CRYOGENICS OPERATIONS 2008

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Organized by CERN

Description of the flexible large scale Cryogenic test facility at CEA Grenoble and various test experiments connected over the past years.

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CEA-Grenoble/DSM/INAC/SBT

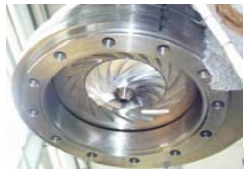
THE 400W TEST FACILITY

THE HELIUM REFRIGERATOR COLD BOX

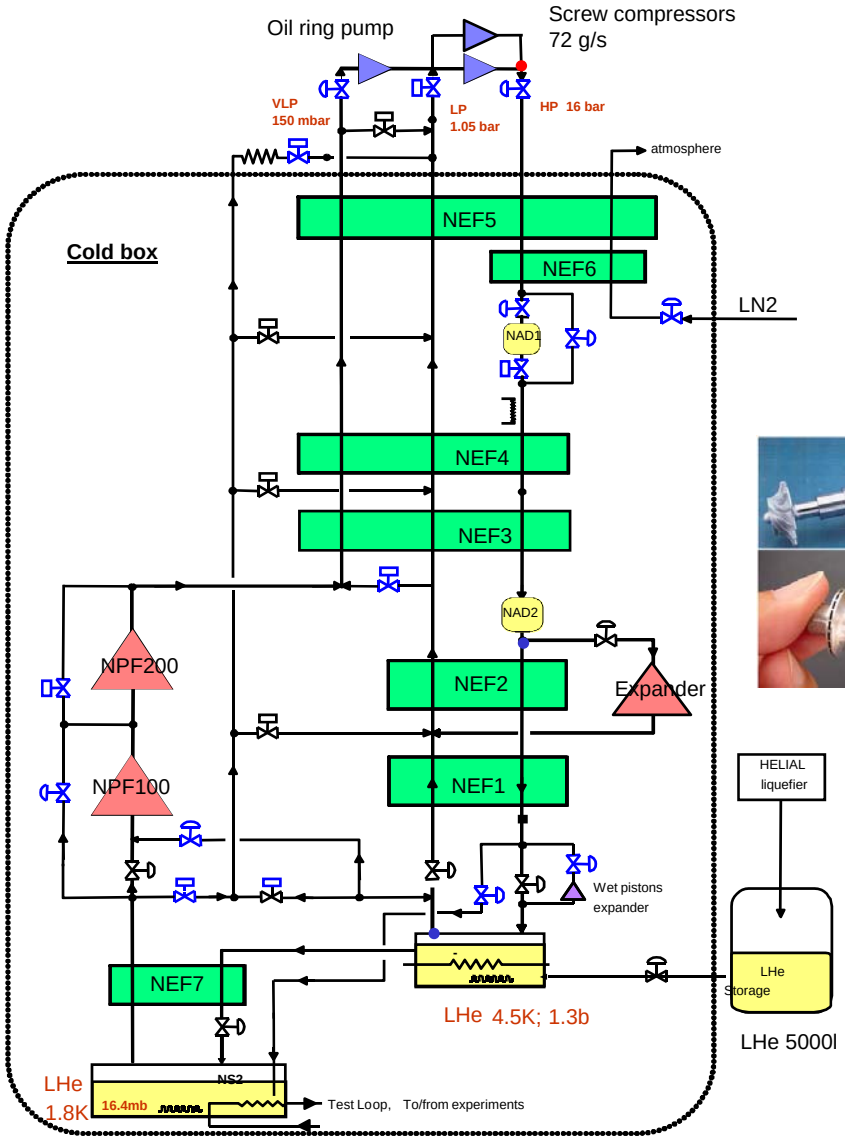
In operation at full capacity since 2004

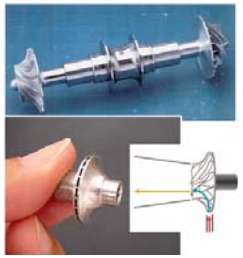
PROCESS

Oil ring
Pump



Wheel of AIR LIQUIDE cold compressor CC2

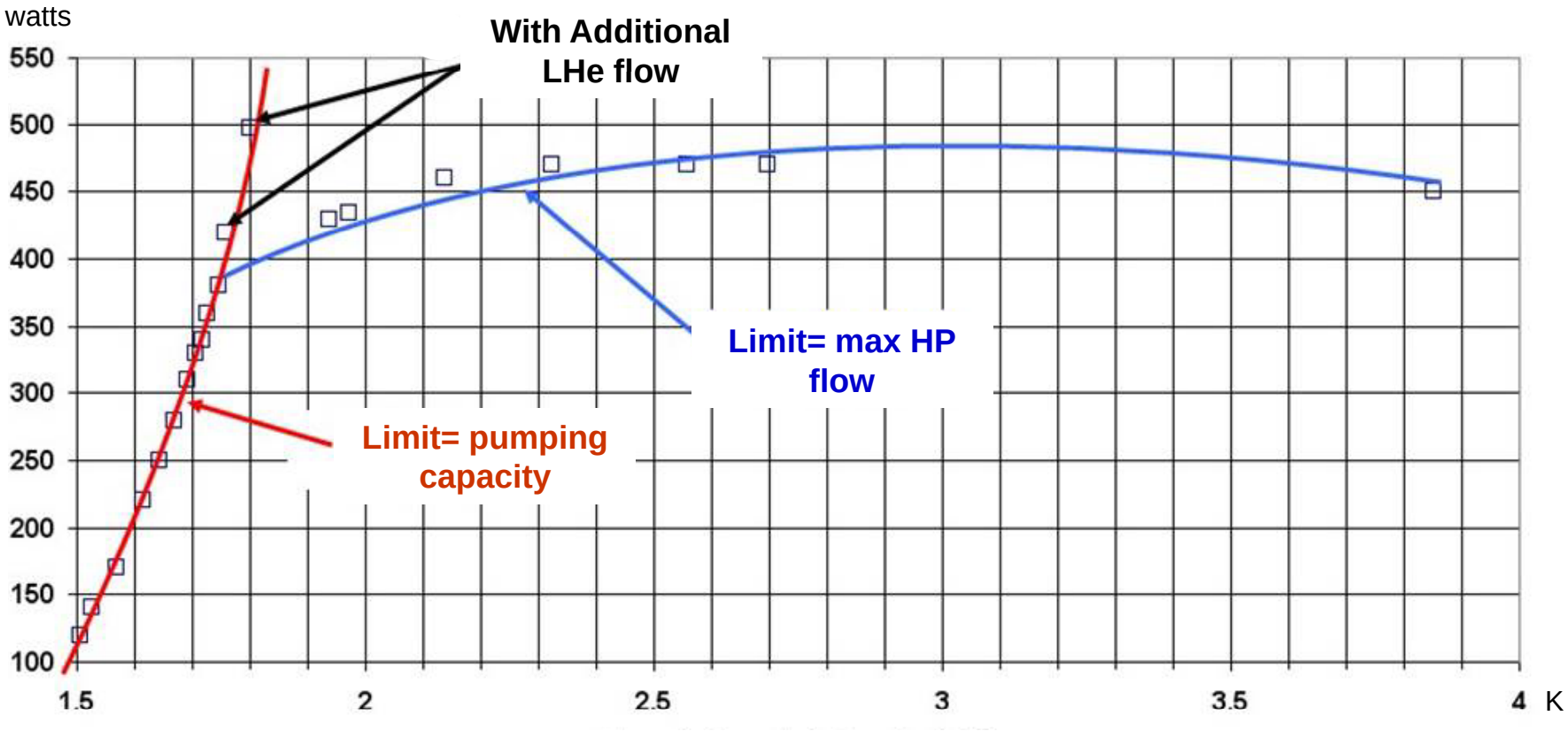




Screw compressors

Heat exchangers before installation

PERFORMANCES



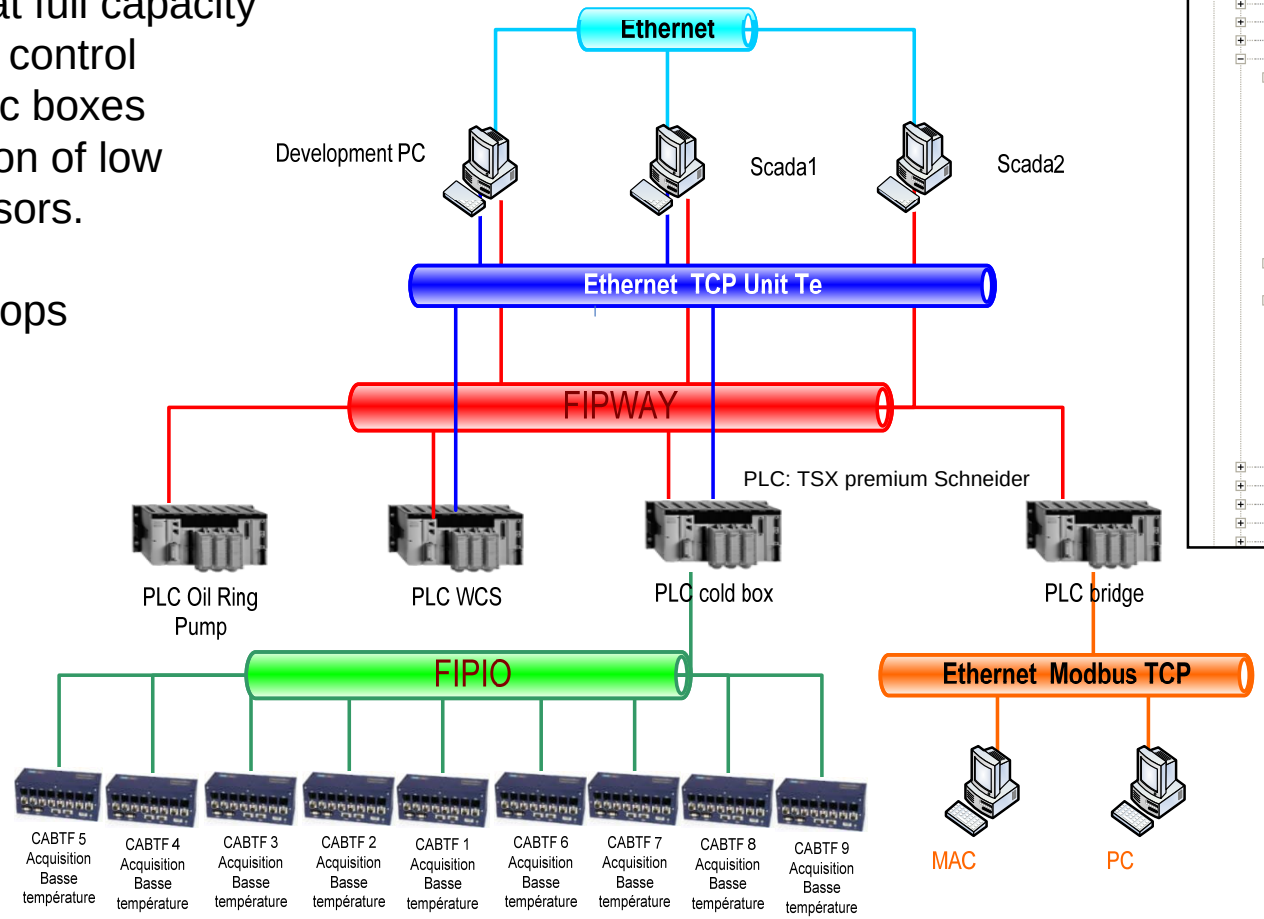
Available power (W) vs bath temperature (K)

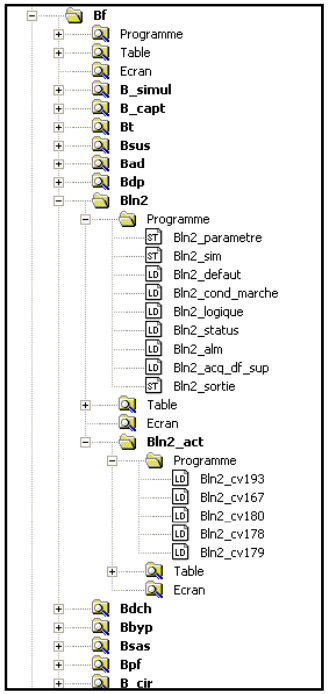
- Capacity @ 4.5K : 800W

DATA acquisition and process control

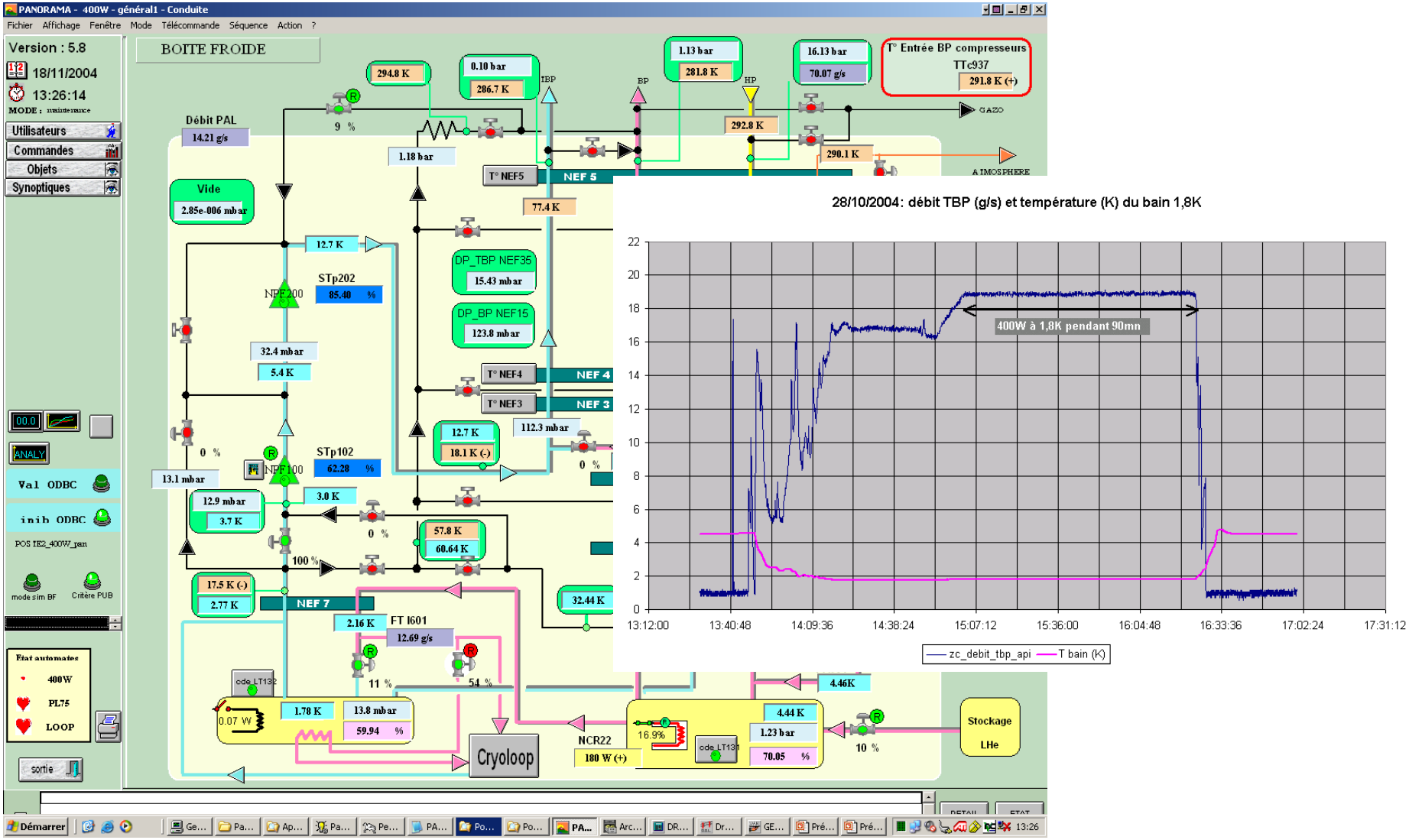
- Allowing safe cool down, warm up phases, and weeks of stand alone operation at full capacity
- Object oriented control
- CABTF: Specific boxes for data acquisition of low temperature sensors.

- 25 regulating loops
- 60 dig I/O
- 100 analog I/O

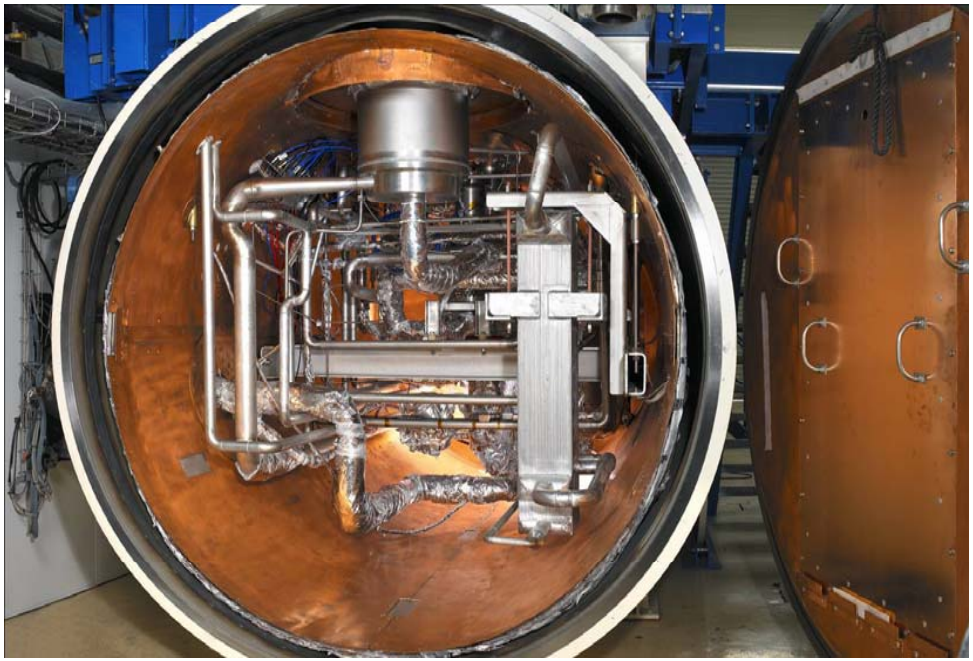




DATA acquisition and process control



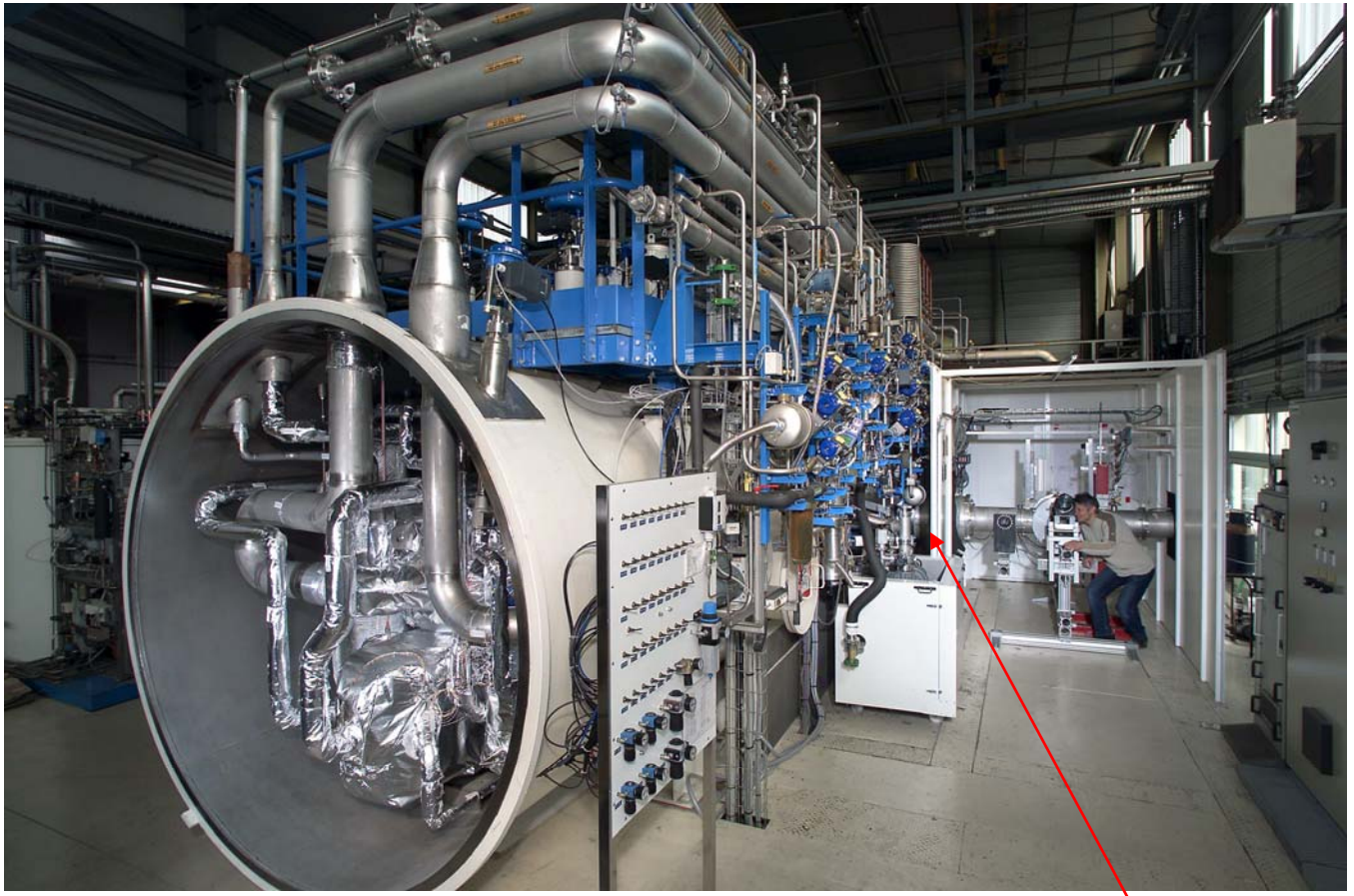
Connecting experiments



Inner view of the cold box, 1.8K bath removed, ready to insert new experiment

Connection through man hole with external experiment, test loop, cryostat
Or insert dedicated 1.8K bath inside the cold box

Connecting experiments



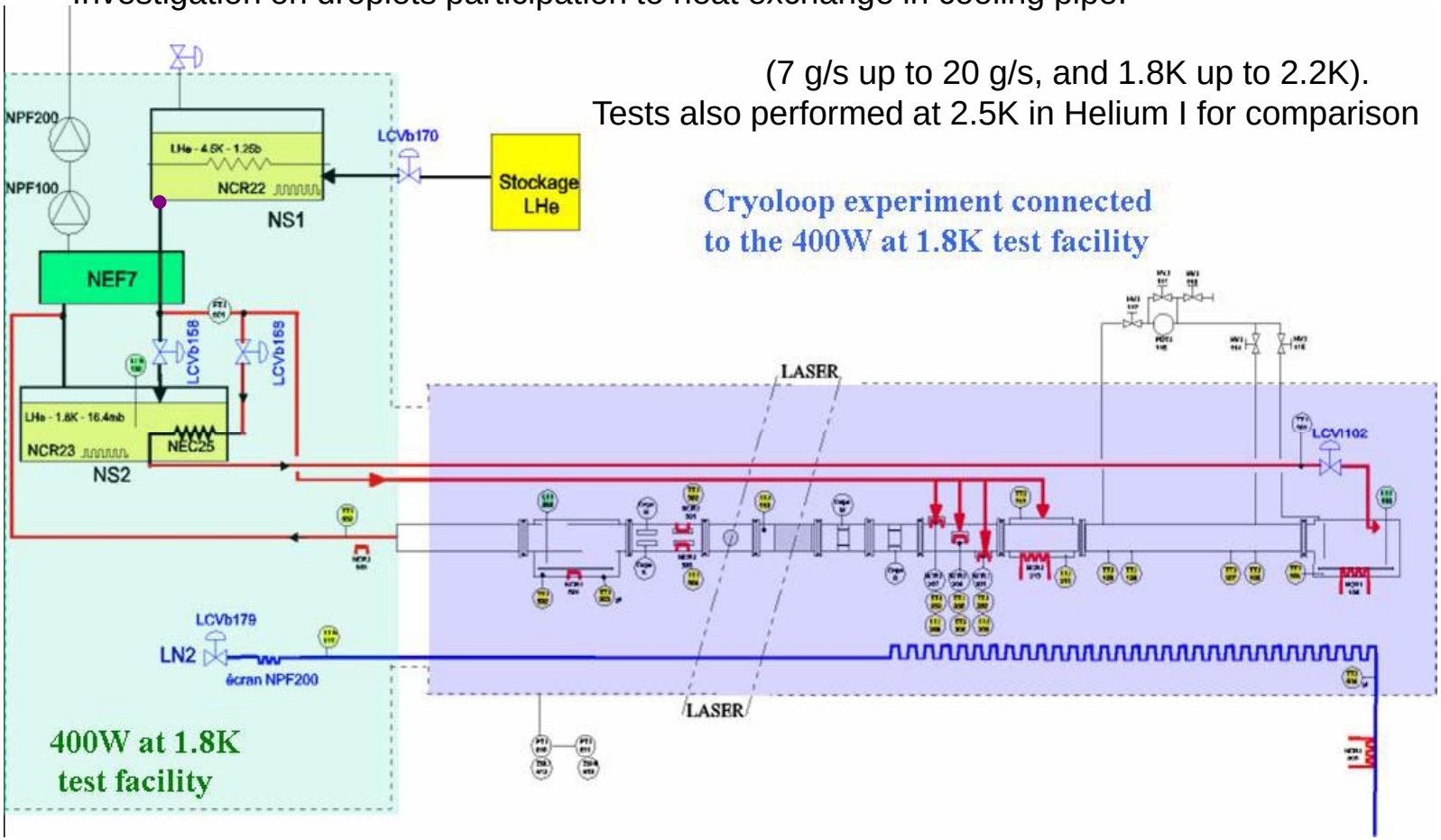
11m long cryoloop experiment connected through man hole

Experiment 1: Superfluid helium flow

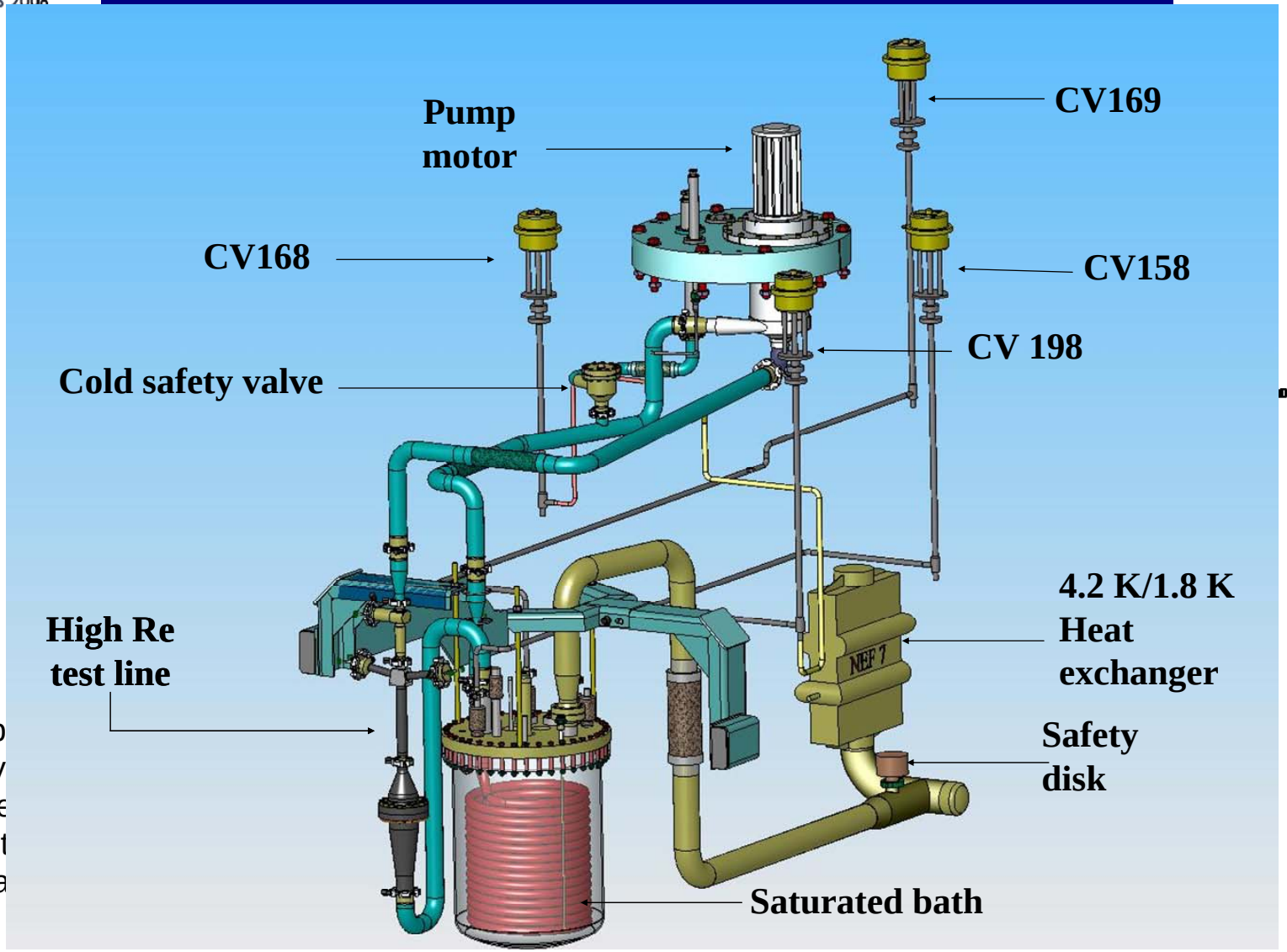
THE CRYOLOOP EXPERIMENT

Connected in 2004: Several tests runs over two years. Supported by CERN. Possible implication on cooling of Upgraded LHC. Study of heat exchange in superfluid He two phases flow. Investigation on droplets participation to heat exchange in cooling pipe.

(7 g/s up to 20 g/s, and 1.8K up to 2.2K).
Tests also performed at 2.5K in Helium I for comparison



Experiment 2: Subcooled loop



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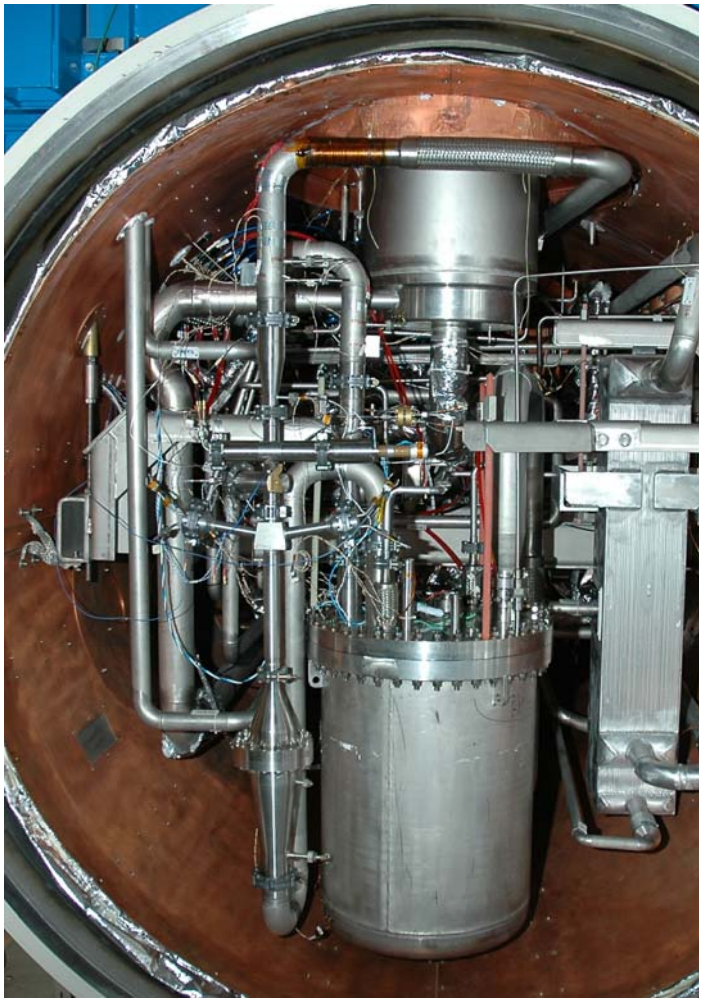
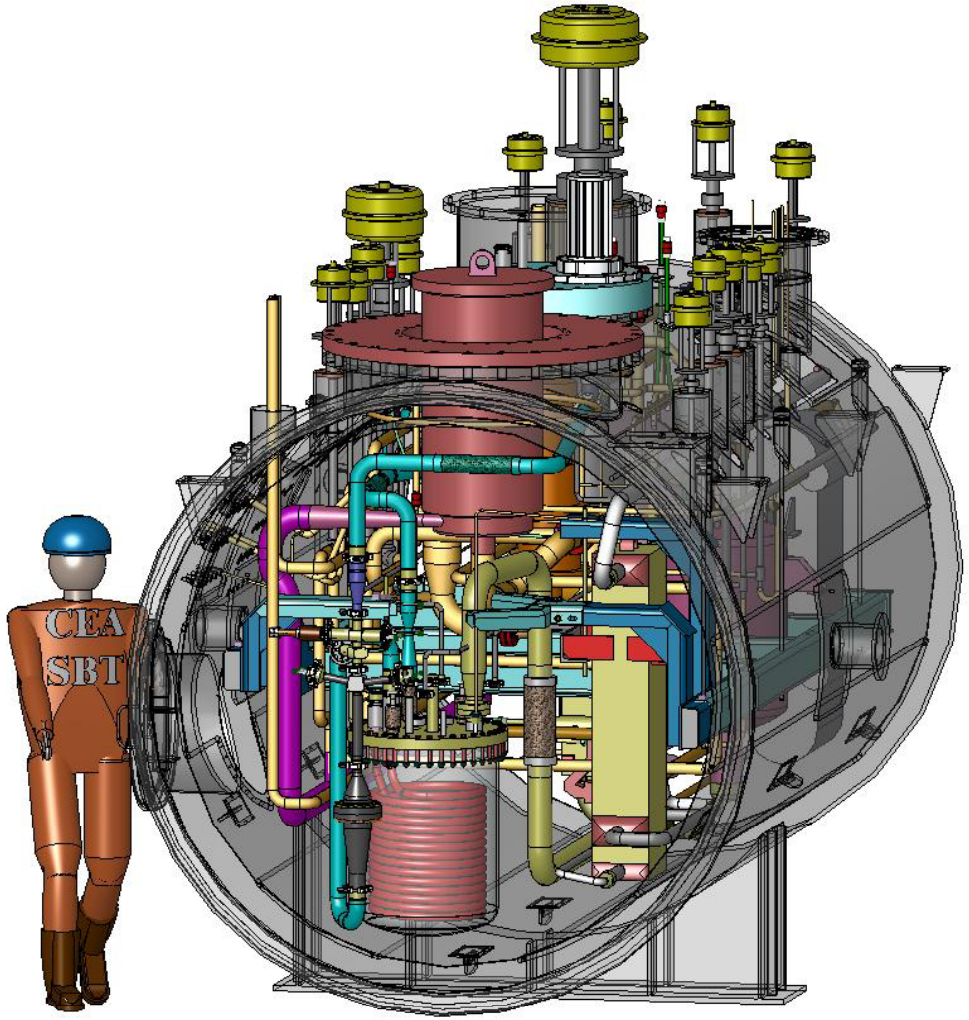
Loop inst
Full capa

Experiment 2: Subcooled loop





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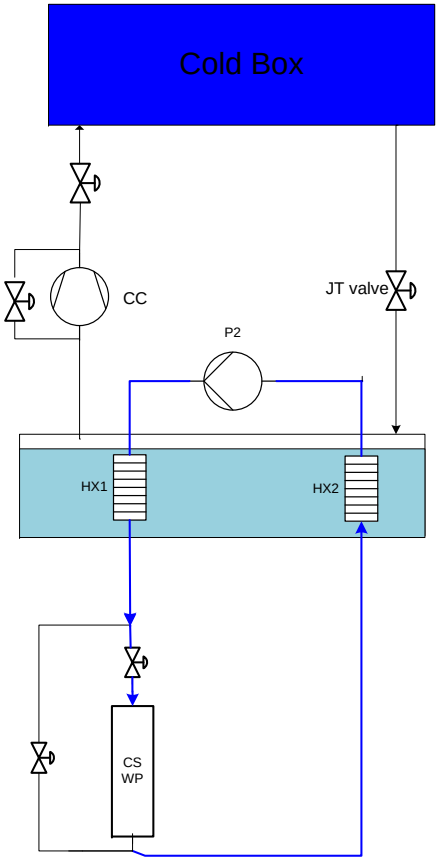

One of JT60SA cooling loop

Coming tests runs:

- **High Reynolds number for turbulence studies, with new instrumentation: end 2008**

- **Supercritical cooling loop for testing of process control strategies for pulses loads smoothing.**

2009/2010.

Similitude ratio : 1/20

New cryostat multi tests under installation (2008)

The 400W test facility

THANK YOU FOR YOUR ATTENTION.