PAUL SCHERRER INSTITUT

PSI

Thomas Geoffrey Lucas :: Paul Scherrer Institute

WLHA plan

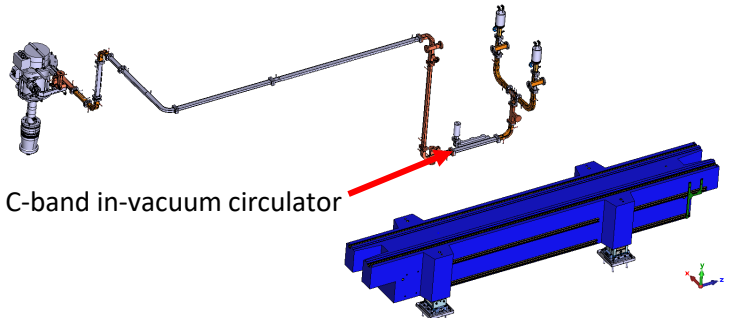
2023-2024

Overview

- Between 2021 and 2024 the IFAST project is taking place in WLHA.
- The bunker has been rebuilt.
- The IFAST project will take place in three stages:
  - High power testing of an RF circulator.
  - High power testing of SW RF Photogun.
  - High power testing of TW RF Photogun.
- Recently we receive funding for the testing of field emission cathodes. Following the testing of the RF photoguns we'll test the field emission cathodes.

Phase 1: Circulator test

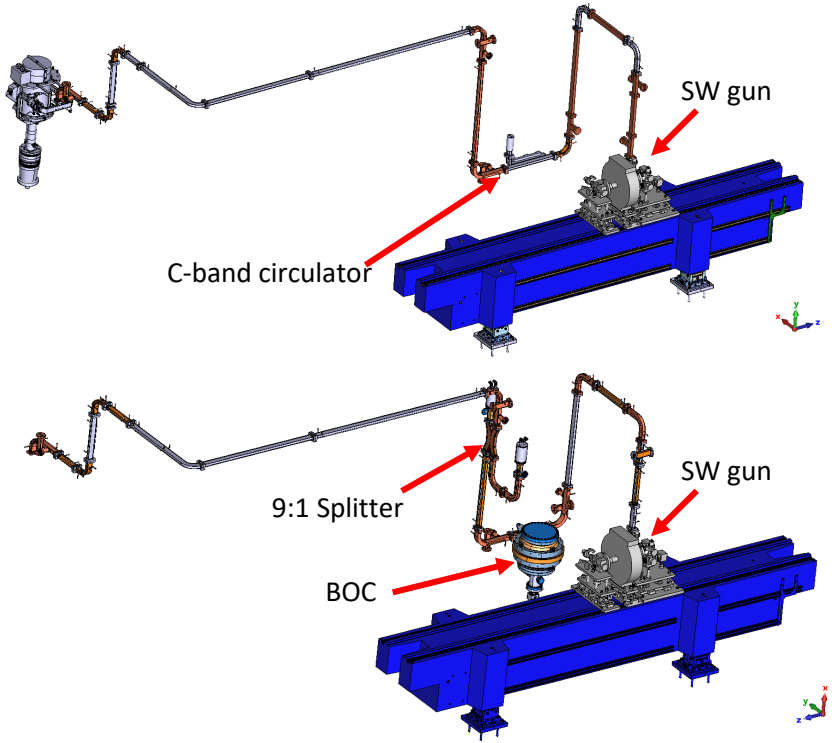
- Initial high power testing of the in-vacuum circulator
- Testing of the new klystron
- Checking waveguide components.



Phase 1: Circulator test

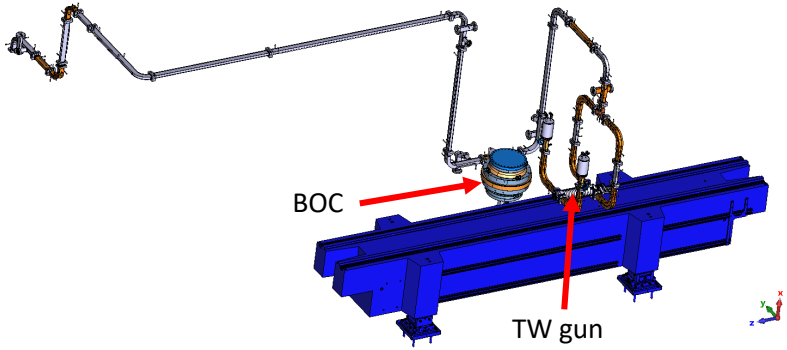
Phase 2: Standing-Wave RF Photogun

- Phase 2 will occur between July 2023 and December 2023.
- Involves the high power testing of the standing-wave RF photogun.
- Standing-wave devises result in large reflected power to klystron. There are two solutions to test the gun:
  1. RF circulator
  2. Splitter with BOC



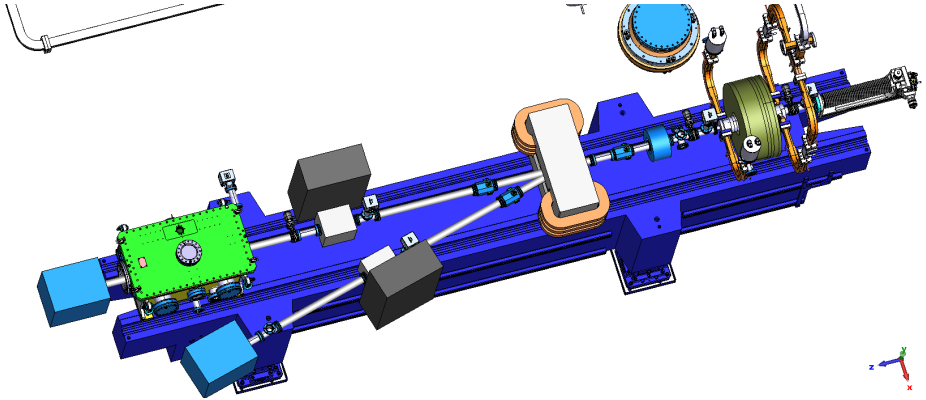
Phase 3: Travelling-wave RF Photogun

- Phase 3 will occur between January 2024 and June 2024.
- Involves the high power testing of the travelling-wave RF photogun.

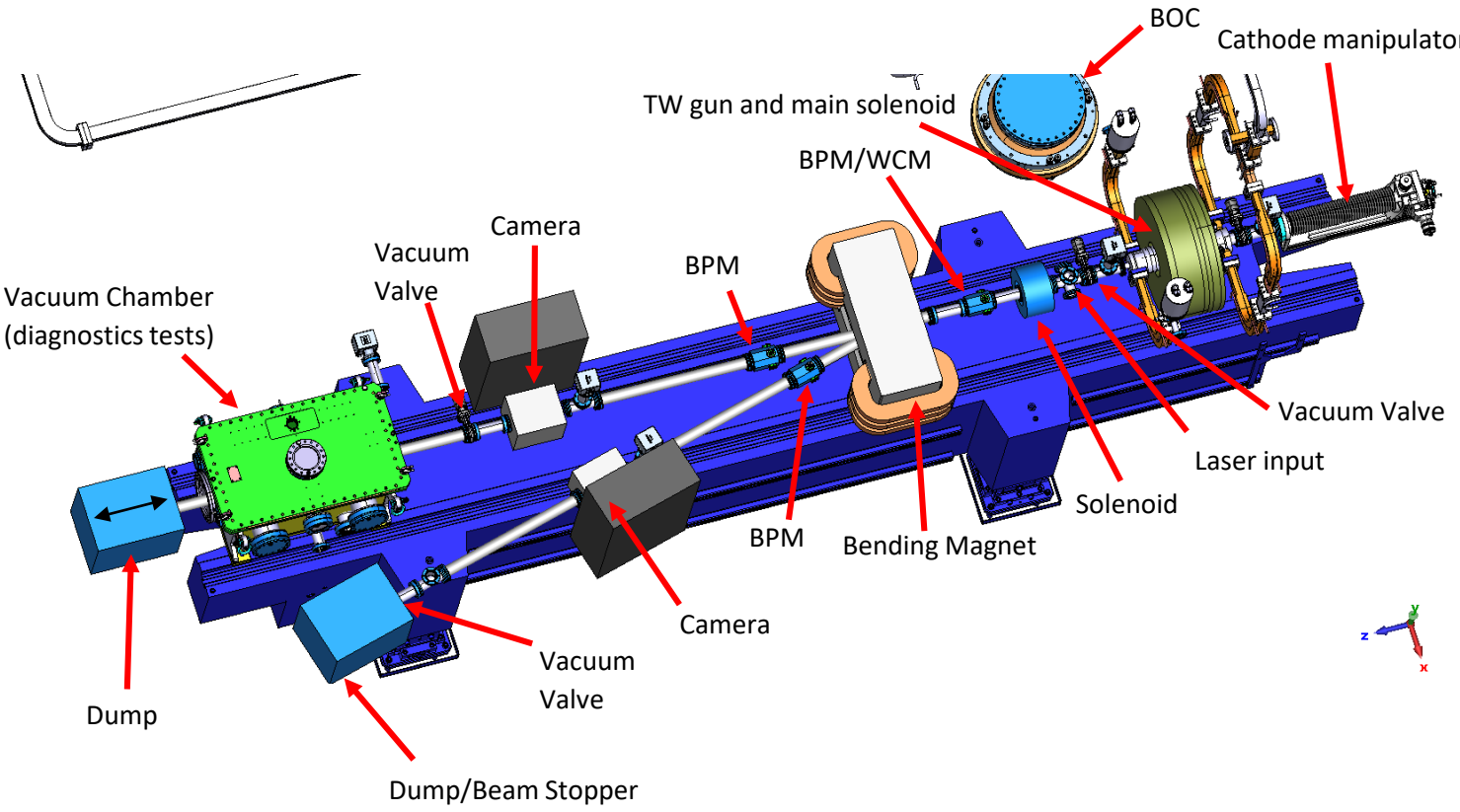


Phase 4: A Multipurpose Test Facility

- Received 200k for the testing of field emission cathodes in the TW gun.
- Phase 4 occurs once IFAST has finished. Rougly June 2024 to December 2024.
- This will be the transition into the IFAST Innovation fund tests.
- We have received money to purchase some instrumentation for the beamline.



Phase 4: A Multipurpose Test Facility



Magnets

- Main solenoid
- Second solenoid
- Bending Magnet

Instrumentation

- BPMs
- Cameras
- WCM

Other Vacuum components

- Laser input chamber
- Vacuum chamber
- Vacuum valves
- Pumping port

Optional elements

- TDC could be used for time resolved measurements of energy spread and emittance.
- Test of diagnostics elements include WCM for Porthos, nanoscale wire scanners and THz structures.
- Concept tests
  - Field emission cathode testing
  - Electron diffraction
  - FLASH therapy
  - Detector tests

Conclusion

- IFAST involves the high power testing of two RF photoguns at C-band frequencies.
- WLHA will be the testing station for these two photoguns over the next 1.5 years along with the test of a field emission cathode concept.
- WLHA bunker has been recommissioned from previous SITF.
- After the gun tests we have the possibility of developing a multipurpose testing facility in WLHA. This could be used to test many different concepts related to SwissFEL and high brightness injectors.