Science & Technology Facilities Council

UK Research and Innovation

Status of CLARA Front End Commissioning

Alex Brynes, on behalf of the CLARA team

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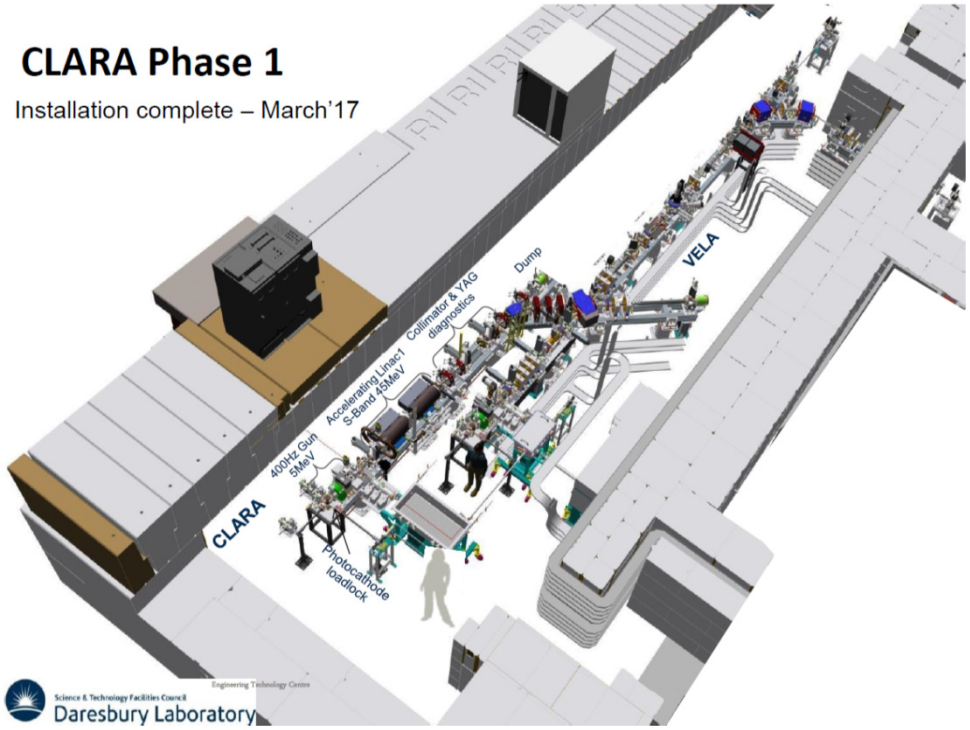
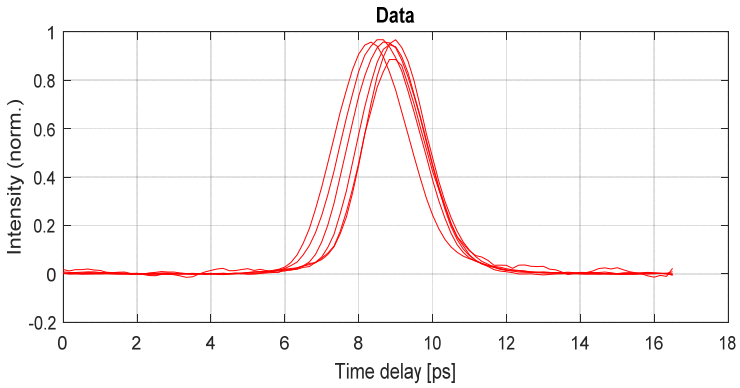
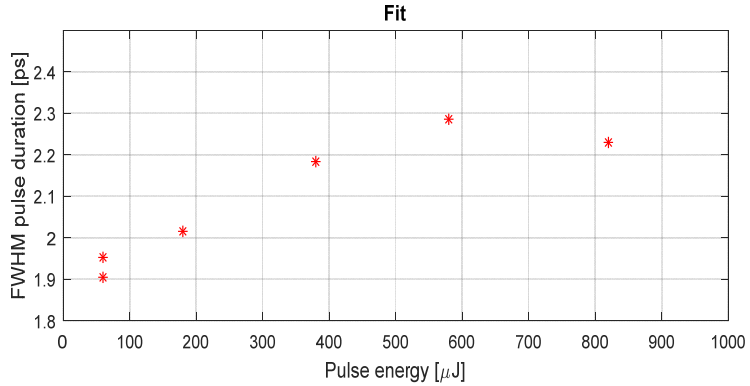
Introduction

- CLARA: FEL test facility @ Daresbury.
- Phase 1:
  - Installation complete early 2017.
  - Achieved up to 50MeV/c.
  - Beam exploitation underway.
- Phase 2:
  - Offline build ongoing.
  - Up to 250MeV/c.



PI Laser Transport Investigations

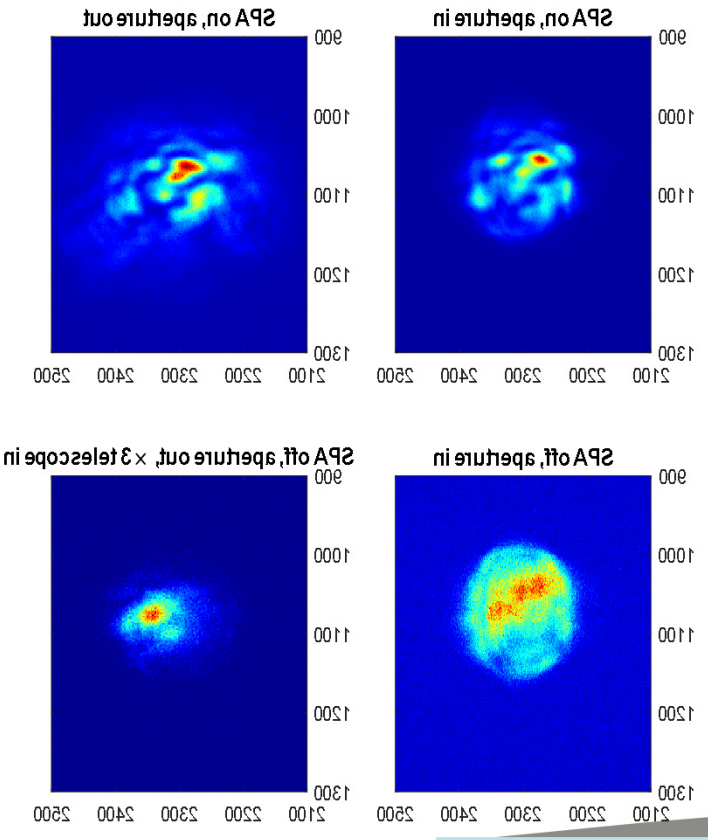




- Set stretcher for shortest pulse duration
- For maximum UV pulse energy, pulse duration ~2.2 ps

VC image

Opened aperture.

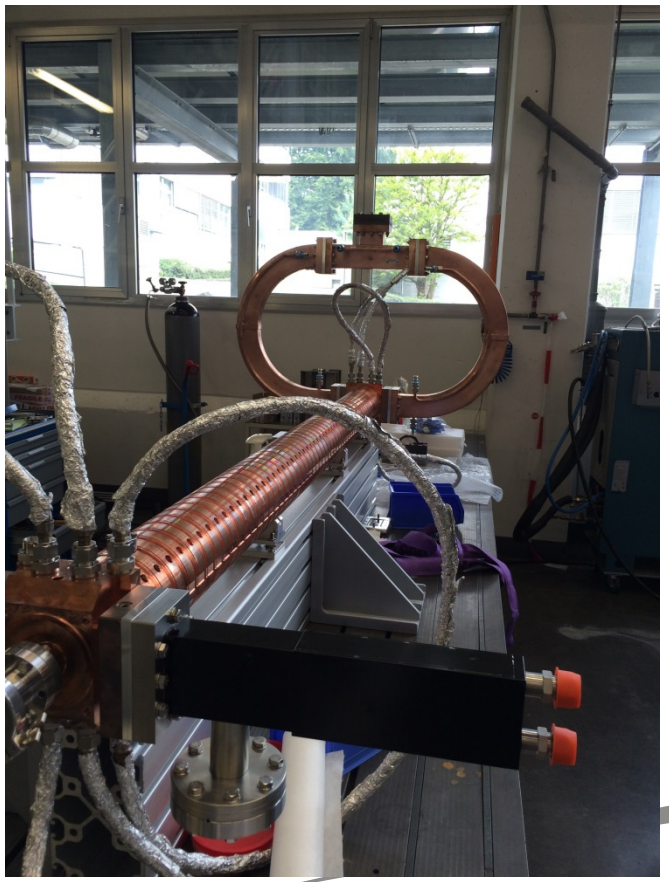


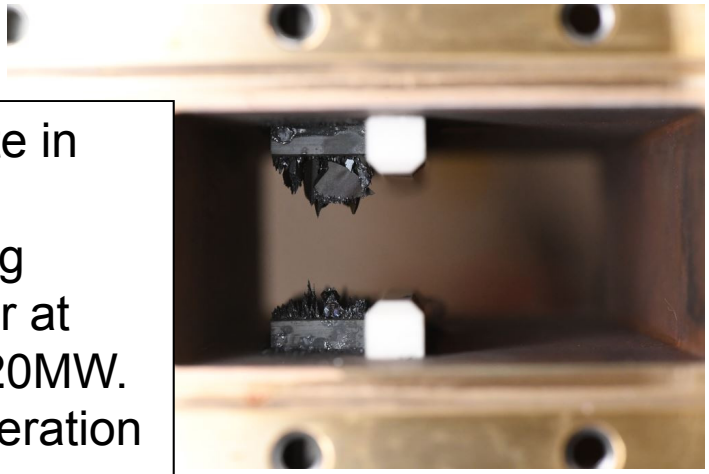
SPA off.

Smaller profile from demagnification.

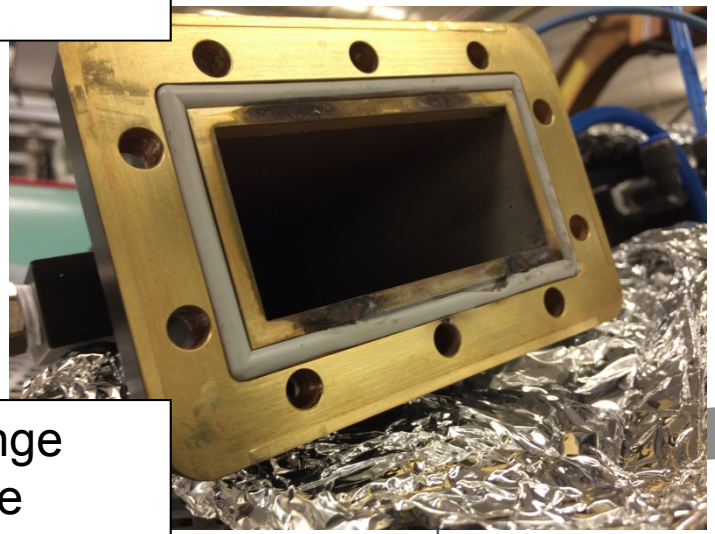
Linac Waveguide

- Linac 1: 2m S-band TW
- Klystron power = 35MW
- Beam acceleration = 45MeV/c





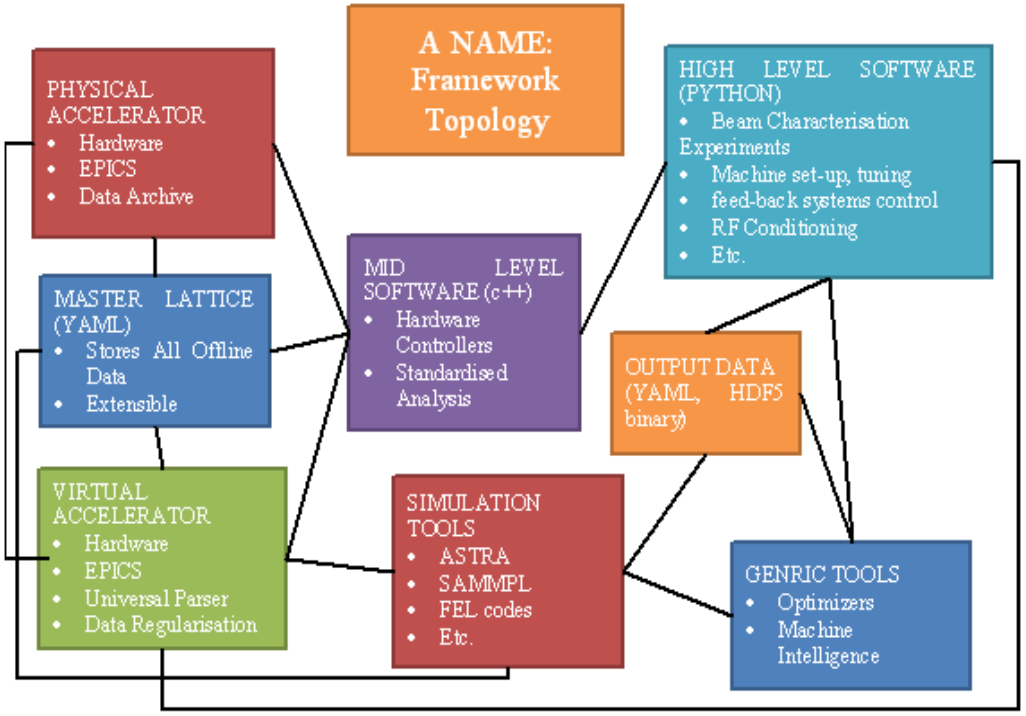
Damage to ferrite in circulator.
Currently running without circulator at klystron power 20MW.
Measured acceleration = 35MeV/c



Damage to flange from waveguide arcing

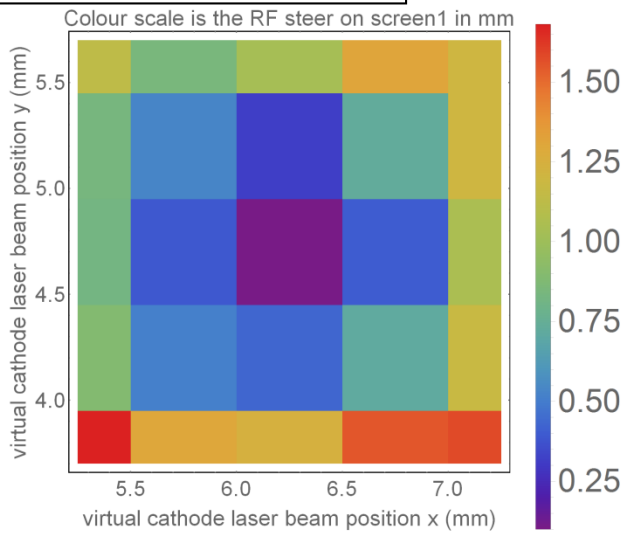
High-Level Software

- Basic EPICS interface for most machine components.
- Mid-level controllers (C++) now developed to encapsulate control of RF, magnets, laser, BPMs ….
- Python used as high-level tool for implementing high level tasks or ‘apps’ (momentum / emittance measurement).
- Effort ramping up now on applications like momentum measurement, RF cresting, alignment.
- Helping to establish repeatable and consistent daily measurements.

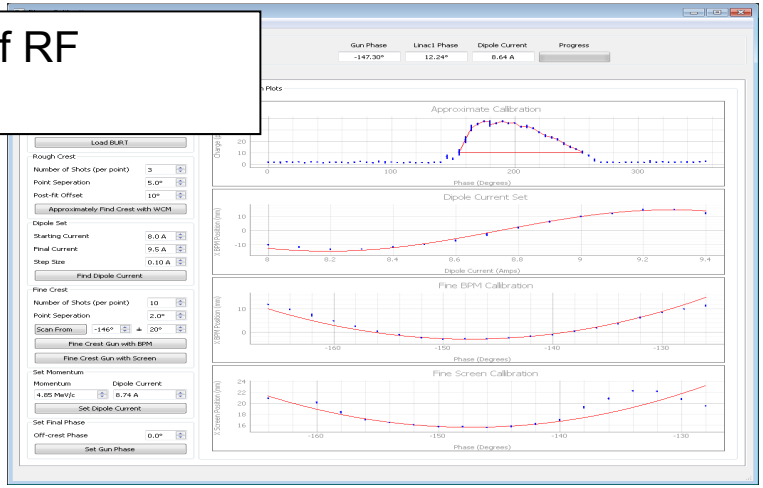


High-Level Software

Cathode charge scans and RF centring in solenoid.



Auto-phasing of RF structures.



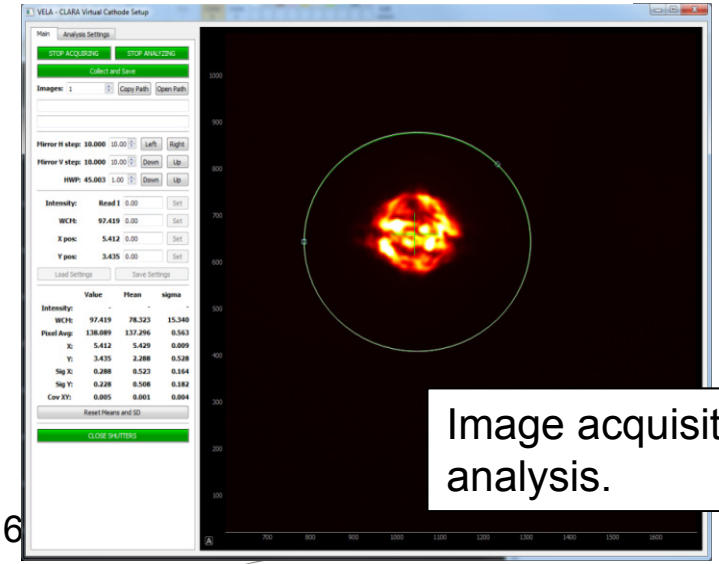
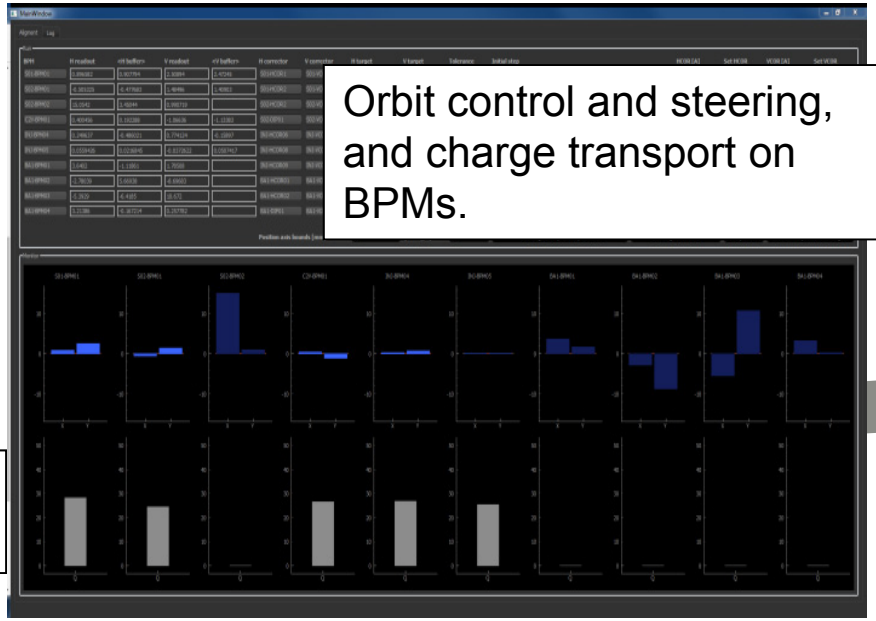


Image acquisition and online analysis.

Orbit control and steering, and charge transport on BPMs.



Thank You