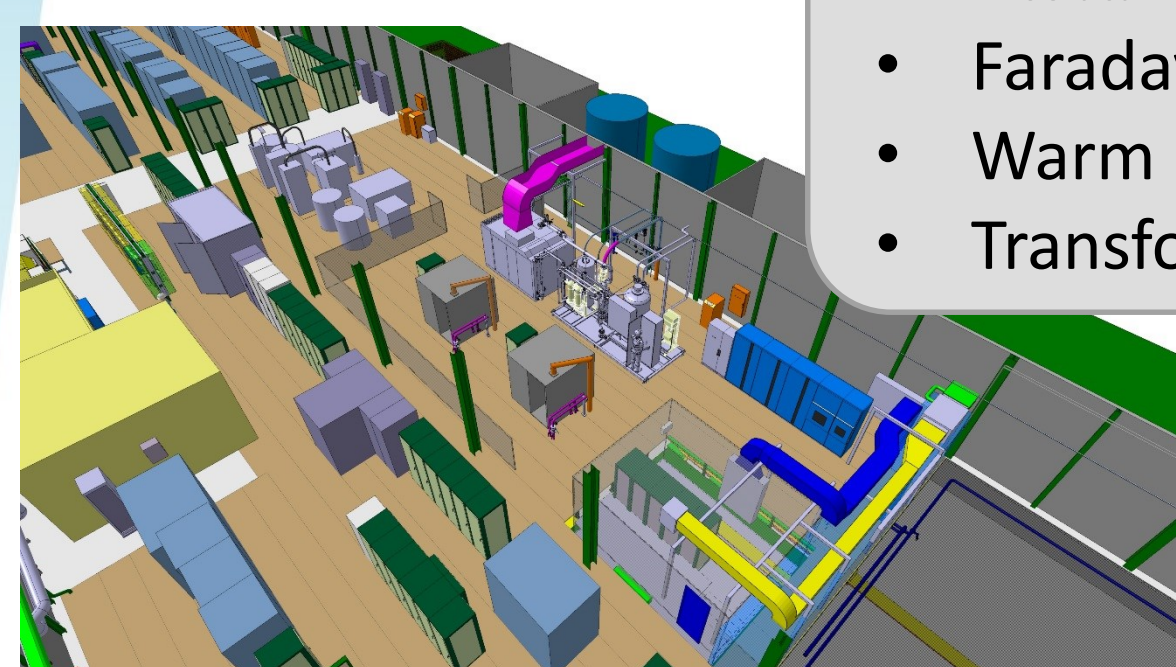


G. Vandoni, K. Artoos, V. Baglin, K. Brodzinski, R. Calaga, O. Capatina, S. Claudet, L. P. Delprat, S. Mehanneche, E. Montesinos, C. Pasquino, J. S. Swieszek
CERN, 1211 Geneva 23, Switzerland

A new facility was installed in 2018 in the SPS tunnel in the framework of HL-LHC. Scope was to study the operational performance of crab-cavities in proton beams, up to high energy and current. The facility was installed in the Technical Stops of the SPS and was operated during 2018 with the high energy and intensity proton beam of the SPS.

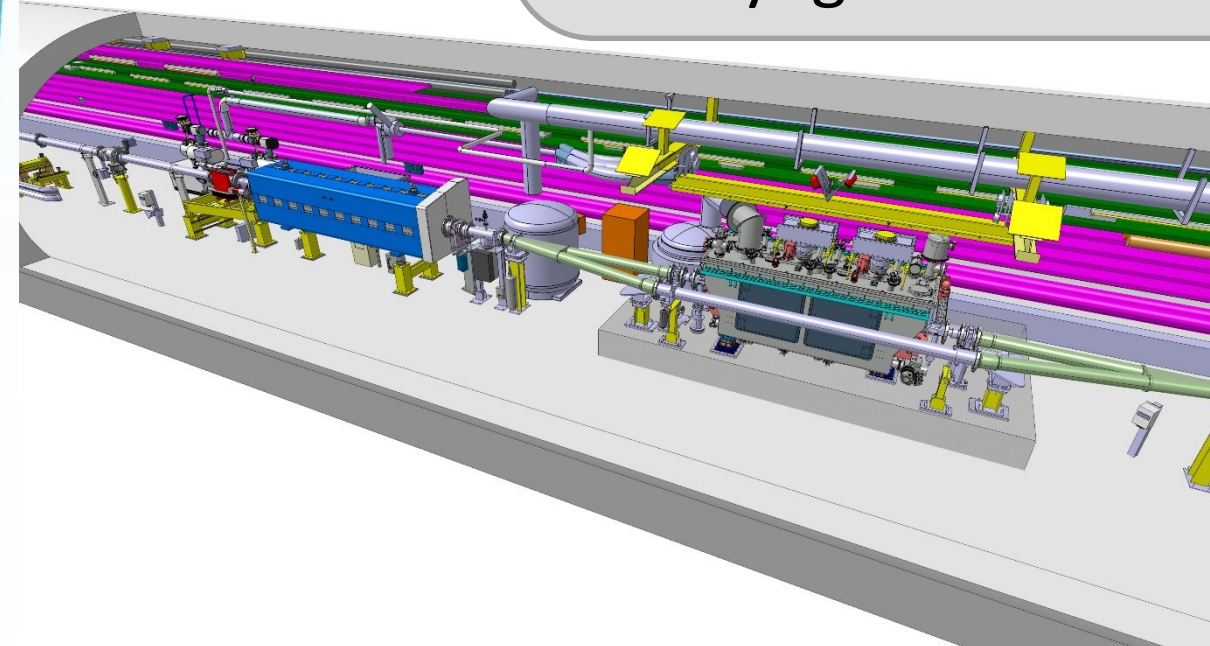
BA6 Surface equipment

- 2 x RF amplifiers IOT 50kW
- Faraday cage for LLRF
- Warm cryo compressor & oil removal
- Transformer & switchboards



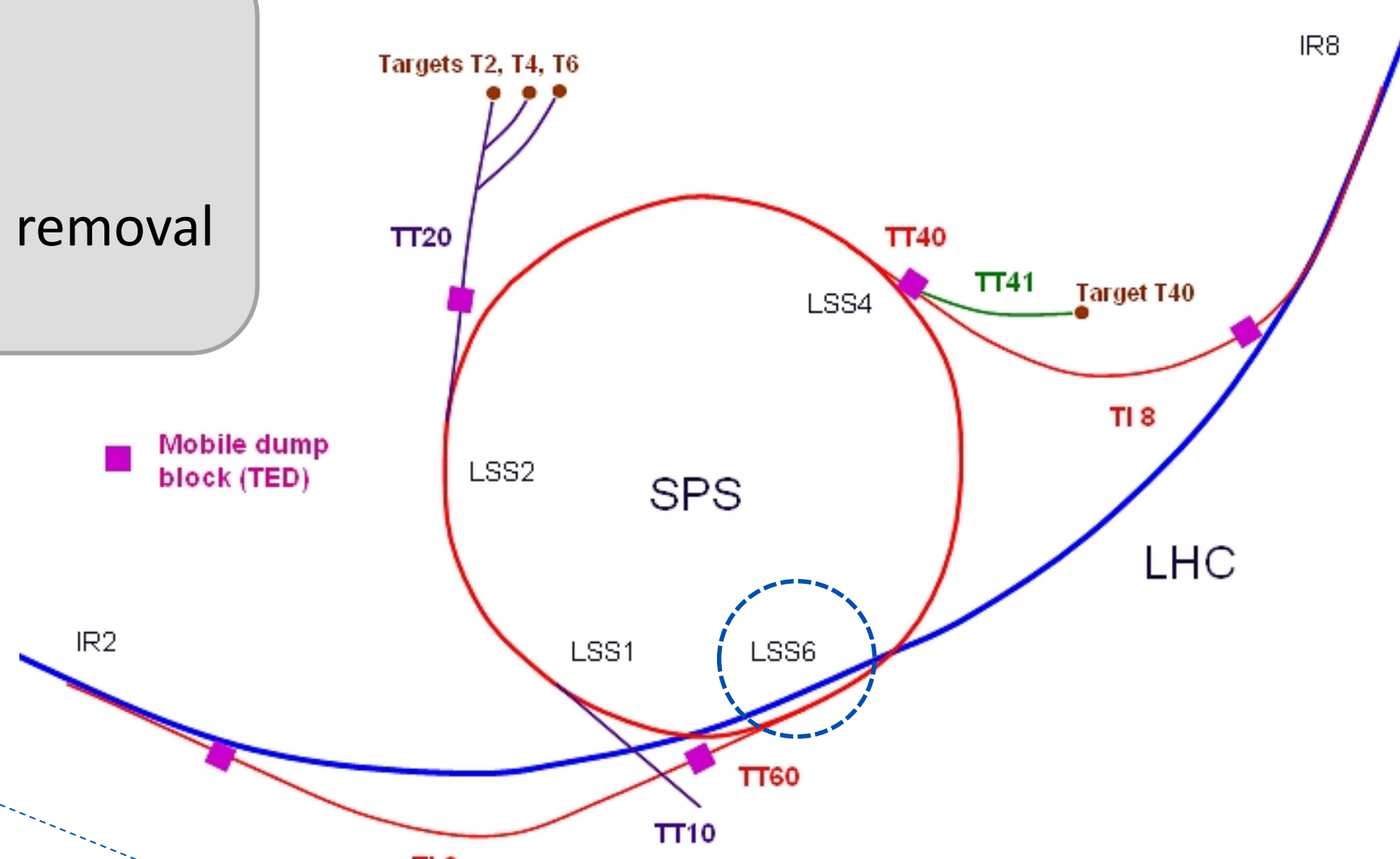
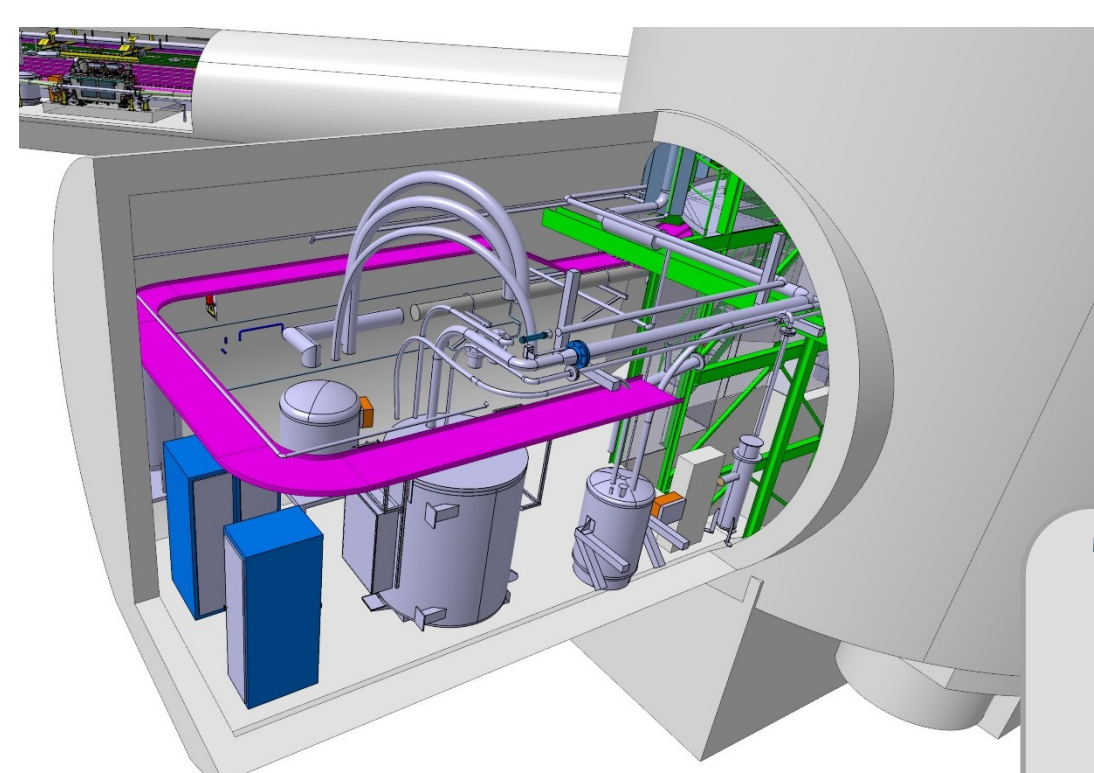
LSS6 tunnel

- Articulated Y-shaped vac chambers
- Articulated V-shaped RF transm. lines
- Transfer table, 0.5m stroke
- Cryogenic distribution & regulation



TA6 alcove

- Cryogenic cold-box
- LN2 phase separator
- Cryogenic distribution

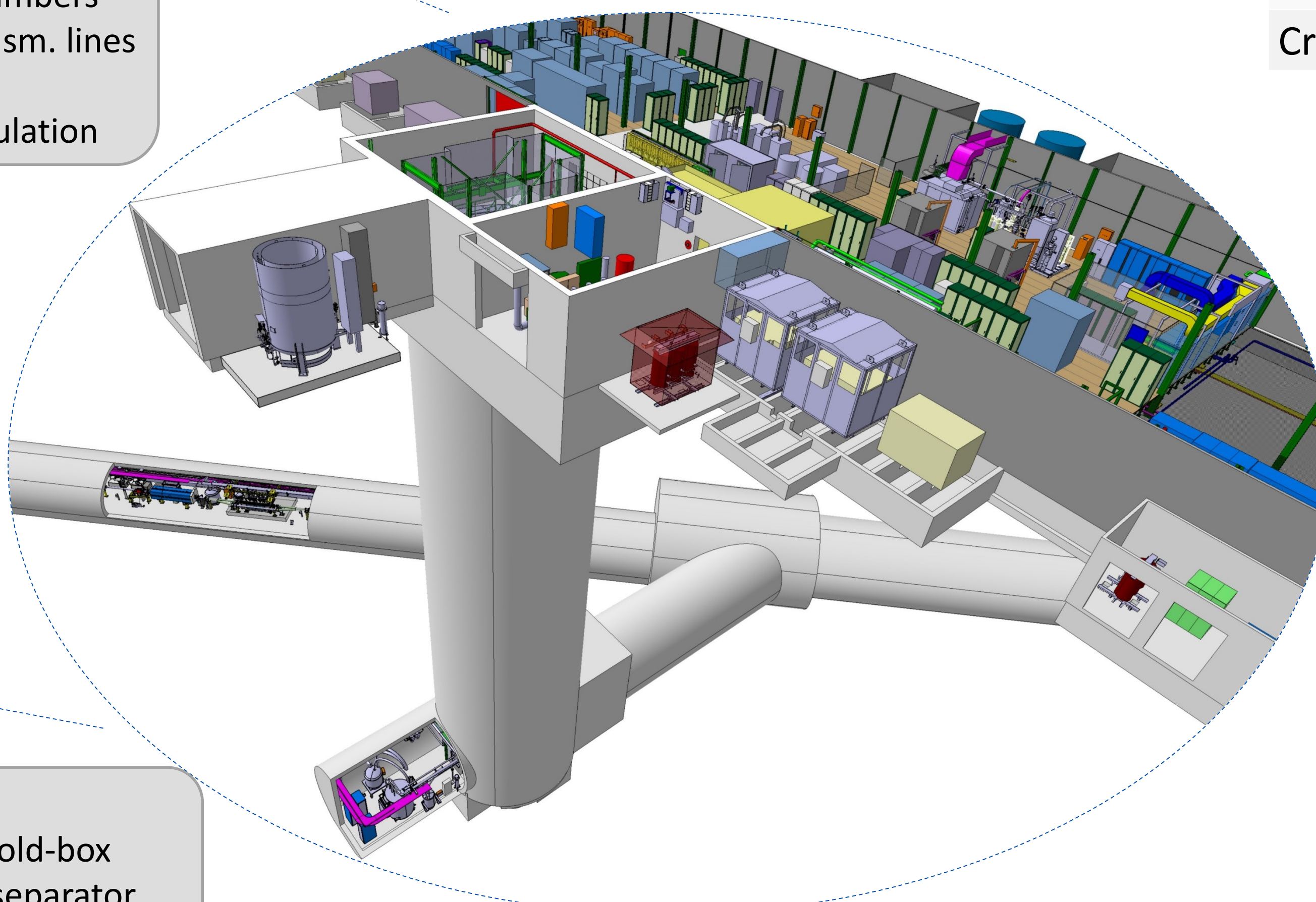


BEAM & CAVITY PARAMETERS

Energy	[GeV]	26-270
Coast energy	[GeV]	26, 55, 120, 270
Bunch intensity	[$\times 10^{11}$]	0.01-1.3
Bunch length	[ns]	1.0-2.0
Main RF frequency	[MHz]	200.39
Crab frequency	[MHz]	400.6 $\pm$ 0.2
Crab kick voltage	[MV]	3.4
Crab cavity aperture	[mm]	84
Crab cavity operating T	[K]	2K

FACILITY PARAMETERS

RF Power IOT	[kW]	50
Cryogenic refrigeration, 4K	[g/s]	7
Cryogenic refrigeration, 2K	[g/s]	3.5
LHe inventory	[l]	450
Vacuum	[mbar]	1 $\cdot$ 10 ⁻⁹
SPS standard aperture	[mm]	156
Transfer table stroke	[mm]	510
Transfer table charge	[tonne]	8
Transfer table reproducibility	[μ m]	4
Electricity	[MVA]	2

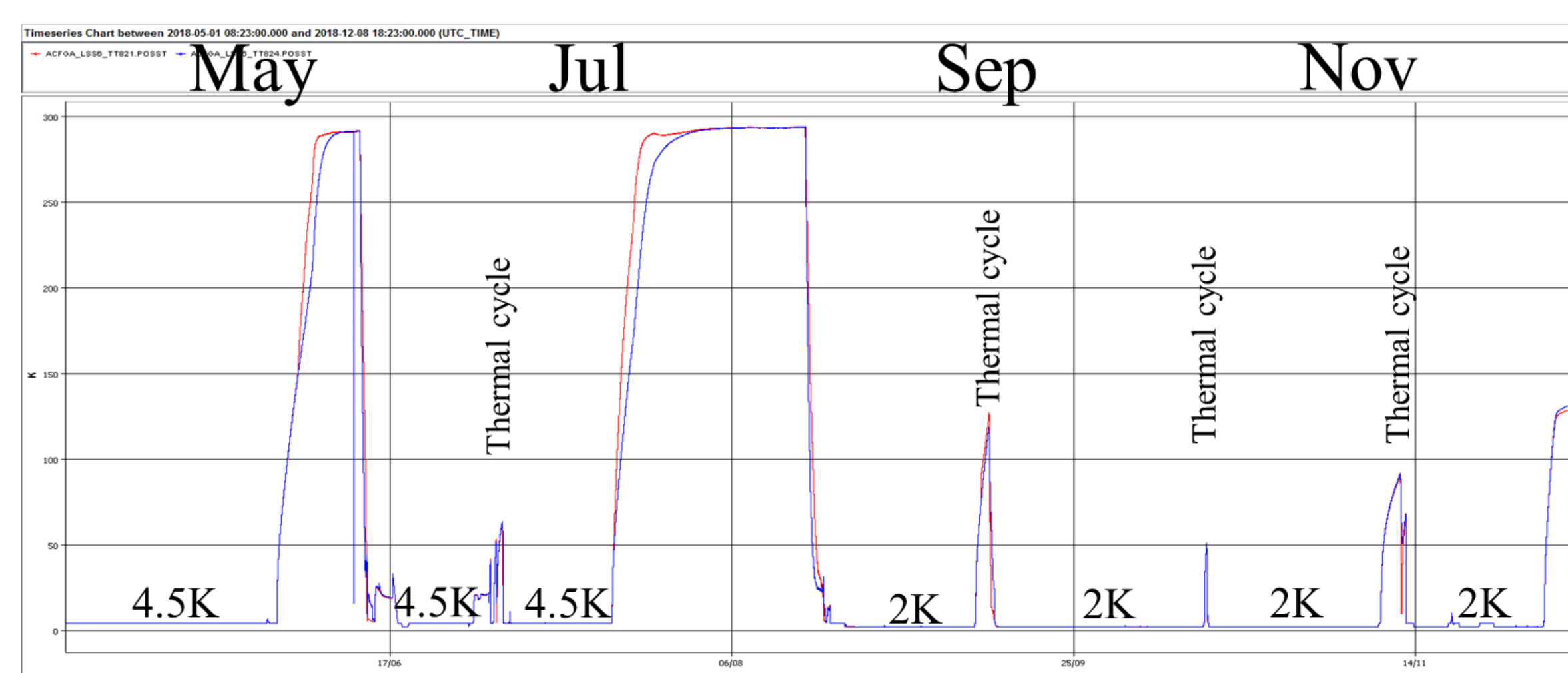


INTERLOCKS & SAFETY

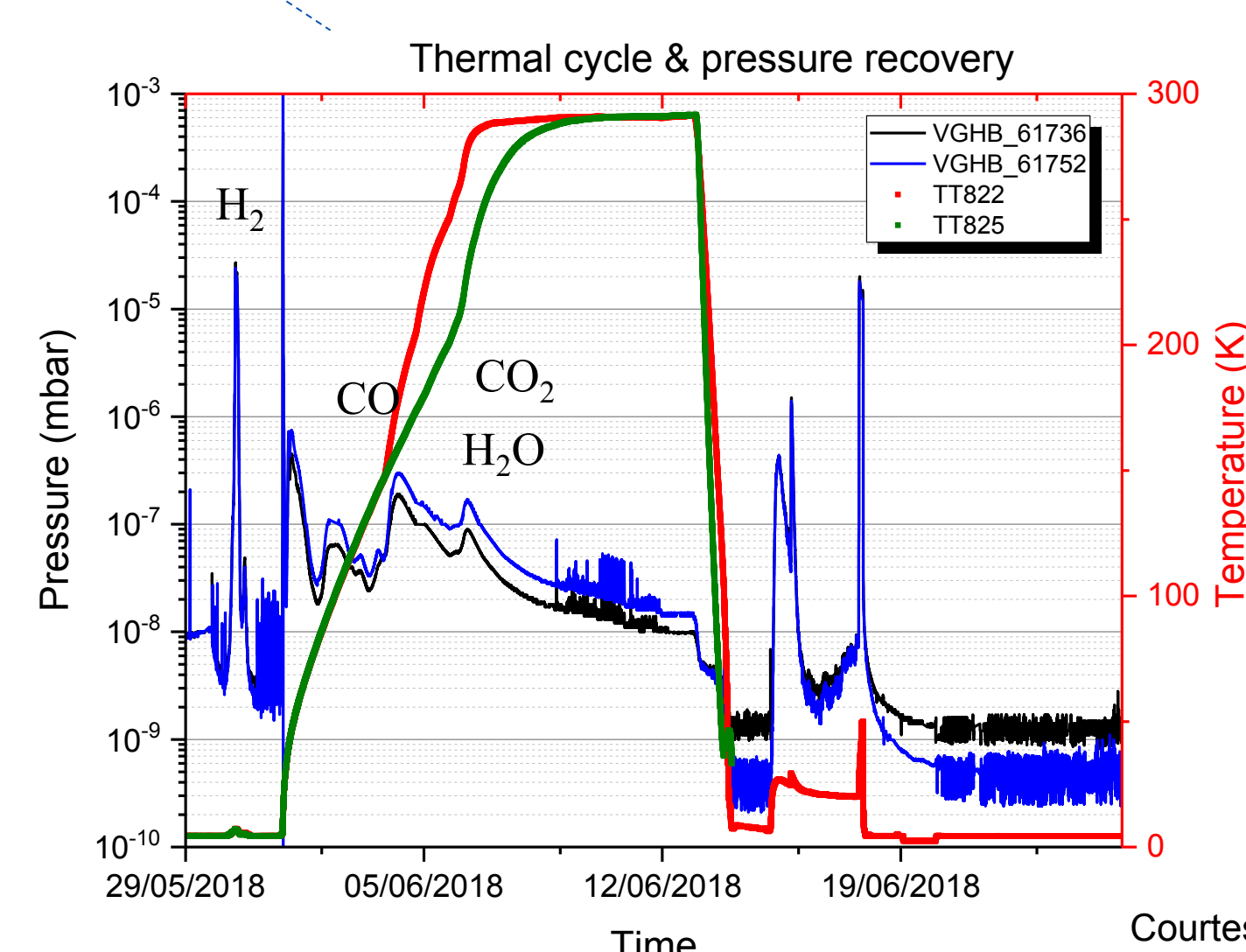
- RF Power ON only if NO ACCESS
- Cryo and Vacuum OK for RF Power
- Table movement interlocked by vacuum valves closure
- Beam OK interlocked by table position undefined
- Beam extraction to SPS North Area interlocked by table position in-beam

OPERATION ISSUES

- Cryo flexibles too stretched during table movement: to be repositioned
- Tuner heaters fail together, rust but no ice: under investigation
- Misalignment of cryomodule by 400 μ m, alignment under study
- Cryogenics : 4K / 3 months, then LN2 operational and 3 months /2K
- High dynamic losses, 9.9W at 0.6/ 0.8 MV cav1/ cav2



Courtesy R. Calaga



Courtesy C. Pasquino