Introduction

Central cryogenic infrastructure of the CERN Meyrin site

Definition of upgrade

Harness the full production capacity of the two existing TCF50 to meet the future LHe requirements in B165 and B163:

- **B165**: 20,000 l LHe dewar to maximize LHe production and allow gravity filling of 10,000 l trailer dewar transportable by road to AD clients
- **B163**: connect FRESCA2, increase LHe supply by enabling the transfer of surplus LHe from B165, connect 6,000 l dewar directly to liquifier and upgrade WPU FRESCA
- **B253**: replace 50 l batteries by 24 x 3 m³ jumbo cylinders

LHe Demand from B163 Clients

- The historic LHe requirements of the STC and F1 are known.
- LHe requirement of F2 is scaled from F1 and F2 will share the WPU; so it is not possible to simultaneously test at 1.9 K in both cryostats. However it is envisaged that the external cryostat of one cryostat could be at 4.5 K while testing is undertaken in the other.

B165 – Central Liquifier

- Supply of 100 l to 500 l LHe mobile dewars to 30 clients CERN wide without dedicated cryogenic infrastructure
- 1998-2006: average annual LHe volume of 250,000 l
- After 2007, increase due to LHe requirement of experiments in Antiproton Decelerator (AD). Peak of 400,000 l in 2010
- Increase of TCF50 production capacity to 160 l/h (boosted with LN2), but limitation from LHe storage of 5,000 l

B253 – Central Purifier

- 3 kPa GHe recuperation network
- Two Linde purifiers 120 m³/h @ 120-200 bar
- Impure and pure GHe HP storage @ 160 bar (1,000 l jumbo cylinders and 50 l batteries)

B163 – SC Wire and Cables Test Facilities

- Sulzer TCF50 boosted with LN2 : 160 l/h (5.2 g/s)
- Seven small test cryostats (STC) to test SC cables (Ni3Sn) and HTS cables under field of 13 T

LHe demand from B165 Clients

- Study of historic deliveries (dependence on operational cycle of each client) with future increase of 20% by AD clients

Combined LHe demand from B165 and B163

- Analysis undertaken to combine competing requirements:
  - B165 average weekly requirement combined with B165 future delivery schedule
  - Maximum combined LHe production of B165 and B163 is conservatively 10 g/s (49,950 l /wk)

Conclusion

Rather than purchase a new cryogenic plant to supply the increased LHe requirement in B165 and B163, a new CDS has been designed and procured to maximize and share the production of the liquifiers in the two adjacent buildings. The CDS of B165 was successfully installed and commissioned during 2019, increasing LHe storage capacity to 20,000 l and enabling the gravity filling of 10,000 l trailer dewar. The installation of CDS for B163 is scheduled to finish early in 2020.