

Overview of the ESS-Bilbao Mobile Diagnostics Test Stand

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Introduction

Mobile Test Stand to characterise

- 3 MeV RFQ,
- MEBT and
- 12 MeV first tank of DTL.

Based on experience gained from other accelerator laboratories (CERN, CEA-Saclay, ...)

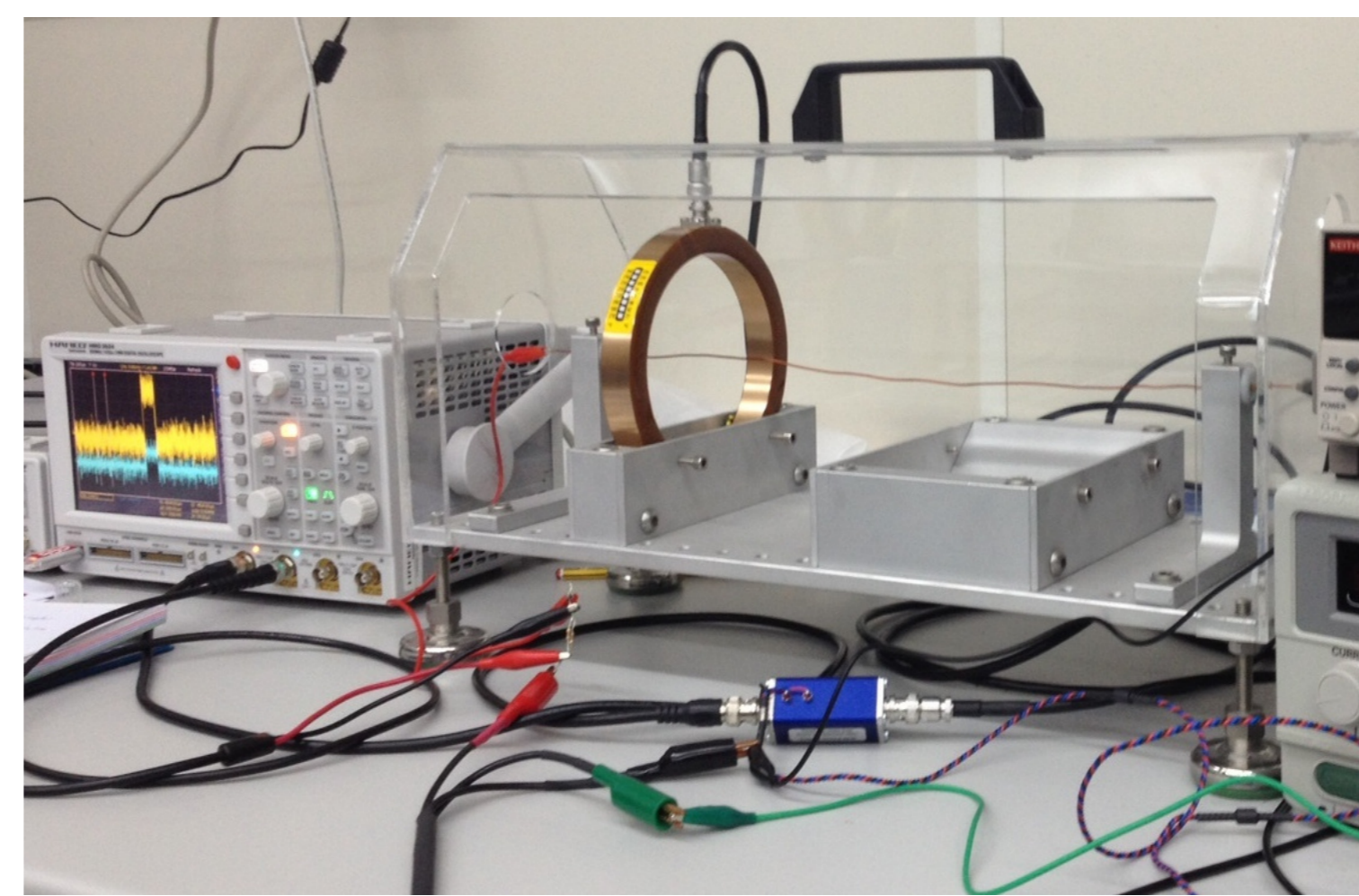
Beam Input

Input beam characteristics (from RFQ design simulations):

- energy: 3.015 MeV
- current: ~ 55 mA
- emittance: $\sim 0.3 \pi$ mm mrad
- pulse width: up to 2 ms.
- repetition rate: up to 50 Hz

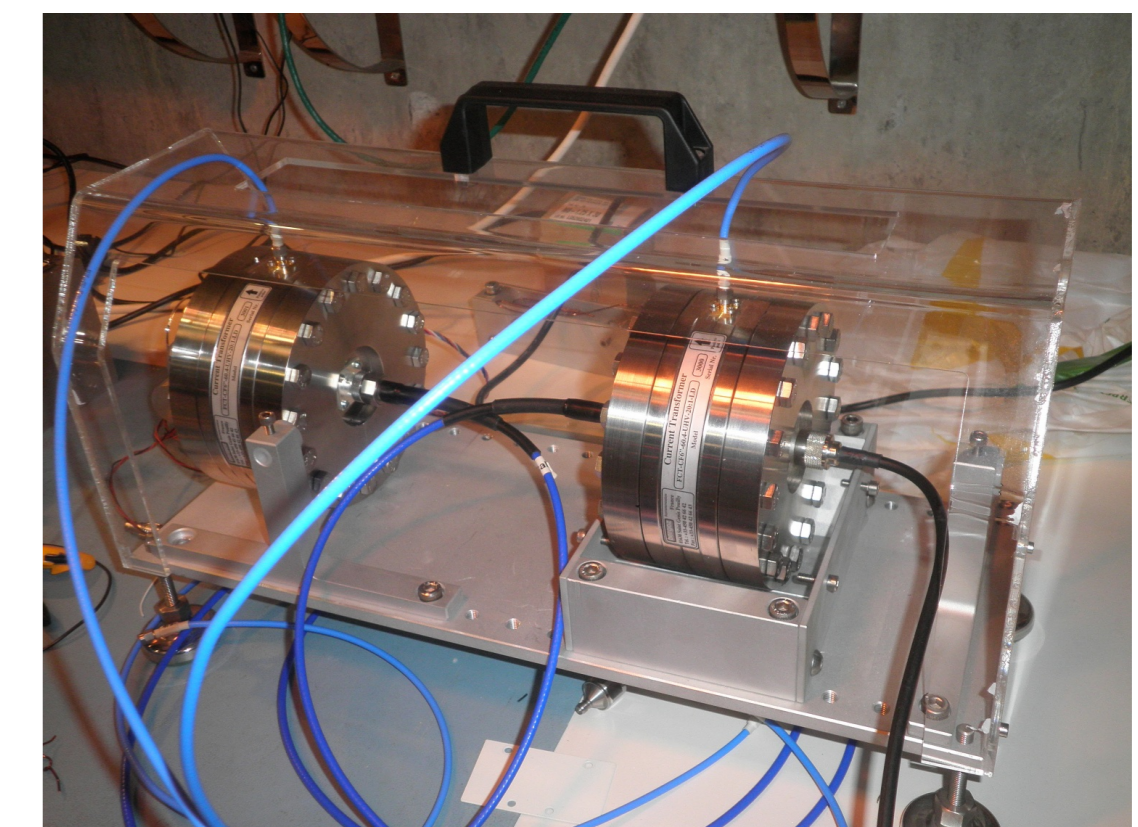
Beam Current

- ACCTs for current measurements
- Tested ACCTs from Bergoz (HR):
 - low current limit of 0.1 mA
 - pulses 10 μ s – 2 ms
 - bandwidth 3 Hz – 300 kHz
- Faraday Cup for first runs (μ A current)



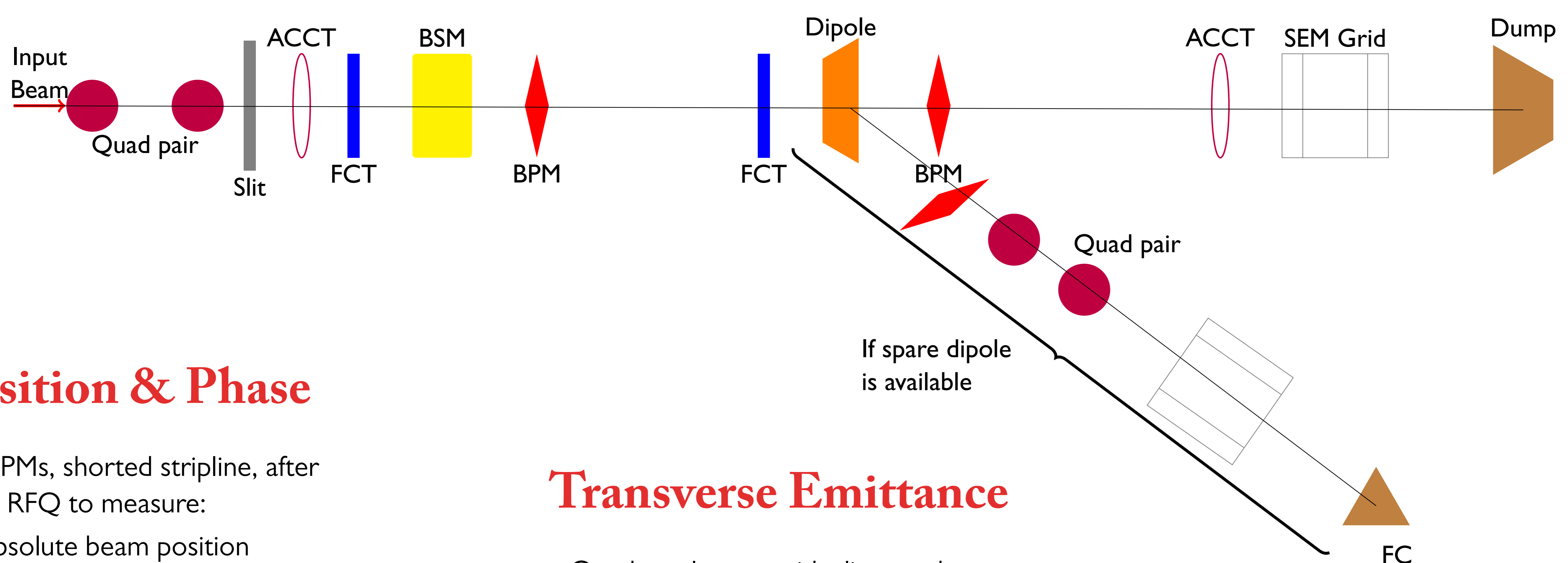
Beam Energy

- Time of Flight with FCTs/BPMs
- Tested 2 FCTs from Bergoz:
 - up to 1.5 GHz bandwidth
 - delay mean value accuracy for consecutive pulses is 17 ps
 - delay mean value accuracy for single pulse is 100 ps



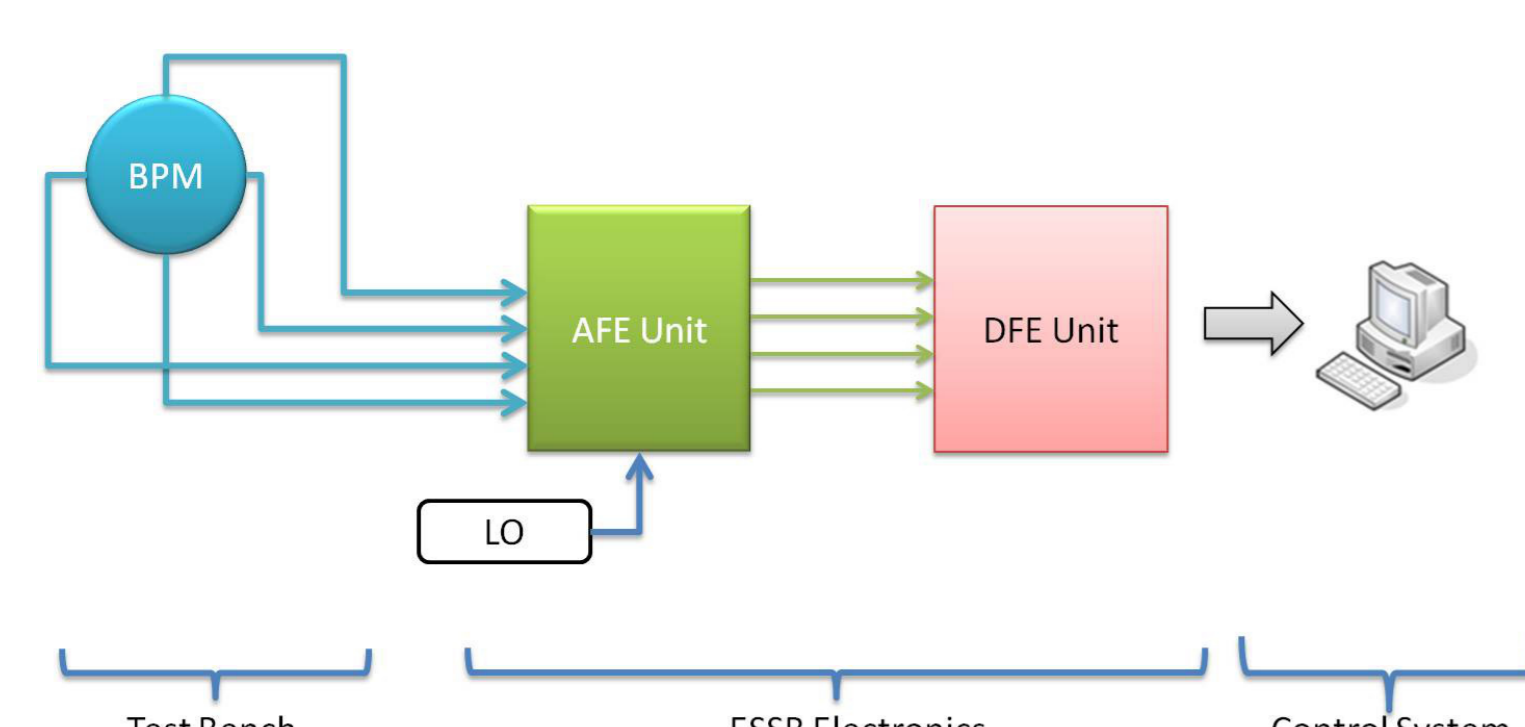
For more information see poster **WEPF26**.

Layout



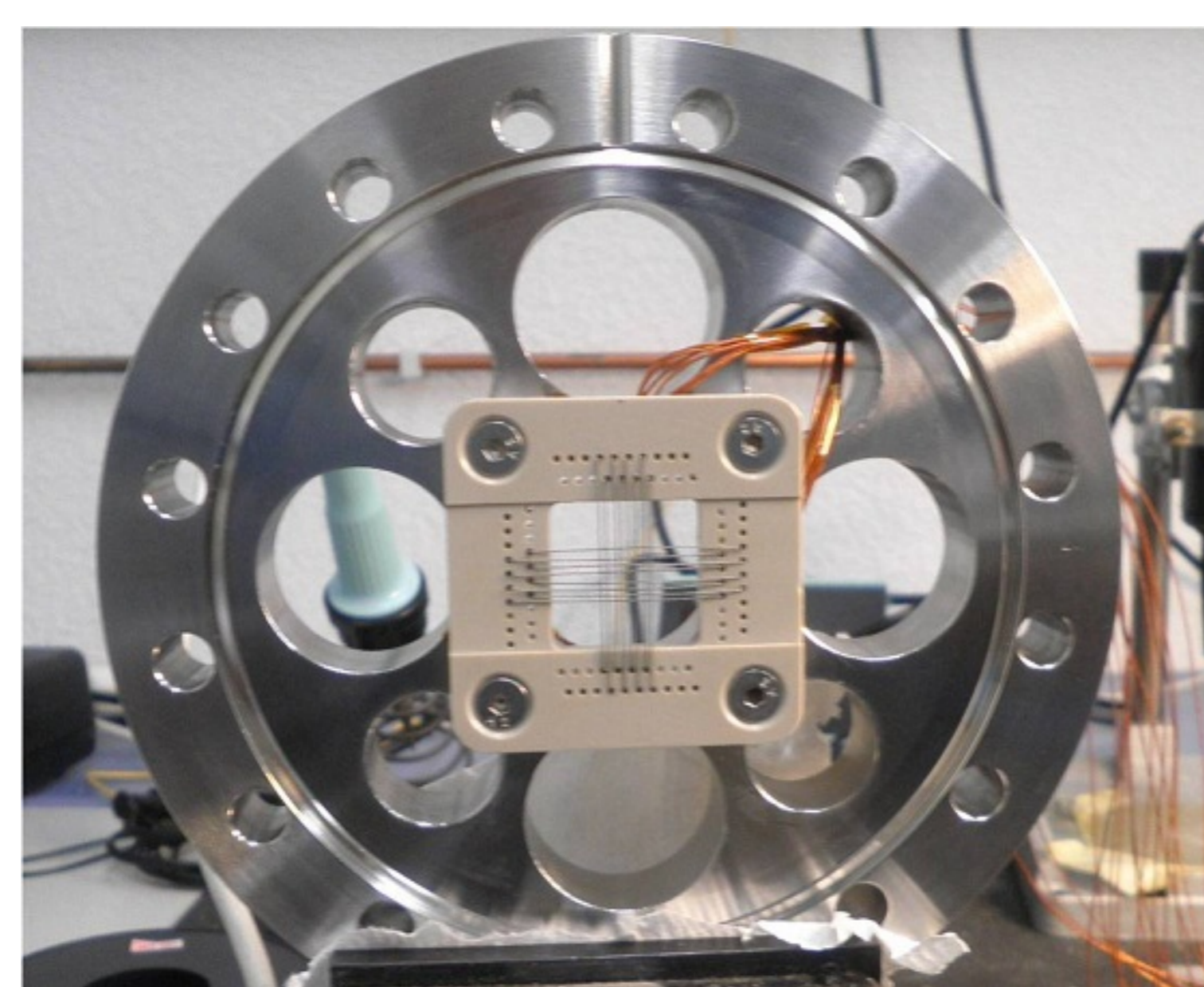
Position & Phase

- 2 BPMs, shorted stripline, after the RFQ to measure:
 - absolute beam position
 - beam phase
 - relative intensity between BPMs.
- Located where the beam is not debunched
- BPM electronics system in collaboration with the Electronics and Electricity department of the UPV/EHU
- Tests results:
 - position resolution 6 μ m
 - phase resolution $< 0.2^\circ$
 - stability < 40 μ m



Transverse Emittance

- Quadrupole scan with slit to reduce space-charge effects
- SEM Grid for profile measurement
- 2 prototypes in collaboration with UPV/EHU:
 - 16 titanium wires (250 μ m diameter)
 - spaced 1 mm and 2 mm



Energy Spread

- Only if there is a spare dipole
- 3% (expected value from simulations)
- Dipole + SEM Grid method
- Quadrupoles to focus on the SEM Grid

Bunch Shape

- Feshenko type BSM
- More detailed study ongoing