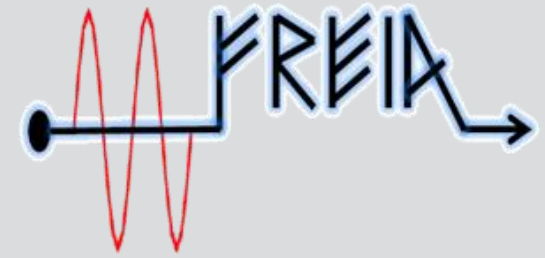




UPPSALA  
UNIVERSITET



# FREIA Laboratory

Facility for Research Instrumentation and Accelerator Development

## News from FREIA

### Status of the “Gersemi” Test Stand

Roger Ruber for the FREIA Team

*2nd International Magnet Test Stand Workshop*

*BNL, 8-9 May 2018*



## Facility for Research Instrumentation and Accelerator Development

Funded by  
**KAWS, Government,  
Uppsala Univ.**

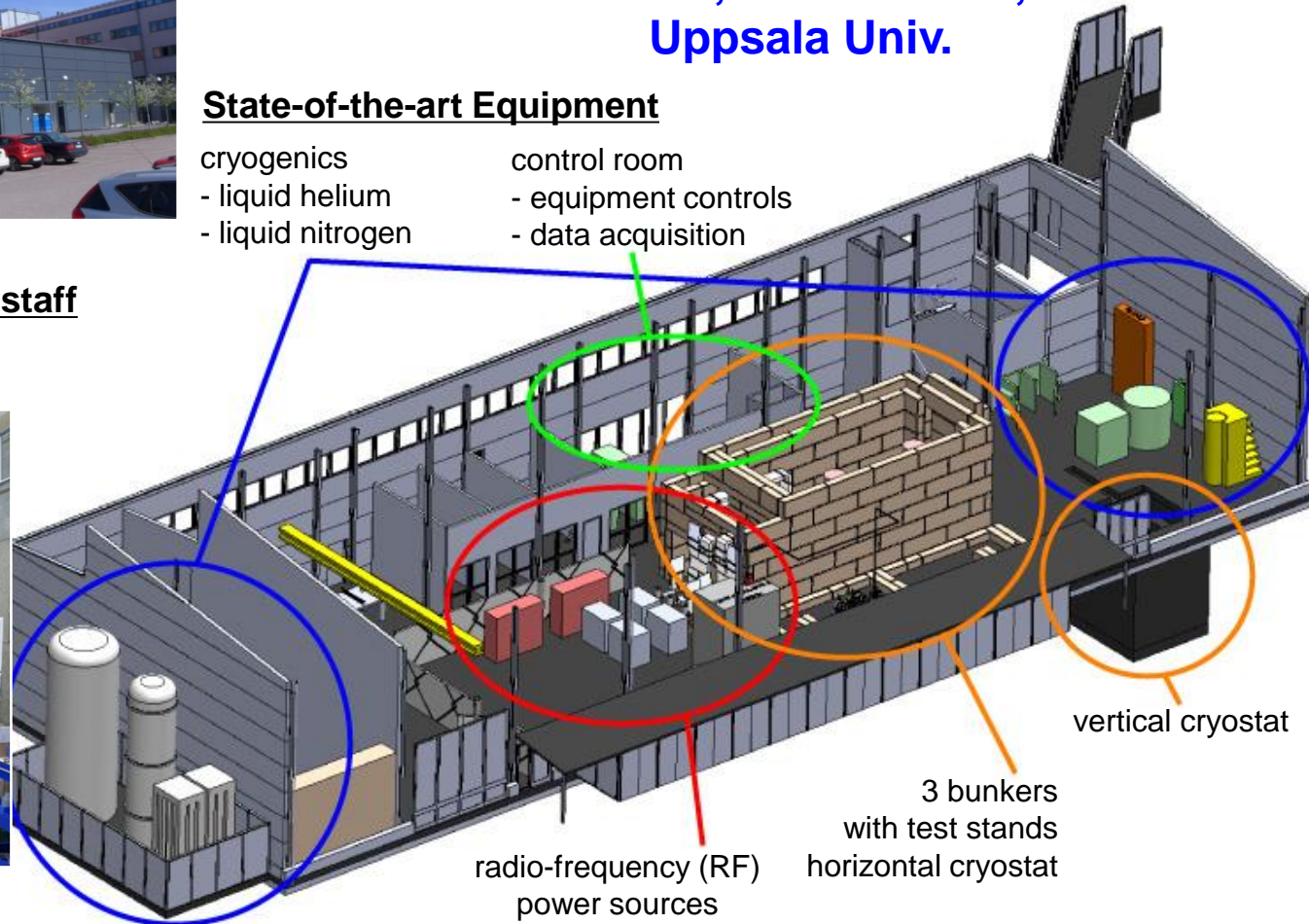
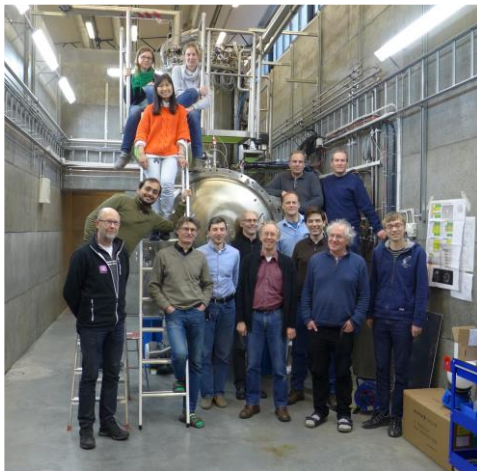


### State-of-the-art Equipment

- |                   |                      |
|-------------------|----------------------|
| cryogenics        | control room         |
| - liquid helium   | - equipment controls |
| - liquid nitrogen | - data acquisition   |

### Competent and motivated staff

collaboration of physics (IFA)  
and engineering (Teknikum).





- **Helium liquefaction**

- 150 l/h at 4.5K (LN2 pre-cooling)
- 2000 l LHe dewar/buffer, 3+1 outlets
- cryostats connected in closed loop

- **Gas recovery**

- 100 m<sup>3</sup> gasbag
- 3x 25 m<sup>3</sup>/h compressor
- 10 m<sup>3</sup> 200 bar storage

- **2K Pumping**

- ~3.2 g/s at 10 mbar
- ~4.3 g/s at 15 mbar
- 90 W at 1.8 K
- 110 W at 2.0 K

- **Liquid nitrogen**

- 20 m<sup>3</sup> LN2 tank



Helium gas recovery system

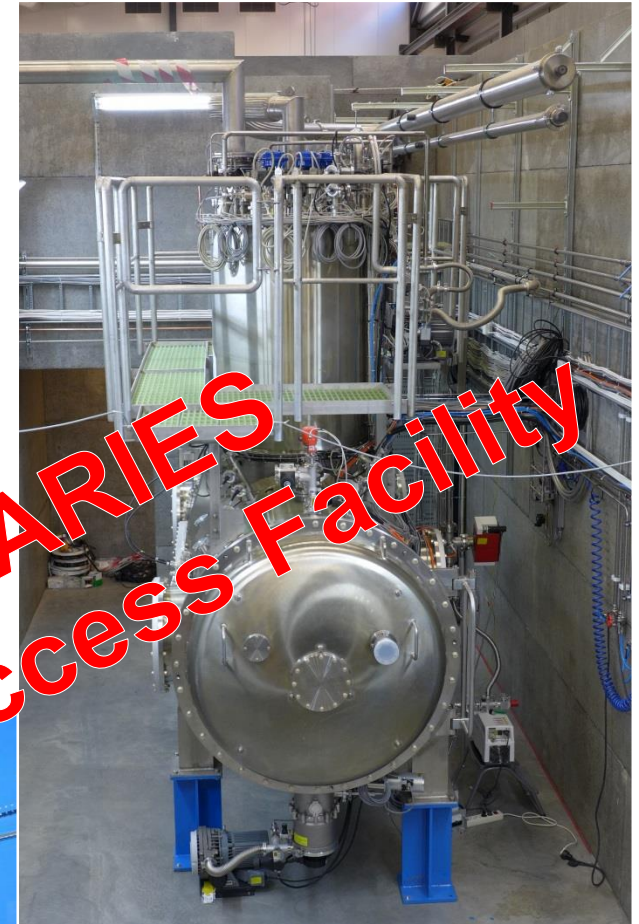


Sub-atmospheric  
pumping station

# “HNOSS” Horizontal Cryostat

HNOSS = Horizontal Nugget for Operation of Superconducting Systems

- Test of superconducting cavities/devices
  - 3240 x  $\varnothing$ 1200mm inner volume
  - up to two cavities simultaneously,
  - each equipped with helium tank,
- Low or High power RF testing
  - fundamental power coupler (top, bottom, side)
  - self excited loop or frequency generator driven
- Operation in the range 1.8 to 4.5K.



Available as ARIES  
Trans National Access Facility

# “Gersemi” Vertical Cryostat

- **Under construction**

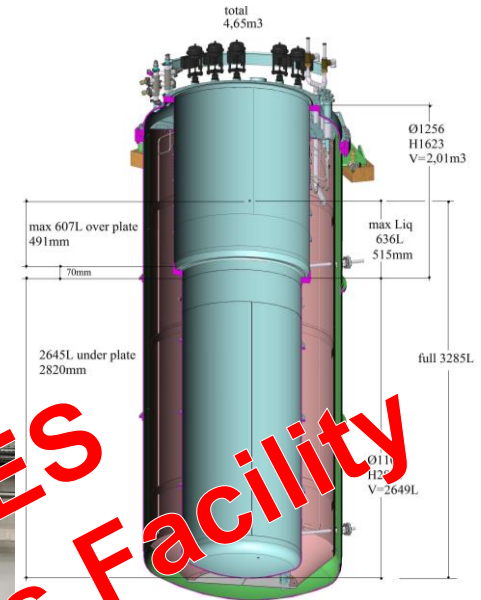
- May → installation
- June → start commissioning with simulator
- September/October → commissioning with inserts

- **Test of SC cavities & magnets**

- 3.2m x ø1.1m total volume
- 2.65m x ø1.1m below lambda plate
  - design includes joint for lambda plate

- **Three operation modes**

- vacuum
- liquid (saturated) bath
- pressurized bath with 2K heat exchanger



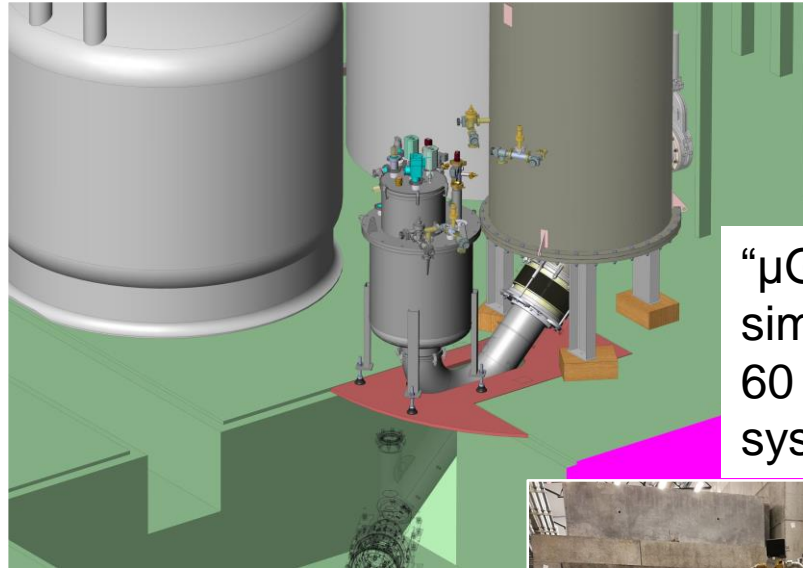
# “Gersemi” Arrival & Positioning



# “Gersemi” Cryostat Re-assembly



# “μGersemi” Simulator & Valve Box



“μGersemi”  
simulator  
60 l cryostat for  
system test

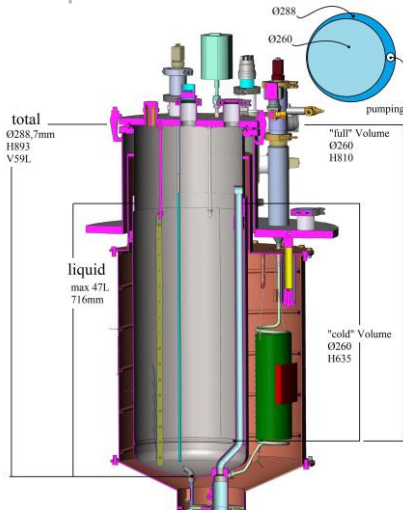


2-May-2018 (100425)

helium distribution  
cold box



“μGersemi” simulator



2-May-2018 (100442)



## Liquid (Saturated) Bath Insert

- (sub-)atmospheric liquid bath
- mainly for SRF cavities



## Pressurized Bath Insert

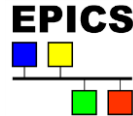
- pressurized liquid bath
  - 2K heat exchanger
- mainly for (small) SC magnets
  - magnet + insert max 6 ton
  - nominal operation 4 barG max.
    - max. stored energy ~500 kJ
  - ports for current leads
    - 4x 2kA current leads (ordered)
  - central oval port for field measurement
    - field measurement system itself not yet foreseen

**Delivery by end May**

**No vacuum insert (yet) → use HNOSS**

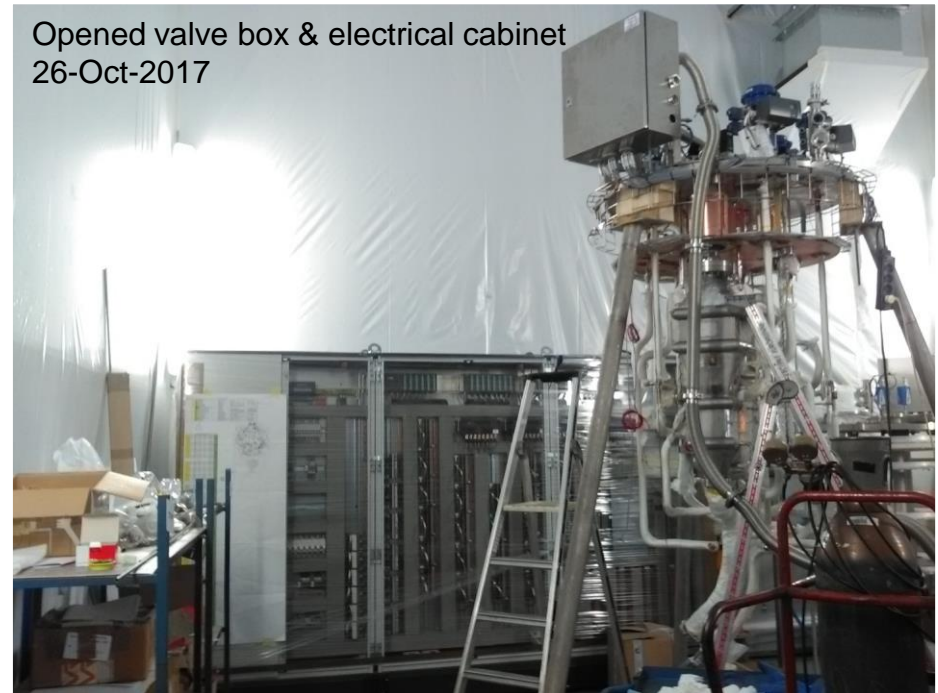
## Controls & Monitoring System

- cryostat/valve box
  - Siemens PLC
  - NI cRIO (safety interlocks)
  - EPICS interface with data archiver
  - connecting different sub-systems: cryogenics, cryostats, ...
- factory tests
  - with valve box & simulator box performed during end 2017-begin 2018
- magnet
  - CERN type



## Magnet Powering System

- 2x 2kA
  - CERN type power converters
- switch and power extraction unit
  - CERN type



**Talk by Kevin Pepitone  
Tue. 5-May 17:05**

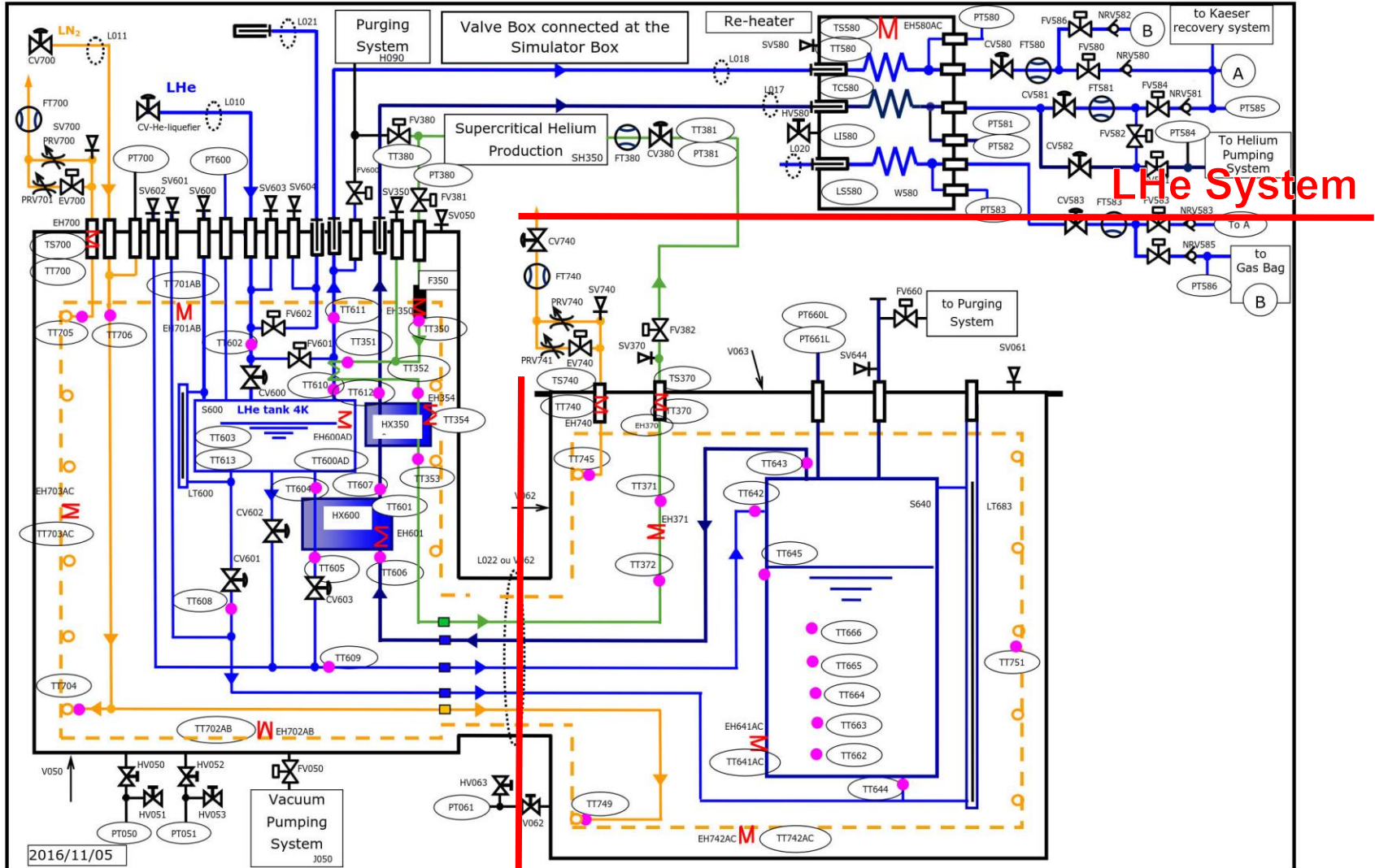
## “Gersemi” at FREIA

- commissioning after summer,
- builds on a long tradition,
- is a young player in magnet testing,
- but working hard to contribute to the community.



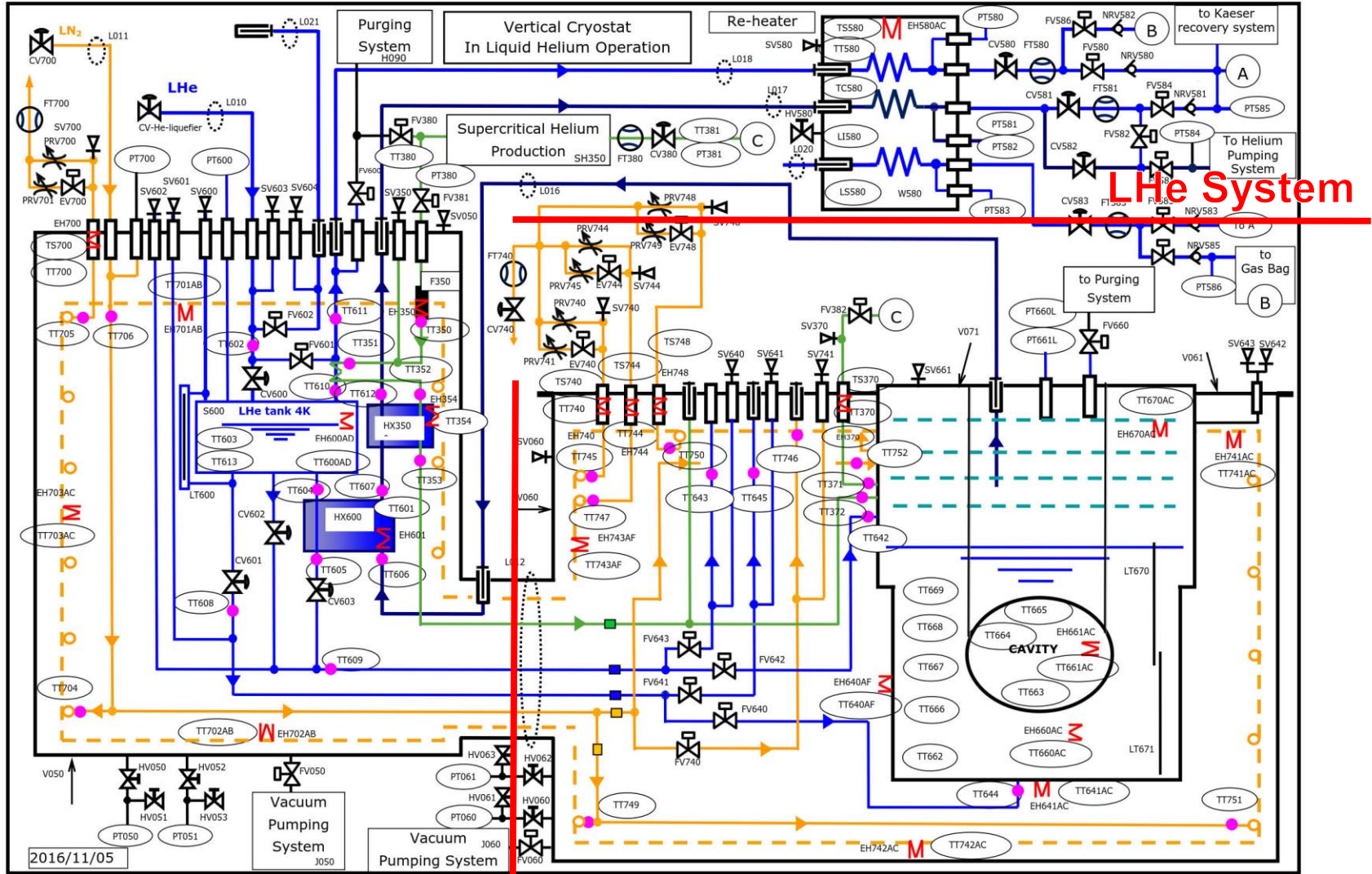


# “Gersemi” Operation - “μGersemi”



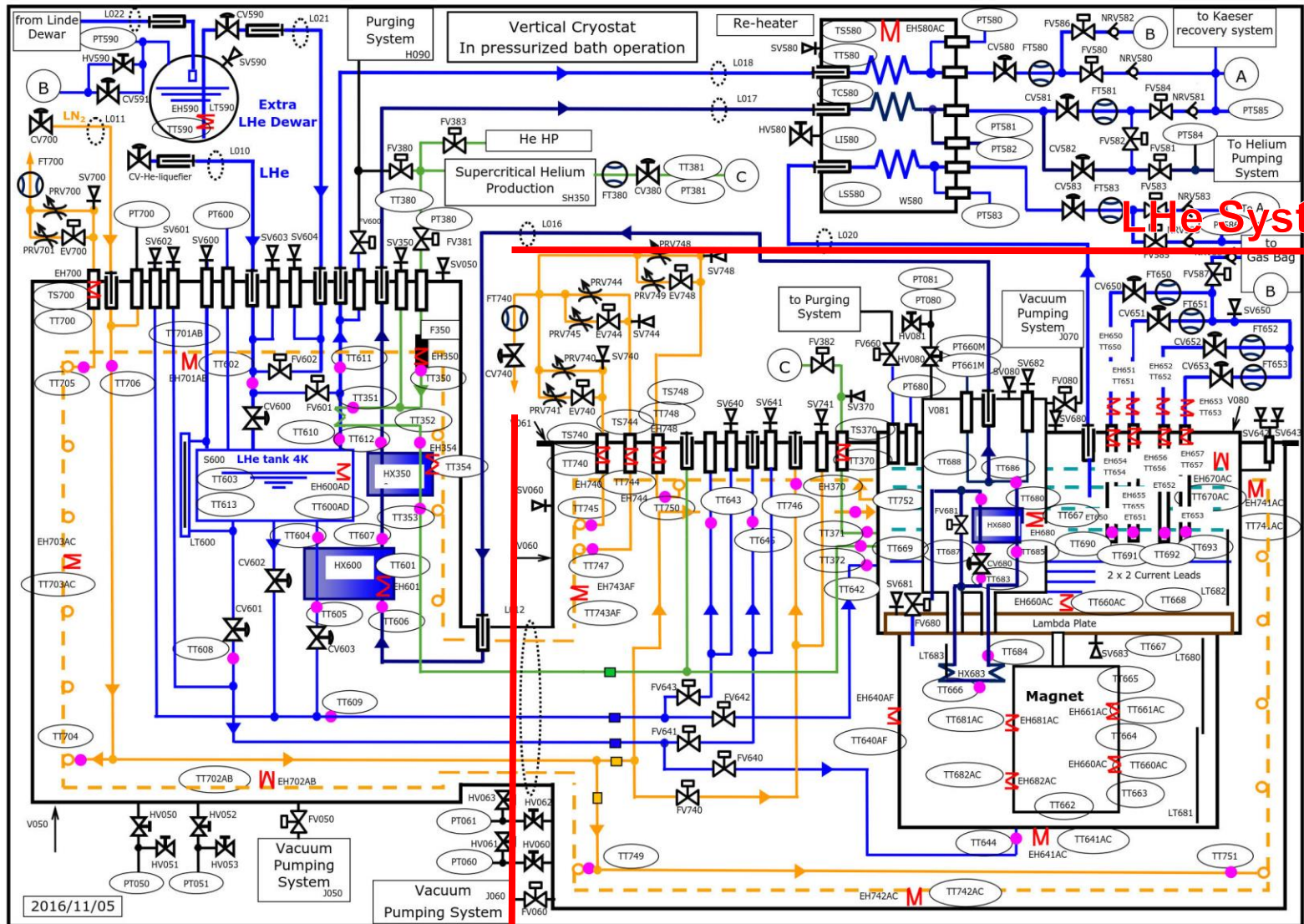
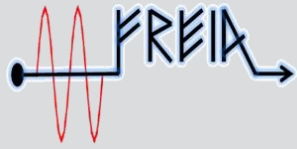
**Valve Box | Vertical Cryostat**

# “Gersemi” Operation – Saturated Bath



**Valve Box | Vertical Cryostat**

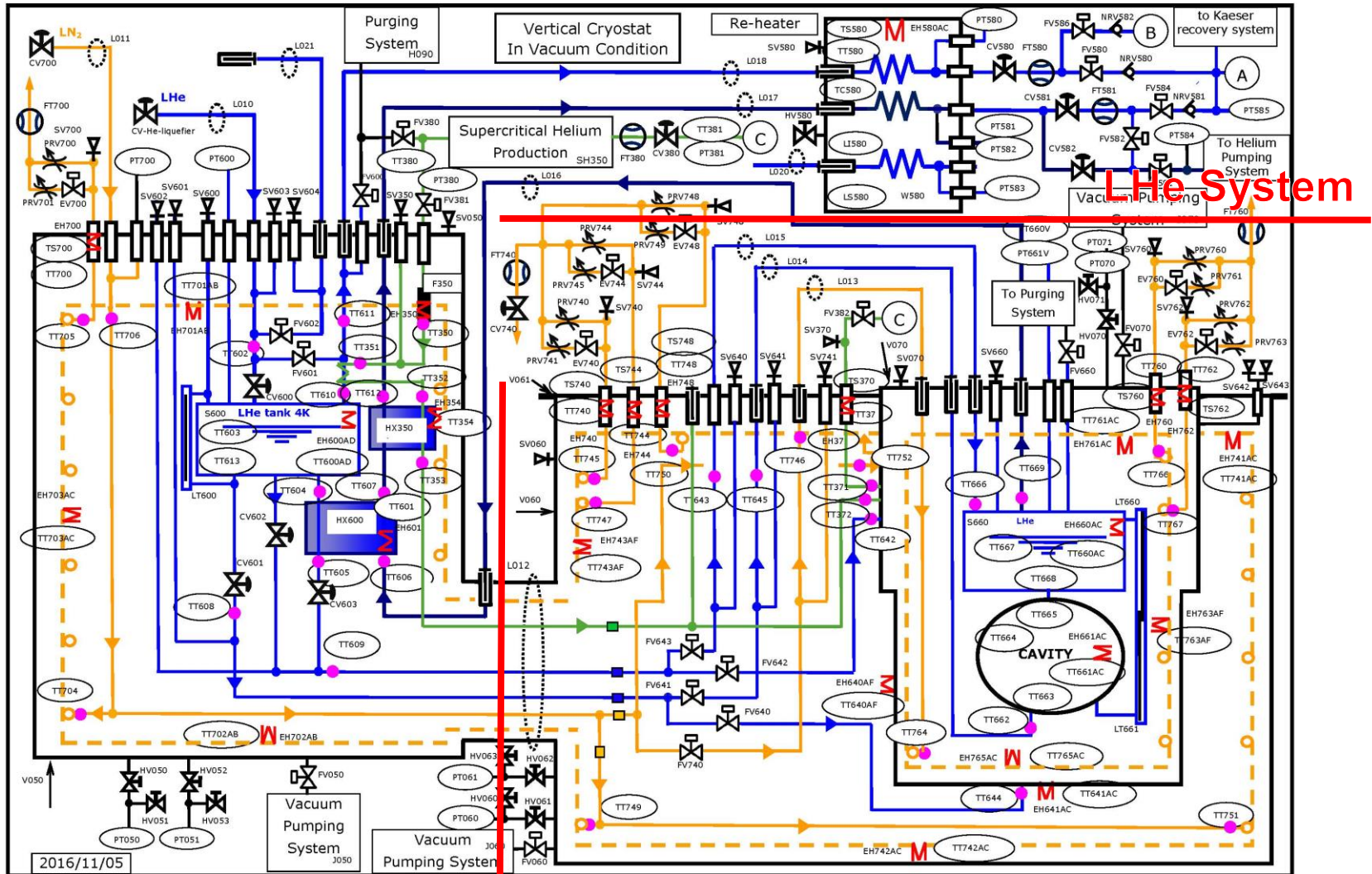
# “Gersemi” Operation – Pressurized Bath



LHe System

Valve Box | Vertical Cryostat

# “Gersemi” Operation – Vacuum



**Valve Box | Vertical Cryostat**