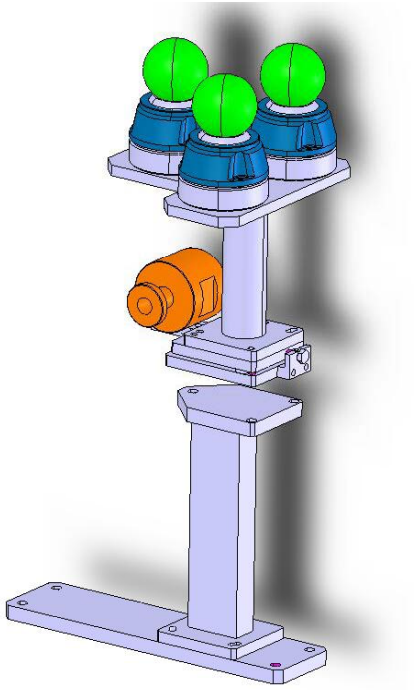
Mechanical Design of :

- BPM support for wire test
- BPM support for the TBL

is in progress.



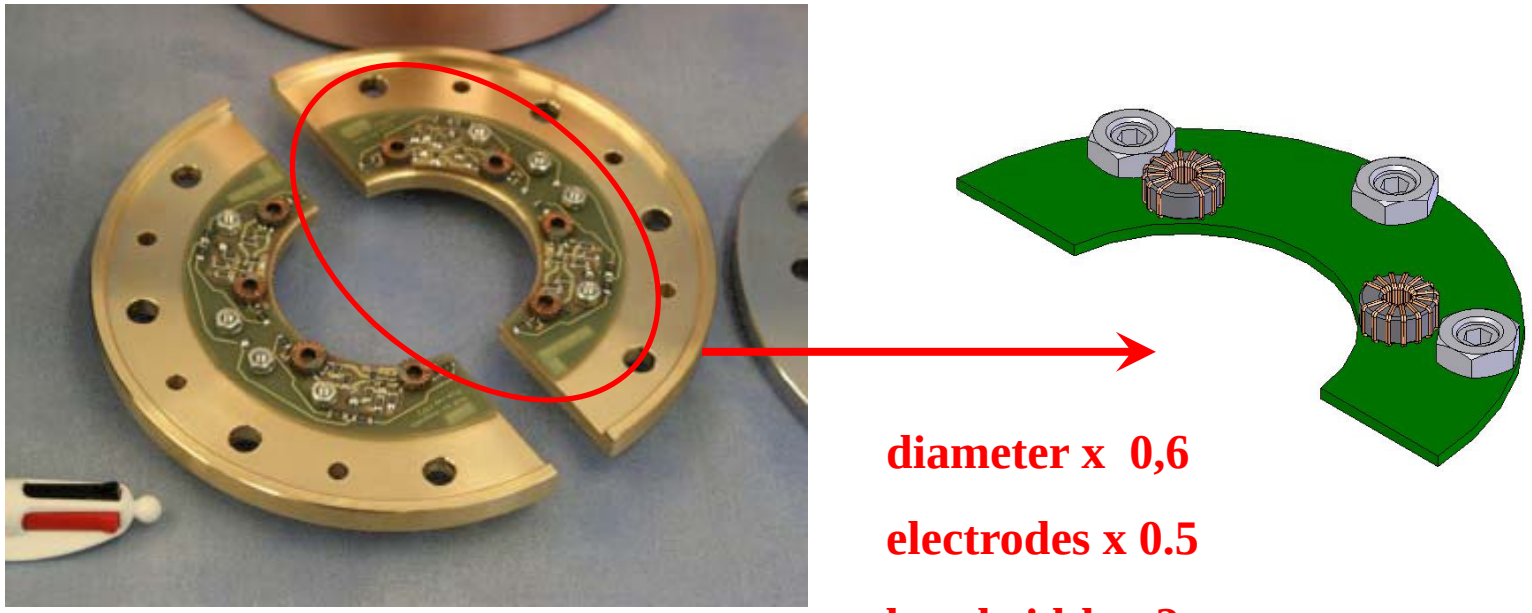
BPM support in the linac of CTF3



BPM support design for the TBL

Design of PCBs electronics

We have designed a new PCB (Printed Circuit Board) based on linac BPM design



diameter x 0,6

electrodes x 0.5

bandwidth x 2

PCBs of linac BPM

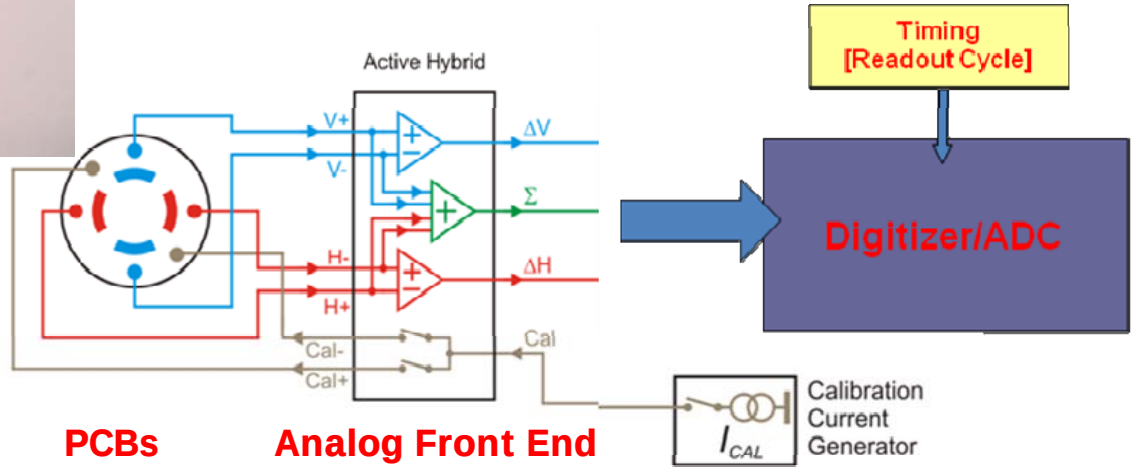
Construction of PCBs electronics

PCBs for the prototypes has been manufactured at the IFIC labs

PCBs of TBL BPM

- PCB role : sensing and conditioning of the beam induced signal through 4 toroidal transformers for the detection of Vertical and Horizontal positions.

- Output signals: Horizontal position (H^+ H^-), Vertical position (V^+, V^-) and 2 input calibration signals.

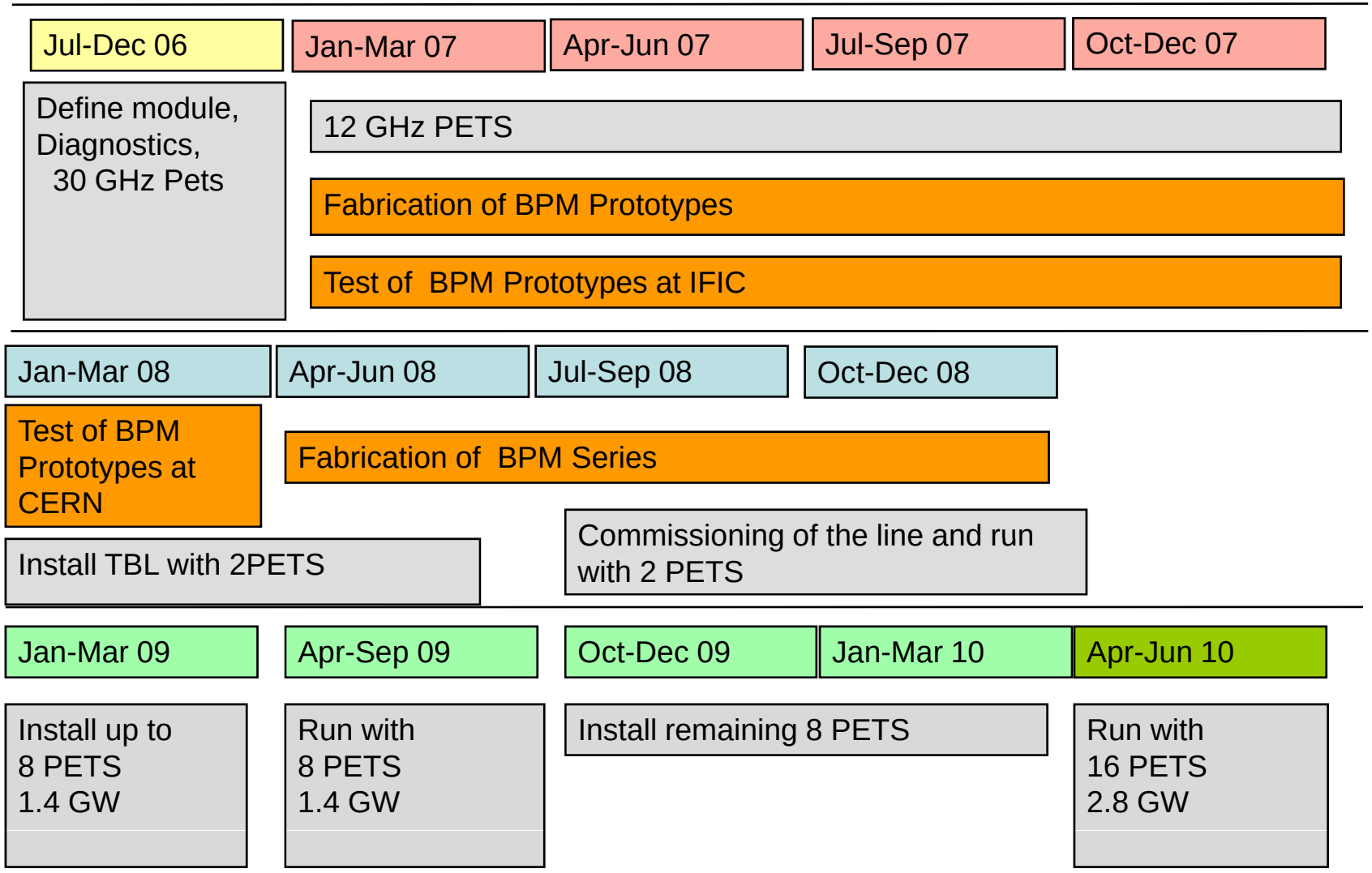


Future Tasks:

1. **Prototypes (2 units):**
   - Manufacturing of BPM supports for testing
   - Validation and Calibration of PCBs
   - Integration of Mechanics and PCBs
   - Installation at CERN
   - Integration with Analog Front End Electronics

2. **Series Production (15 units)**:
   - Series production of BPMs including supports and PCBs
   - BPMs Characterization and Installation at CERN

Future Tasks:



Future tasks:

Pending MEC (Spanish Ministry of Science and Education) funding request for the series production