STATUS of the FARADAY CUPS for the ESS LINAC

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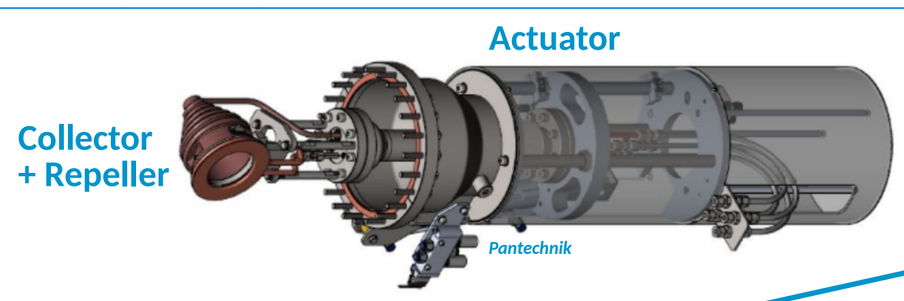
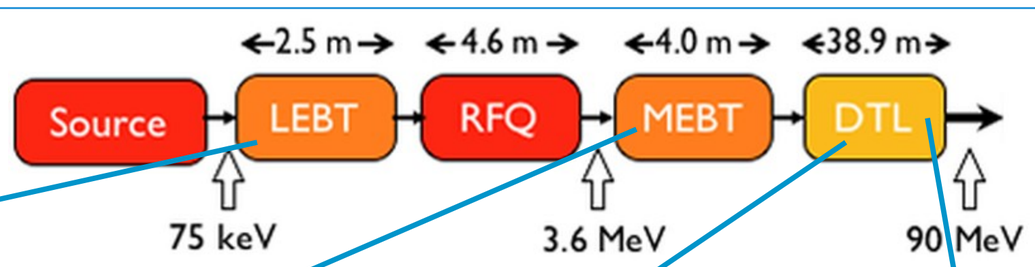
The FCs are key diagnostics devices during the ESS **linac commissioning**, with either *slow* (50 µs, 62.5 mA, 1 Hz pulses) or *fast* tuning (5 µs, 62.5 mA, 14 Hz pulses).
This contribution summarizes the latest **milestones and challenges** either in the development or operation of the ESS FC, as well as the next steps in the plan.

The European Spallation Source (**ESS**) is under construction in Lund, Sweden. A 5 MW, 2.0 GeV and 62.5 mA proton beam generates fast neutrons at the spallation target.
The **beam current** is measured with four **Faraday cups** (FC): one in the LEBT, one in the MEBT and two in the DTL intertanks.



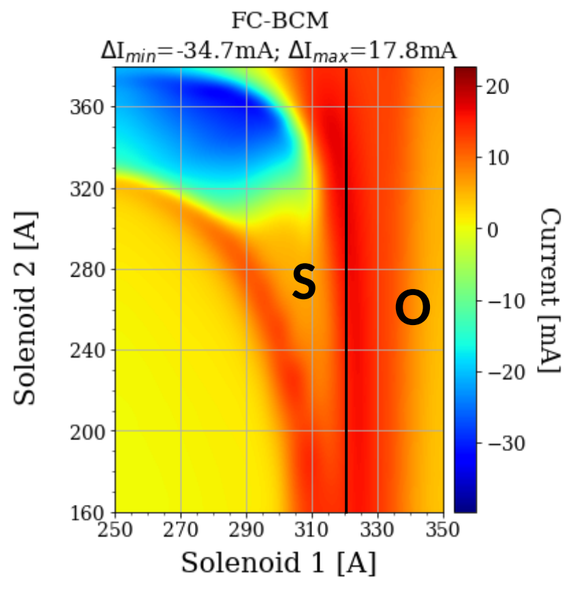


LEBT FC

75 keV

- **Operational** since Sep-18, withstanding up to 14 kW/cm²

- The LEBT FC was used throughout the **Commissioning** phase of the ESS ion source and LEBT in [Sep-18, Jul-19]



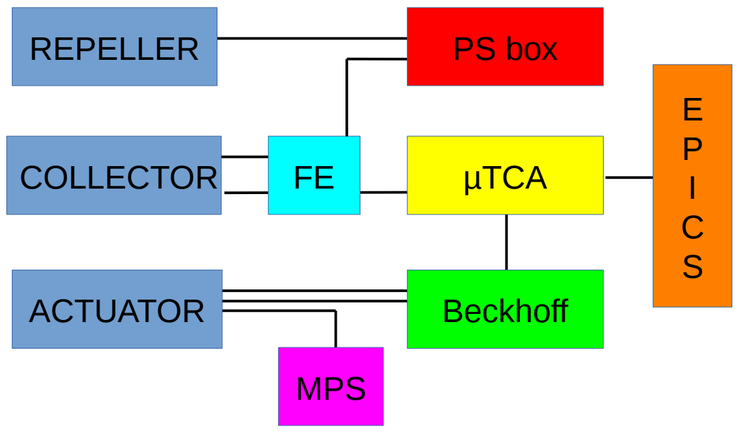
- The plot shows the difference between currents measured by the FC and the BCM upstream, during the scan of the two LEBT **solenoids**.
S = good transmission in the collimator
O = over-focused region

MEBT FC

3.6 MeV

- **Designed** by ESS-Bilbao and produced by Pantechnik. **Tested** in Bilbao with 45 keV protons.

- Beam line element **installed** in the ESS tunnel in Jun-19, undergoing system acceptance tests



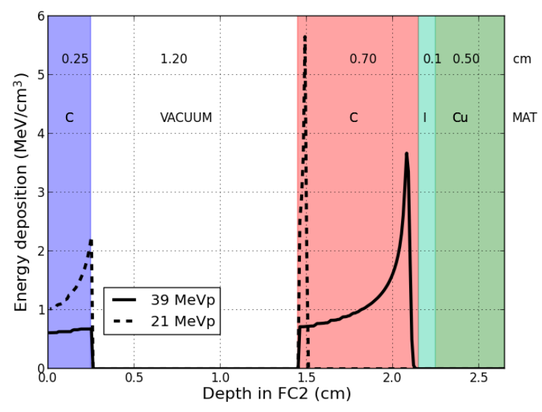
- Acceptance tests of the **FE**, having two main requirements: 2 MHz bandwidth, 0.1% noise

- As for all the FCs, the PS provides -1 kV max and the actuator motion control I/O consists of Beckhoff modules.
The **FC control system** is integrated in a µTCA crate, with a software developed in ESS EPICS Environment and CSS as GUI.

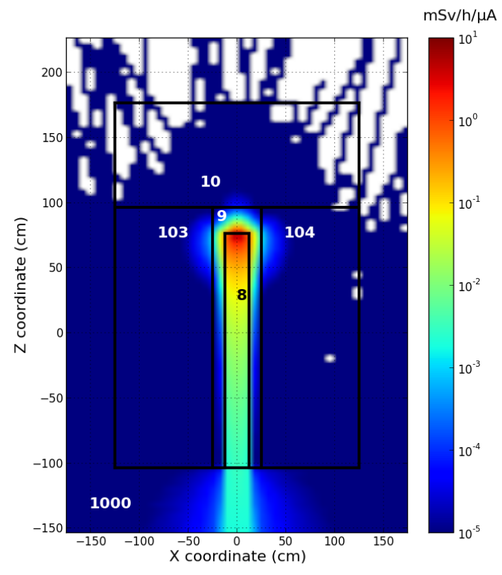
DTL FCs

21, 39 MeV **39, 74 MeV**

- **To be produced** by RadiaBeam in Oct-19



- In MCNP6, a dedicated **shielding** made of SSL (9) and concrete (10-103-104) was validated for the commissioning phase.



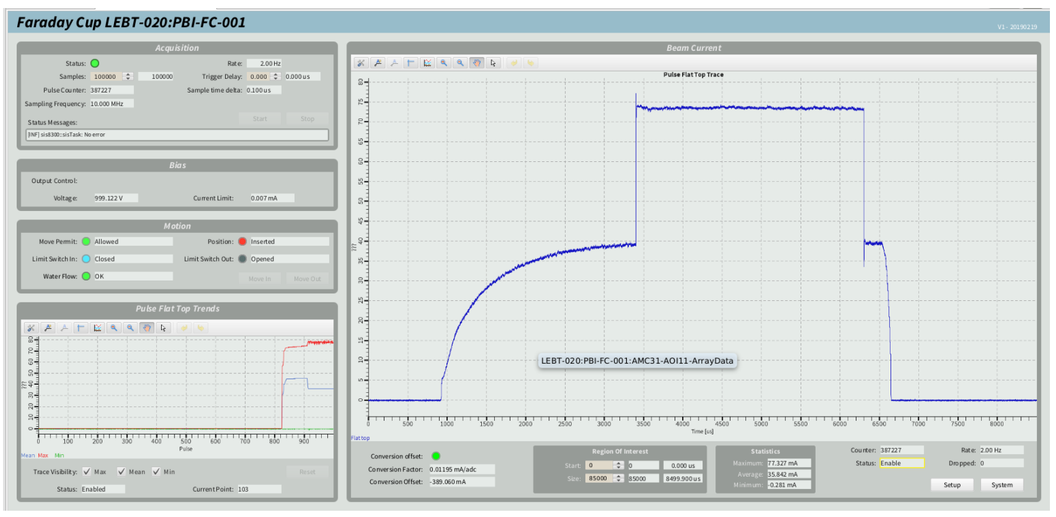
COMING SOON

- **LEBT FC**: analysis of **data** collected during the commissioning of source and LEBT

- **MEBT FC**: **verifications** without and with 3.63 MeV protons in fall 2019

- **DTL FCs**: **production** at RadiaBeam and installation at ESS in Oct-2019

- **ALL FCs**: unified operator **interface** in CSS studio, including interlocks and alarms



Scan the QR code to find out more about the Beam Diagnostics Section at ESS

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