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Facilities Council

Pre-injector Upgrade for the ISIS H⁻ Linac

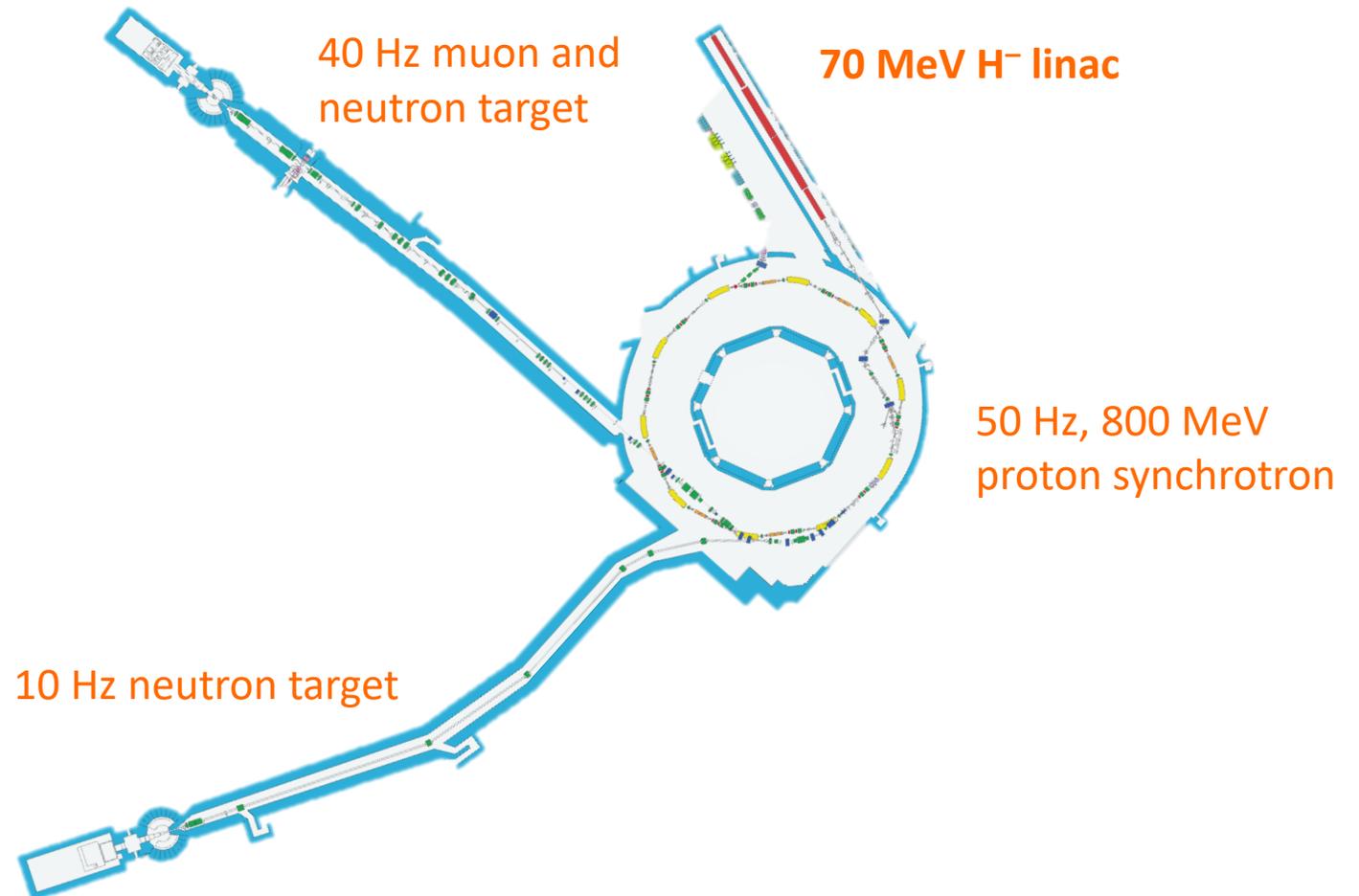
Dr. Scott Lawrie

Ion source section leader

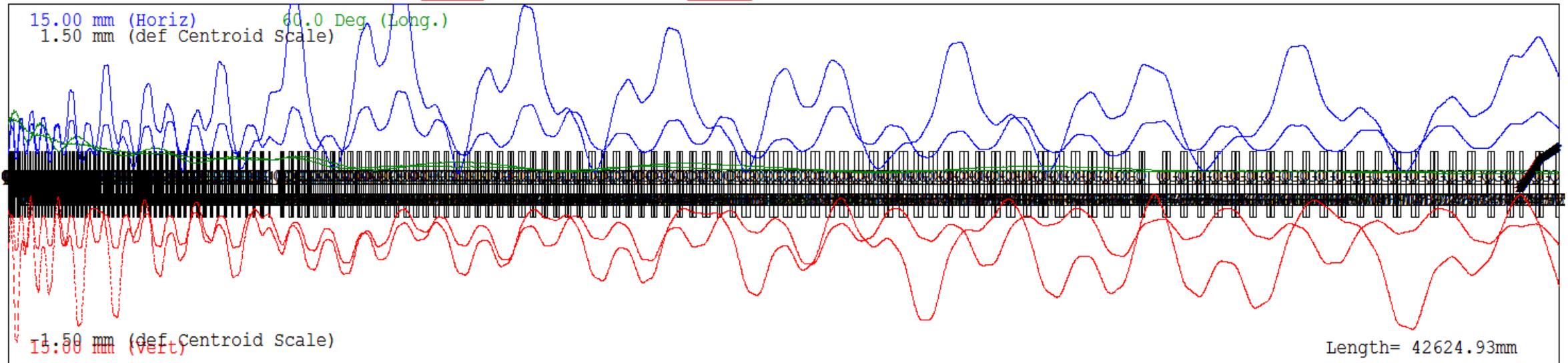
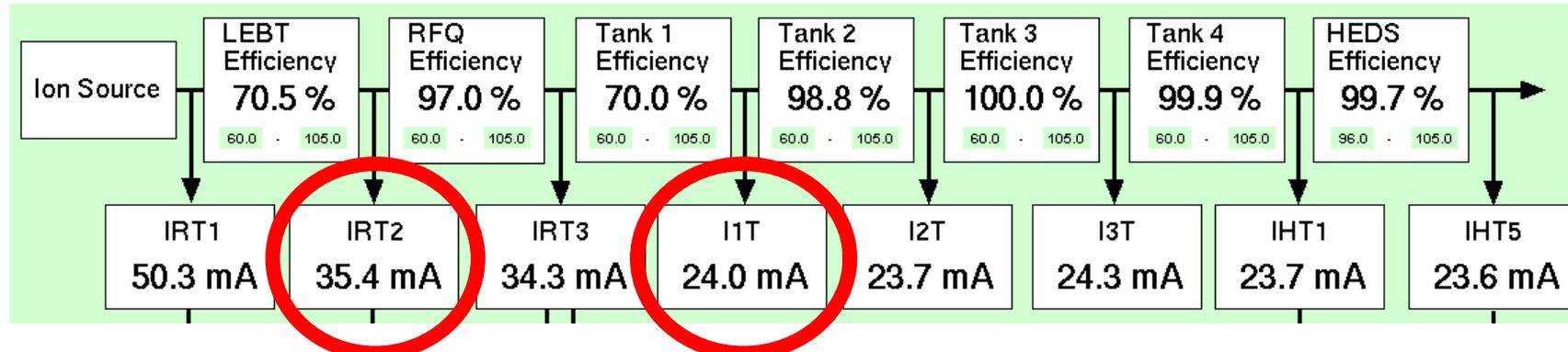
ISIS pulsed spallation neutron & muon facility
Rutherford Appleton Laboratory

Contents

- Why upgrade the linac?
- New pre-injector, including a Medium Energy Beam Transport (MEBT)
 - Beam dynamics
 - Magnets
 - Cavities
 - Chopper
 - Beam position monitors (BPMs)
- New volume-type H^- ion source
- First extracted beam



Pre-injector Upgrade



New Pre-injector in R106



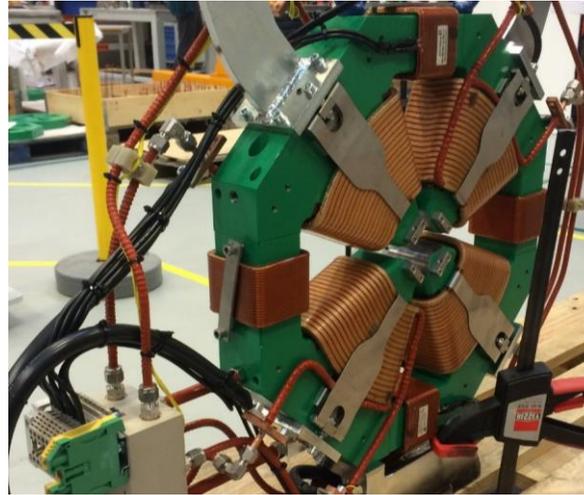
- Ion source, LEFT, RFQ & MEFT in shielded test stand
- Test each component in sequence, aiming for full transport by Summer 2023
- Soak-test for one year to prove reliability, then transfer to ISIS linac 2025

MEBT Components

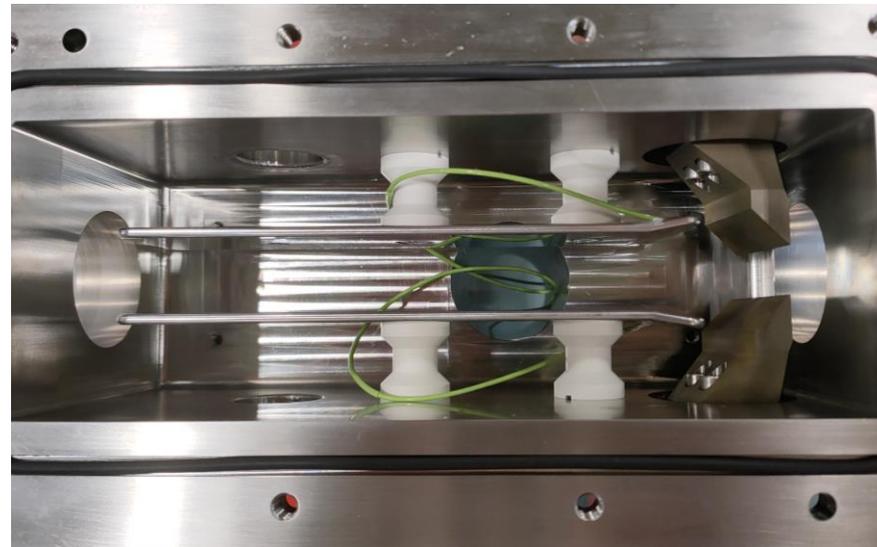
4 x Re-bunching Cavities



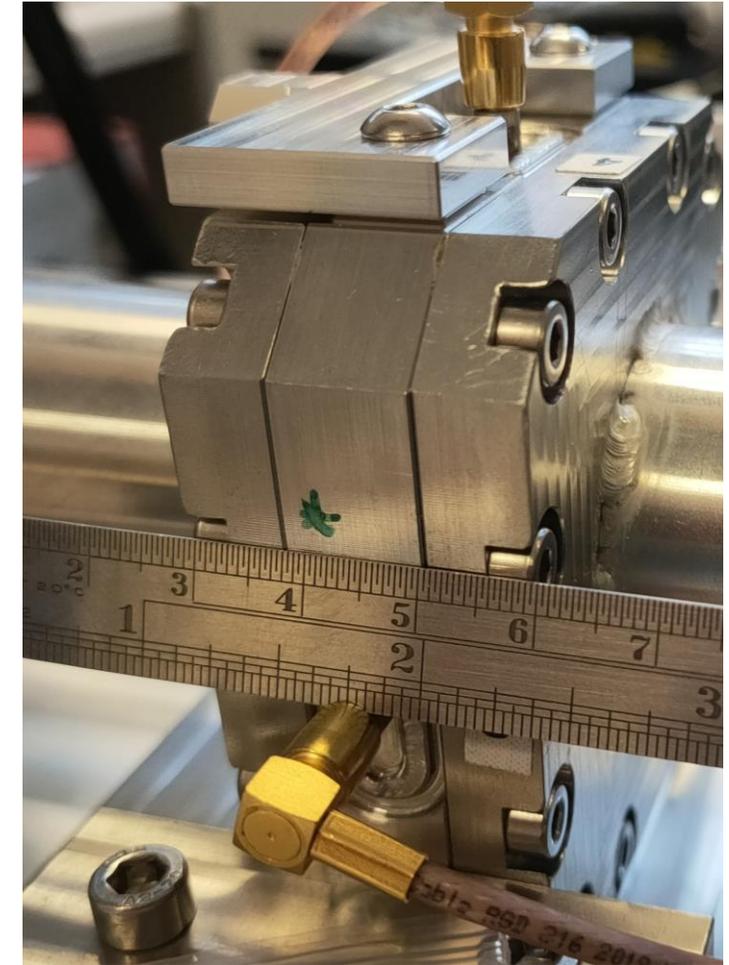
8 x Quadrupole Magnets & Steerers



Chopper and 2 x Dumps

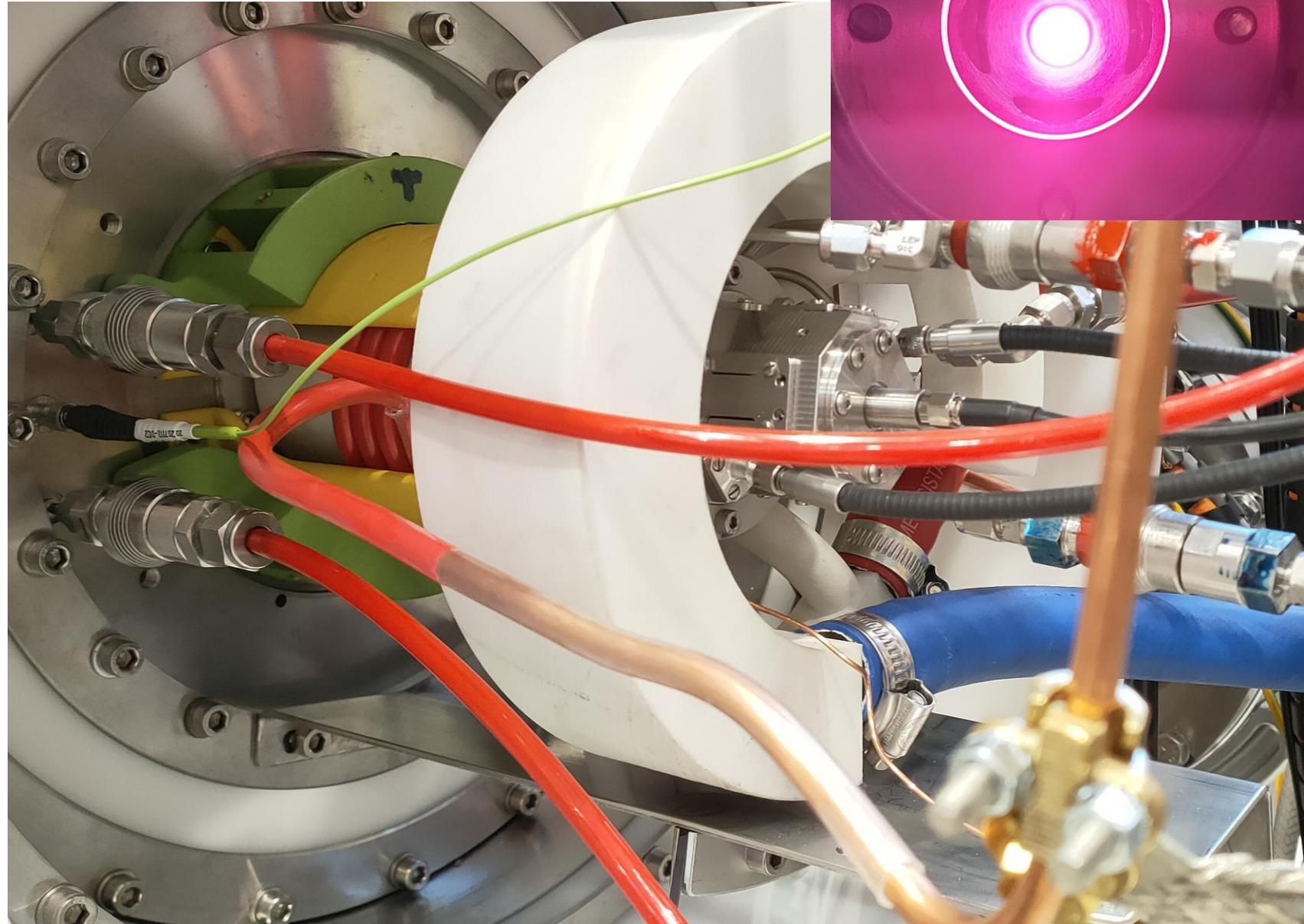


4 x Beam Position Monitors

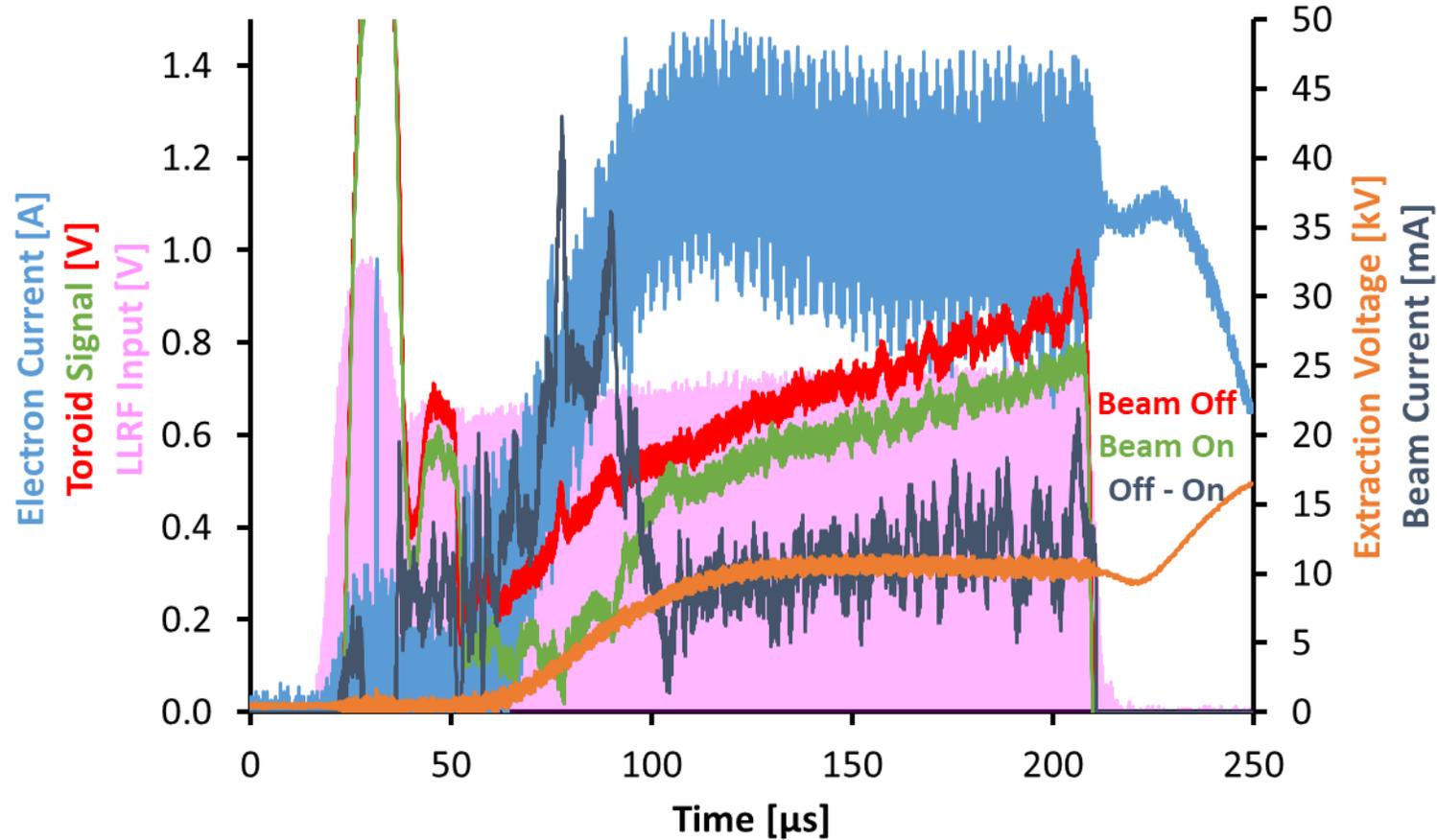


ISIS RF Volume H⁻ Source

- 2 MHz, 100 kW RF
- 50 Hz, 1 ms pulses
- 5% duty factor
- ECR electron ignitor
- Adjustable filter field
- Many 3D-printed parts
- 35 mA H⁻ beam
- $\epsilon_{4,RMS} < 1.2 \pi$ mm mrad
- No caesium
- Easy operation
- Should last forever!



First Extracted Beam





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Thank you

See you at poster
TUPOJO21!



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@STFC_matters



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