



Science & Technology
Facilities Council

UK Research
and Innovation

Status of CLARA Front End Commissioning

Alex Brynes, on behalf of the CLARA team
17th September 2018

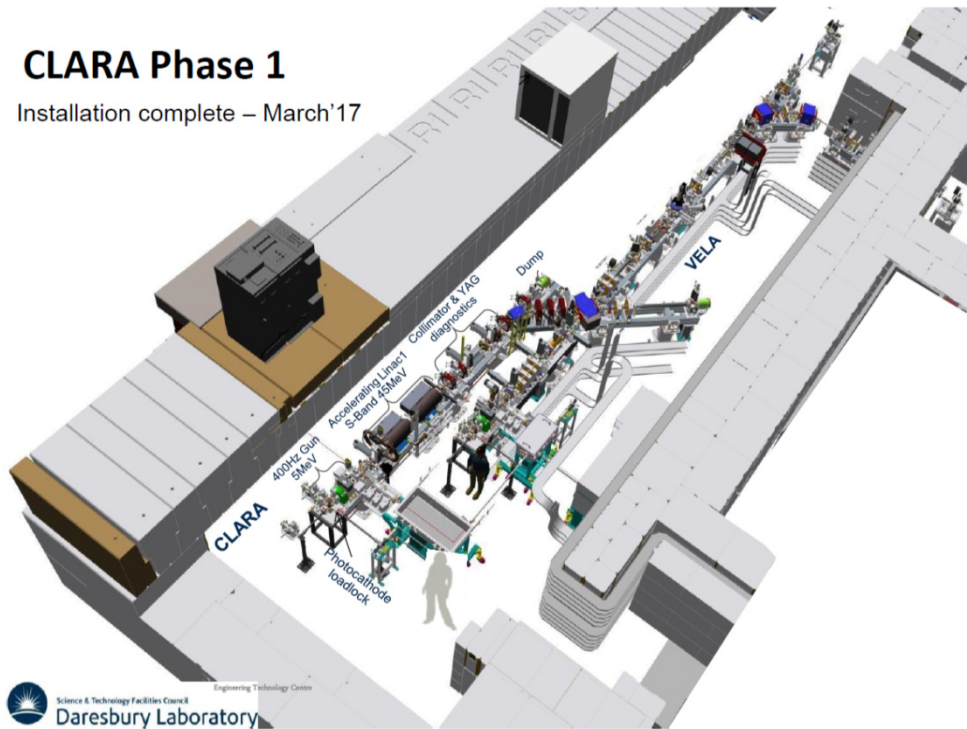
A banner for the LINAC2018 conference in Beijing. The text 'LINAC2018' is written in a large, blue, stylized font with a white outline. Below it, 'Beijing 16-21 September 2018' is written in a smaller, white, serif font. The background of the banner shows a traditional Chinese building with a red roof and a courtyard, with a body of water in the foreground.

LINAC2018

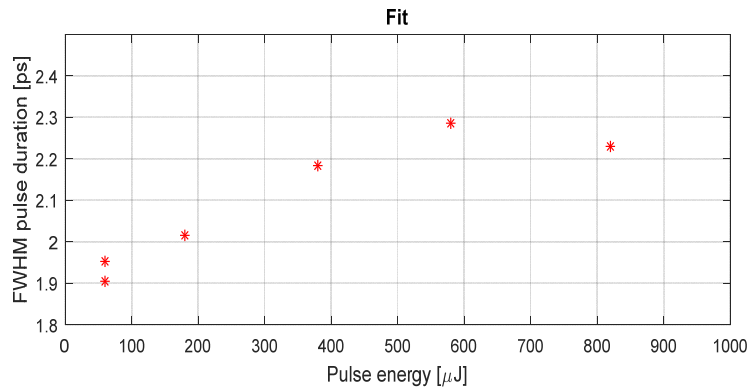
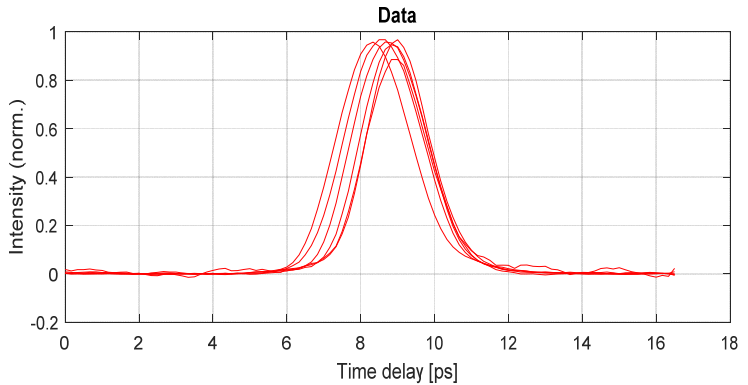
Beijing 16-21 September 2018

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.



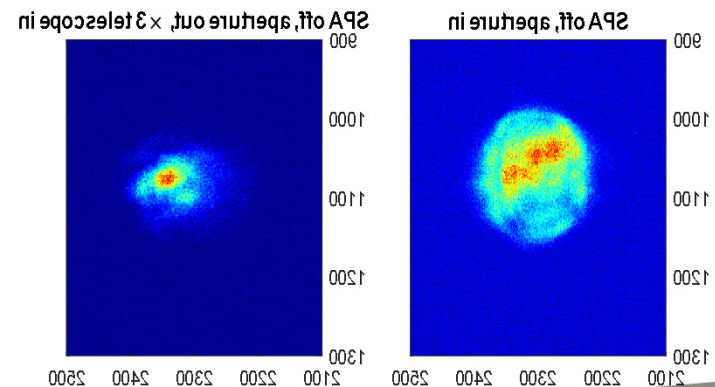
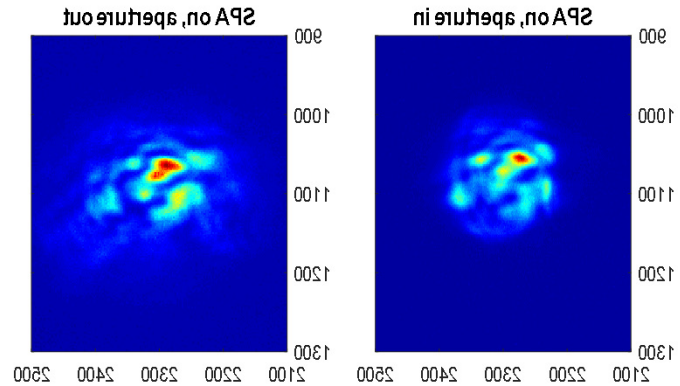
PI Laser Transport Investigations



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

VC image

Opened aperture.

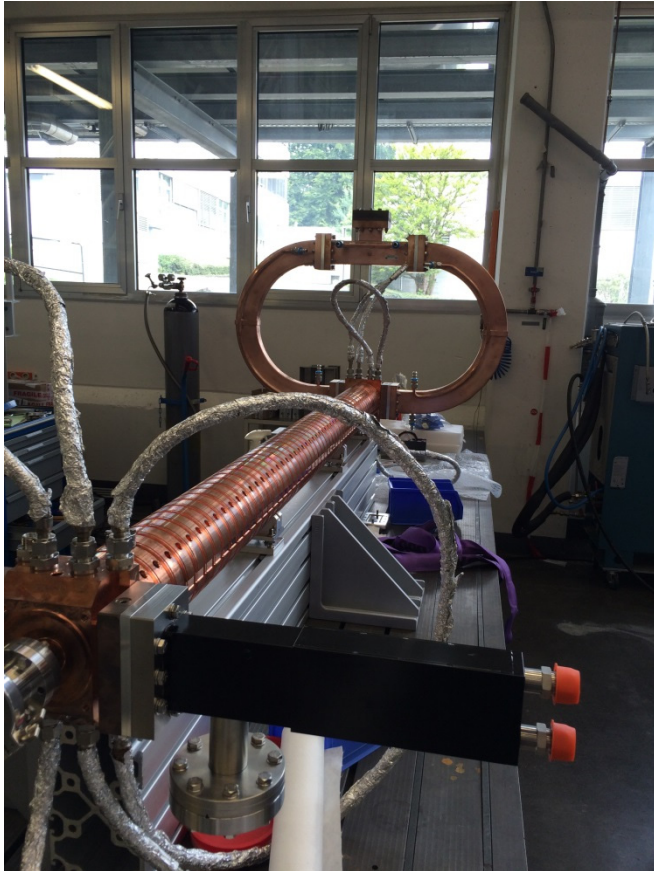


SPA off.

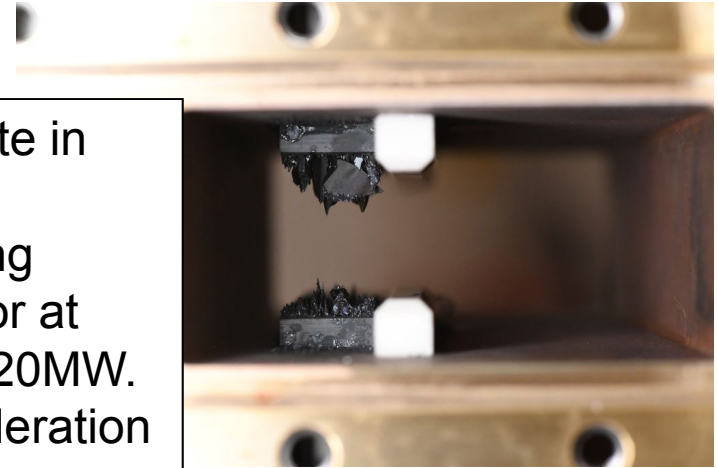
Smaller profile from demagnification.

Linac Waveguide

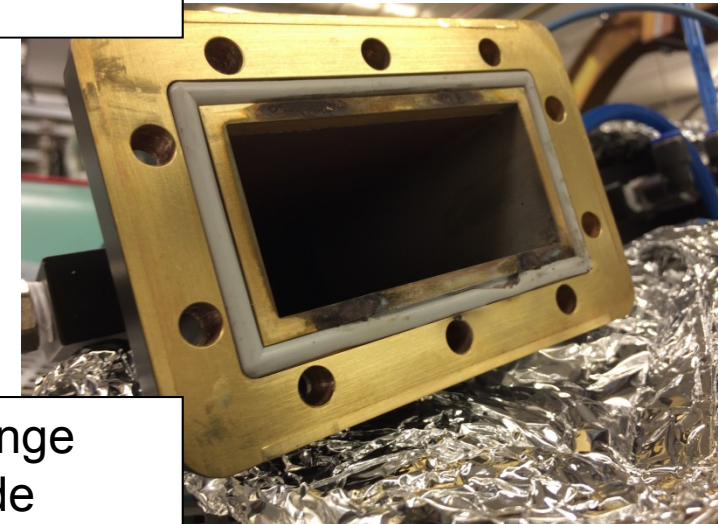
- Linac 1: 2m S-band TW
- Klystron power = 35MW
- Beam acceleration = 45MeV/c



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

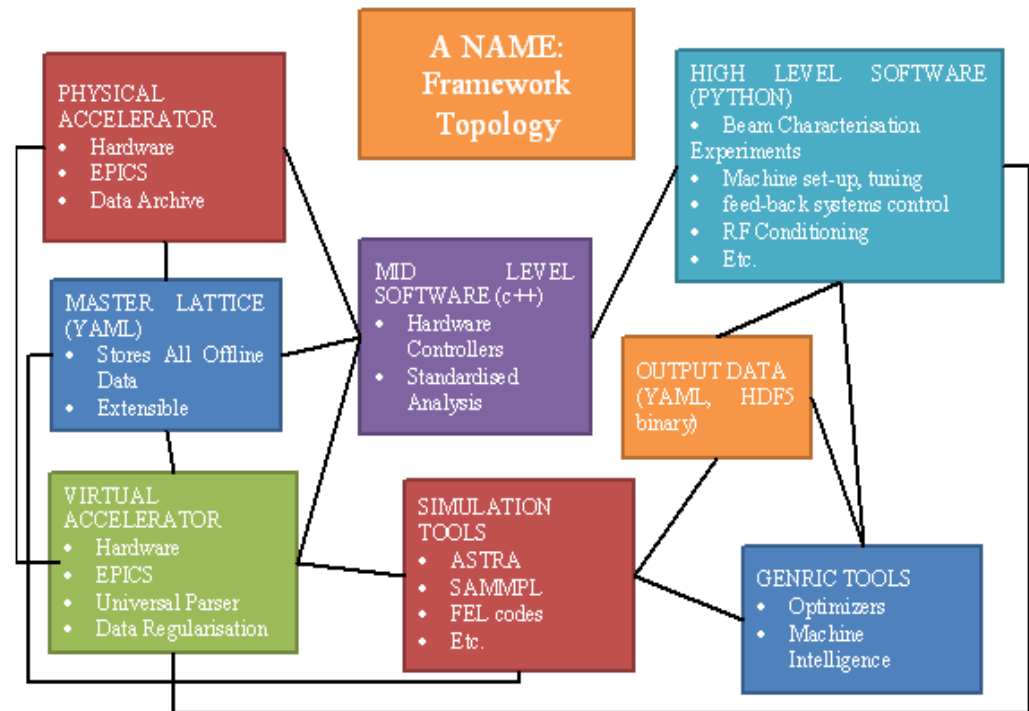


Damage to flange from waveguide arcing



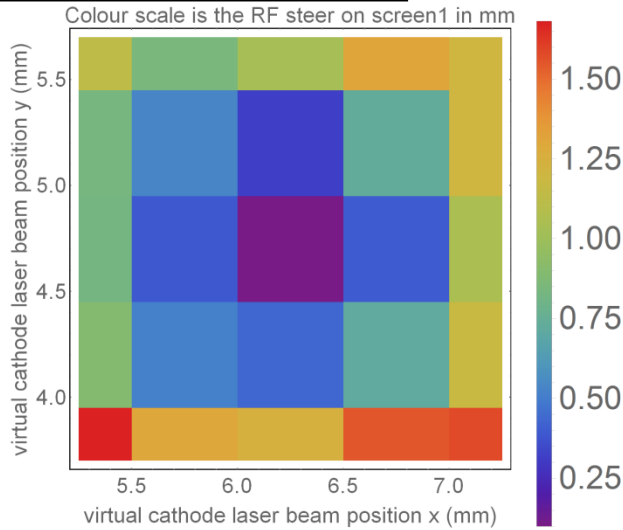
High-Level Software

- 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.

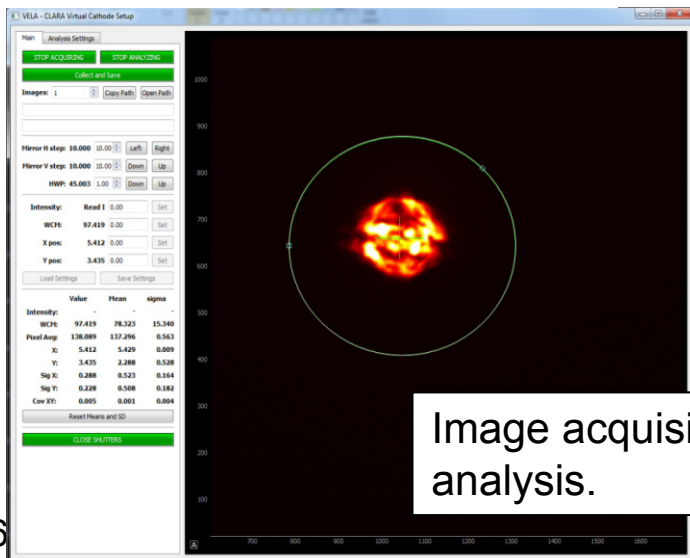
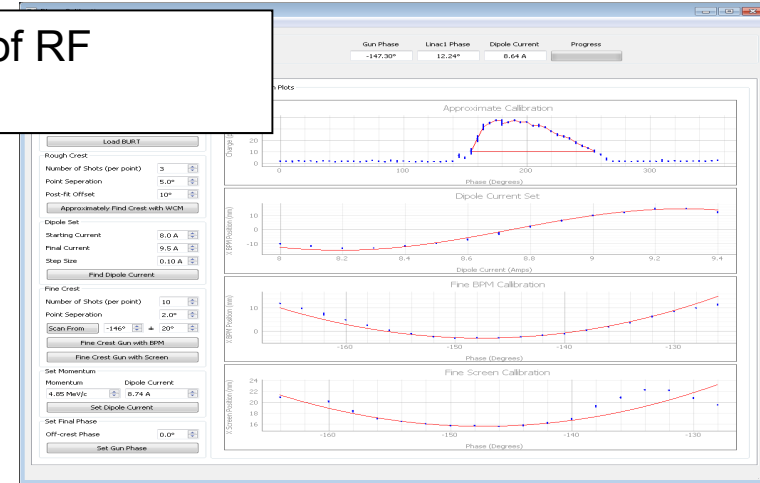
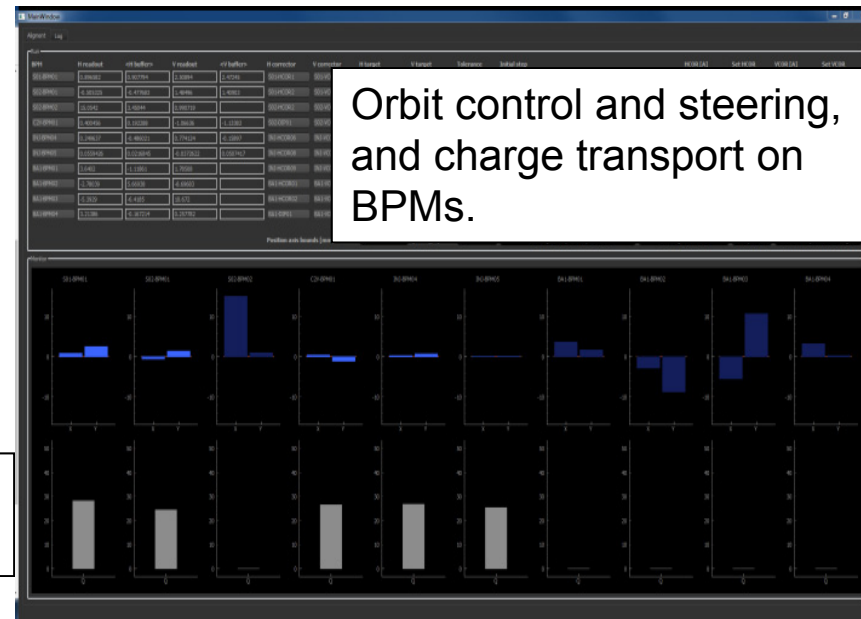


Image acquisition and online analysis.



Orbit control and steering, and charge transport on BPMs.

Thank You