DFX instrumentation requirements_DRY RUN

J. Fleiter

Conceptual design review of the DFX 31 Jan 2019

Outline

- Functional requirements:
  - Cryogenic
  - Vacuum
  - Protection of circuits
- List of instrumentation
  - Vtaps
  - Cryo sensors
  - Vaccum

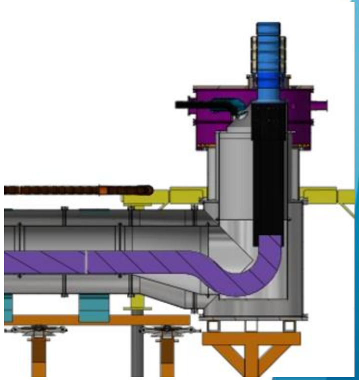
Functional requirements

- **The DFX will host the MgB2/Nb-Ti splices and the Nb-Ti bus bars of the cold powering system of triplets:**
  - 2x 18 kA
  - 2 x 13 kA
  - 3x 7 kA
  - 12 X 2 kA

- **Three types of functional requirements (others not part of this presentation)**
  - Cryogenic
  - Vacuum
  - Protection

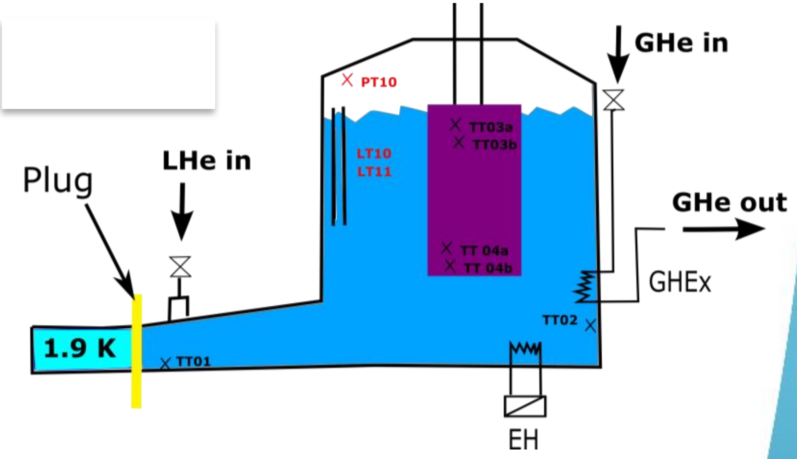
Cryogenic requirement

- Immersion of Nb-Ti/MgB_2 splices and Nb-Ti bus bars in LHe bath => regulation of level.
- Generate from the LHe bath, a He boil off mass flow (of up to 10 g/s) sufficient to:
  - Maintain the MgB2 cable of the Sc Link below 25 K
  - Maintain the MgB2 HTS splices below 25 K
  - Thermalize to 50 K the bottom of the HeX of the leads



Cryogenic instrumentation of DFX

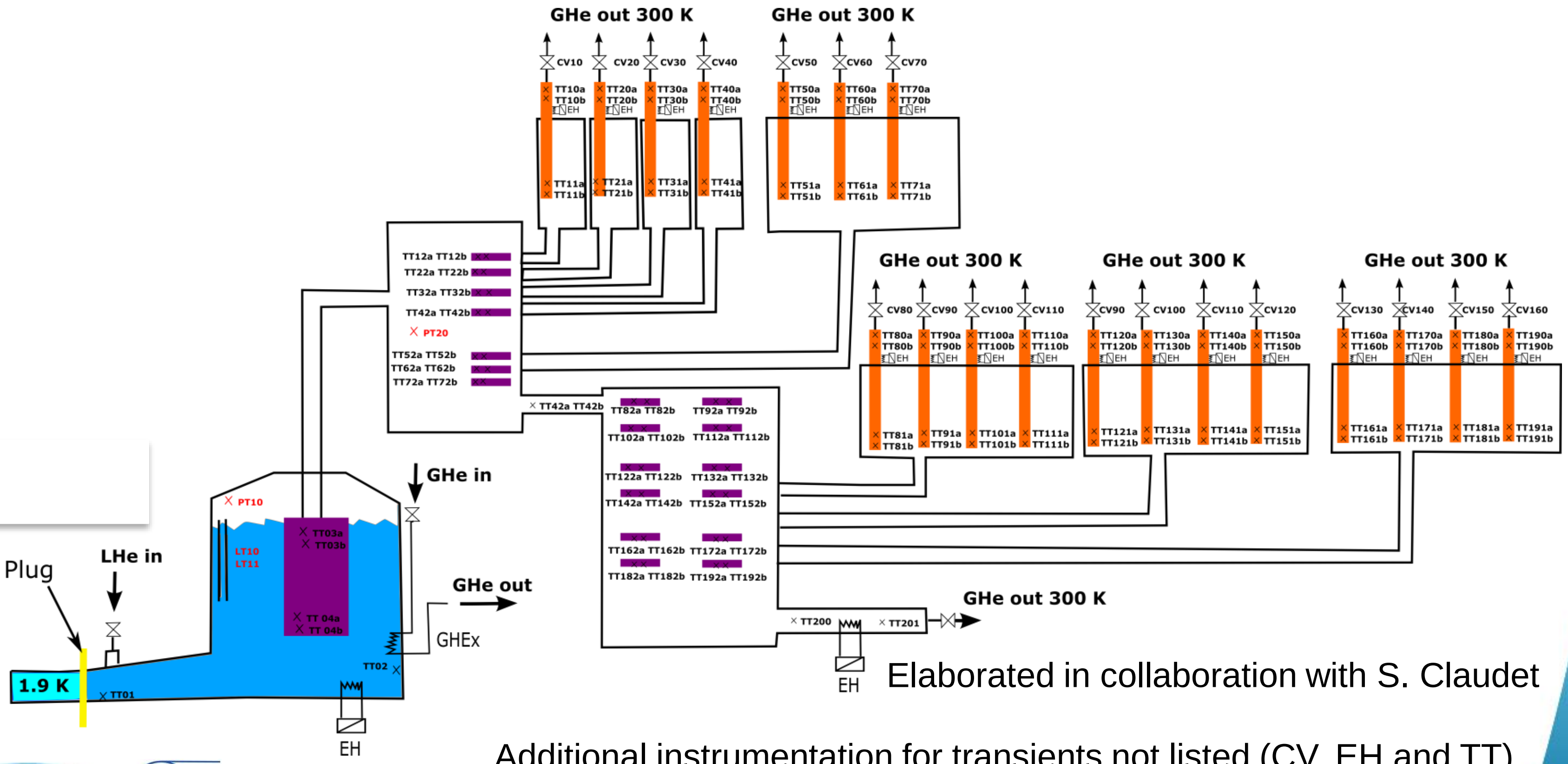
- 6 Thermal transducers (TT)
  - Two in the He tank
  - 4 in the splice box
- Two heaters
  - 1 Ghe/LHe Heat exchanger
  - 1 resistive Heater
- 1 He pressure gage
- Two LHe level transducers



Elaborated in collaboration with S. Claudet

Additional instrumentation for transients not listed (CV, EH and TT)

Cryogenic instrumentation of Sc Link



Elaborated in collaboration with S. Claudet

Additional instrumentation for transients not listed (CV, EH and TT)

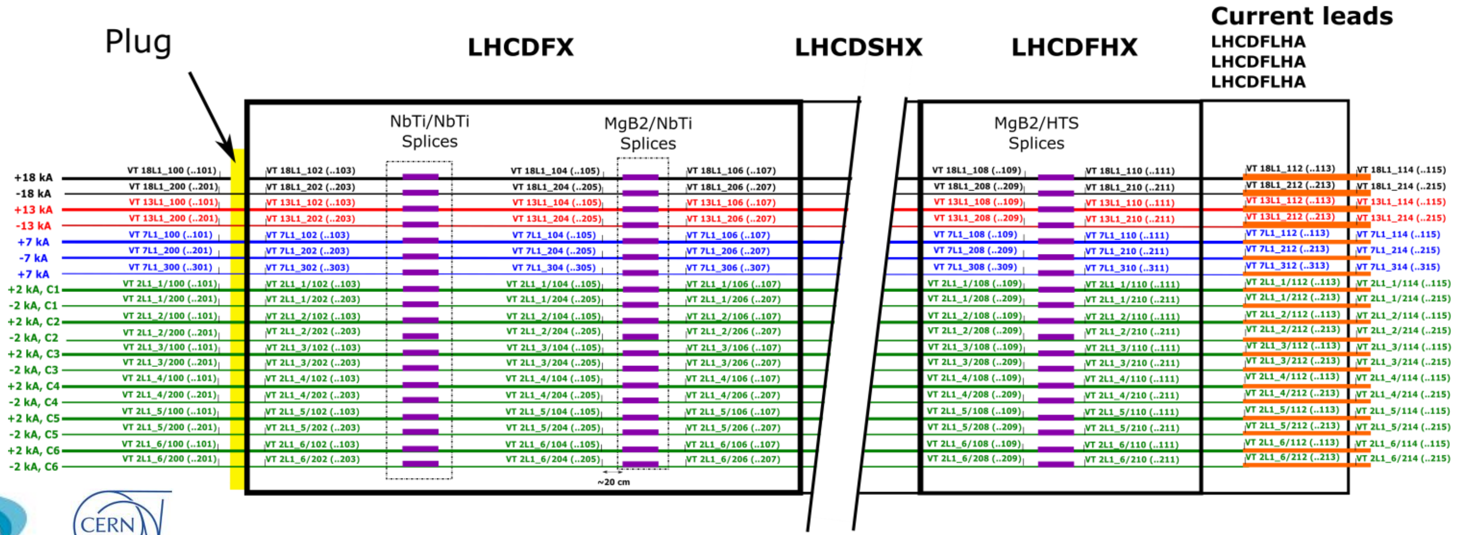
Protection requirements

- Each of the circuit of the Sc Link shall be protected by a dedicated QPS system that:
  - Detect any quench or detached Vtaps
  - Triggers the removal of energy from the circuit (strategy depends on the circuit): fast abort, EE system, quench heater

- Each circuit equipped with Vtaps to monitor voltage along Sc cables and across splices.

List of VTaps

- Each VTap has a spare
- Vtaps on the 1.9 K side required to monitor the plug
- Local pairing (outside the DFX) of taps of the plug required



Vacuum requirements

- The cold powering chain made of three vacuum volumes
- Each of the volume equipped with pumps and instrumentation (under definition with Germana, more advanced next week)……