Update on MEBT BPMs, BCM &Combo BCM

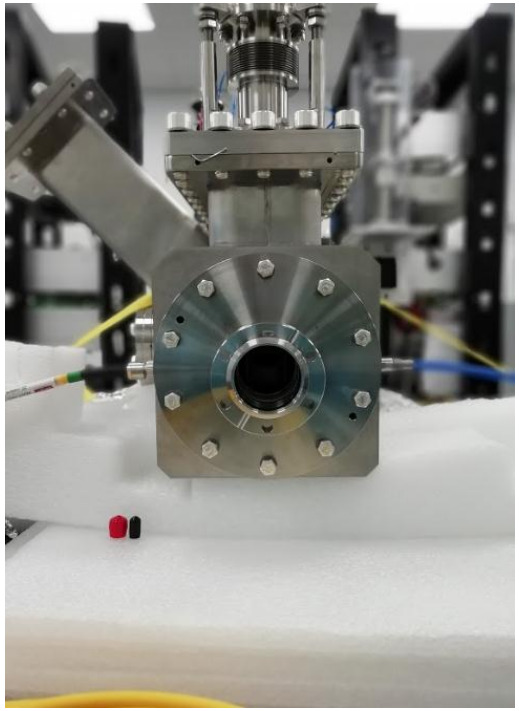
Seadat Varnasseri

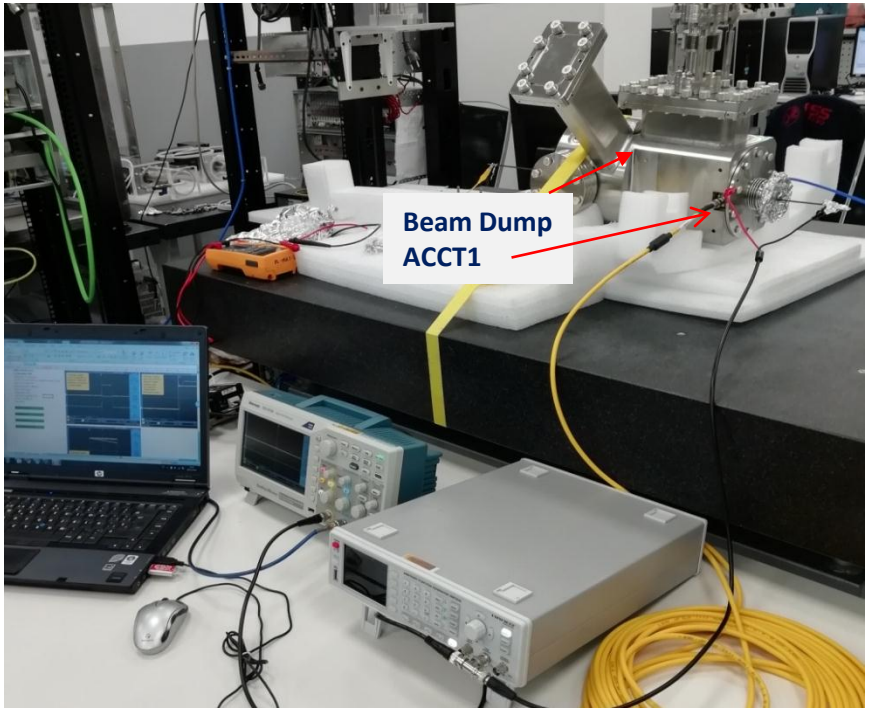
On behalf of the ESS Bilbao teams

BI Forum, Lund 20-22 November 2018

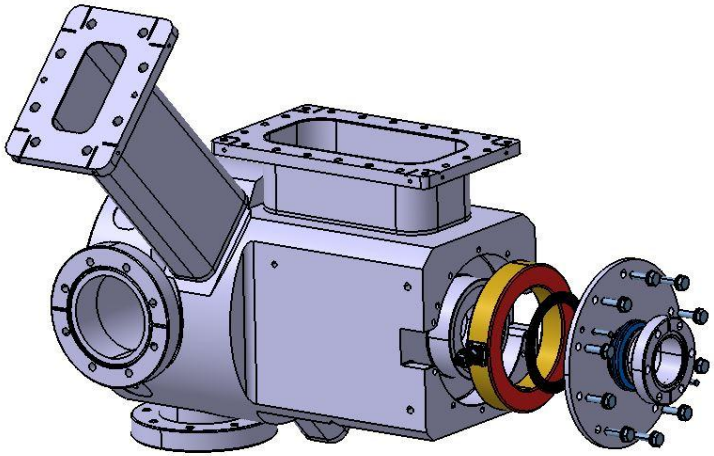
BCM (ACCT1) Status

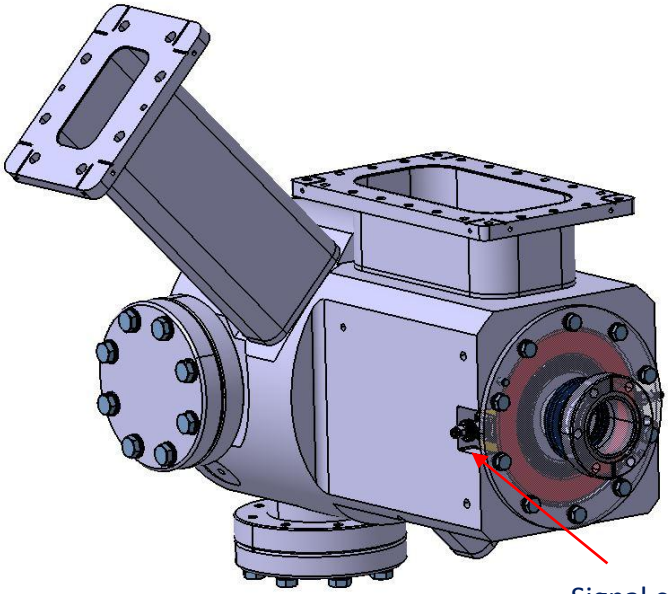
- It is installed within Beam Dump vessel
- Has been tested and verified in November 2018.
- Insulation gap: EPDM gasket
- ACCT is radiation hard version
- Tests at Bilbao finished.

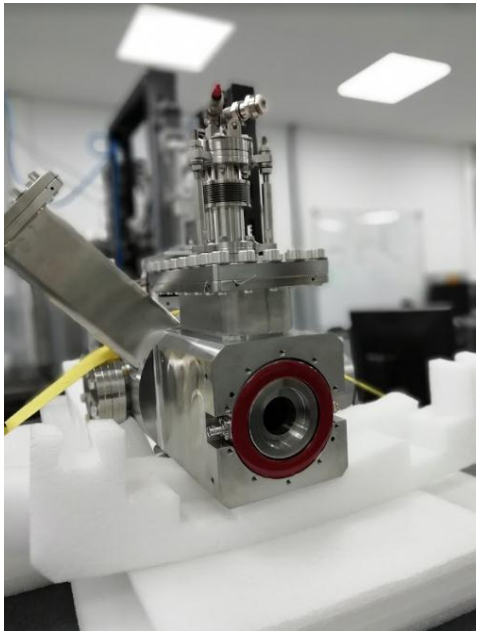


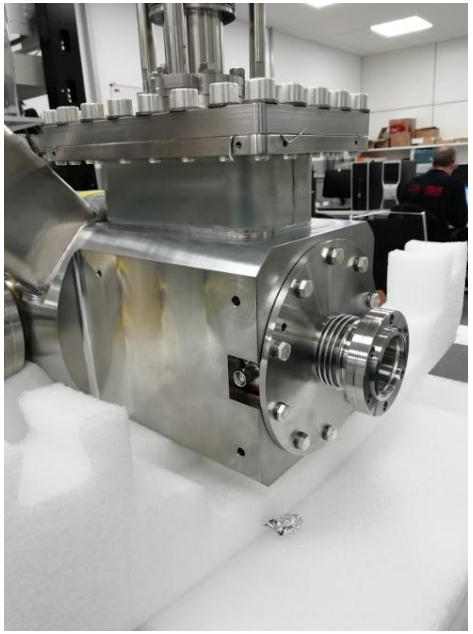


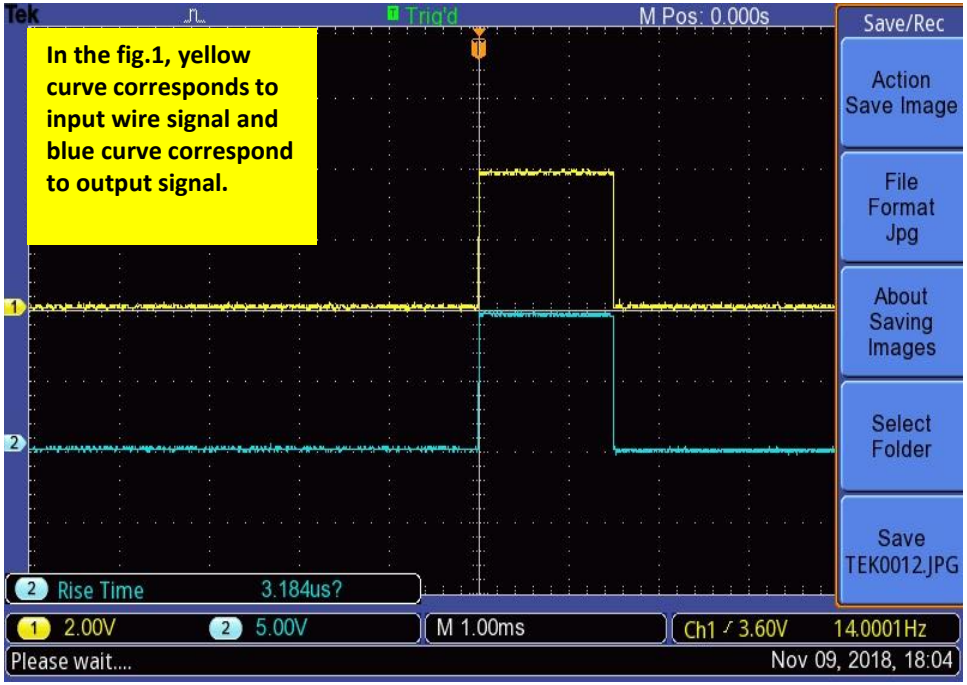
ACCT1 position in beam dump vessel





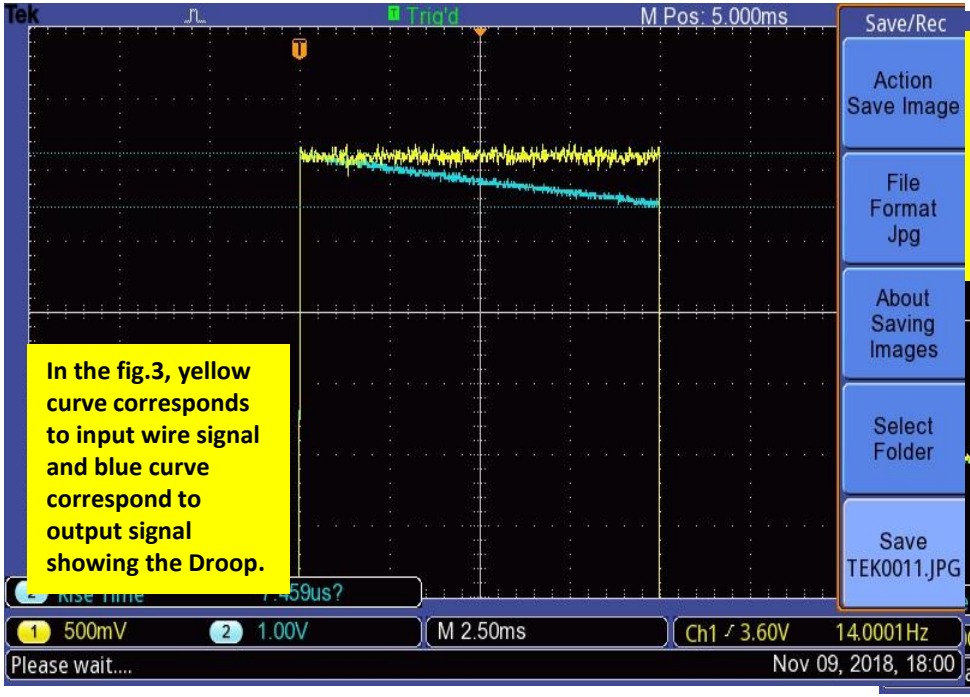


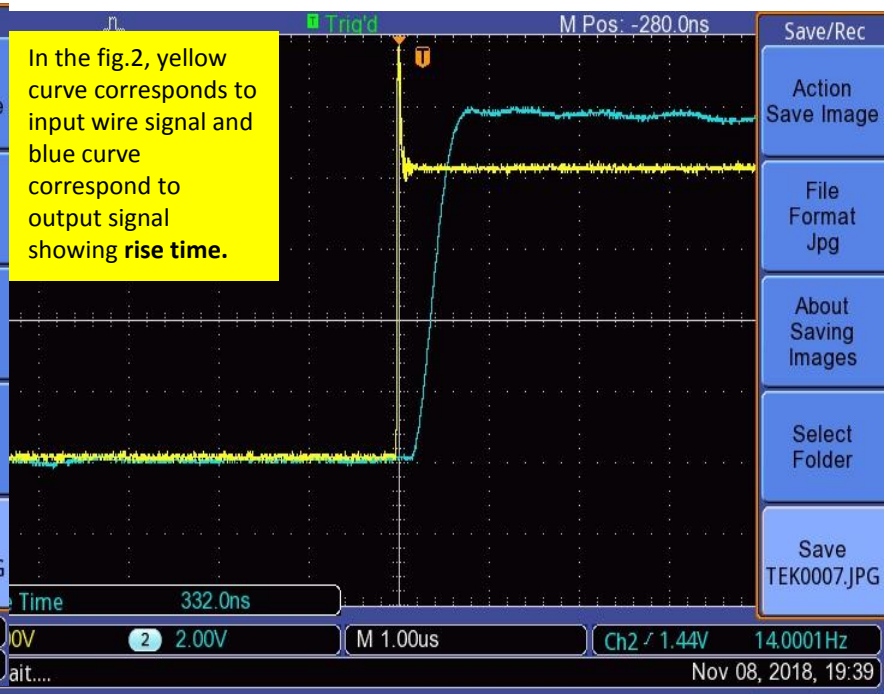




Specification measured values

Specs.	Value	Unit
F.S	10	V
Sensitivity	125	V/A
Droop	0,8	%/ms
Rise time	332	ns
BW (3dB)	1.003	MHz



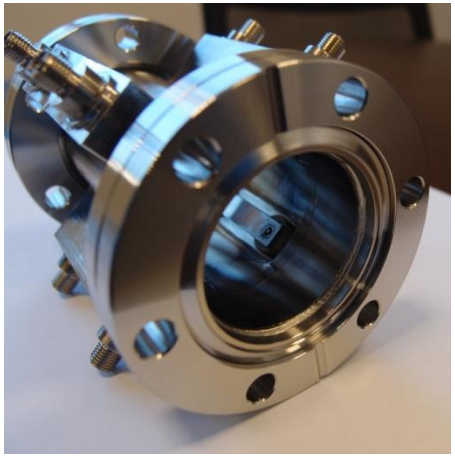


MEBT BPM status

- 8 BPMs are required for MEBT. They have been fabricated. They are five types. BPM1(1), BPM2(3),BPM3(2), BPM4(1), BPM5(1)
- All 8 BPMs have passed the vacuum leakage tests.
- All 8 BPMs have passed the RF tests.
- At the first stage just 6 of BPMs passed the RF, Signal tests. And 2 of BPMs failed RF tests either in one or two planes.
- We started the process for fabrication of two failed BPM (BPM1, BPM4). In parallel investigated on potential solutions for the two failed BPMs.
- We found a solution to fix the two failed BPM by injection pulse defusing voltage to electrically clean the signal path. After using this method the RF responses are fully corrected and other two BPMs have passed the RF tests.
- One complete BPM system with electronics (ESS) was tested in Saclay (details in Rafael/Hooman talk)

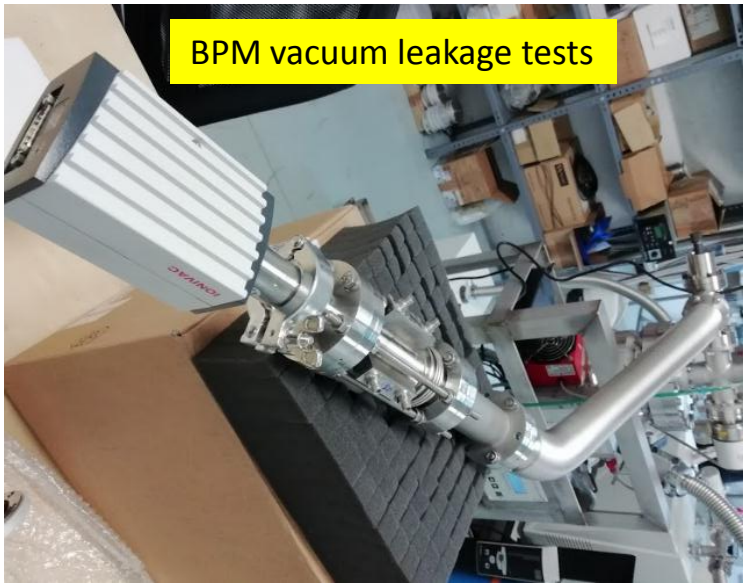
BPM TESTS AND MEASUREMENTS

BPM RF
S-parameters tests

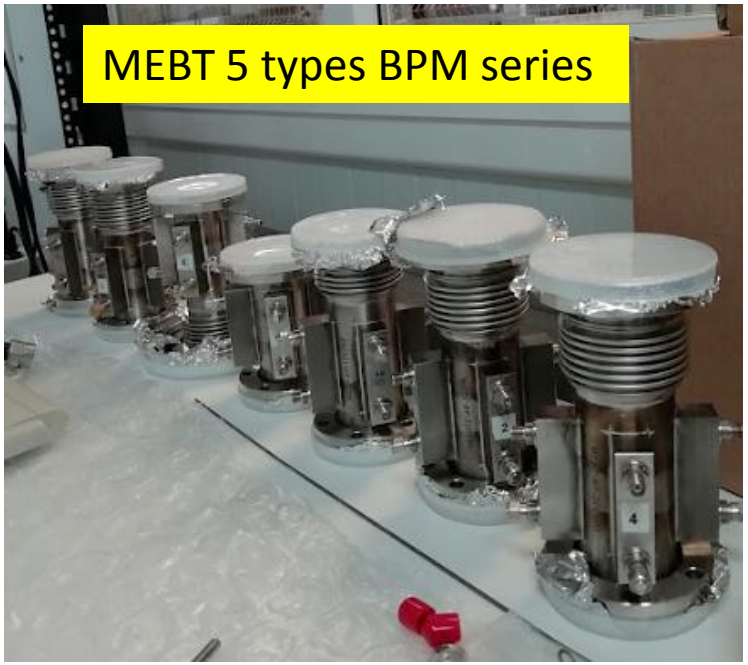


BPM signal test stand

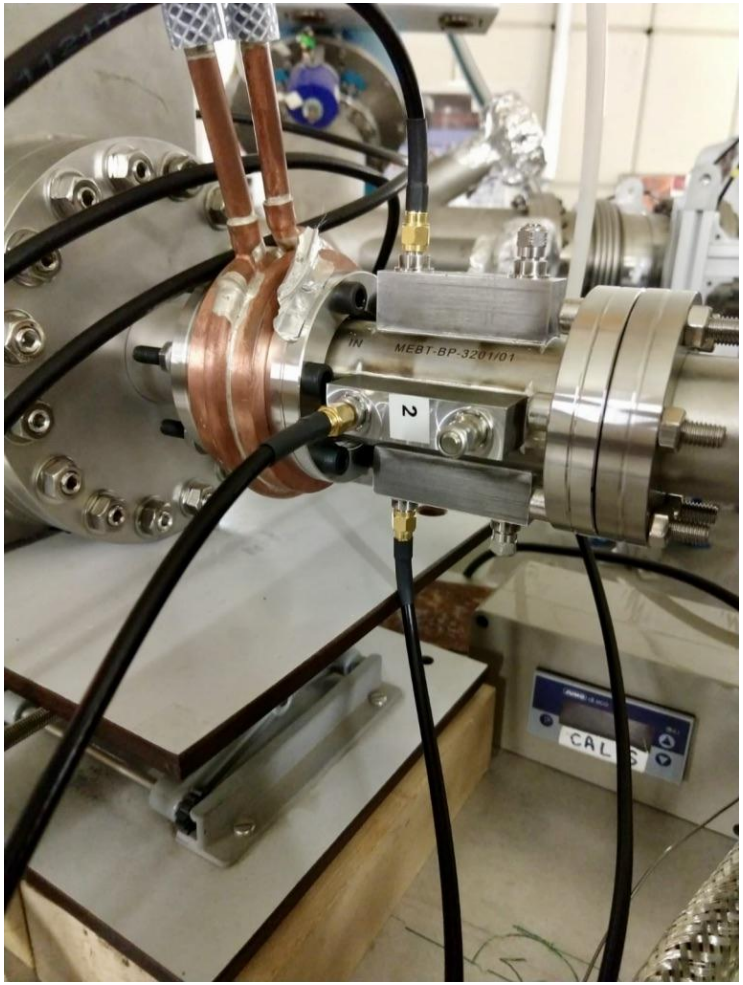
BPM vacuum leakage tests



MEBT 5 types BPM series

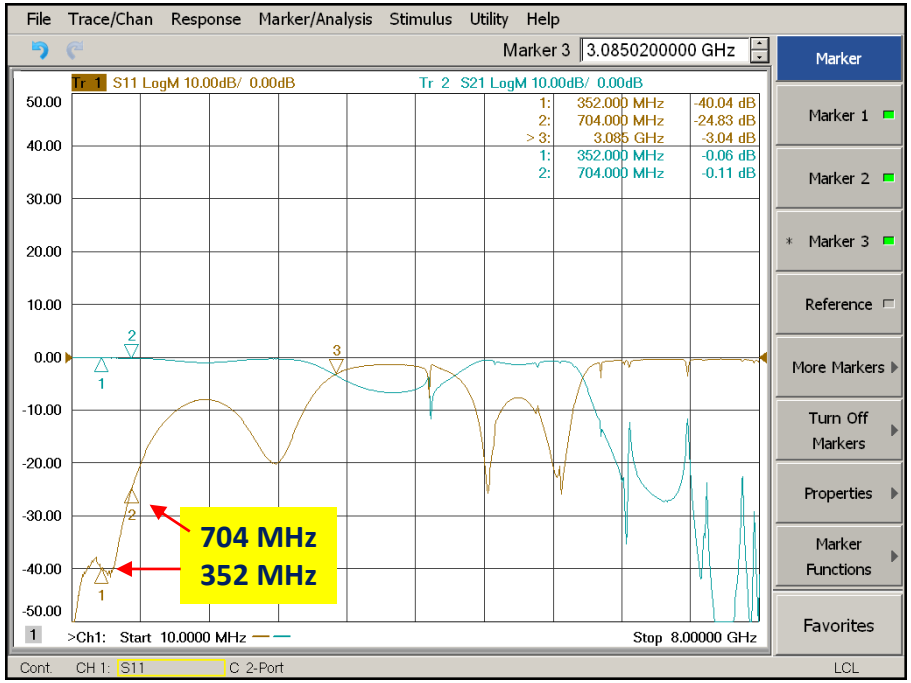


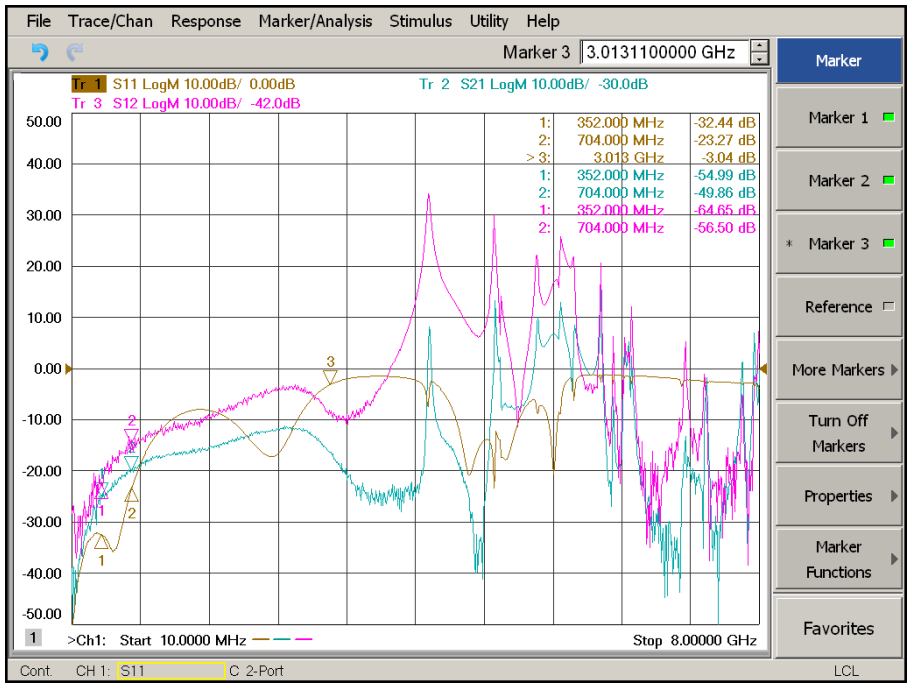
BPM3 installation and tests in Saclay IPHI (1-5 October). The beam energy of 3 MeV, RF#352 MHz, processing at 704 MHz, Beam current~1-10 mA (See Rafael/Hooman talk)



MEASUREMENT HIGHLIGHTS

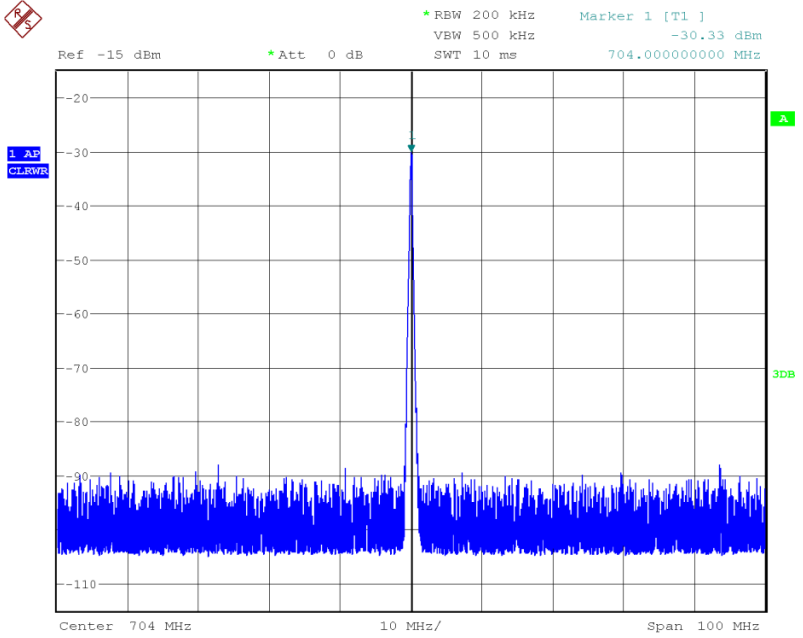
- The strips S11 for all accepted BPMs is smaller than -20 dB at 704 MHz. It is smaller than -40 dB at 352 MHz.
- The 3-dB Bandwidth for all accepted BPMs is higher than 2.95 GHz.
- The Strips SWR for all accepted BPMs is smaller than 1.2 at 704 MHz.
- The coupling between adjacent Strips is around -50 dB (±1 dB)
- The coupling between opposite Strips is around -56 dB (±1 dB)

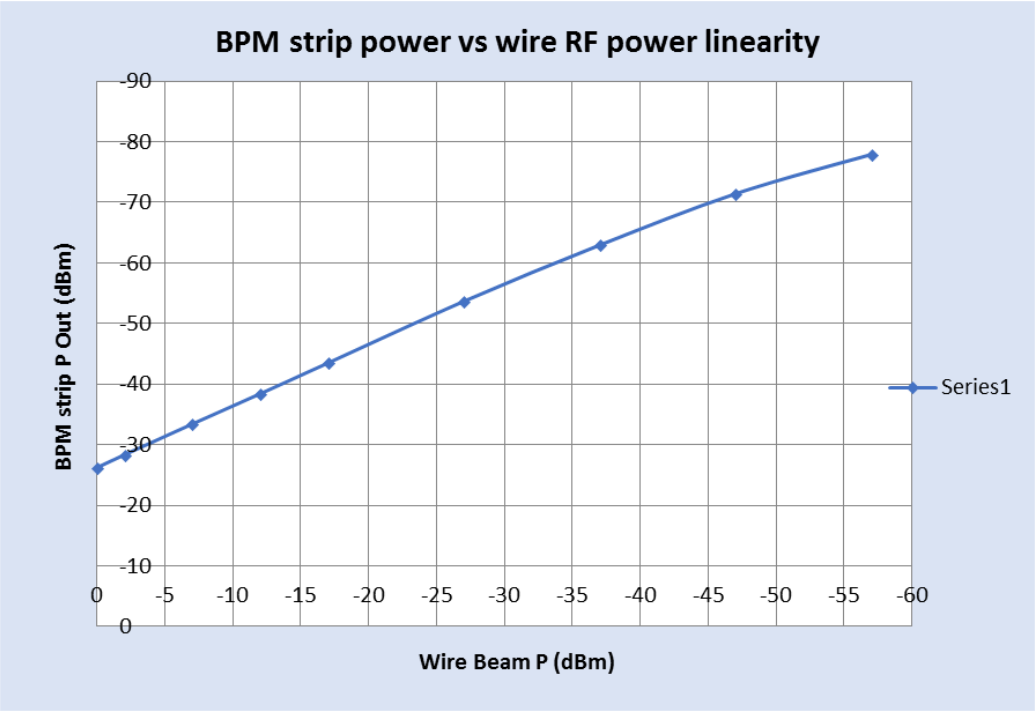




Output linearity measurement

The single Strips output shows a linear range of around 50 dB in relation to wire input. The rigid wire is fed by a rf signal of 704 MHz, variation from 0 to -60 dBm.





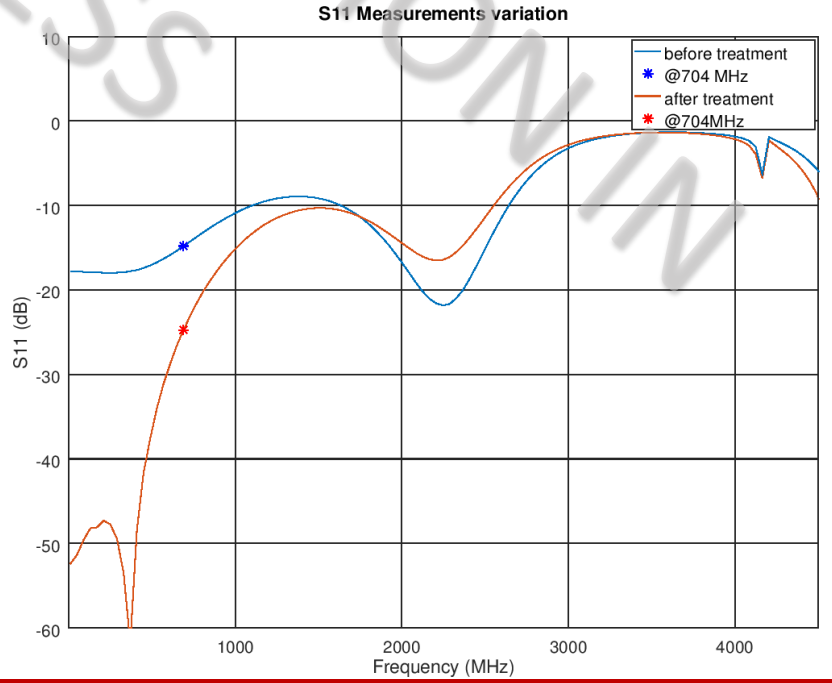
Interesting problem with two BPMs and solution

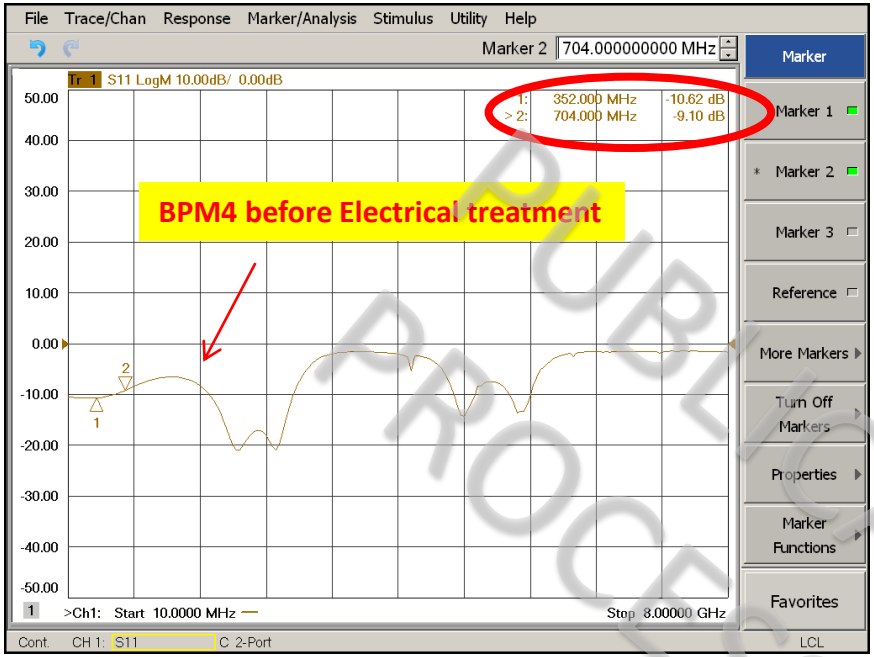
It is found that two BPMs have frequency dependent resistance between Strips and body which are not present at high frequency, but are present at low frequencies and DC mode (frequency dependent resistance).

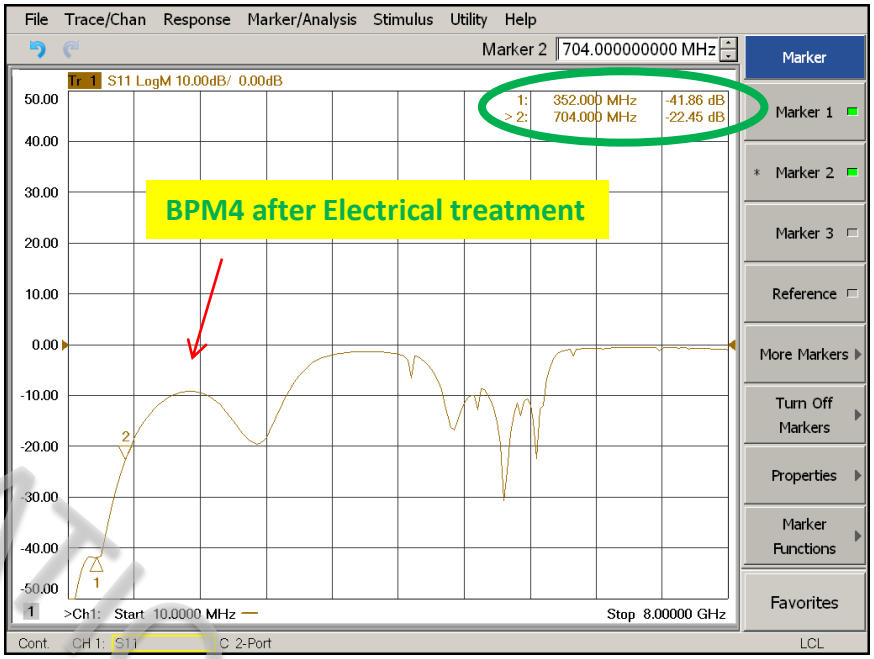
We investigated the issue and from the value of resistance , it is estimated of a extremely narrow connection with a thickness of around 2µm developed between the SMA weldable pin and the ground body during the fabrication process.

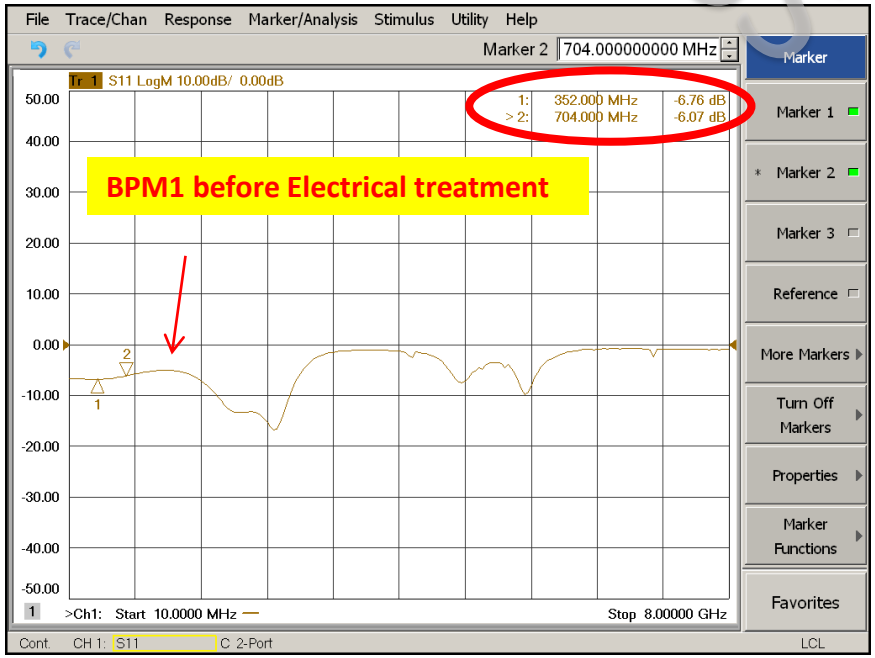
We used a defusing pulse voltages to remove the un-necessary signal paths.

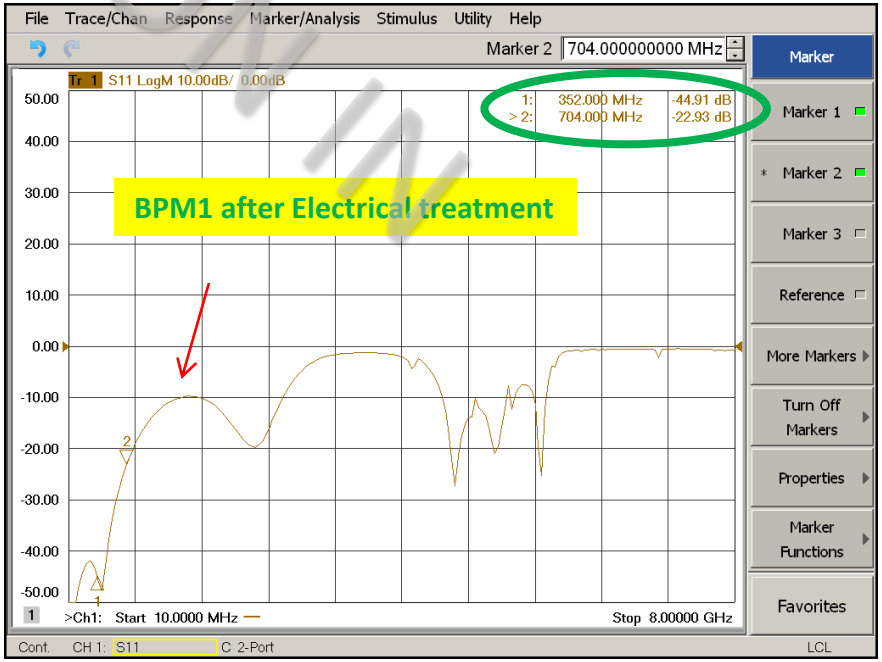
After this treatment, the RF tests show the correct response for all strips.







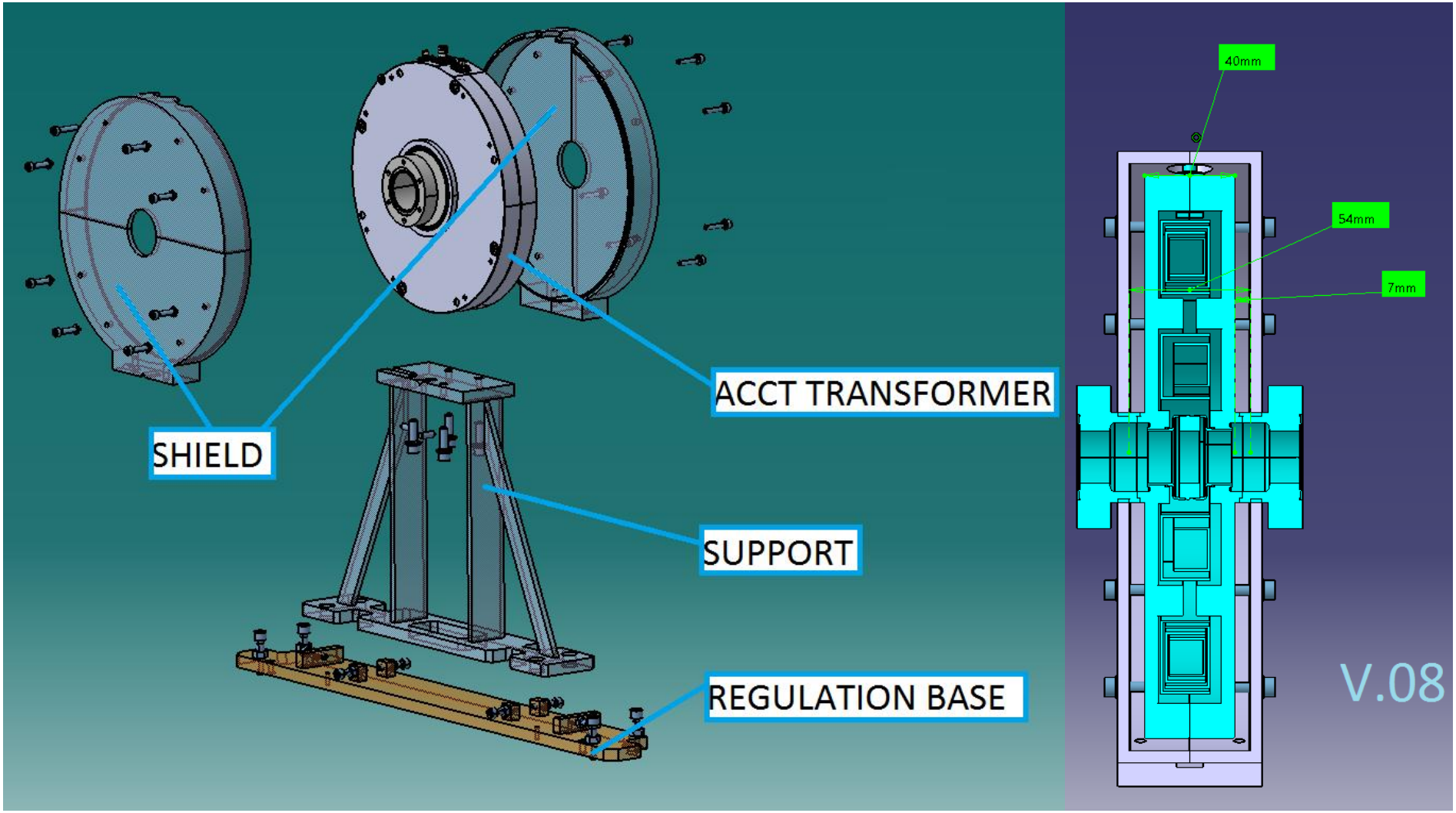




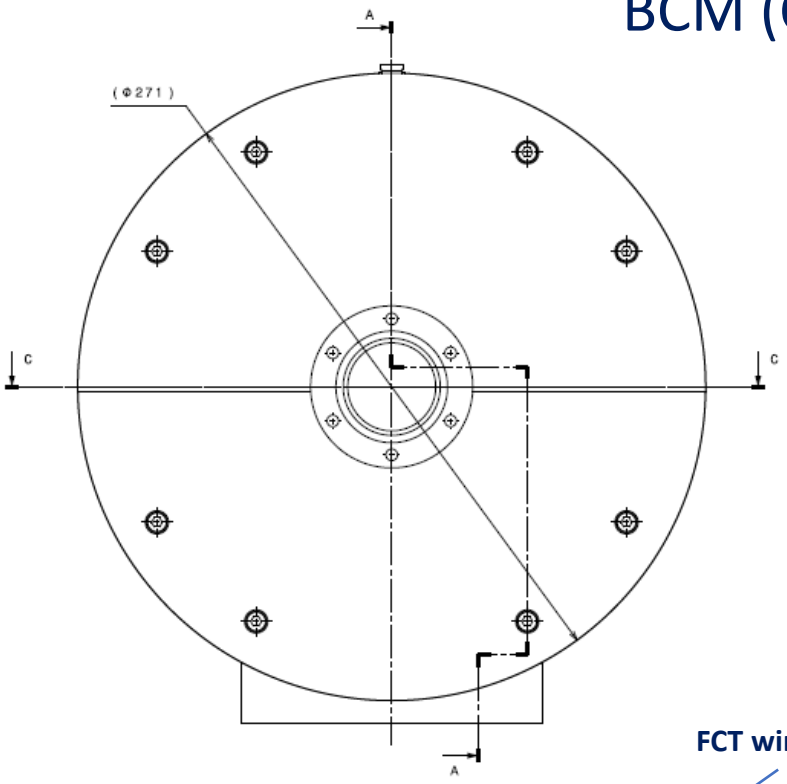
Combo BCM Status

- The Combo FCT and ACCT with the mu-metal, housing structure and flanges are under fabrication in Bergoz.
- There has been issue of ordering Combo from ESS Bilbao due to “too much administration documents in Tender process”. So ESS intervened and helped on the ordering of Combo from Lund.
- The delivery is expected in the course of December 2018.
- The outer magnetic shielding of soft-iron is under fabrication in Doilan local company.
- The outer shield delivery is expected at the end of November 2018.
- Vacuum and electrical checks will be done at Bilbao in December.

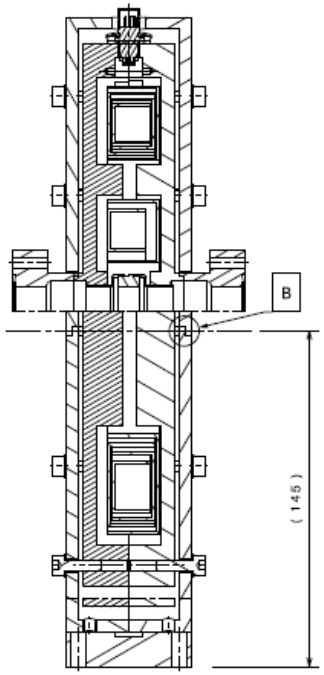
BCM (COMBO) parts I



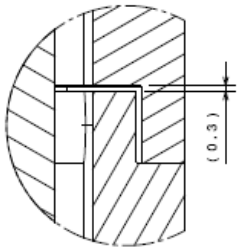
BCM (COMBO) parts II



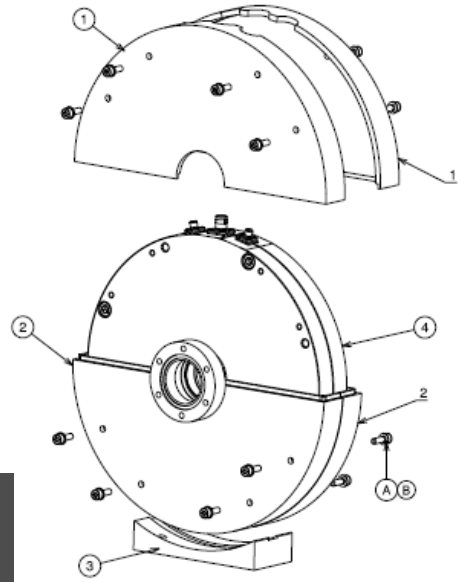
Front view



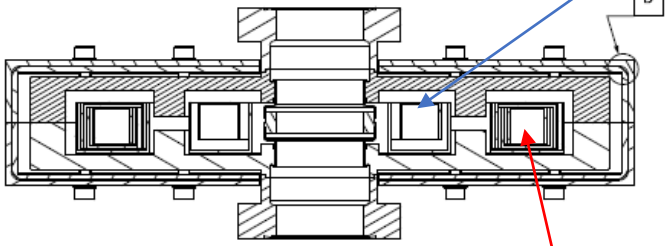
Section view A-A



Detail B
Scale: 4:1



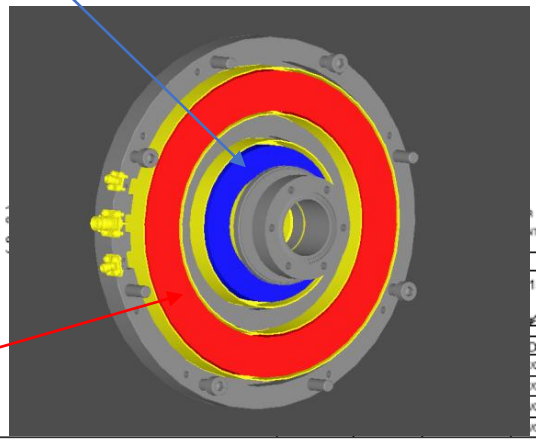
Isometric view
Scale: 1:4



Section view C-C
Scale: 1:2

FCT winding

ACCT winding



R INSTALLATION REQUIREMENTS OF THIS PART/ASSEMBLY.
TAMINATED FROM OIL AND GREASE.

15 ±0.5	ESS bilbao	P. I. Júndiz c/ Basaldea 23 C 01015 Vitoria-Gasteiz (ALAVA) tel: 945 290 840 www.essbilbao.org
Date 06/2017 07/2017 06/2018 06/2018	DRAWING TITLE BC_VESSEL	
	DRAWING NUMBER MEBT-BC-0100-ESS.03-PCK	
	Scale: 1:2 | Size: A3 | Weight (Kg): 8	Sheet: 2/2