



# ***XLS @ Uppsala University***

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**FREIA Laboratory, Uppsala University**

*XLS - WP4-meeting, 30/11/2017*

# ***FREIA Laboratory***

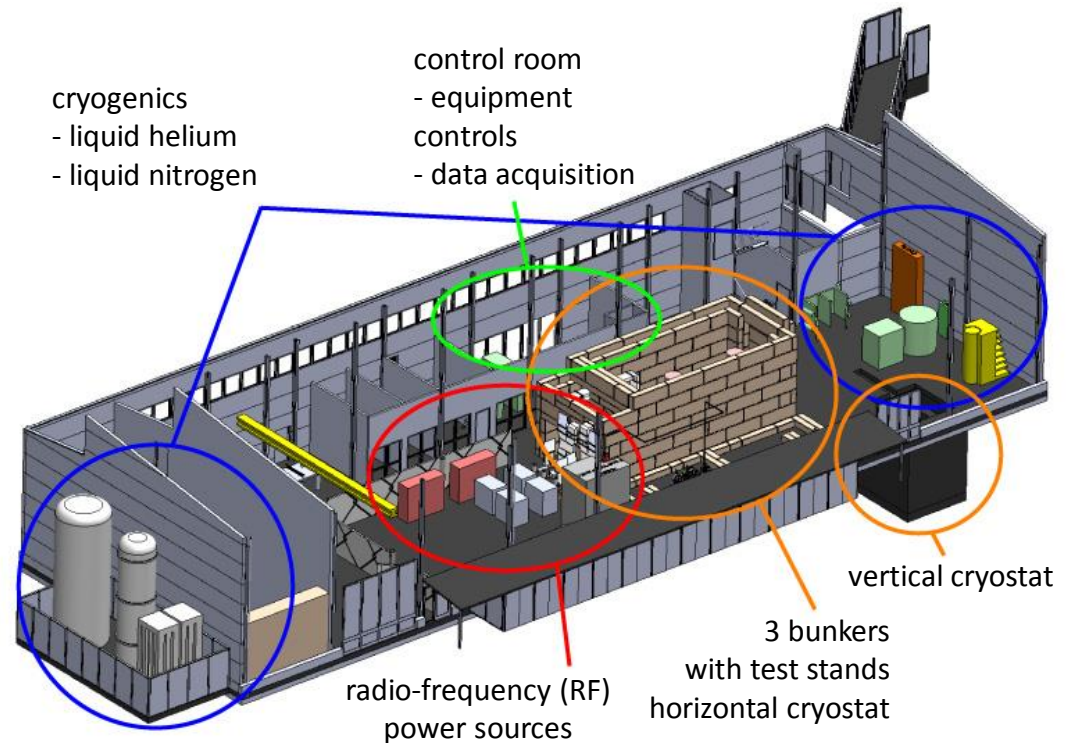
## ***Facility for Research Instrumentation and Accelerator Development***

### **History of Accelerator Science in Uppsala**

- “ Gustaf Werner synchro-cyclotron (1947 - 2016): nuclear & medical physics
- “ CELSIUS ring (1984 - 2005): nuclear & particle physics

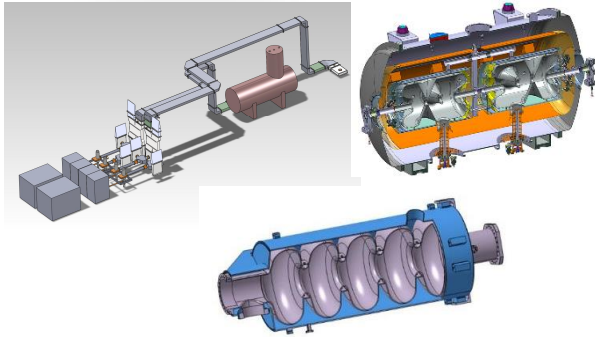
### **Recent projects**

- “ CTF3/CLIC (since 2005)
- “ FLASH/XFEL (since 2008)
- “ ESS (since 2009)
- “ **FREIA laboratory** (est. 2011)
  - “ 30 employees
    - “ 13 researchers
    - “ 11 engineers/technicians
    - “ 6 PhD students



# FREIA Laboratory Activities

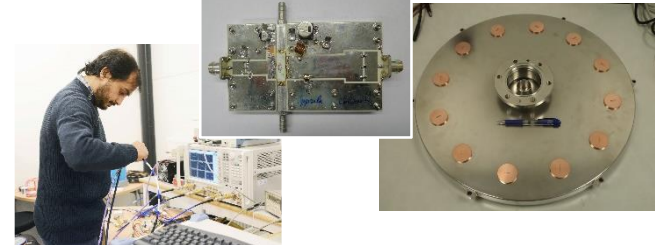
ESS SRF Linac



Cryo Distribution



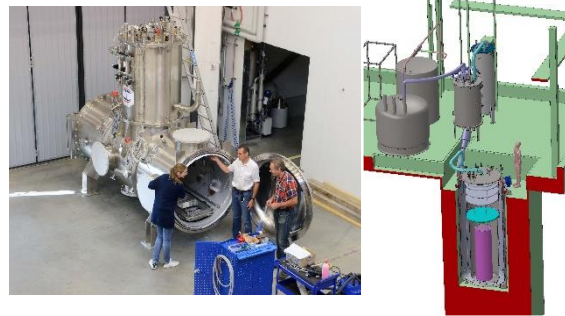
High Power RF



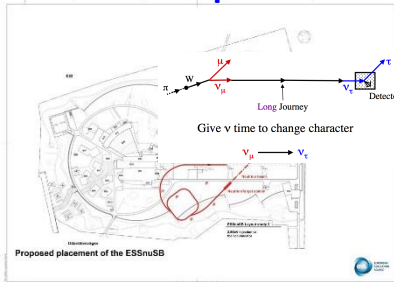
CLIC / CTF3



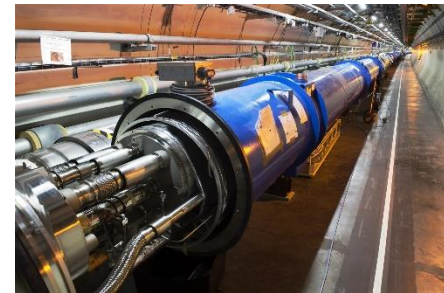
Cryo Test Stands



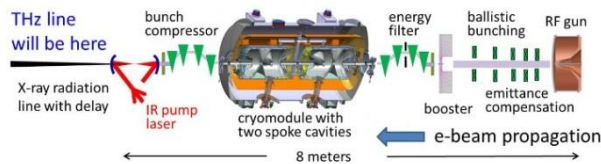
ESS Neutrino Super-beam



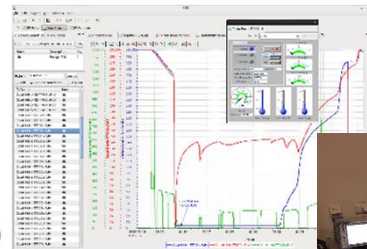
HiLumi LHC



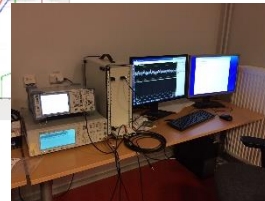
Single-cycle light-beams



Controls & Data Acquisition



EPICS





# *High Power RF @FREIA*

## *Energy efficiency and optimization*

### **352 MHz, 400 kW, 3.5 ms, 14-28 Hz**

- “ prototype for ESS SRF spoke linac
- “ Uppsala design
- “ tetrode tube TH595
- “ industrial manufacturing
  - “ Itelco-Electrosys (Orvieto, IT)
  - “ DB Elettronica (Padua, IT)

### **HV modulator, 120 kV, 3.5 ms, 14 Hz**

- “ Driver for 1.5 MW, 704 MHz klystron for ESS elliptical cavities
  - “ Ampegon (Switzerland)

### **Solid-state amplifiers 352 MHz**

- “ In-house development

### **352 & 400 MHz, 50 kW, CW**

- “ CERN (loan since Feb.2015)
- “ tetrode tube TH571b



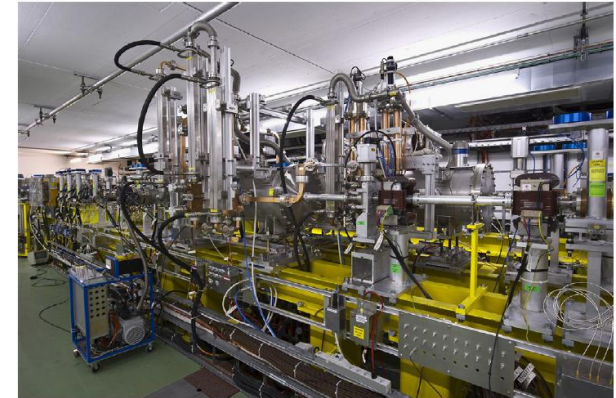


# ***FREIA Laboratory***

## ***X-band RF : expertise and competence***

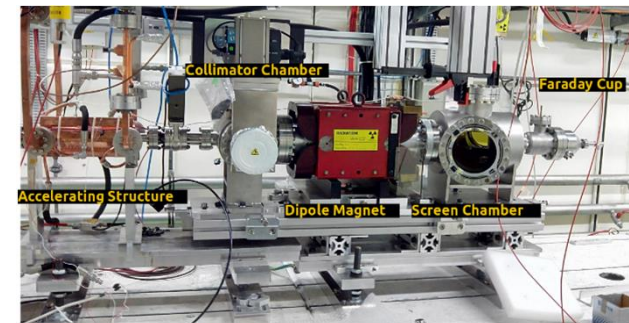
### **Design, build-up and tests of the Two-Beam Test-Stand @CTF3**

- “ Instrumentation
- “ Diagnostics
- “ Beam dynamics



### **Vacuum breakdown studies @ CERN XBoxes**

- “ RF cavities conditioning diagnostics
  - “ Uppsala X-band Spectrometer



### **Vacuum breakdown studies @ Uppsala**

- “ DC studies related to CLIC structures
  - “ In-SEM Experiments
  - “ Cryo-DC setup (soon)

