Cryostat design and location of feedthroughs
(Slides presented at LARP Meeting and Circuits Review)

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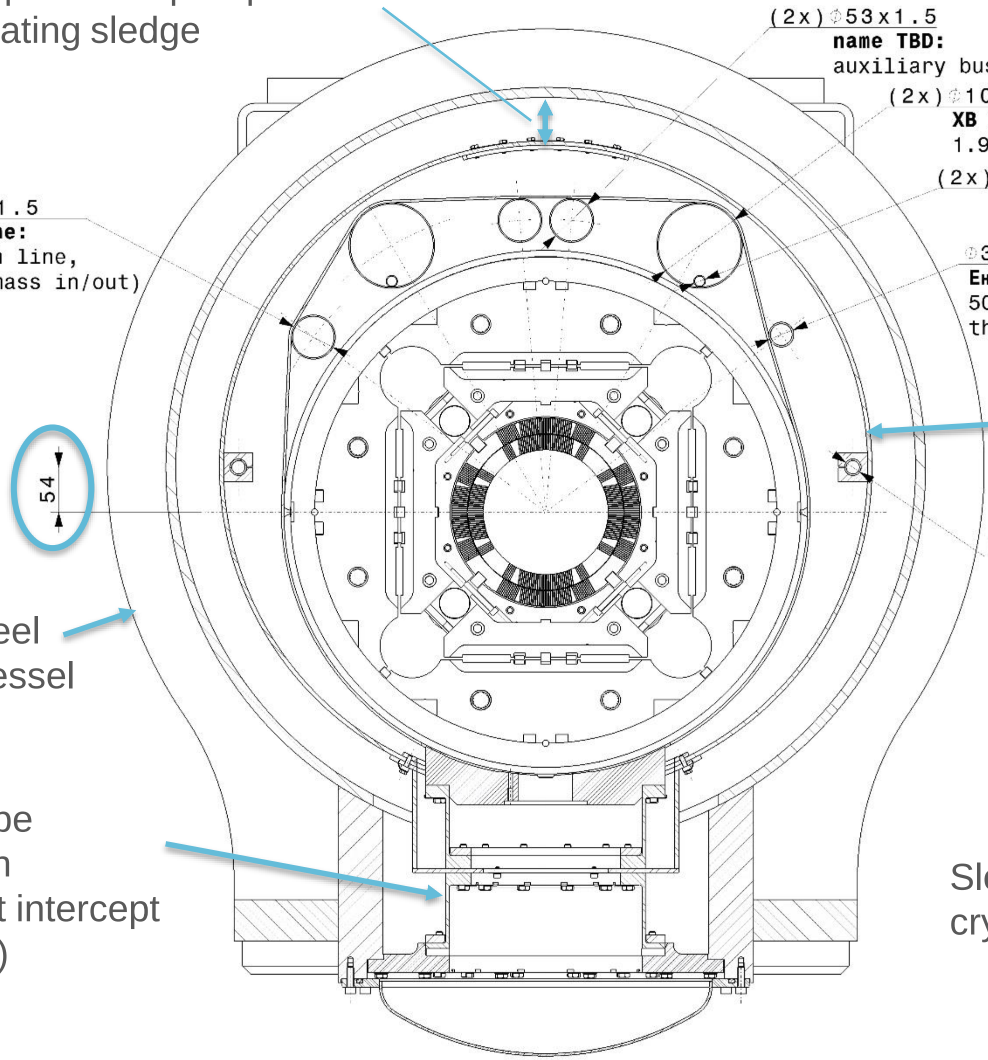
Standard cryostat cross section

Radial gap at the top required for cryostating sledge



Offset creates space for piping inside the cryostat

Aluminium thermal shield 40-60K

Carbon steel vacuum vessel

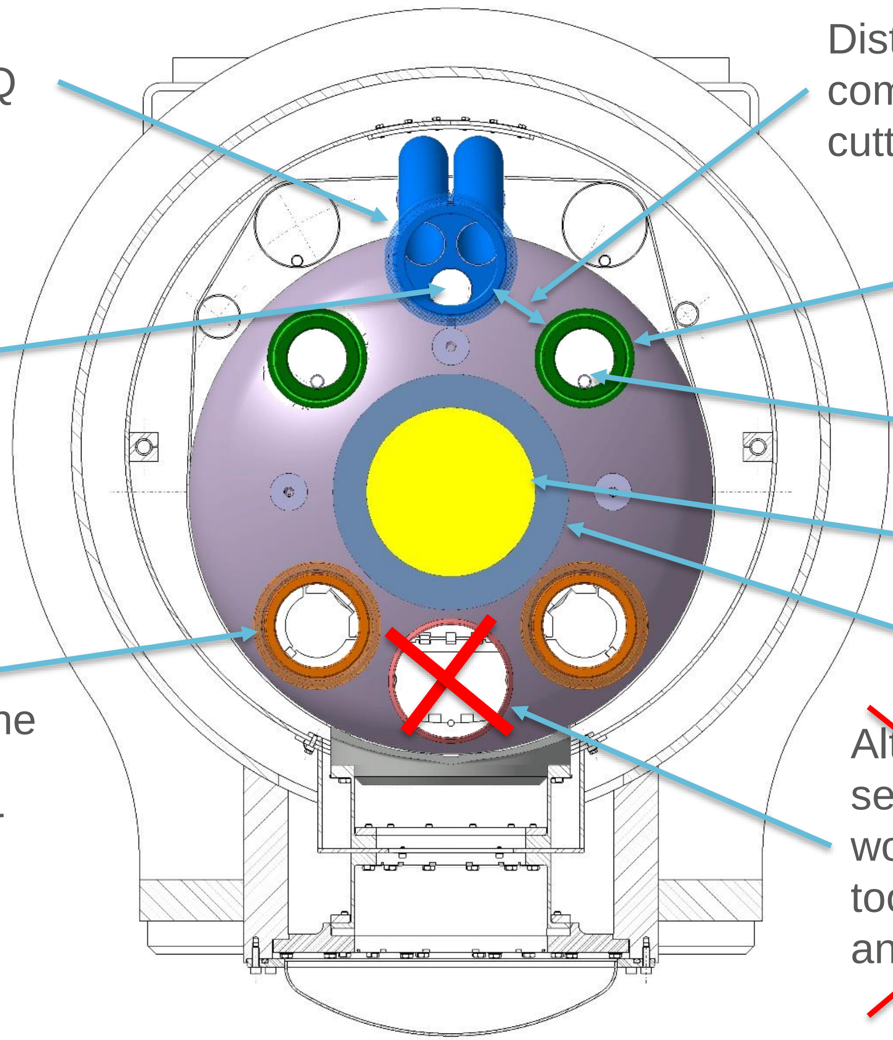
Cryo pipe diameters take into account cryo parameters and industrial availability

GFRE column type supports (3x) with intermediate heat intercept (design on-going)

Sledge on rail cryostating method

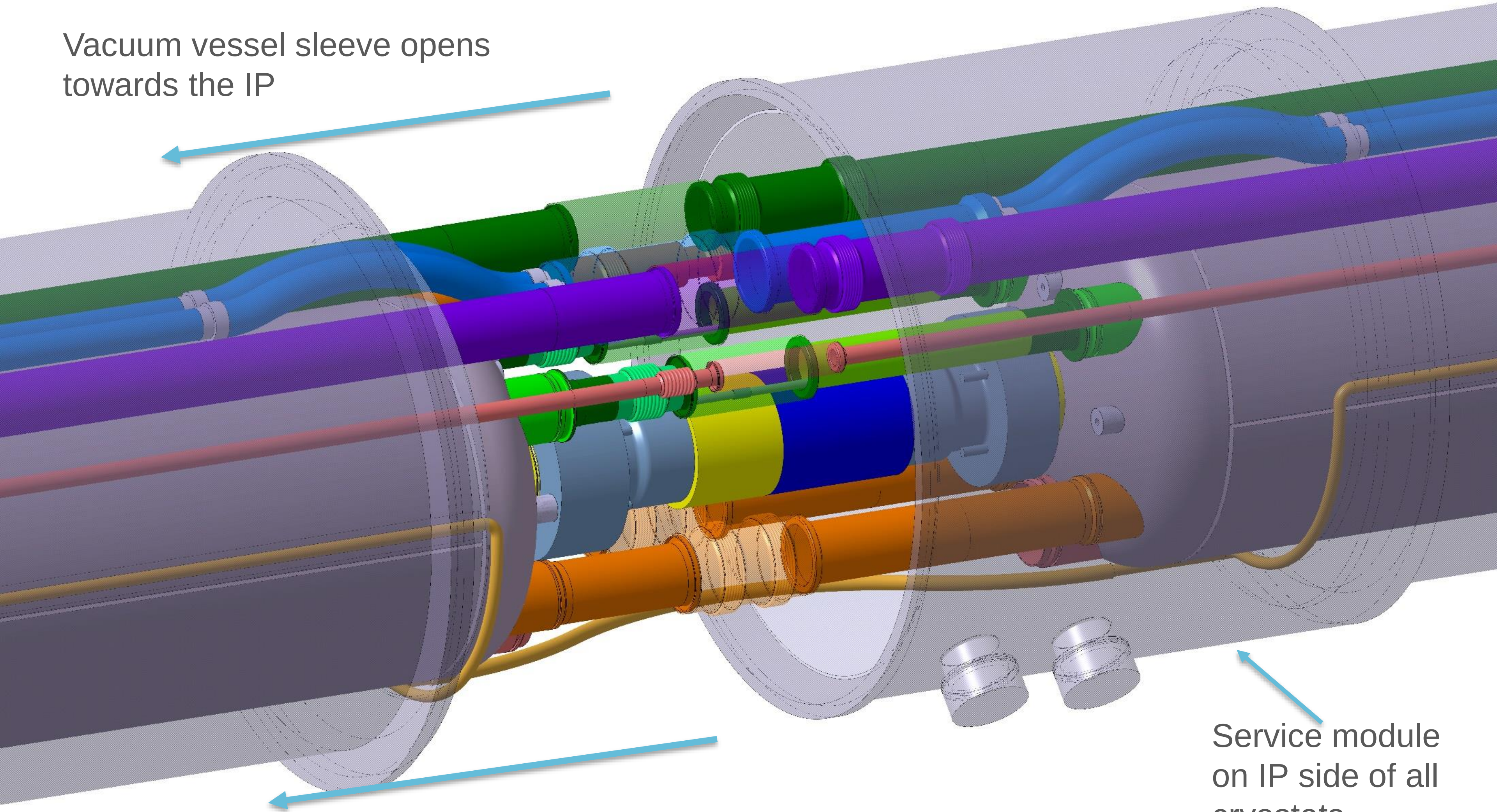
More details on drawing: LHCQQX__0001

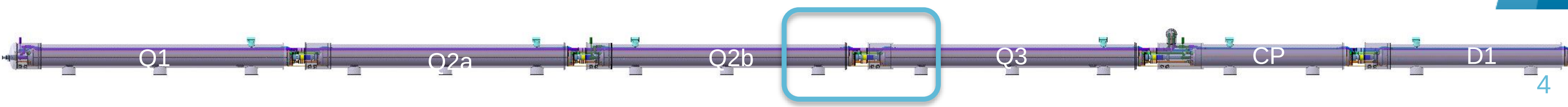
Cold mass interfaces



More details on drawing: LHCQQX__0001

Complete interconnect





Phase separators and pumping lines

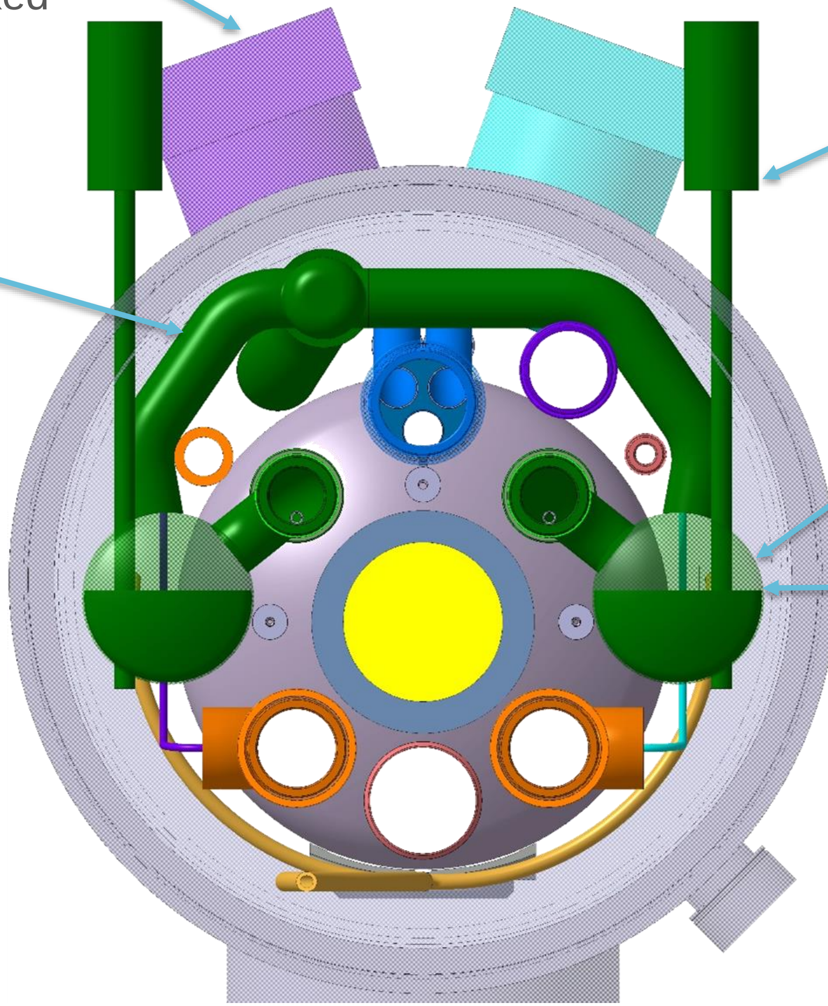
Integration with alignment equipment to be checked

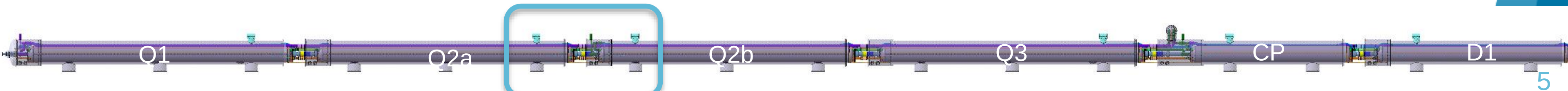
Reservation for level gauge (if needed)

Pumping manifold requires locally enlarged diameter: service module

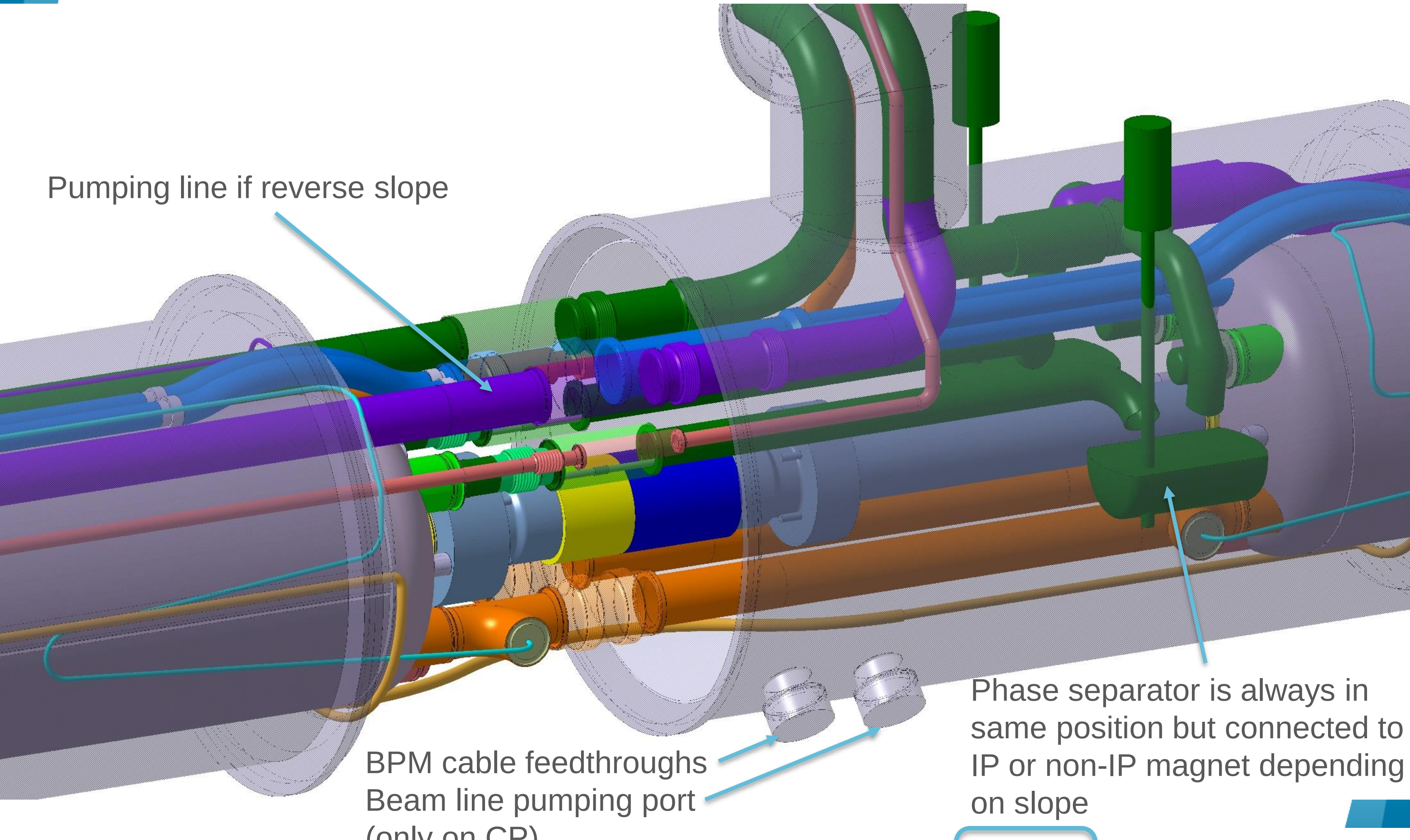
Lower than heat exchanger

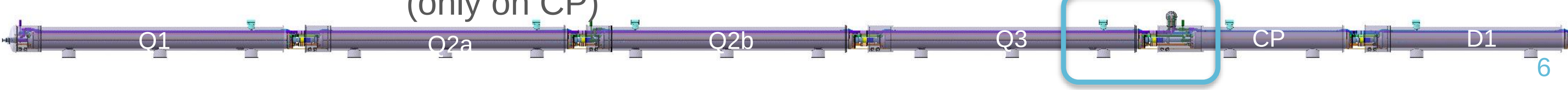
2x 6.5 L of liquid volume





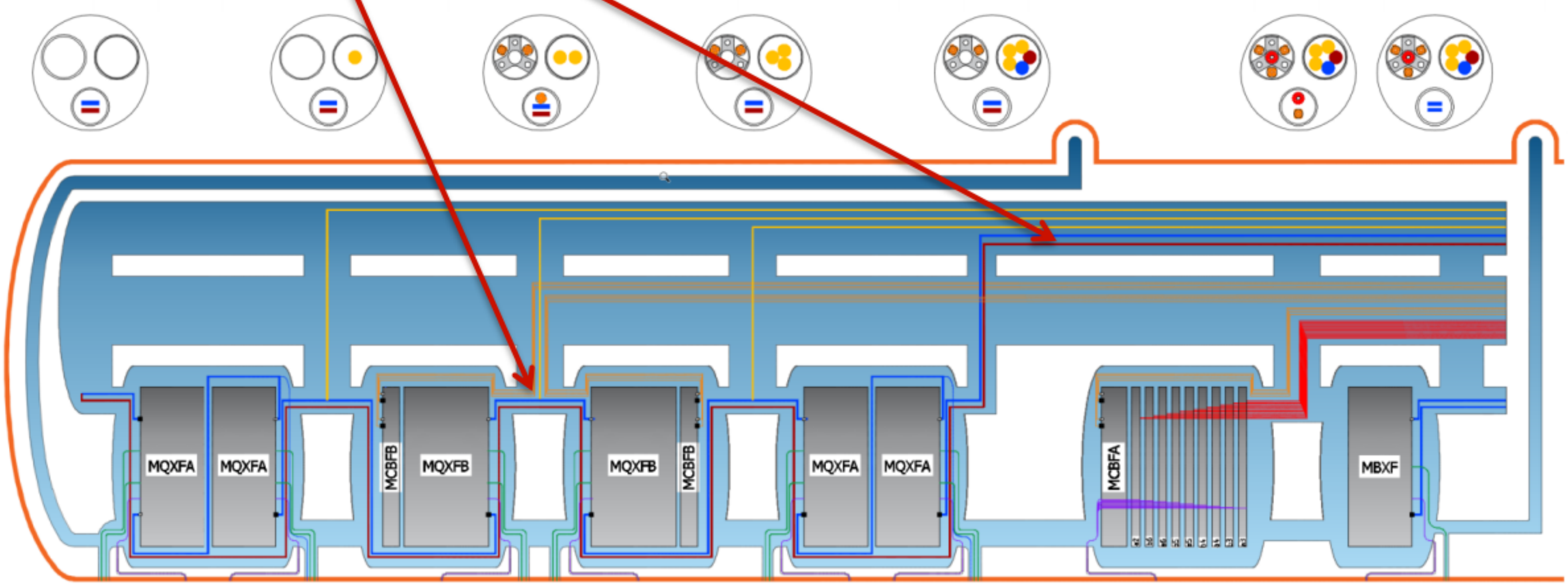
Interconnect and service module Q3-CP

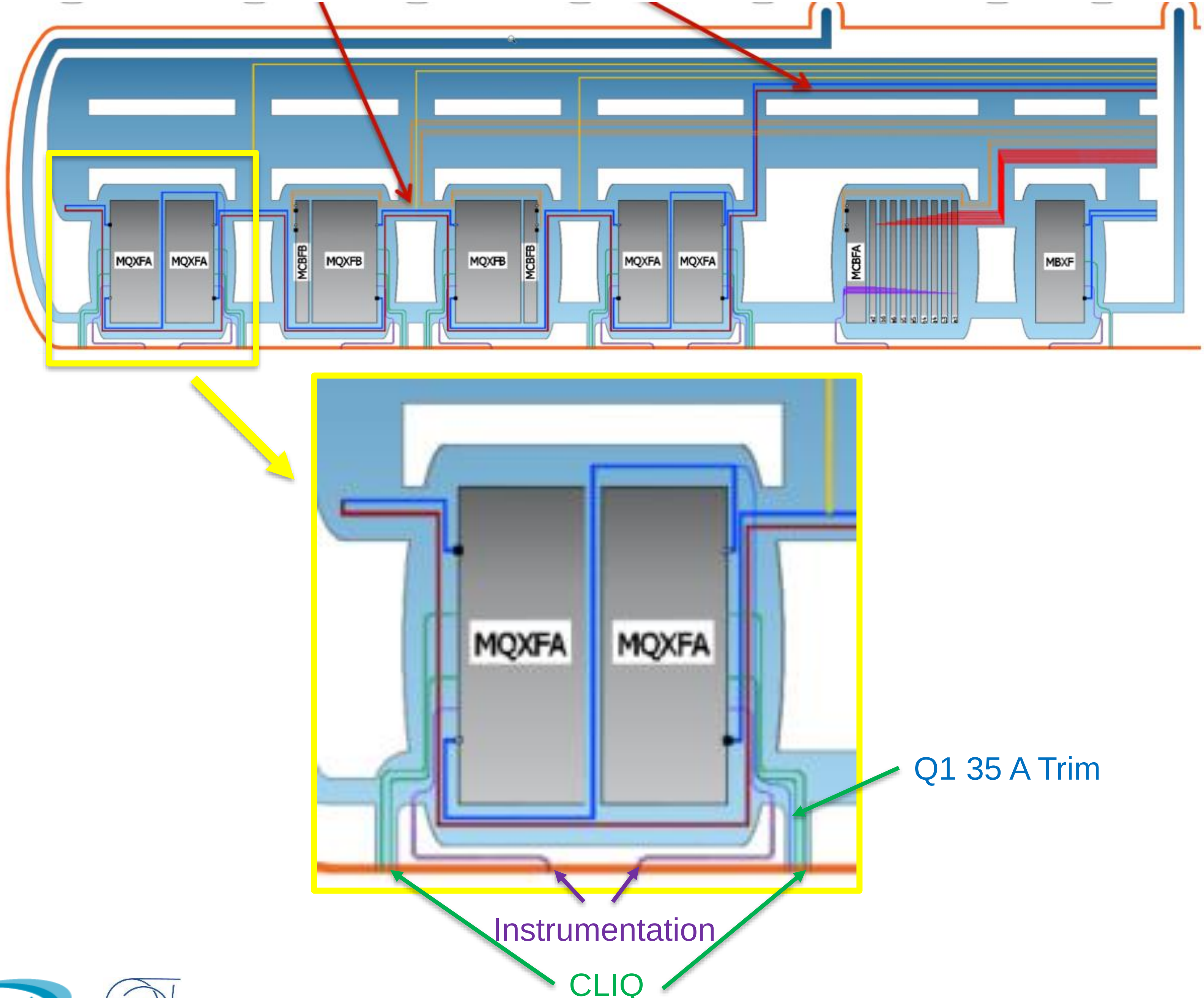




CIRCUIT BASELINE

- Triplet 18 kA main busbar: a mix of flat and round
  - Flat busbars made of two Nb-Ti Rutherford cables inside the triplet, (see next slide)
  - In the parallel line bypassing D1 and the corrector package we will have a round busbar



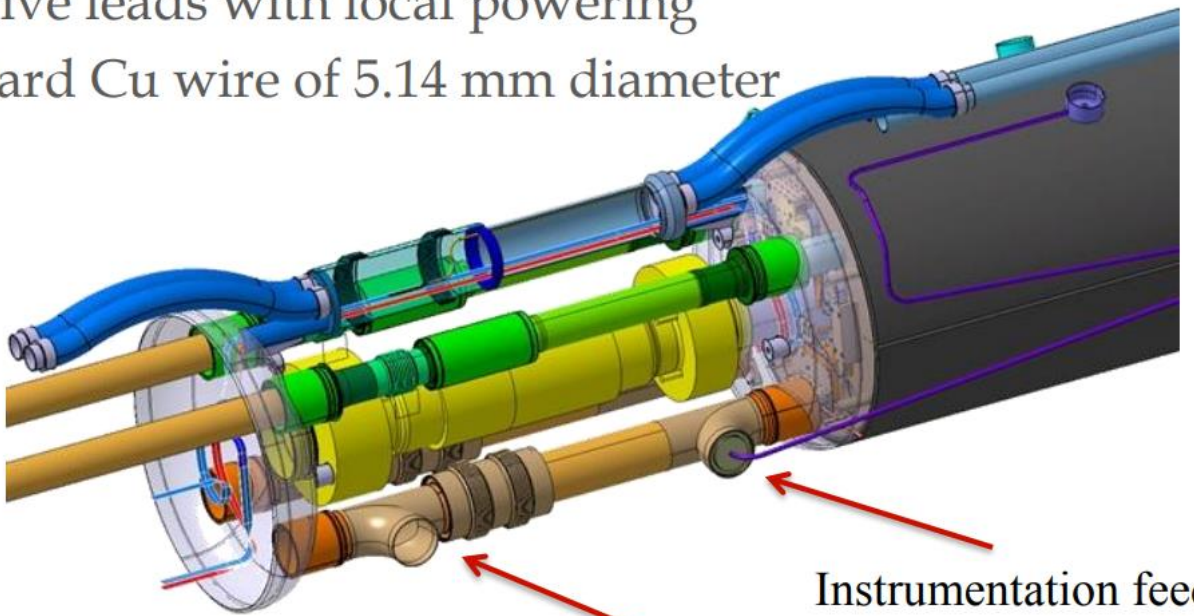


HiLumi HL-LHC PROJECT

CERN

CIRCUIT BASELINE

- Triplet trim on Q1a (recent requirement, low current of 35 A)
  - Resistive lead with local powering
  - The same is put on Q3a to avoid symmetry breaking
- Triplet CLIQ leads (2 kA for short time ≈100 ms)
  - Resistive leads with local powering
  - Standard Cu wire of 5.14 mm diameter



Why local feedthroughs?

- Finished cold part of the circuit, including feedtrhoughs, can be **tested at cold** as part of the magnet test (SM18, US, Japan). Electrical and thermal validation at operating conditions before installation.
- …and without modifications of the test bench
- **Less connections** at cold impacting intervention time for magnet replacement. Reliability.

For details on the circuite see https://indico.cern.ch/event/643197/contributions/2623195/attachments/1486026/2308746/et_busbar_1706.pdf