



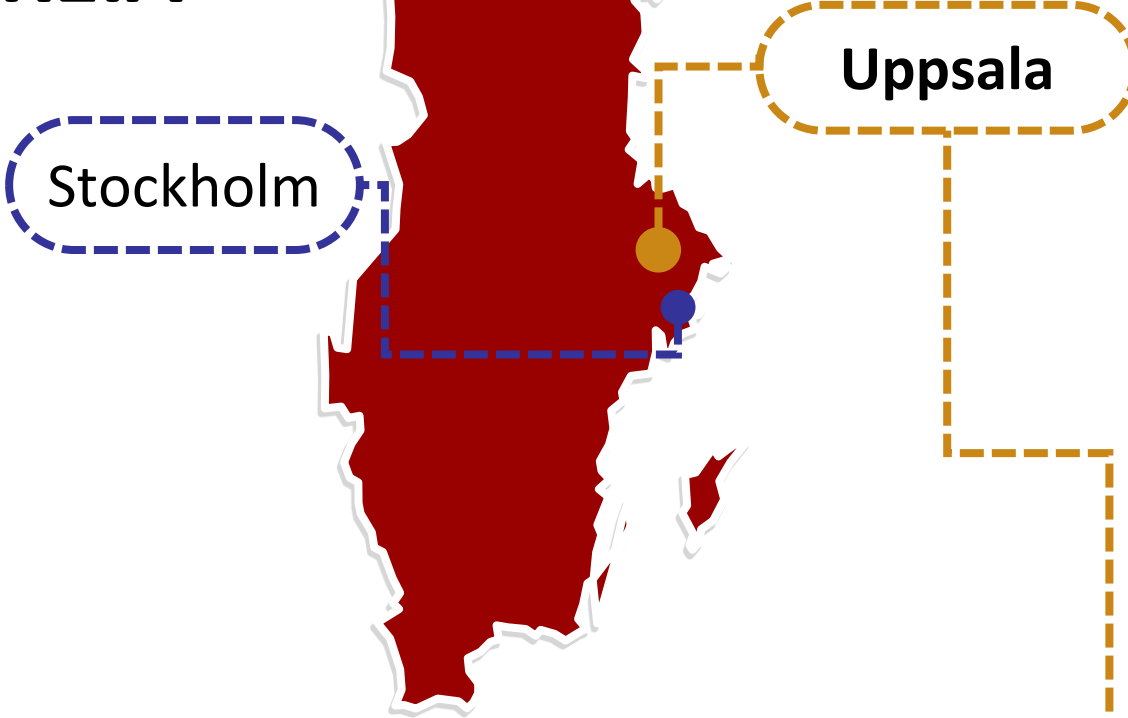
UPPSALA
UNIVERSITET

The FREIA Laboratory and GERSEMI

Kévin Pepitone for the FREIA Division
Department of Physics and Astronomy
Uppsala University, Sweden



FREIA

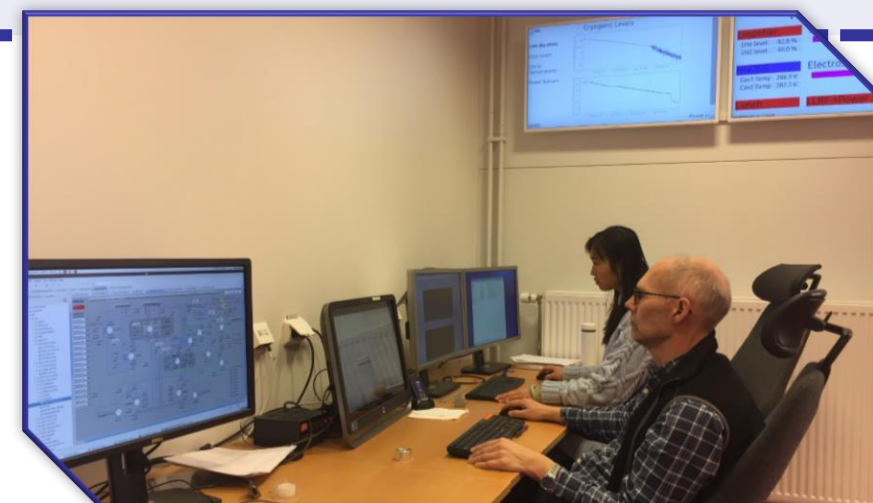


The FREIA hall

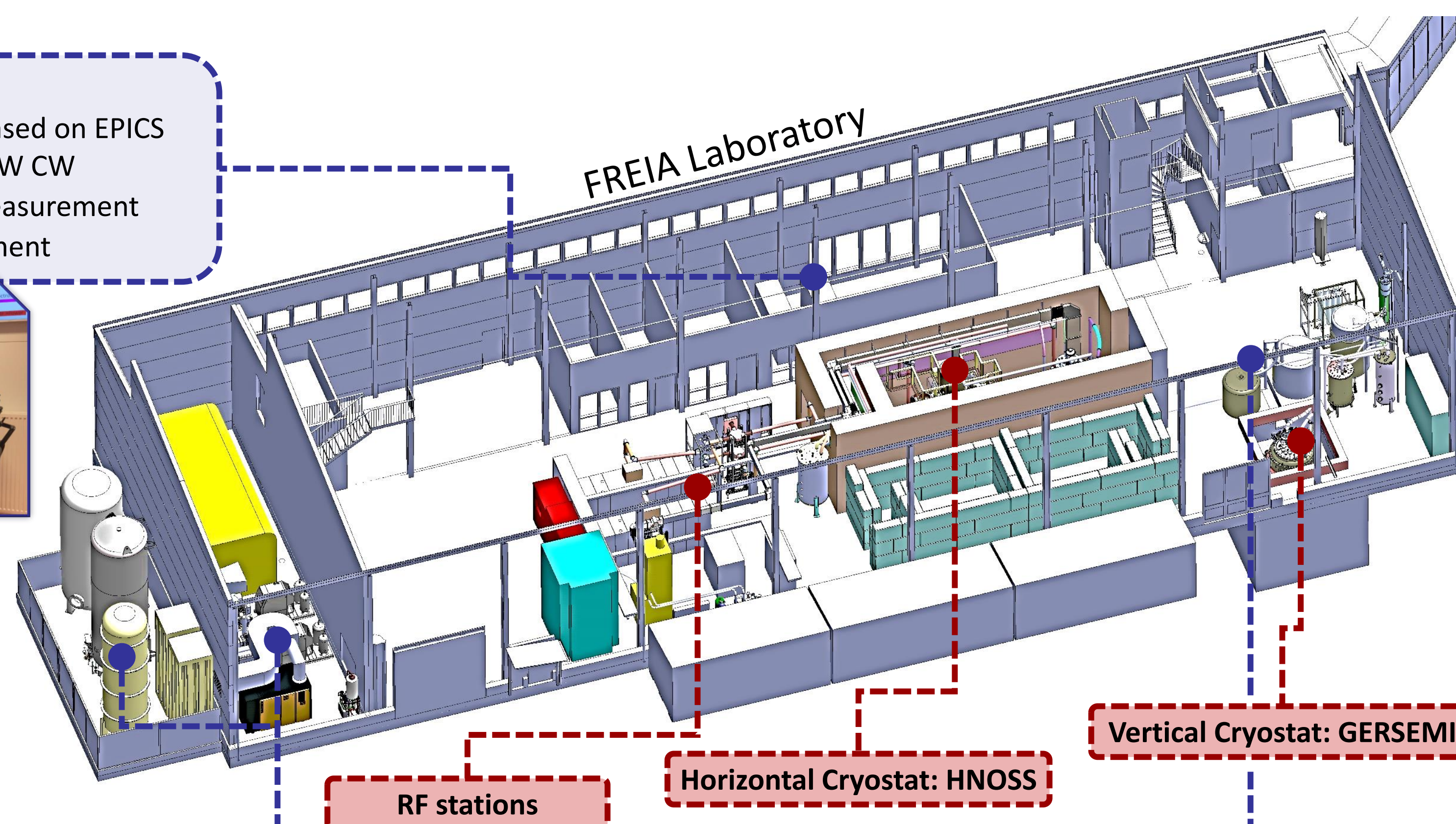
- 1000 m² large, 10 m high
- 7.2-ton movable crane and mechanical equipment
- Small workshops for mechanics and electronics and 50 m² control room
- Office space for ~25 people

Control room

- The overall control system is based on EPICS
- Self-excited loop, 352 MHz, 1 kW CW
- LLRF controls and RF power measurement
- Standard measurement equipment



FREIA stands for "Facility for Research Instrumentation and Accelerator Development". The FREIA Laboratory was established in 2011 within the department of Physics and Astronomy at Uppsala University, to develop and test new particle accelerator and detector instrumentation. FREIA is located at the Ångström Laboratory campus and was inaugurated in 2013



Cryogenics area

- LHe and LN₂ dewar filling area
- Helium liquefier 140 l/h at 1.15 bar
- Liquid helium storage dewar 2000 l + 1000 l
- Liquid nitrogen storage dewar 20 m³ at 3 bar
- High pressure helium gas storage, 19.2 m³ at 200 bar
- High pressure helium gas recovery compressor station, 255 m³/h at 200 bar
- Impure helium recovery gas storage balloon 100 m³
- Helium gas sub-atmospheric pumping system, 3 g/s at 10 mbar

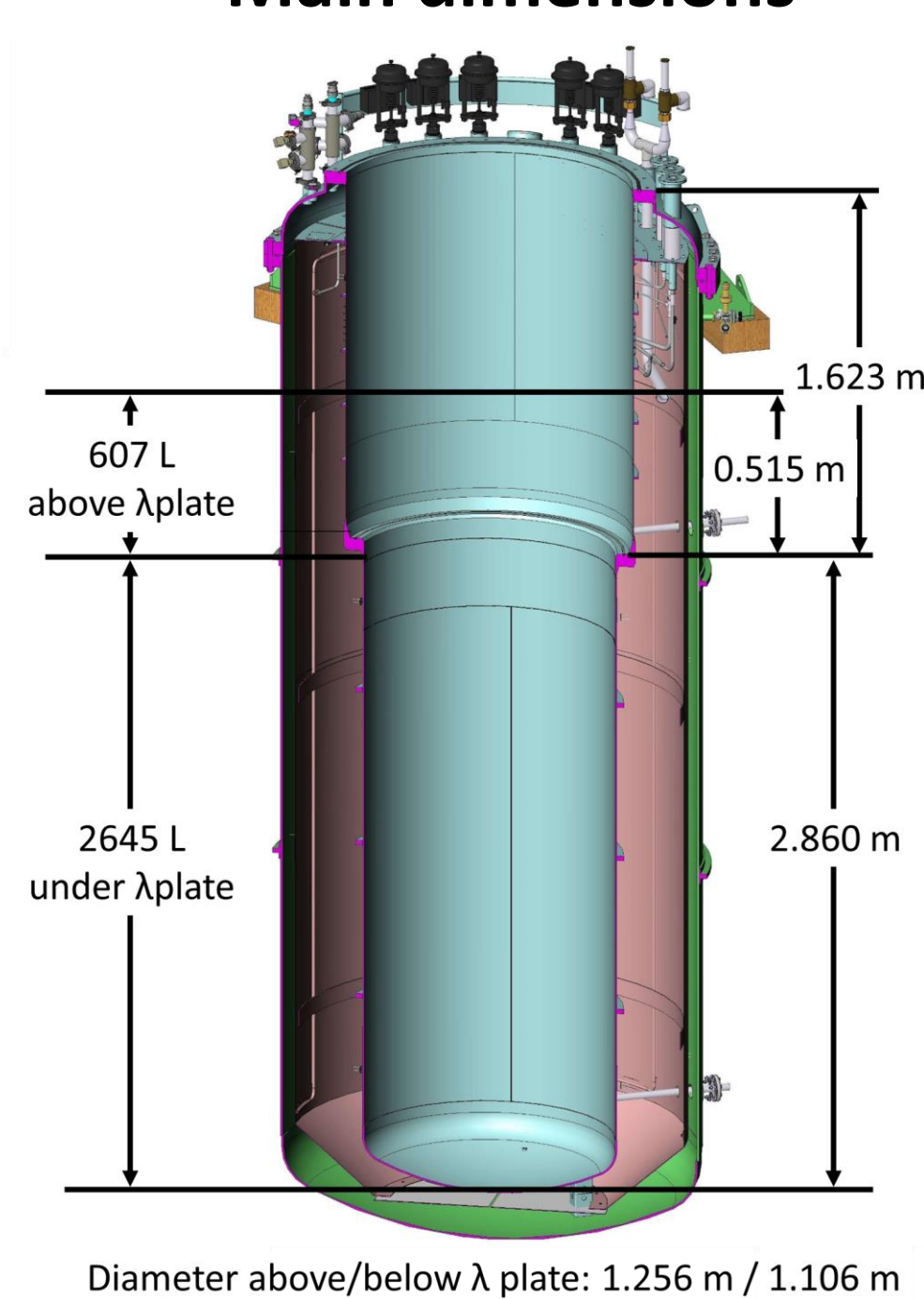


GERSEMI

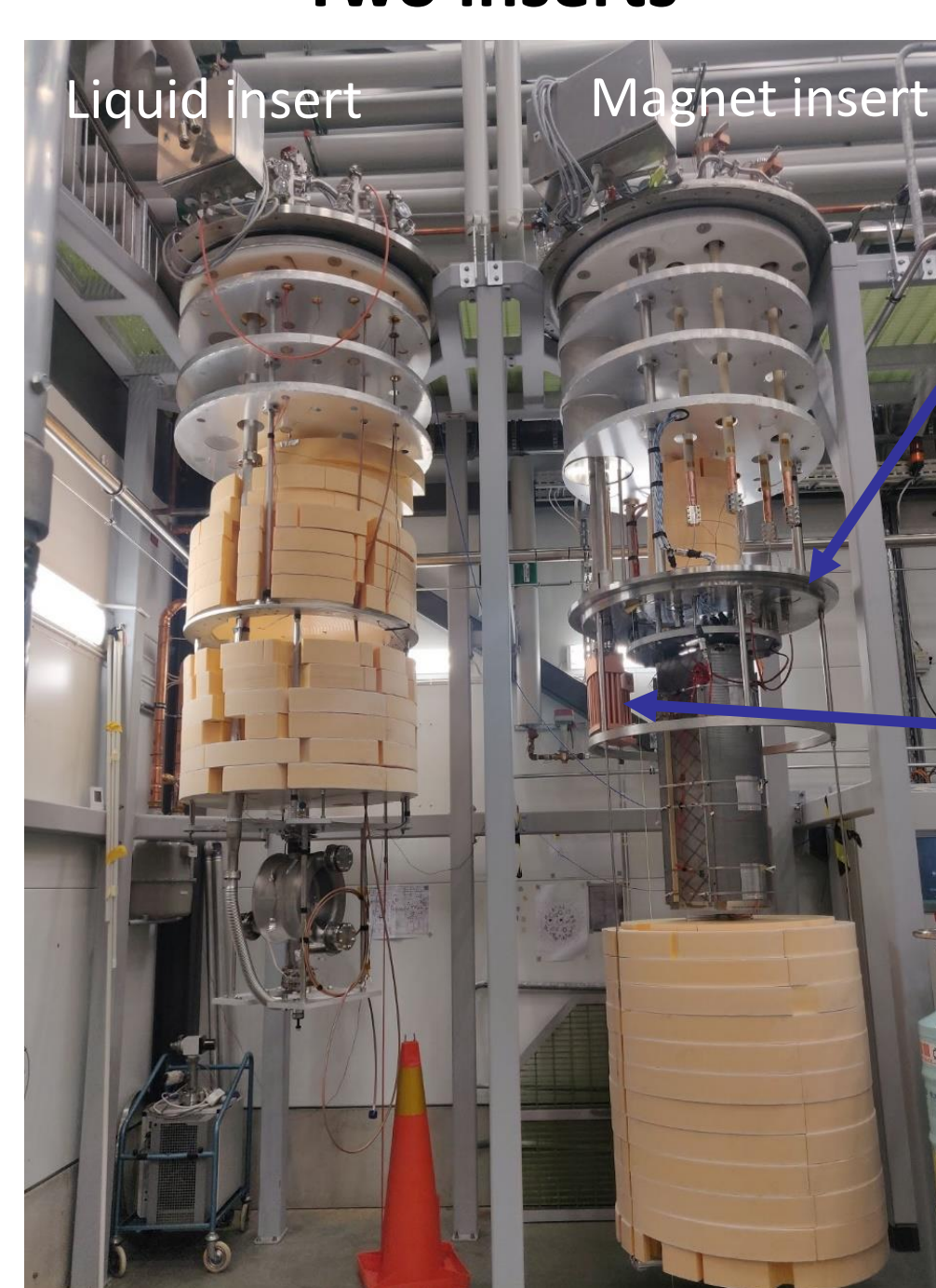
A versatile vertical cryostat system for testing superconducting devices such as accelerating cavities and magnets, either in saturated or sub-atmospheric liquid helium baths.

- Dimensions: 1.1 m diameter, 2.8 m height
- Range of operation: 1.8 to 4.5 K, 16 to 1250 mbar
- Pressure stability at 16 mbar: ± 0.1 mbar
- Cooling power at 1.8 K: 90 W
- Superconducting magnets
- Maximum allowed stored energy up to 500 kJ
- Maximum allowed up to 5 ton
- Superconducting cavities

Main dimensions

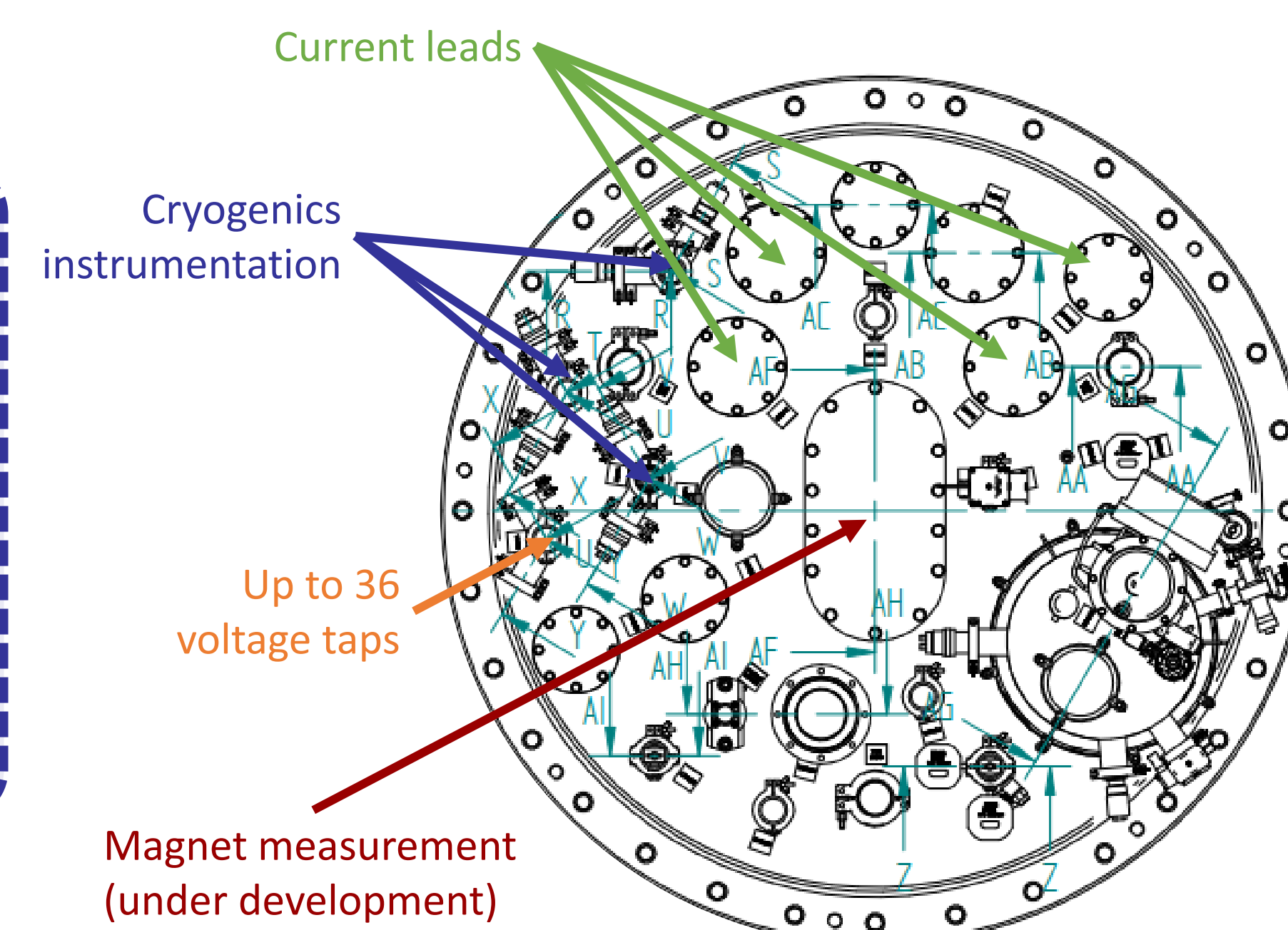


Two inserts



- Lambda plate to separate 2 K pressurized helium from 4 K helium
- Heat exchanger with sub-atmospheric 2 K helium to cool the pressurized 2 K helium

Top view

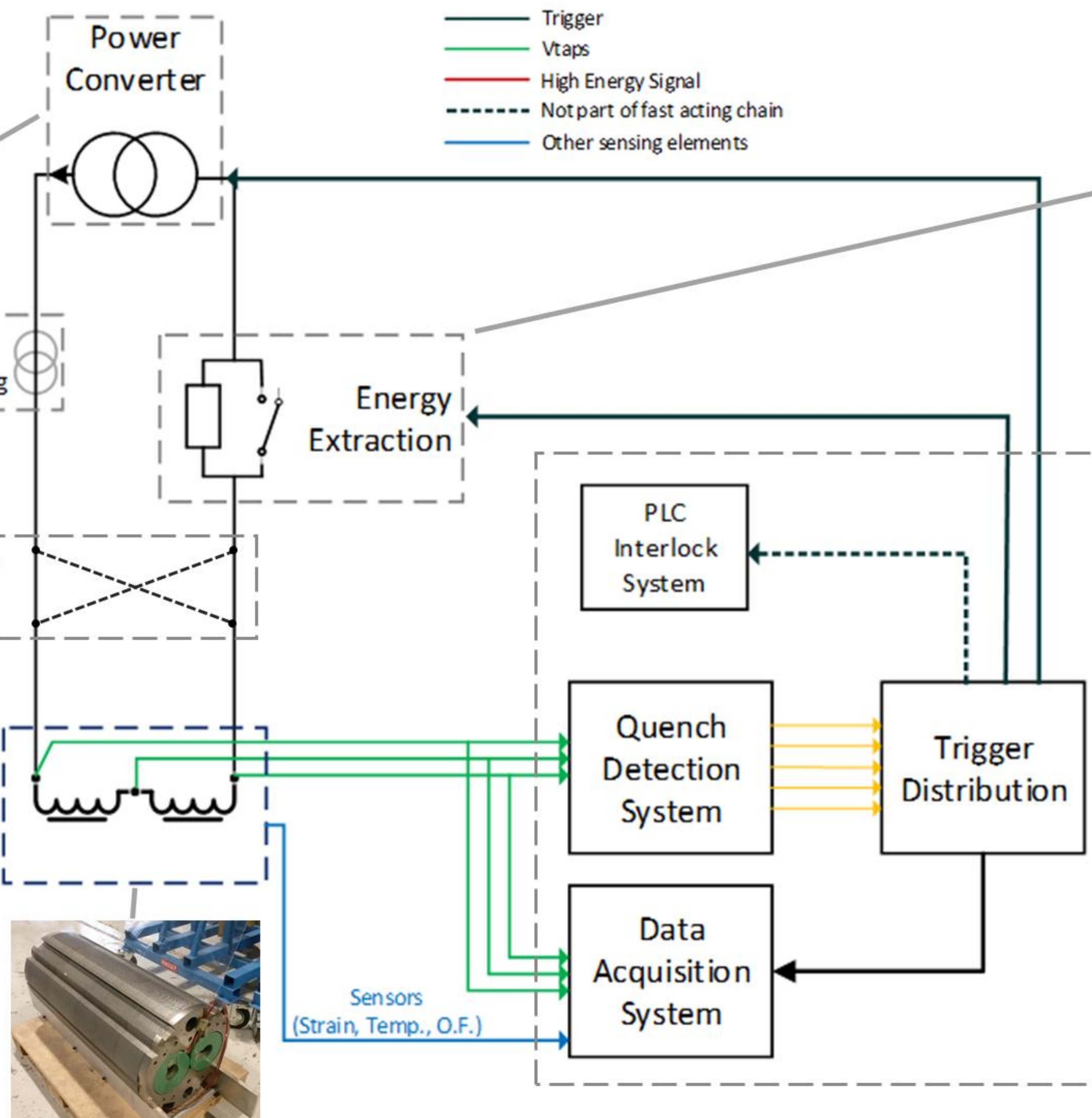


Satellite equipment

Power converters can provide a maximum of 2 x 2 kA_{DC} for a maximum voltage of 10 V_{DC} in one quadrant



Polarity reversing switches have been installed to operate in four quadrants



IGBT based energy extraction units
Dump resistors between 77 m Ω and 3200 m Ω



DAQ
72 LF channels
48 HF channels
DMM
10 channels
Safety
20 PotAim cards
1 uQDS
PLC