

CALIFES

Beam Position Monitors and Video Profile Monitors

Claire Simon – Wilfrid Farabolini

- BPM developed for the CTF3 probe beam CALIFES:

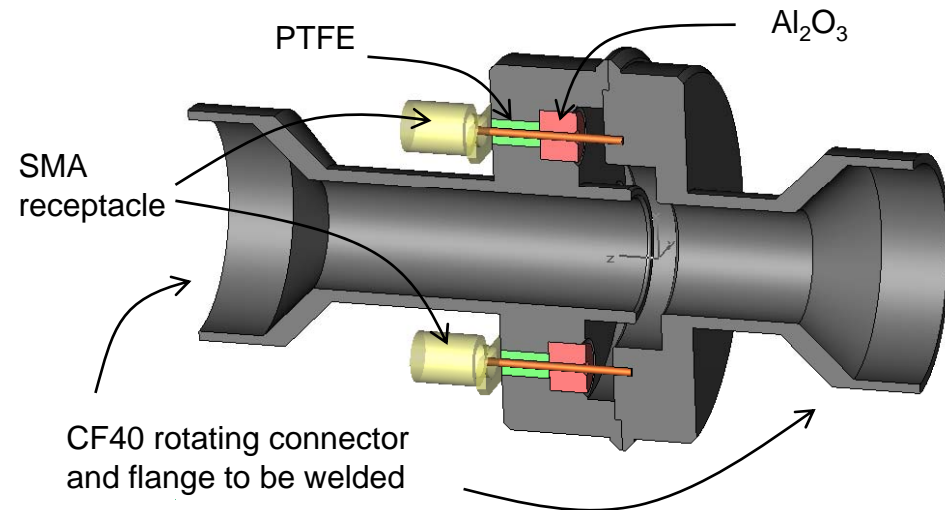
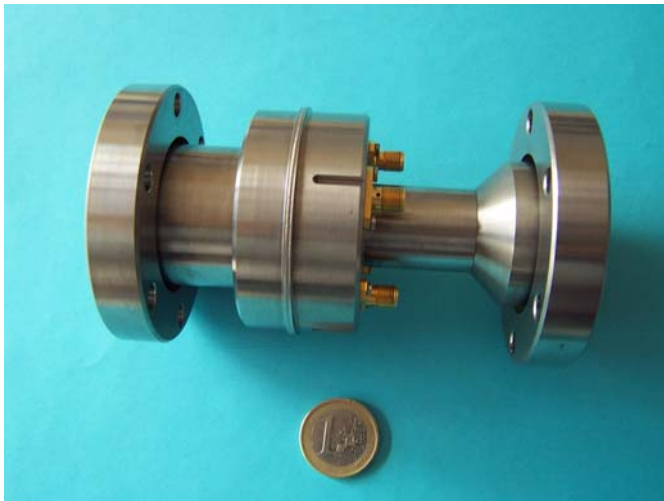
- designed with a **large frequency separation between monopole and dipole modes**, as well as a **low loop exposure to the electric fields**

- **mechanical simplicity**

- **excellent resolution**

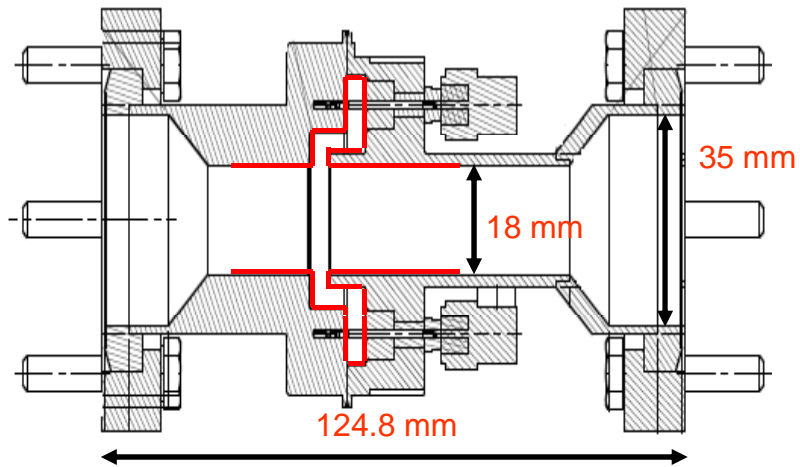
- operated in **single and multi-bunches modes**

- 6 BPMs will be installed on the linac



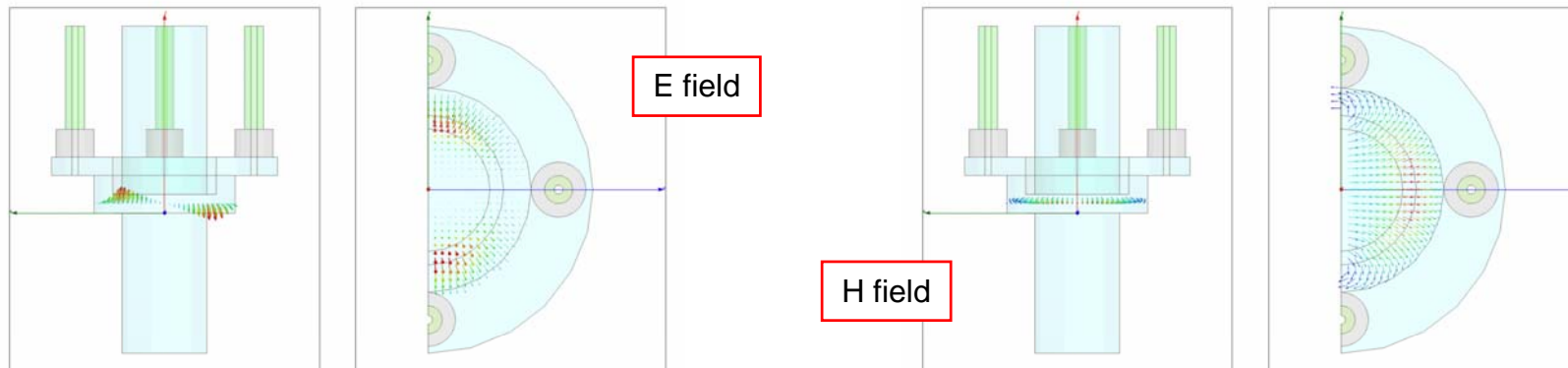
RF characteristics measured on the 6 BPMs in laboratory.

- Standard deviation on the dipole frequency : ~ 12 MHz
- Monopole frequency ~ 3.99 GHz



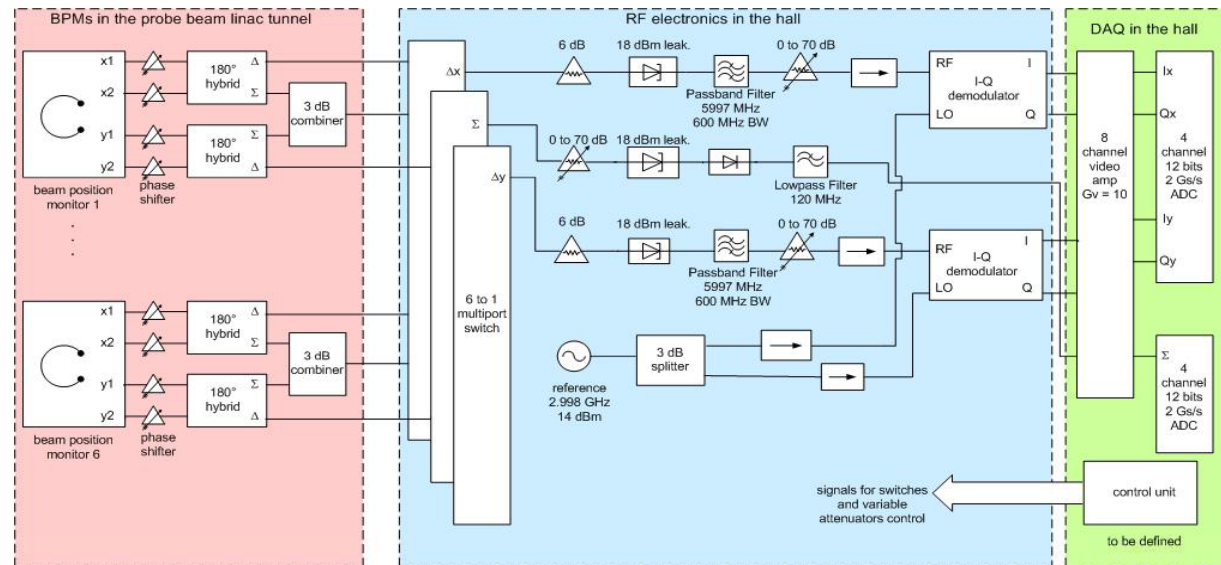
Eigen modes	F (GHz)	Q_1	R/Q_1 (Ω)	R/Q_1 (Ω)
	Measured in lab	Measured in lab	Offset 5 mm	Offset 10 mm
Monopole mode	3991	24	22.3	22.2
Dipole mode	5985	43	1.1	7

Cross-talk better than 30 dB measured on 6 BPMs



Signal processing electronics:

- analog electronics having several steps to reject the monopole mode
- I/Q demodulation



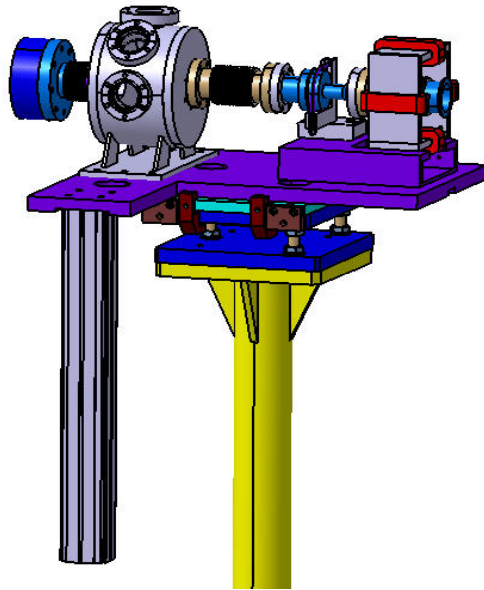
➤ To assess the **system performance**, a **model (cavity+signal processing)** is elaborated with a **Mathcad code** based on **Fourier transforms**.

System	Signal Δ with 5 mm beam offset	Noise
Single bunch	590 mV	0.5 mV
Multi-bunch	590 mV	0.5 mV

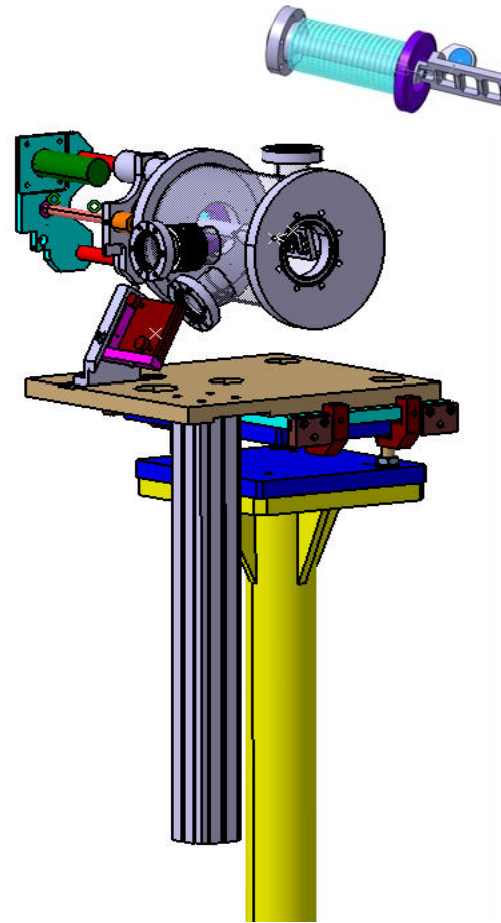
Resolution $\sim 3.2 \mu\text{m}$ with a measurement dynamic range $\pm 5 \text{ mm}$

Damping time of the cavity : 2.8 ns

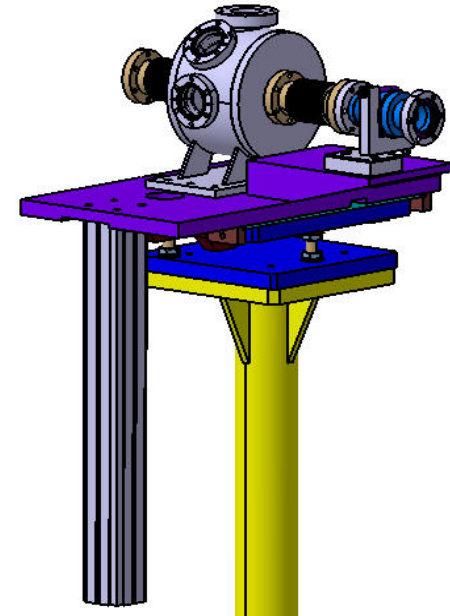
Rising time: - single bunch mode = 2.8 ns
- multi bunches mode (32 bunches) = 4.426 ns



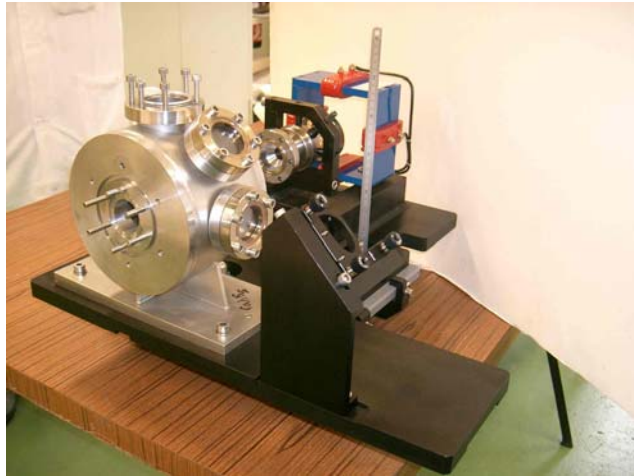
After the photo-injector:
ICT, VPM and BPM



After the triplet:
2 magnifications VPM



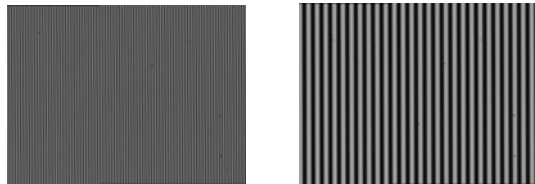
After the dipole:
VPM and BPM



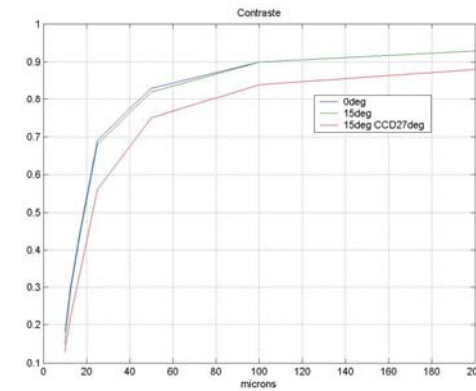
VPM, BPM and steerer mounted on the same platform



Screen alignment procedure



Tests with $16.7\mu\text{m}$ and $25\mu\text{m}$ Ronchi rullings



Modulation transfer function