Electron Beam Test Stand (EBTS)

A. Rossi for the EBTS team

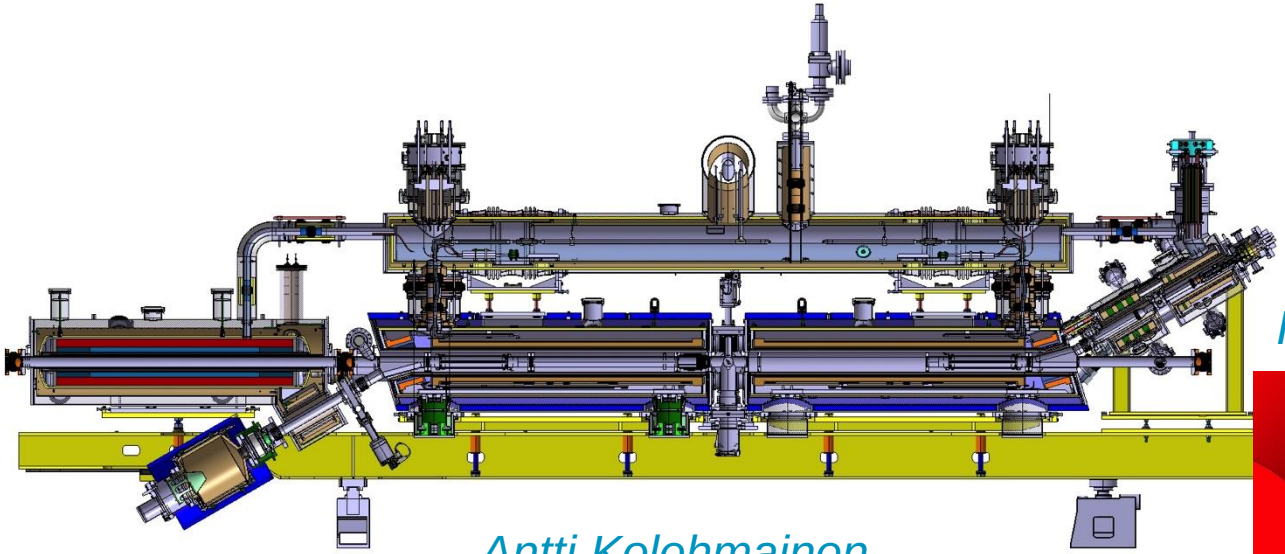
BGC Collaboration meeting
30/03/2022
CERN

EBTS current team

- **Sameed** Muhammed– Senior physicist fellow (2y) and **Fredrik** Wenander – Senior physicists and expert in beam sources (strong support from BE-ABP-HSL for first phase)
- **Wilfried** Devauchelle- electrical technician + student (interlocks)
- **Alexandre** Frassier- electrical engineer (HV)
- **Ashley** Churchmann mechanical technician and **Jean** Cenede mechanical engineer (design EBTS + integration)
- Students **George** Bantemits (BI motor control and BPM) + **Lukas** Golino (readout)
- **Manfred** Wendt – Senior electrical engineer, expert in BI & BPM
- Technical support from industrial support for cabling and similar

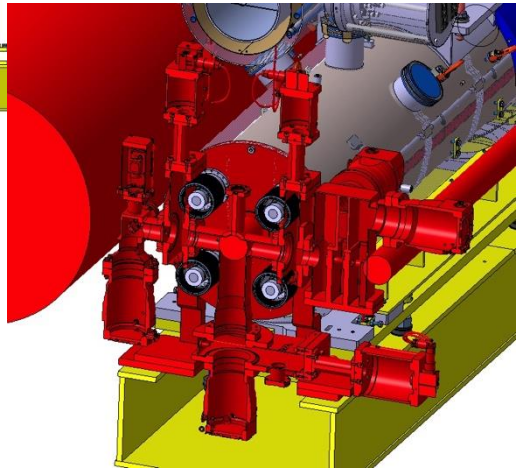
- Acknowledging the work of Sergey Sadovich

Latest design of the Hollow Electron Lens

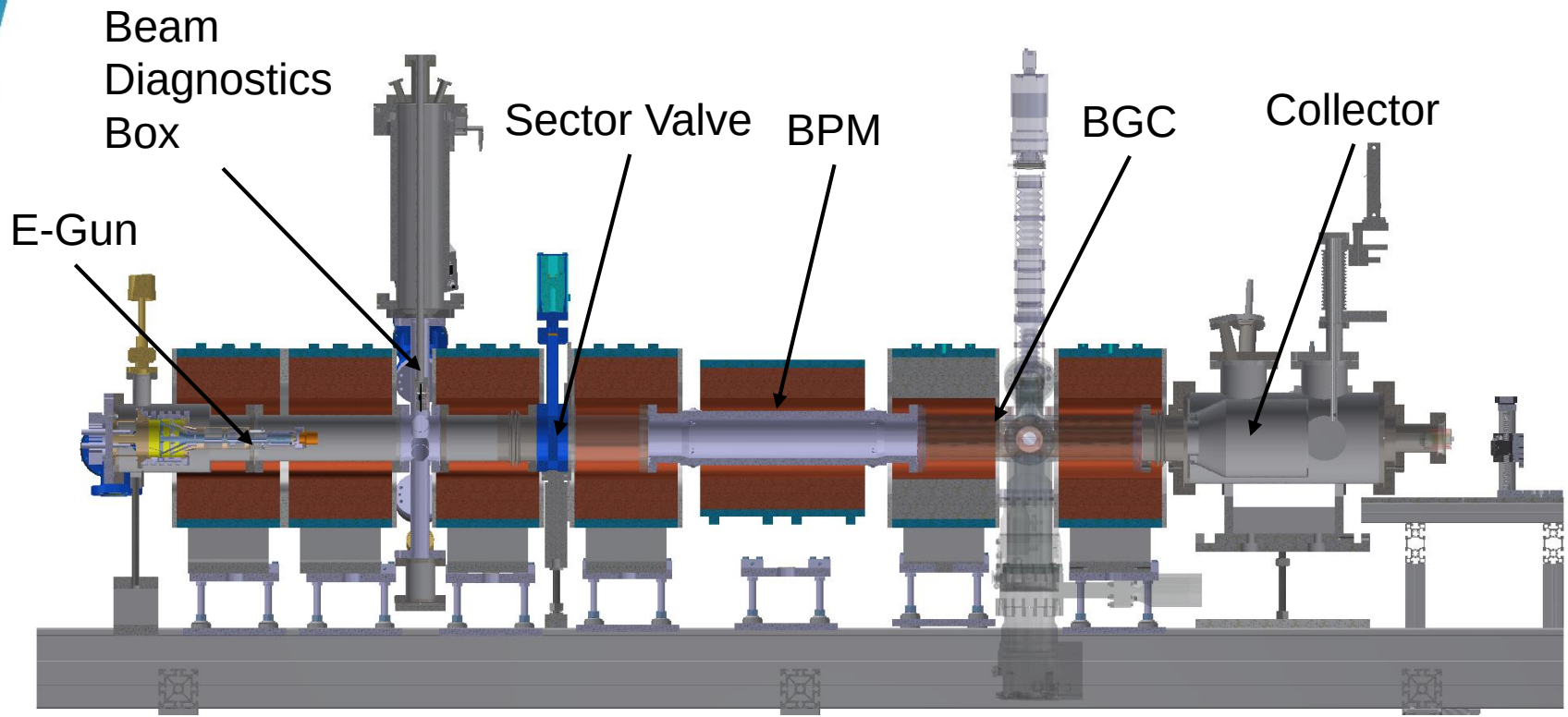


Antti Kolehmainen

Ioannis Papazoglou



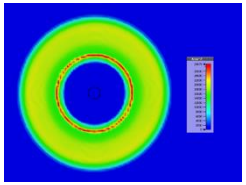
Electron Beam Test Stand



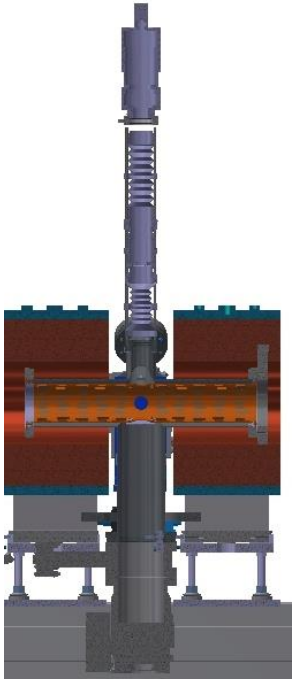
Sergey Sadovich

EBTS scope and experimental programme: BGC

- BGC prototype for LHC measurements:
  - Validation of prototype with HEL beam type

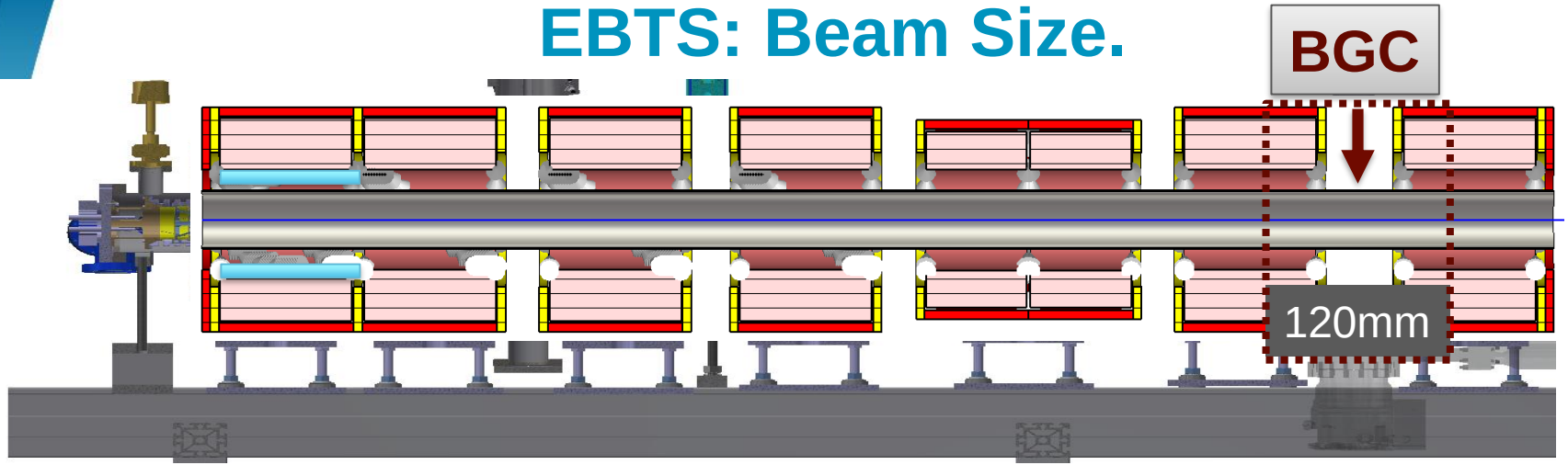


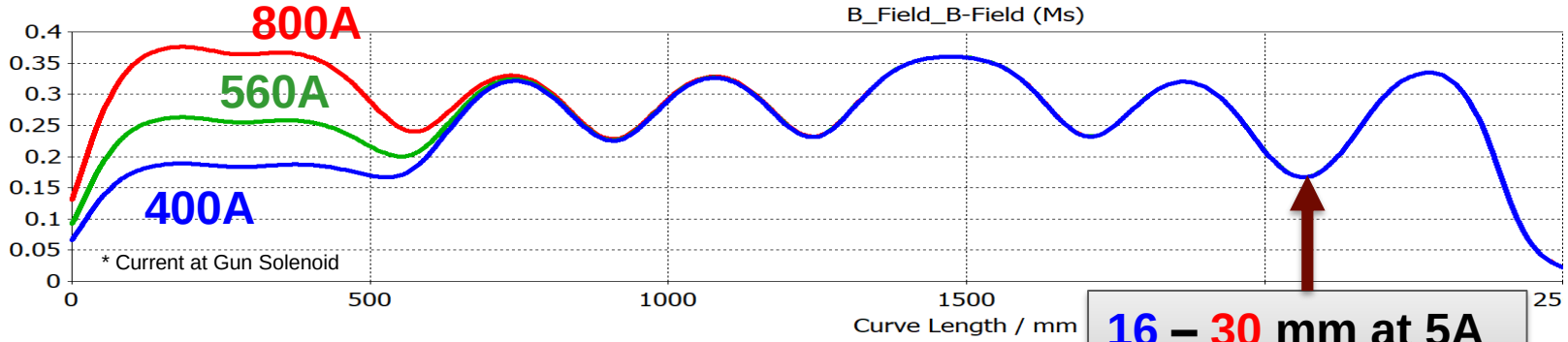
- Hollow Beam D_{ext} ~16 – 30 mm
- Steering ± 5mm
- Energy ≥ 10 keV
- Pulsed mode: 100us at 5A at 10Hz ≈ 5mA average
  - Presently limited by passively cooled collector
  - Repetition rate can be increased using water-cooled collector up to HEL nominal parameters (Anode Modulator is also needed), or DC beam



- See Ashley's for EBTS layout and installation

EBTS: Beam Size.



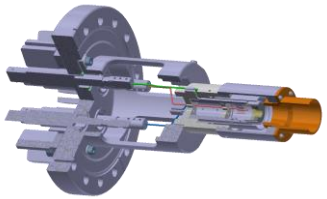


16 – 30 mm at 5A
Offset: ±5mm H/V

Sergey Sadovich

EBTS scope and experimental programme: e-GUN

- Characterisation of HEL e-gun prototype II: full scan I(T,V)
- First prototype 2019



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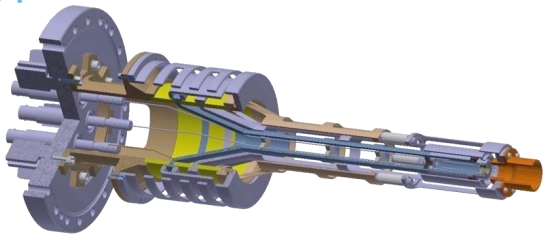
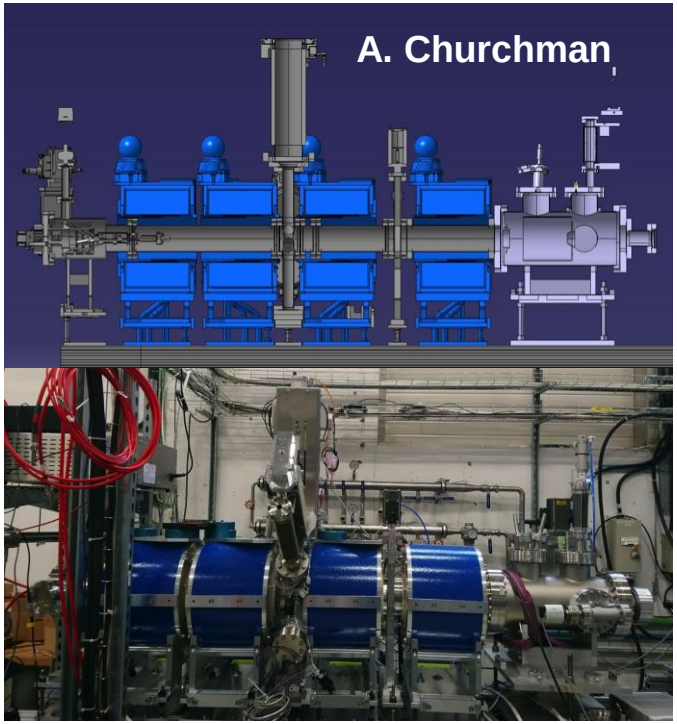
- Second prototype

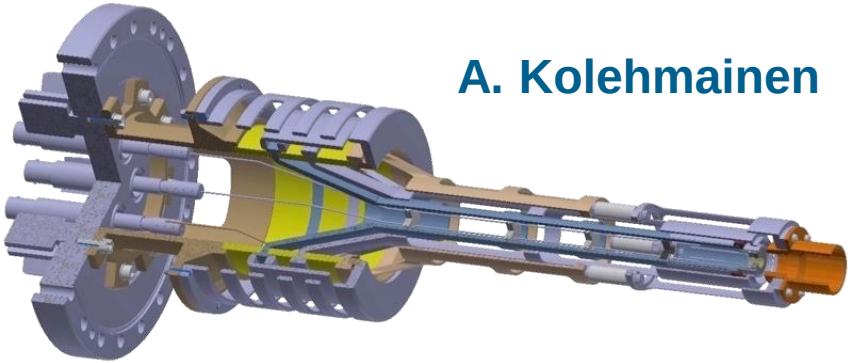


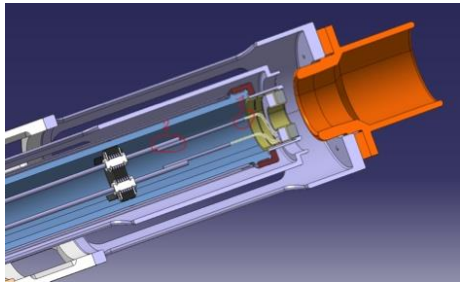
  - Tested: small current due to old cathode
  - New cathode being activated



EBTS scope and experimental programme: e-GUN

A. Kolehmainen



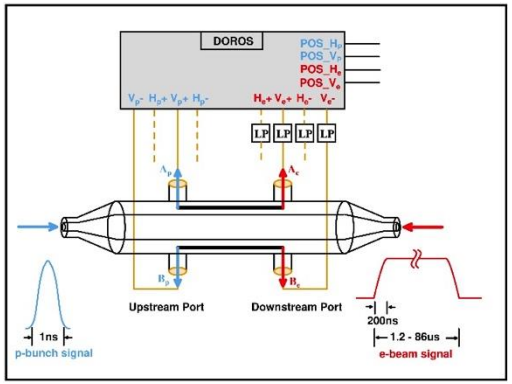


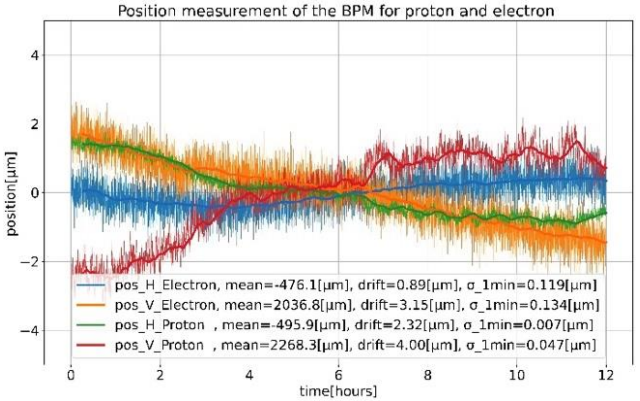
EBTS scope and experimental programme: BPM

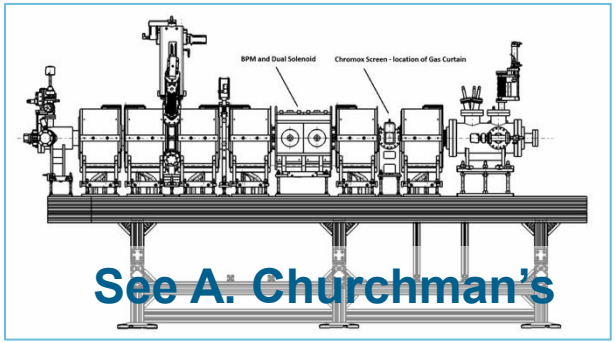
- Strip-line BPM: experimental confirmation of e-beam measurements with HEL type beam
- Numerical simulations and laboratory measurements demonstrate the feasibility of measuring both ~ DC e-beam and bunched LHC beam, with < 2um difference

G. Bantemits et at. IBIC2021

- Planned to be mounted ~ May 2022



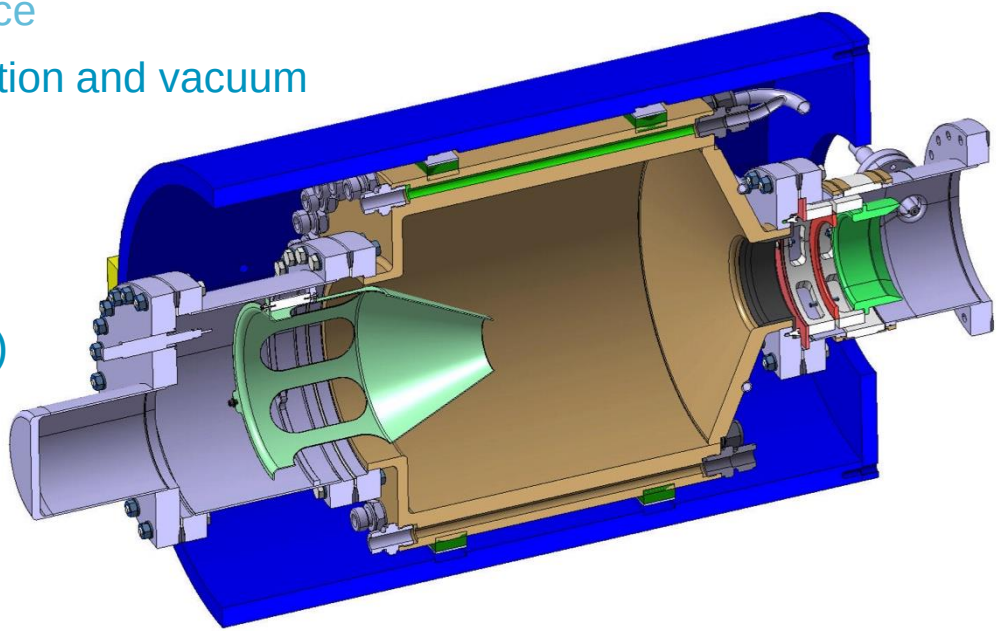




EBTS scope and experimental programme

- Collector prototype & powering:
  - High Voltage behaviour
  - Thermomechanical resistance
  - Efficiency for electron collection and vacuum
  - HV powering: coping with large power pulsed

Material procurement (1/2 done) and construction planned



Planning 2022

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Stage 1

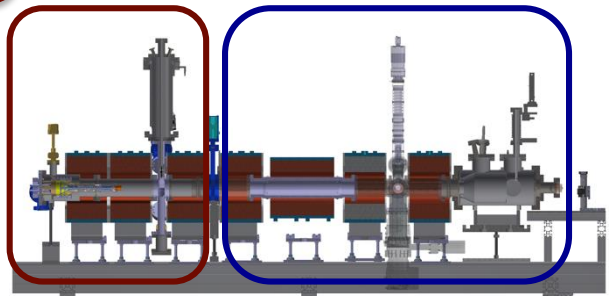
- Gun characterisation
- BDB (FC and YAG Commissioning)
- Interlocks
- Corrector magnets

Stage 2

- BPM
- BTV

Stage 3

- BGC



Thank you for your attention.