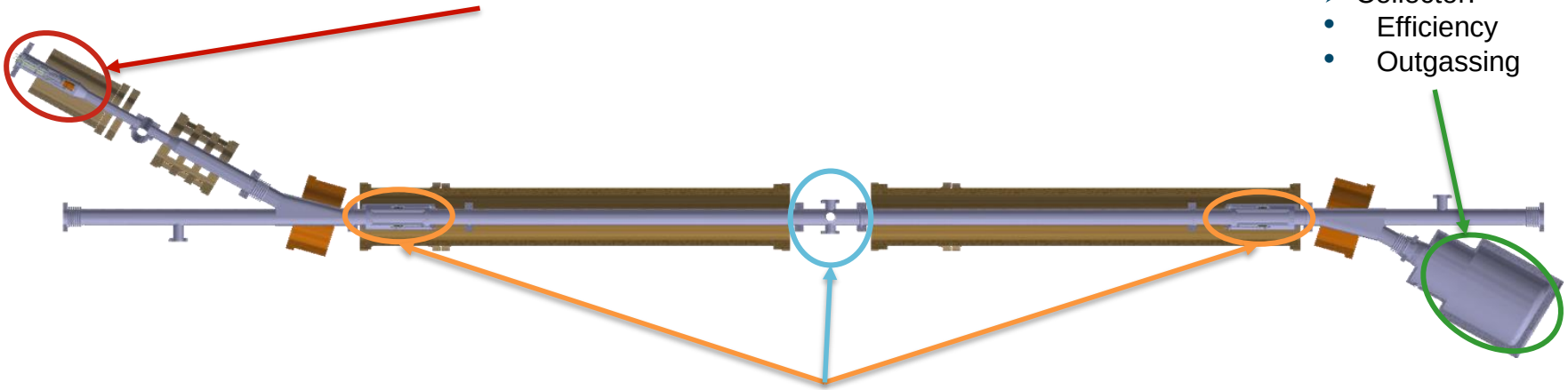
Update:
- Hollow Electron Lens
- Electron Beam Test Stand

S. Sadovich, A. Rossi

2020-DEC-10 - BGC Collaboration Meeting

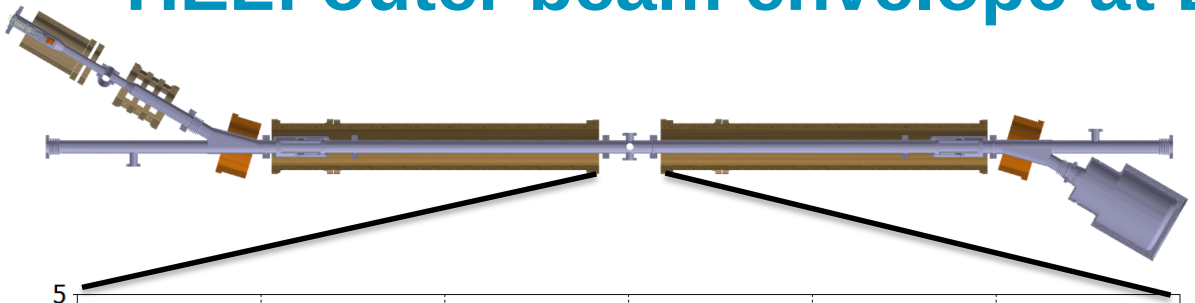
HEL and Electron Beam Test Stand

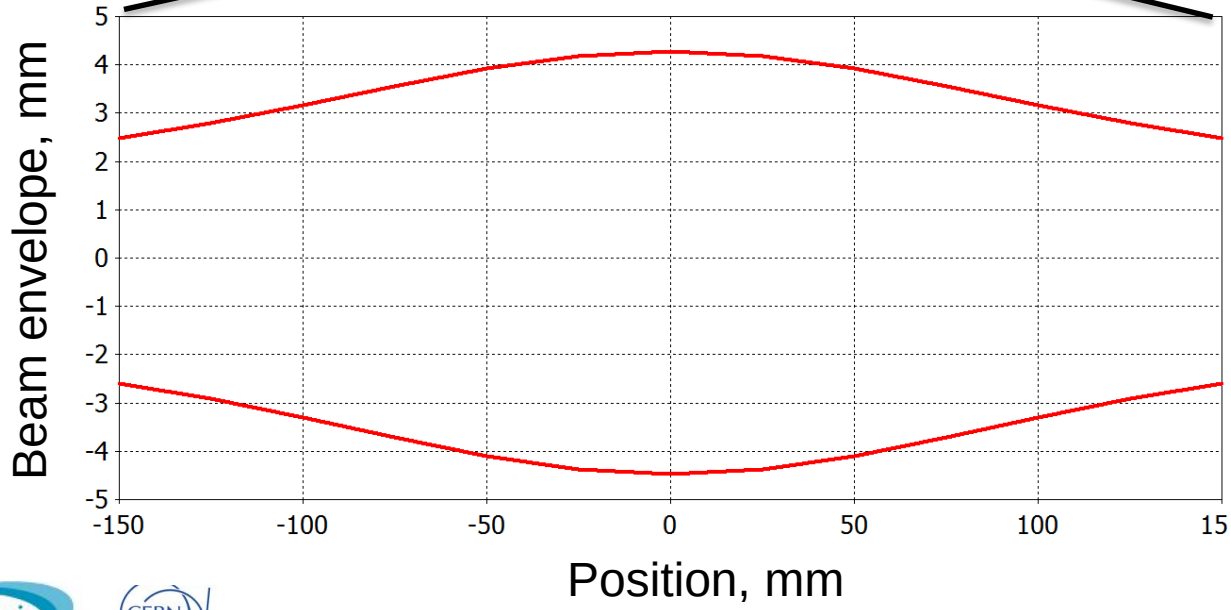
- Electron gun (5A, 10kV extraction, 15kV energy):
  - current as function of temperature and extraction voltage
  - profile measurements (annular uniform distribution)
  - HV performance (15kV across 2.5 mm gap)
- Anode modular (200ns rise time (0-5A), up to 86us pulse length, 33kHz repetition rate)



- Collector:
  - Efficiency
  - Outgassing
- Diagnostics for electrons and hadrons:
  - Beam Gas Curtain Monitor
  - Beam Position Monitor

HEL: outer beam envelope at BGC



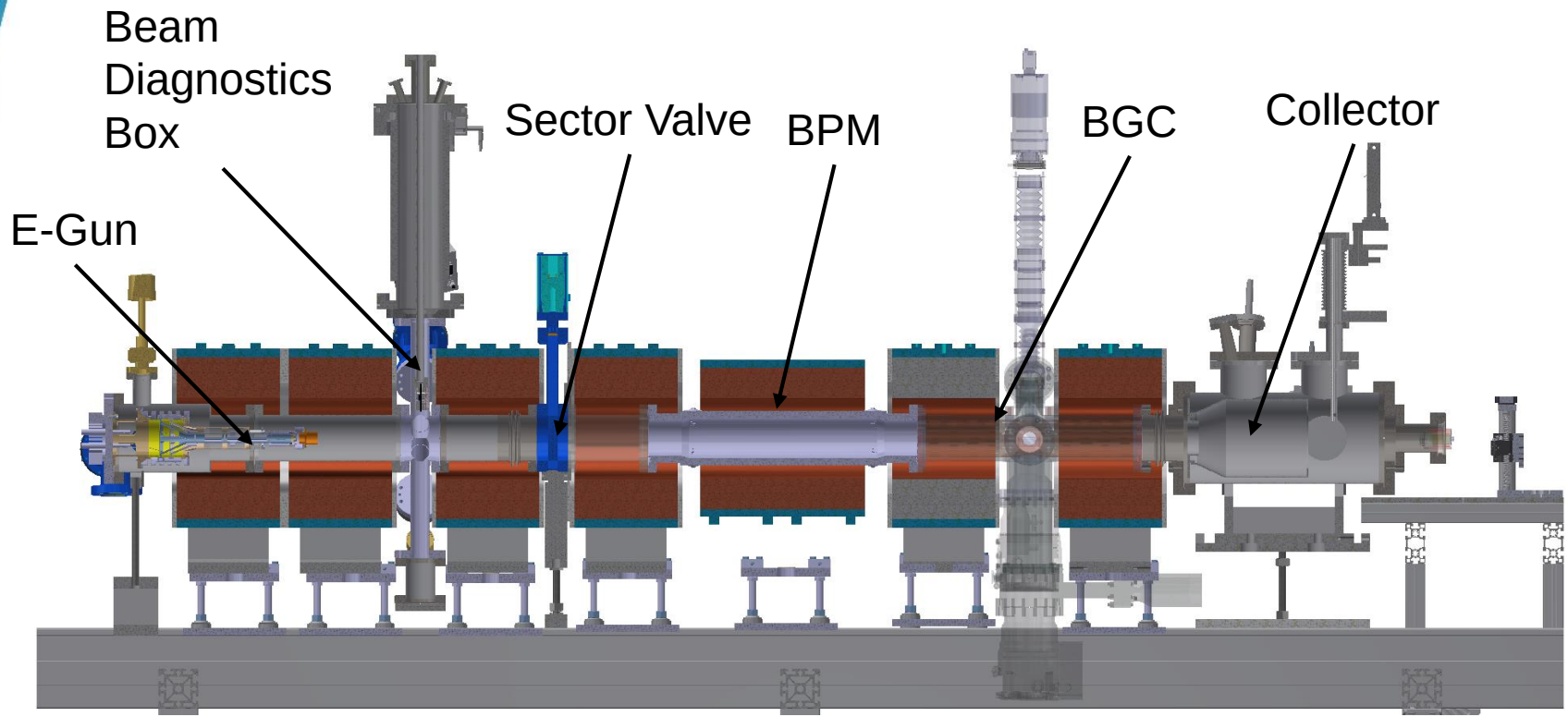


E-beam at BGC:
annular shape
~10keV
5A pulses
duty cycle 35-65%

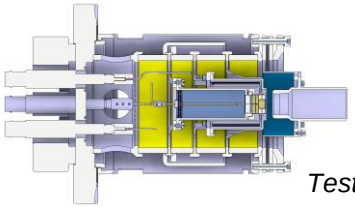
Outer diameter:
~9 mm at flat top
~31 mm at start

Offset *±4 mm tbc*

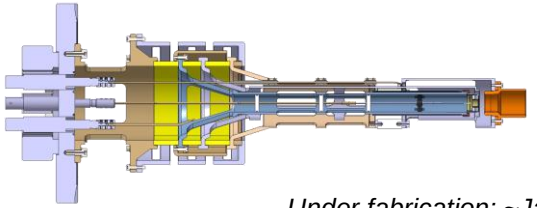
Electron Beam Test Stand



EBTS: Electron Gun



Tested. Available. Functional.



Under fabrication: ~Jan 2021

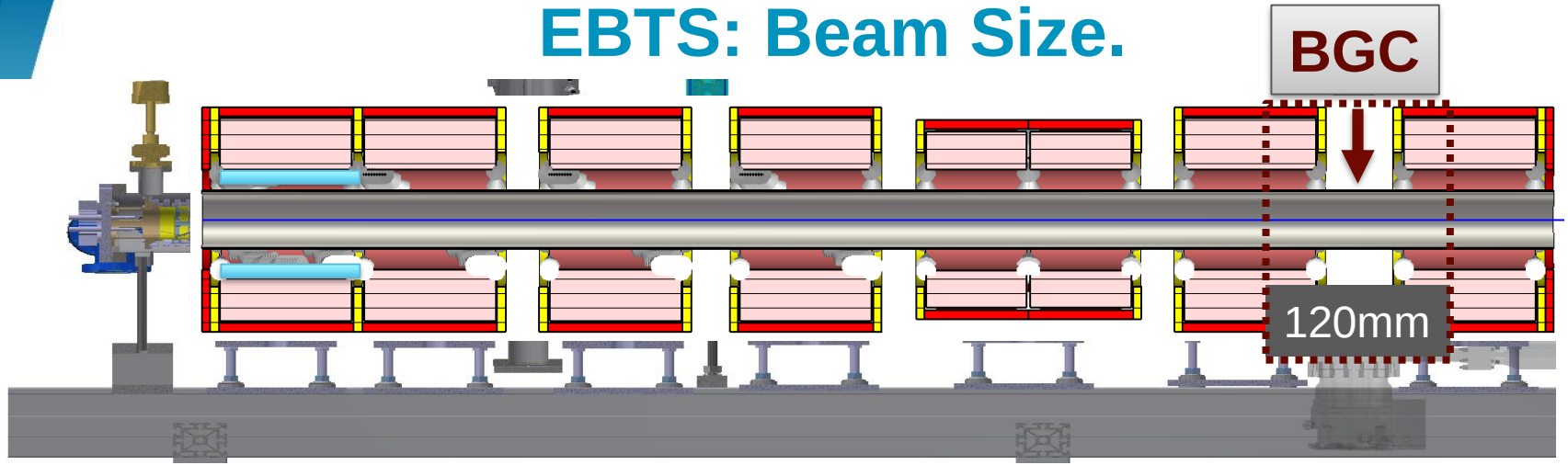
courtesy of Antti Kolehmainen

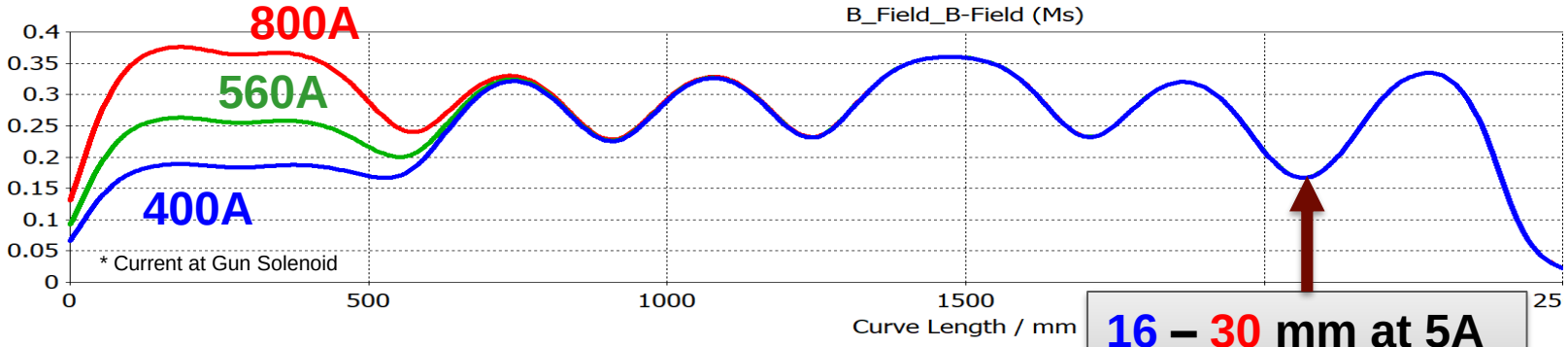
Nominal parameters of the e-beam:

- Current 5A
- Hollow profile

* Pulsed mode of operation (10us at 10Hz)

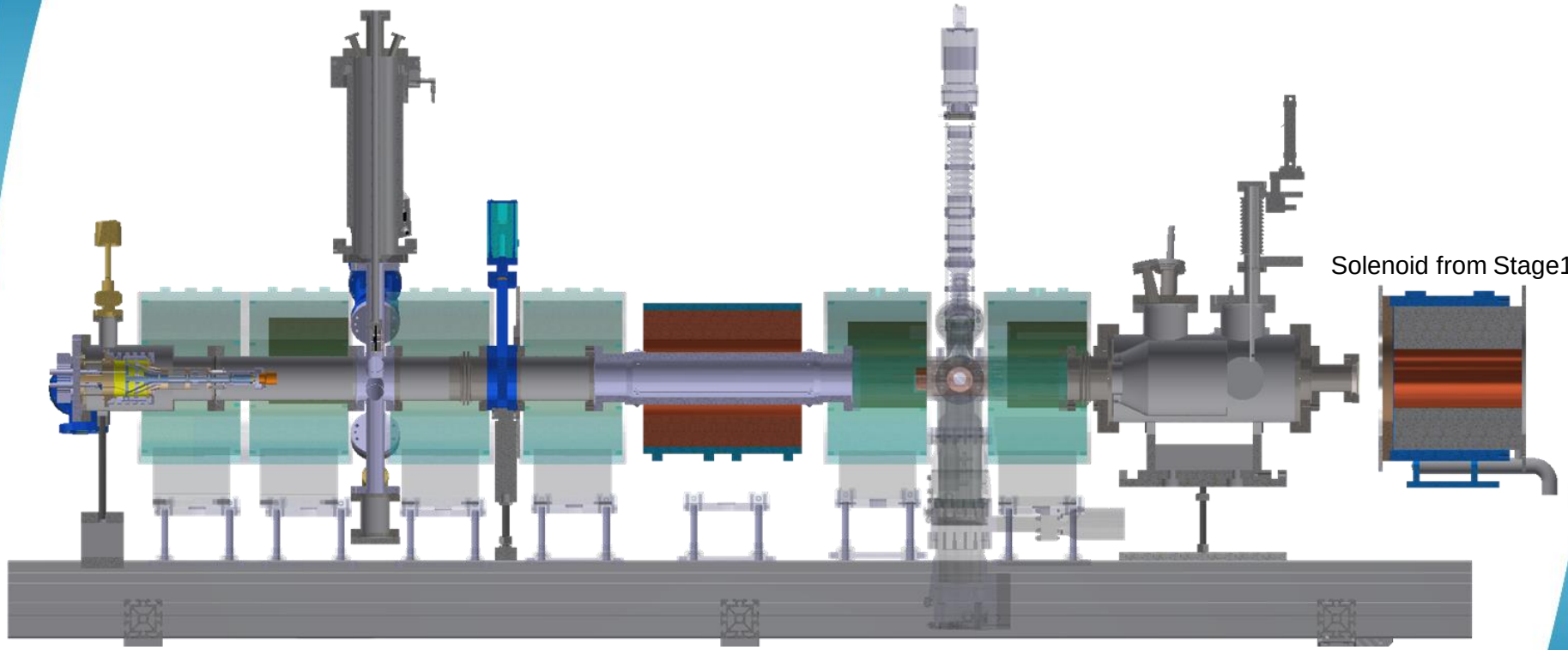
EBTS: Beam Size.



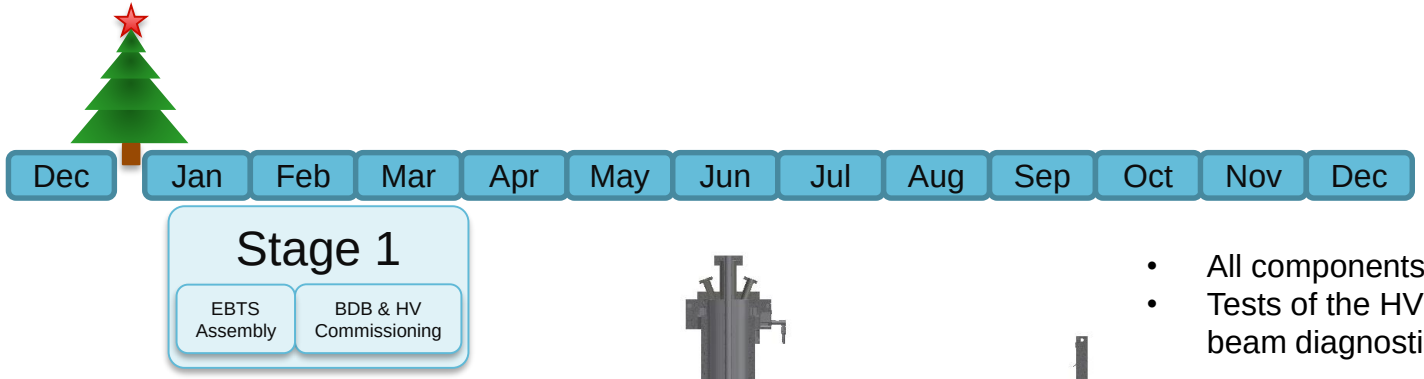


16 – 30 mm at 5A
Offset: ±6mm H/V

EBTS: Availability of components



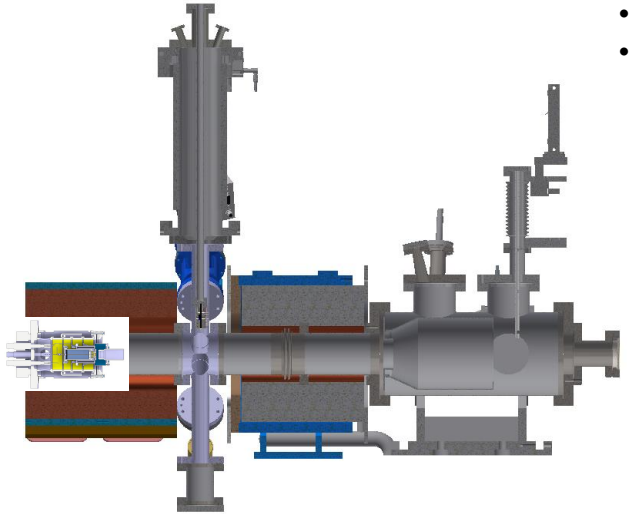
Planning 2021



E-gun:

- The same cathode/anode
- Tested at FNAL

- Source of the e-beam



- All components are available
- Tests of the HV system and beam diagnostics

Planning 2021

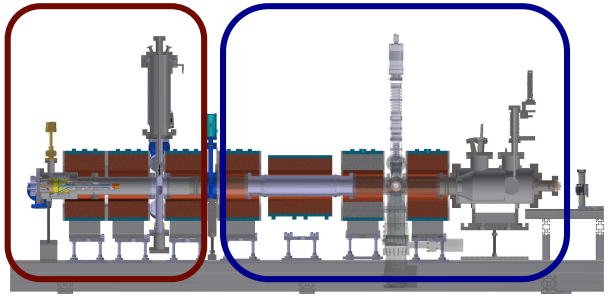
Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec

Stage 1

- EBTS Assembly
- BDB & HV Commissioning

Stage 2

- EBTS
  - Reconfiguration
  - BGC installation
  - BPM installation
  - New solenoids
- EBTS Commissioning Including new magnets
- Tests with Electron Beam at EBTS

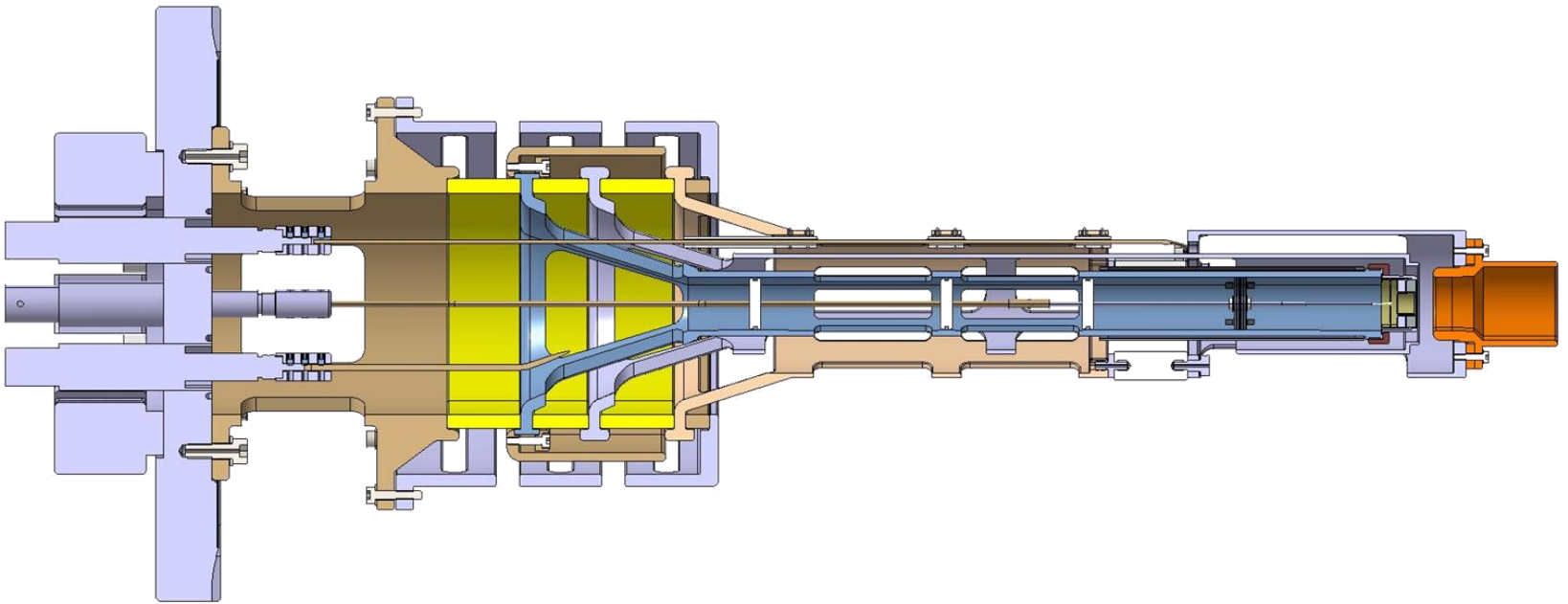


Tests:

- Gun (extracted current, beam shape)
- Anode Modulator (rise time)
- BPM (signal vs position, current, shape)
- BGC (sensitivity, profile, etc)

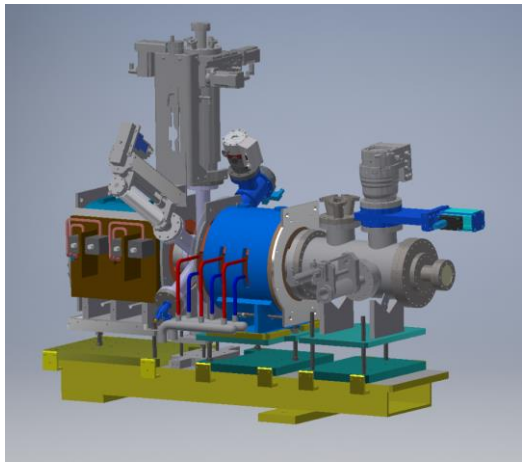
Spare slides

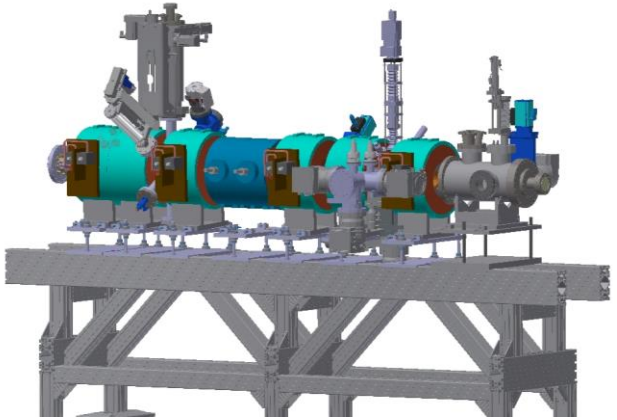
E-Gun V2



courtesy of Antti Kolehmainen

E-lens test stand at CERN (staged approach)





Stage 1 (gun prototype and diagnostics):

- Current yield as function of filament temperature and extraction voltage
- Profile of electron beam after 250 mm drift
- **Use E-Gun prototype to commission HV system, Beam Diagnostic Box, etc.**
- Anode modulator: rise time and fall time

Stage 2 (full working version):

- E-gun measurements as Stage 1
- BGC
- BPM
- Anode modulator: Stage 1 + repetition rate
- Collector
- Control & Interlocks
- Beam dynamics studies