

EUROTeV Diagnostics WP5

PBPM : Precision Beam Position Monitor.

WBCM: Wide band current monitor.

<https://cern-eurotev-wp5.web.cern.ch/CERN-EUROTeV-WP5/>

- **Prototype PBPM:**
 - Design and build prototype.
- **Report on bench tests:**
 - Design and build high resolution test bench.
 - Develop front end electronics.
 - Measure PBPM.
- **Report on beam tests:**
 - Build 3 PBPM's and test with CTF3 or ATF-2 beam.

PBPM-Requirements

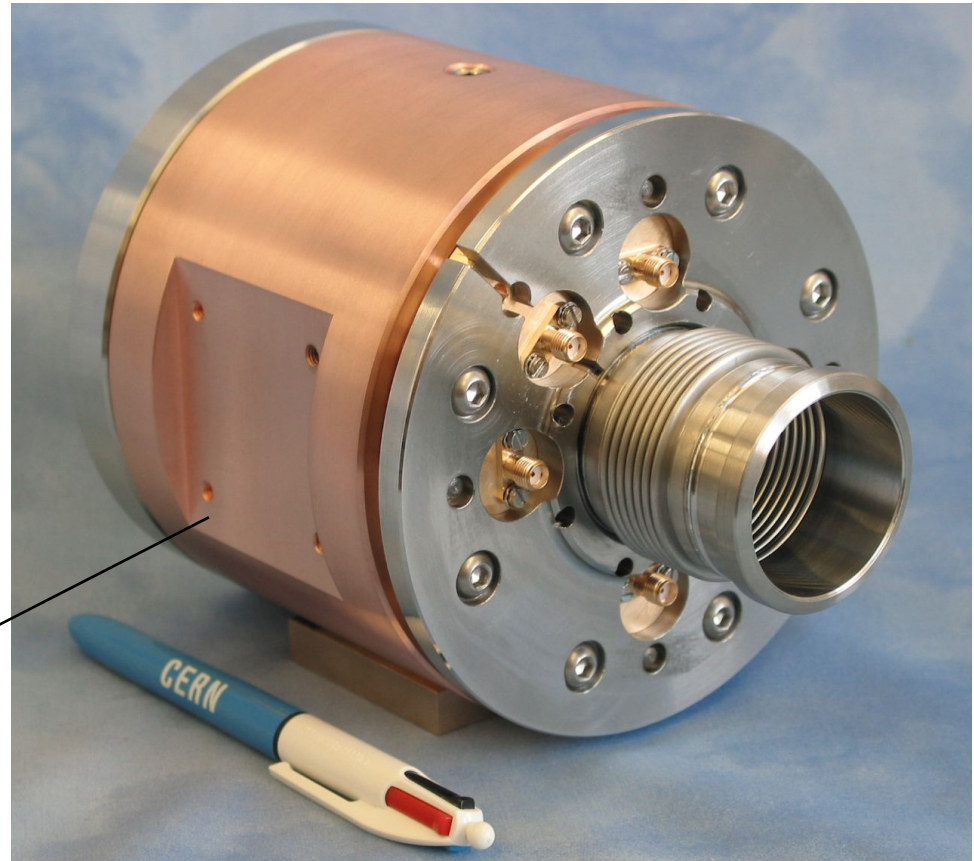
EUROTeV ⇒

- Aperture: 4 (6) mm
- Resolution: 100nm
- Absolute precision: 10 μ m
- Rise time: <15ns

ME ⇒

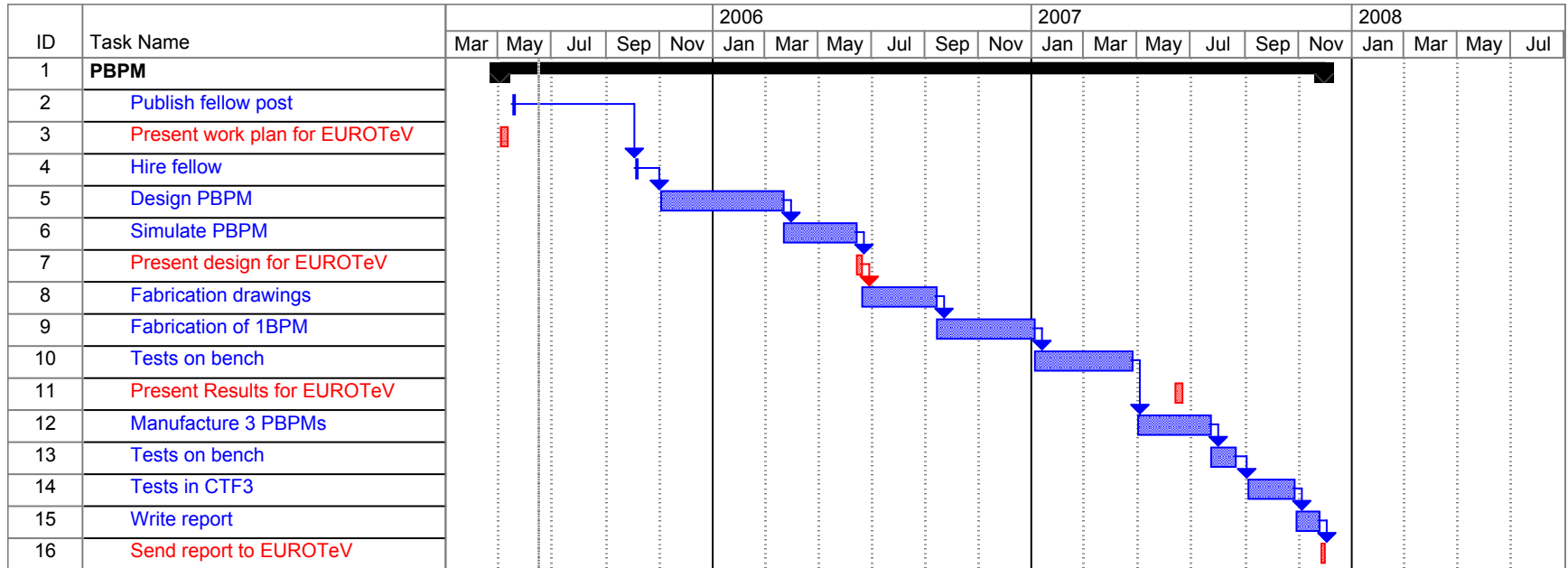
Dynamic range:	± 1.5 mm (15 bits)
Linearity error:	< 1%
24H stability:	1 μ m
Vibrations	<100nm
Low frequency cutoff:	100kHz
High frequency cutoff:	30MHz
Bake out temperature:	150°C
Operating temperature:	~20°C
Vacuum:	10 ⁻⁹ Torr

Inductive Pick-Up



This is what we want to do!!

- **Low sensitivity to beam spray, halo.**
- **Independent on bunch spacing.**
- **Low longitudinal impedance.**
- **Low frequency FE electronics, could be passive \Rightarrow cheap, but CMRR \sim 100dB.**
- **Sensitivity OK.**
- **Complicated design.**
- **Mechanical stability in 100nm range?.**



Ivan Podadera will start 1st November 2005.

L. Søby working 5% in 2005 and 25% in 2006 and 2007

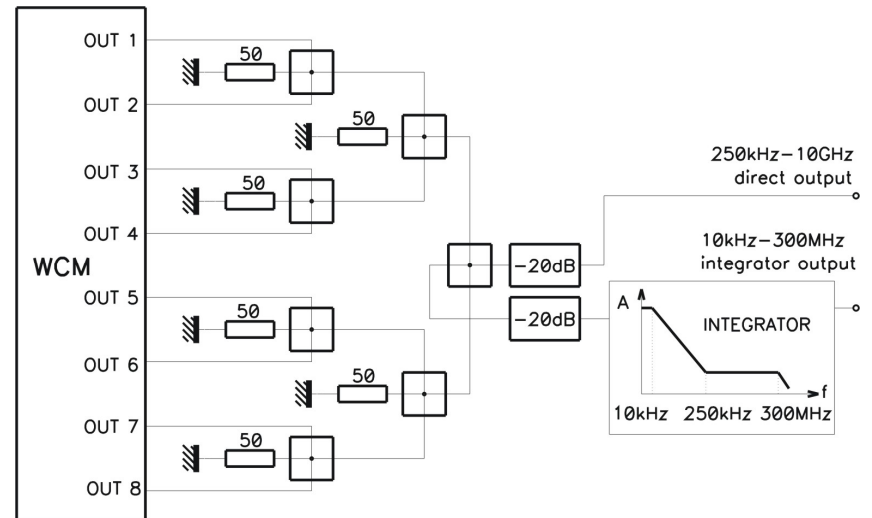
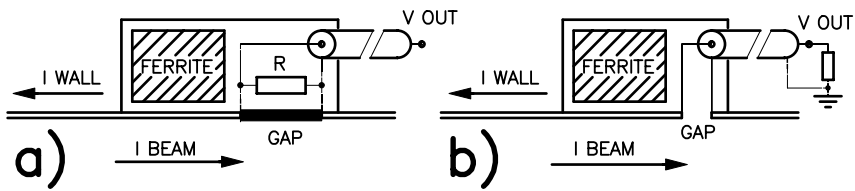
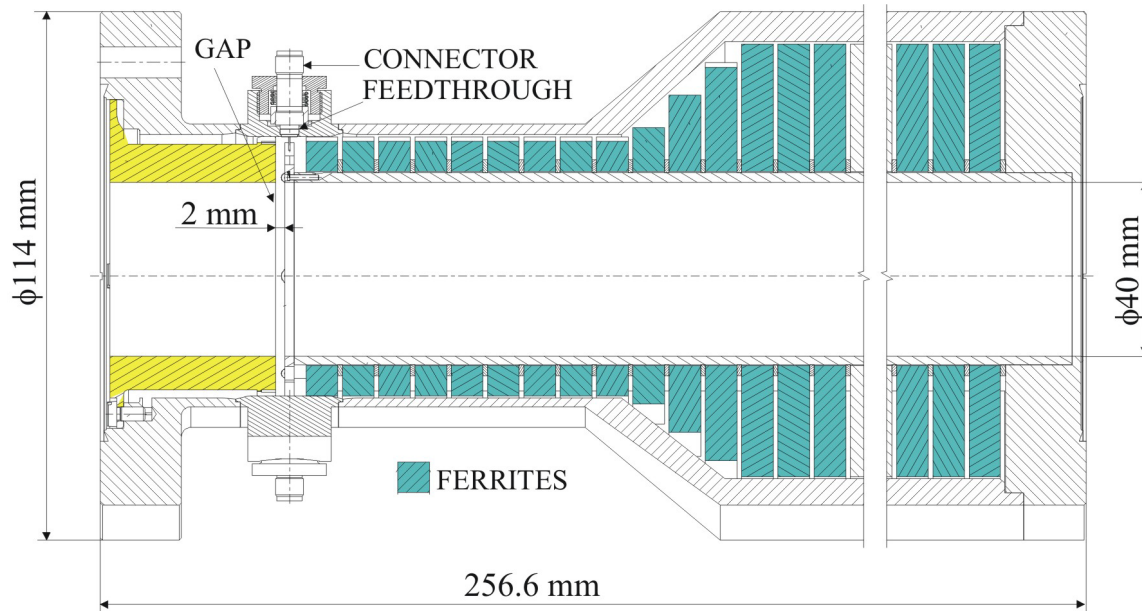
- **Report on BW limits:**
 - 3D EM simulations to identify high frequency limits.
- **Improved prototype system:**
 - Modify design and simulate.
 - Build new WCM and test on bench.
- **Report on beam tests:**
 - Tests with CTF3 beam

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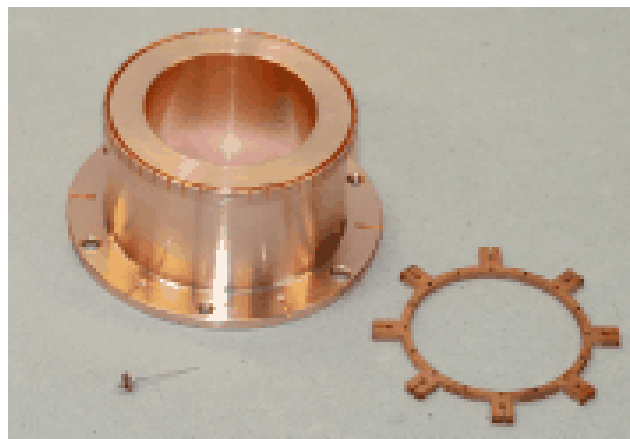
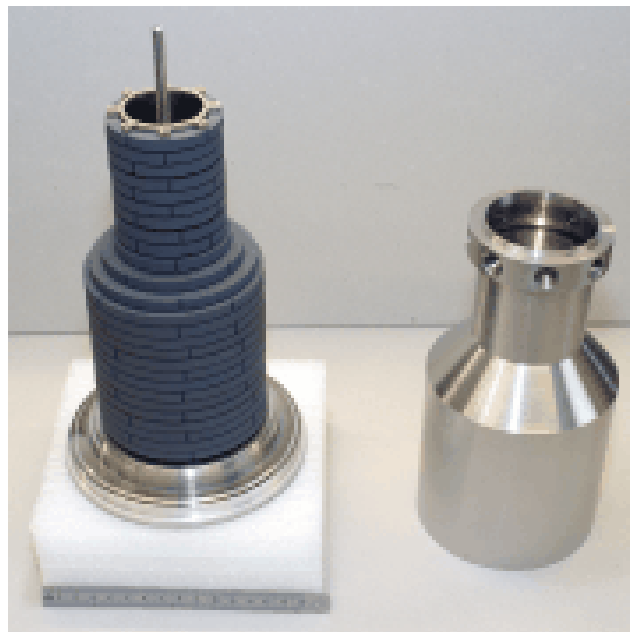
- Beam current monitor with > 20GHz band width for measurement of intensity and bunch to bunch longitudinal position.
- Main beams, drive beams and damping rings.

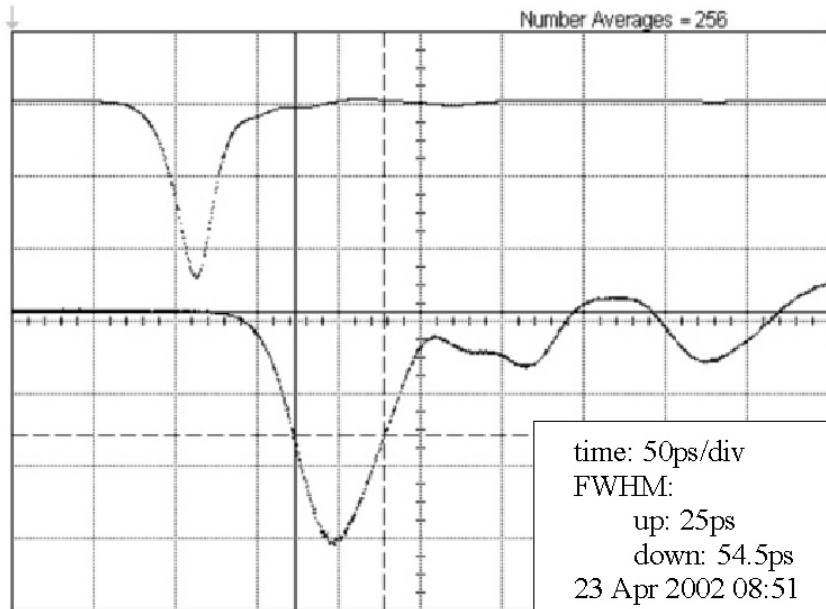
ME ⇒

Low frequency cutoff: 100kHz
Bake out temperature: 150°C
Operating temperature: 20°C
Vacuum: 10⁻⁹ Torr
100kHz-20GHz WB signal transmission
over 10-20m.



Design: J. Durand, P. Odier





Impedance	4 Ω
Lf cut-off, direct output	250 kHz
Lf cut-off, integrator output	10 kHz
Hf cut-off	7 GHz
Number of feed thru	8
Gap length	2 mm
Beam aperture diameter	40 mm
Length	256 mm
Flange type	DN63CF
Max temp. bake-out	150 °C

ID	Task Name	2005				2006				2007				2008
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
1	WBCM													
2	Present work plan for EUROTeV													
3	Hire scientific associate													
4	Simulate existing WCM													
5	Simulate new design													
6	Present design for EUROTeV													
7	Fabrication drawings													
8	Fabrication of 1 WCM													
9	Tests on bench													
10	Modify design													
11	Present Results for EUROTeV													
12	Tests on bench													
13	Tests in CTF3													
14	Write report													
15	Send report to EUROTeV													

½ day work shop at CERN in November!

Scientific associate perhaps from May 2006.

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