

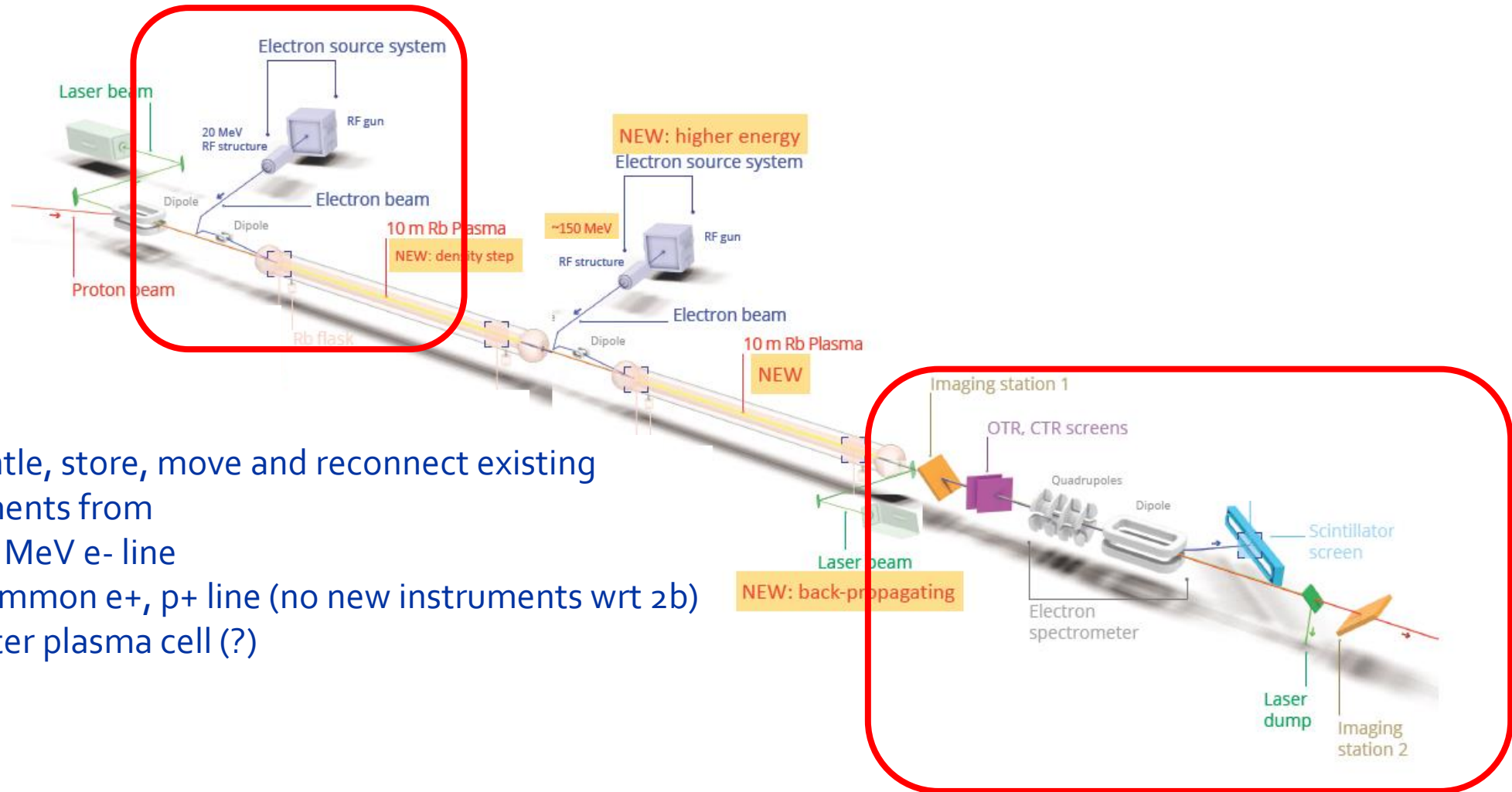


Strategy towards reliable beam instrumentation for run 2c

S. Mazzone for the BI team

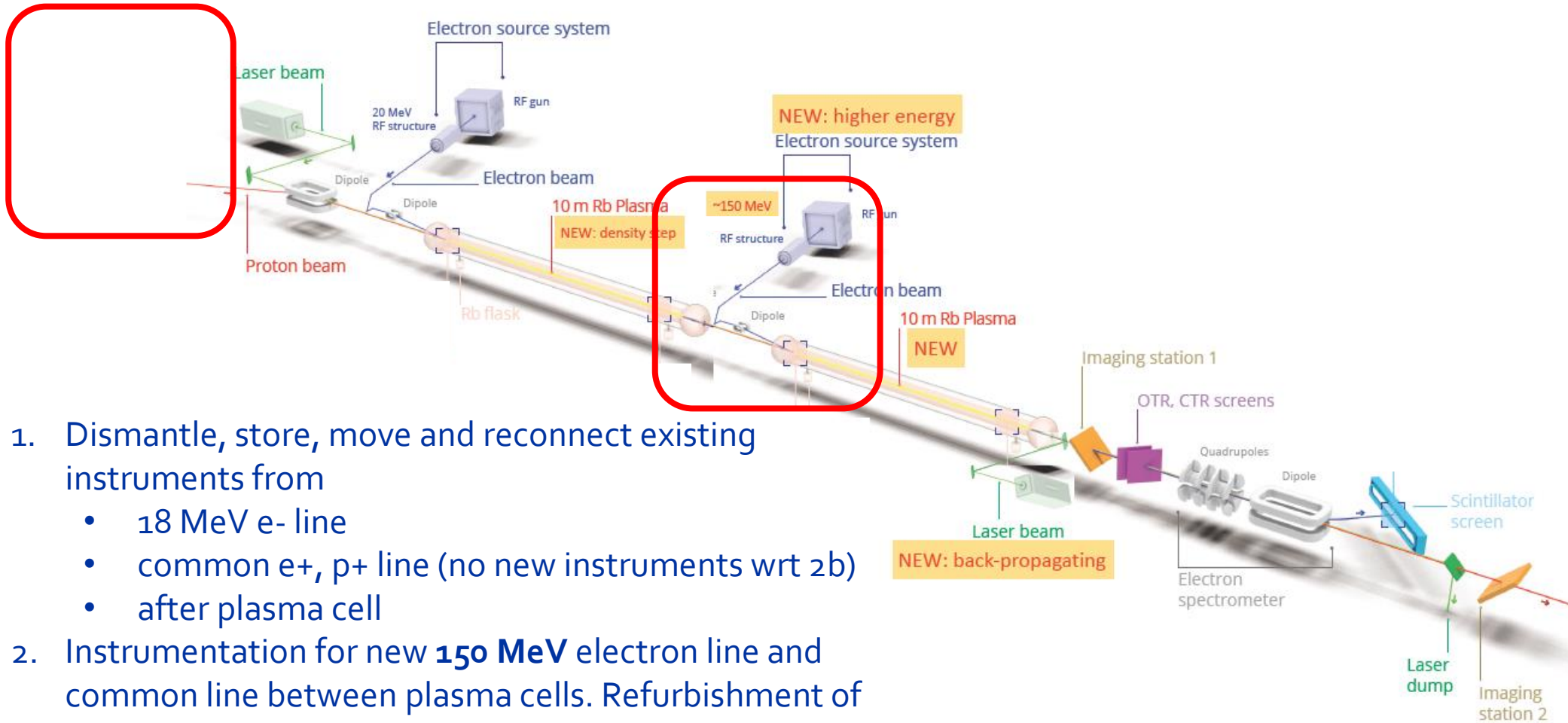
AWAKE collaboration meeting @ Uppsala University, 25-26 April 2023

Beam instruments for Run 2c



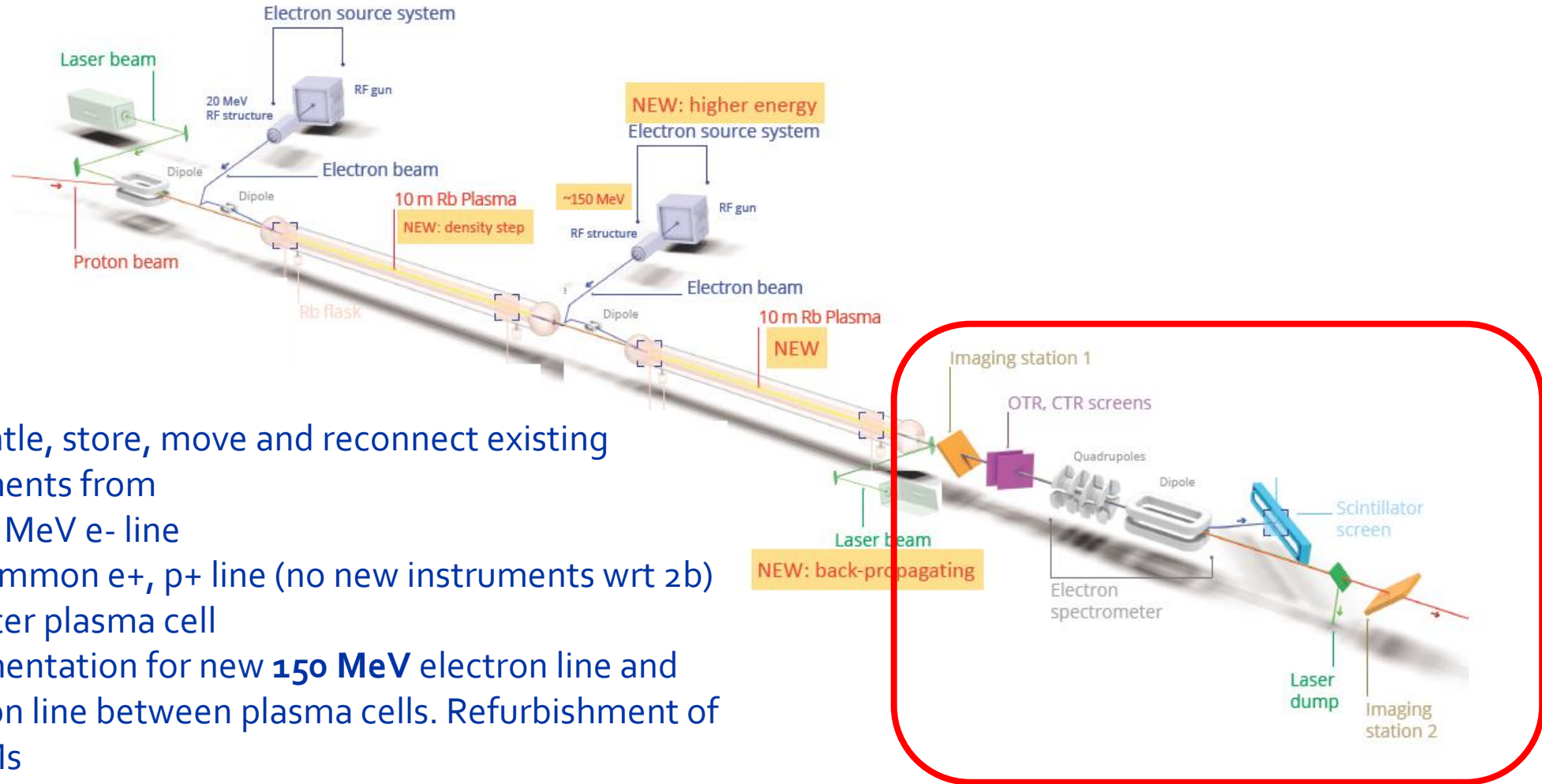
1. Dismantle, store, move and reconnect existing instruments from
 - 18 MeV e- line
 - common e+, p+ line (no new instruments wrt 2b)
 - after plasma cell (?)

Beam instruments for Run 2c



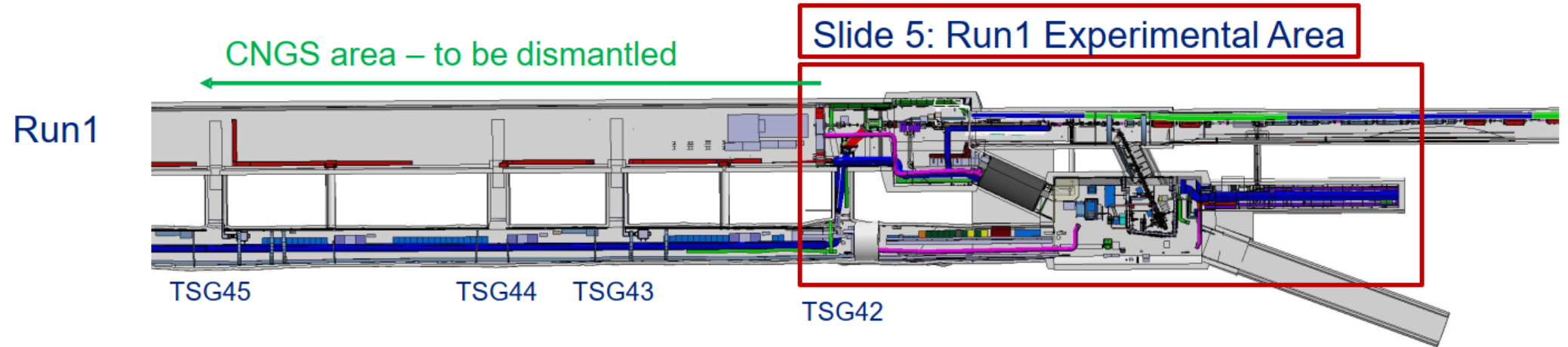
1. Dismantle, store, move and reconnect existing instruments from
 - 18 MeV e- line
 - common e+, p+ line (no new instruments wrt 2b)
 - after plasma cell
2. Instrumentation for new **150 MeV** electron line and common line between plasma cells. Refurbishment of p+ BPMs

Beam instruments for Run 2c

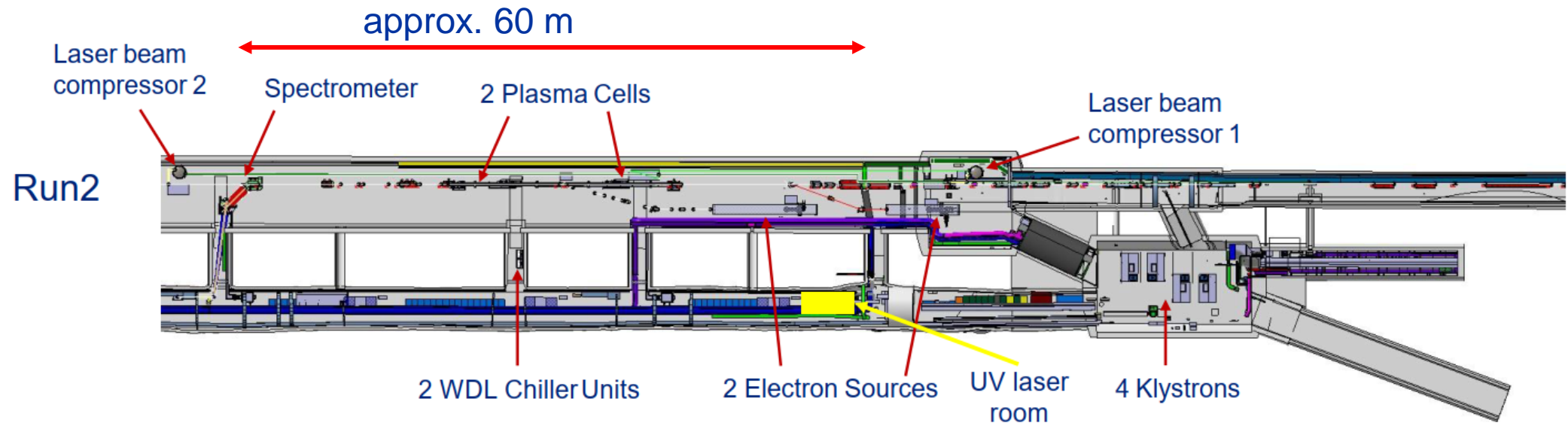


1. Dismantle, store, move and reconnect existing instruments from
 - 18 MeV e- line
 - common e+, p+ line (no new instruments wrt 2b)
 - after plasma cell
2. Instrumentation for new **150 MeV** electron line and common line between plasma cells. Refurbishment of p+ BPMs
3. Instrumentation for post acceleration diagnostics

Run 1 > Run 2

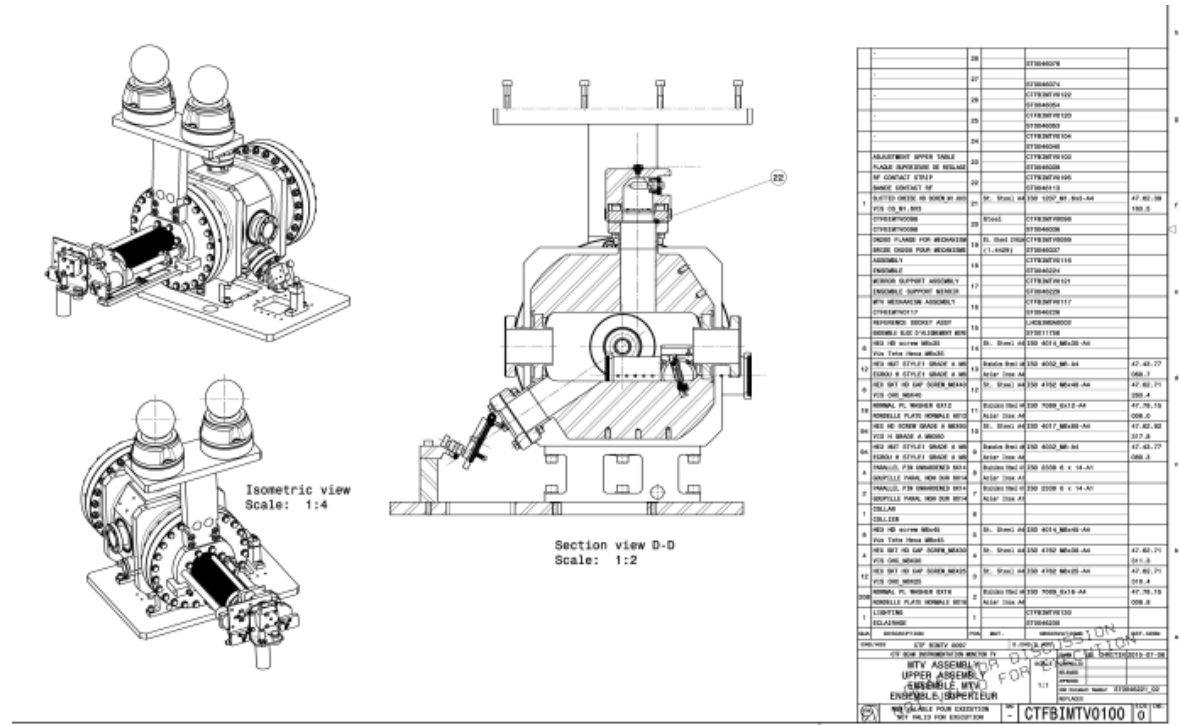


E. Guran



New instrumentation for 150 MeV line: BTVs

- 3+4 BTVs for new e- line gun and dogleg respectively. 1 BTV in gun with intensified camera
- present requirement for beam size: resolution up to 1 um (can be achieved with very small field of view of typically 2 mm and OTR PSF technique – not a standard BTV).
- Proposal is to re-design CTFBIMTV (now in TT43 line): low angle, target. New design for AWAKE (no real synergies with DEFT)
- AWAKE fellow in PM section
- Origin tech in ML section to follow up production



New instrumentation for 150 MeV line: BPMs

- 3+12 BPMs for new e- line gun and dogleg respectively.
- present requirement 10 um resolution provided that BTVs have 1 um resolution
- **Present plan: replicate TRIUMF stripline BPMs**
 - existing design, <10 um resolution, electronics might have obsolete components to be replaced (eg FPGA). Existing instrument in AWAKE, no new SW needed.
 - V. Verzilov willing to share knowledge. CERN agrees to NDA
 - Refurbishment of present electronics needed. One spare at CERN + one to be shipped from TRIUMF available

Refurbishment of p+ BPMs

- **20 BPMs installed in SPS extraction line.** Electronics is a prototype version of ALPS system (SPS)
- For Run 2c: **refurbishment of acquisition electronics with HL-LHC type:**
 - improvement of resolution from 70 μm to (expected) 20 μm
 - adopt a standard CERN system
- **personnel in BP section:**
 - one rolling QUEST in BP section (electronics of HF buttons, p+ and e- BPMs)
 - origin tech fellow in BP sections (production of electronics)

BLMs

- present BLMs need to be refurbished. Additional ones due to longer p+ line
- Estimated is between 12-15 new systems.
- Additional personnel to be confirmed

Contribution from Institutes

- Collaboration from institute is **needed**
- 200 fs Bunch length monitor
 - coherent ChDR – Manchester (C. Davut), RHUL (P. Karataev).
 - coherent TR / SR imaging – Liverpool (J.Wolfenden)
 - EOSD – CERN (E. Senes)
- Emittance monitor
 - betatron radiation – Manchester
 - OTR based - Liverpool (Beamline optics)
- 1.5 / 2 years PhD at CERN (DOCT or COAS)

