Cryogenic System of Interaction Region (SiD, ILD, QD0, QF1, Crab Cavity) in the Japanese Mountain Site

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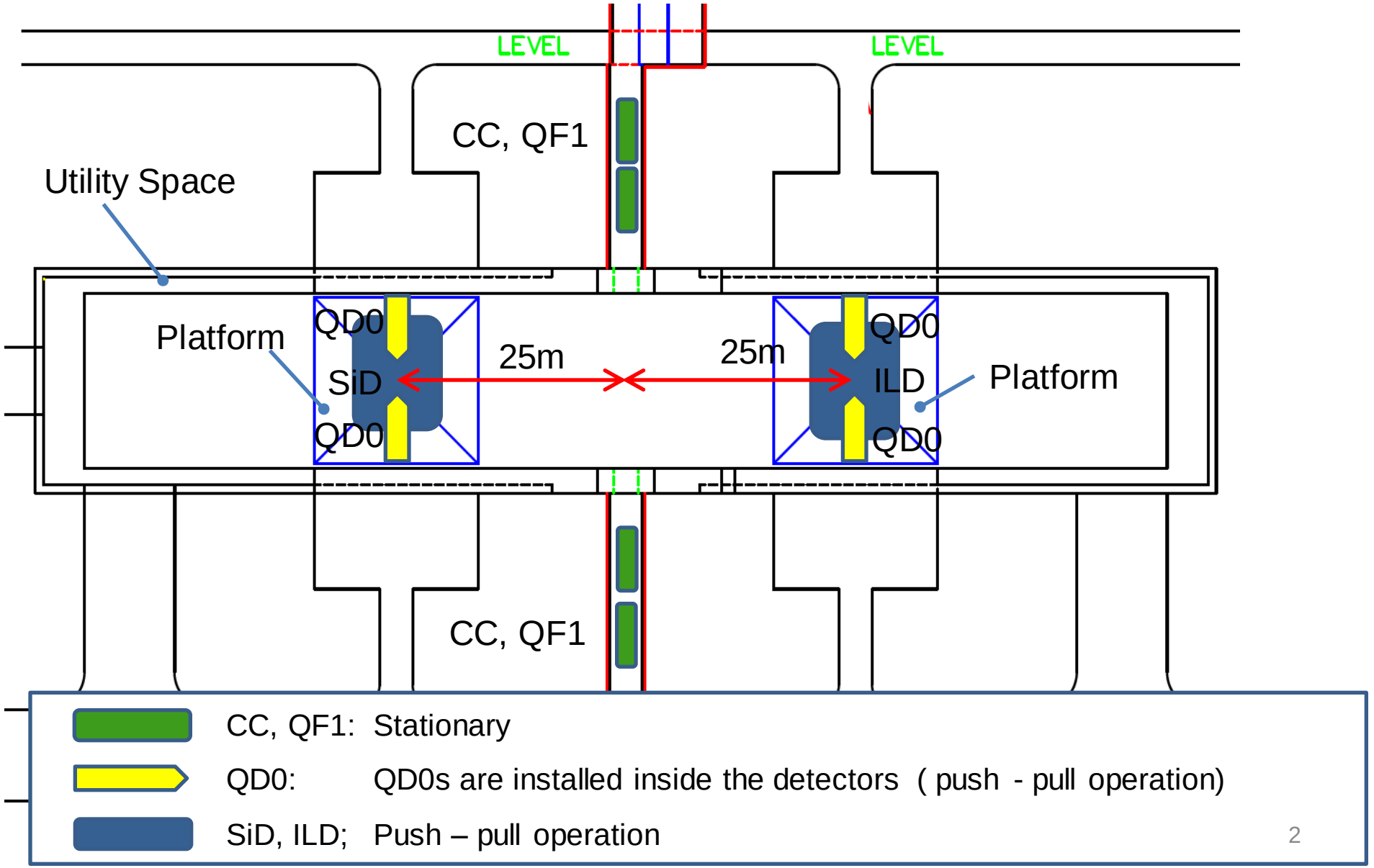
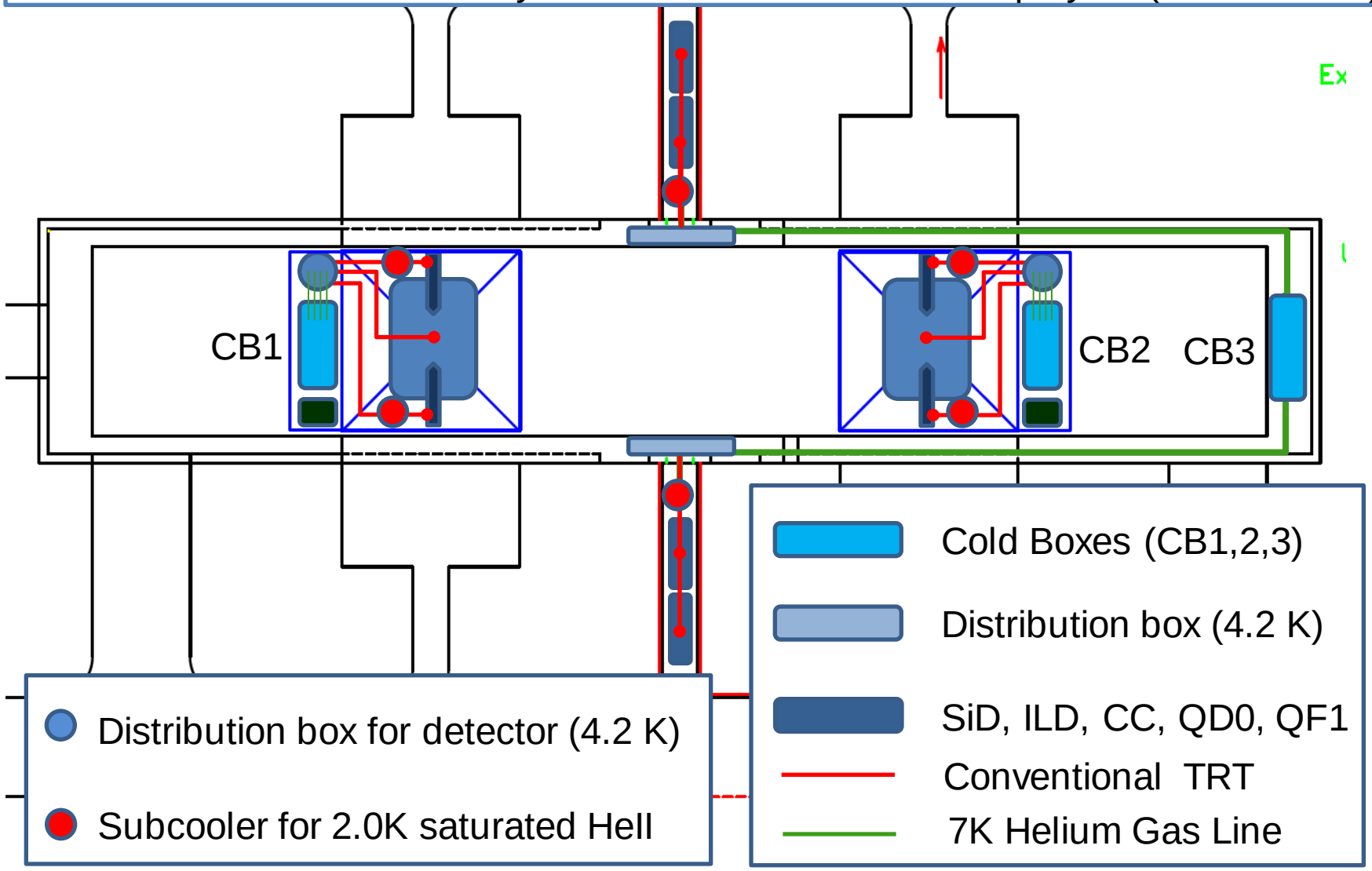
Physical relationship of Superconducting Equipment in the Japanese mountain site



Cryogenic Layout in the experimental hall

- ✓ CB3 and distribution boxes for CC and QF1 are installed on the 6F.
- ✓ CB1, 2, distribution boxes and PSs are installed on the each platform for detector
- ✓ Several numbers of ordinary flexible tubes have to be employed. (see P6 & P8)



Installation location of cryogenic equipment

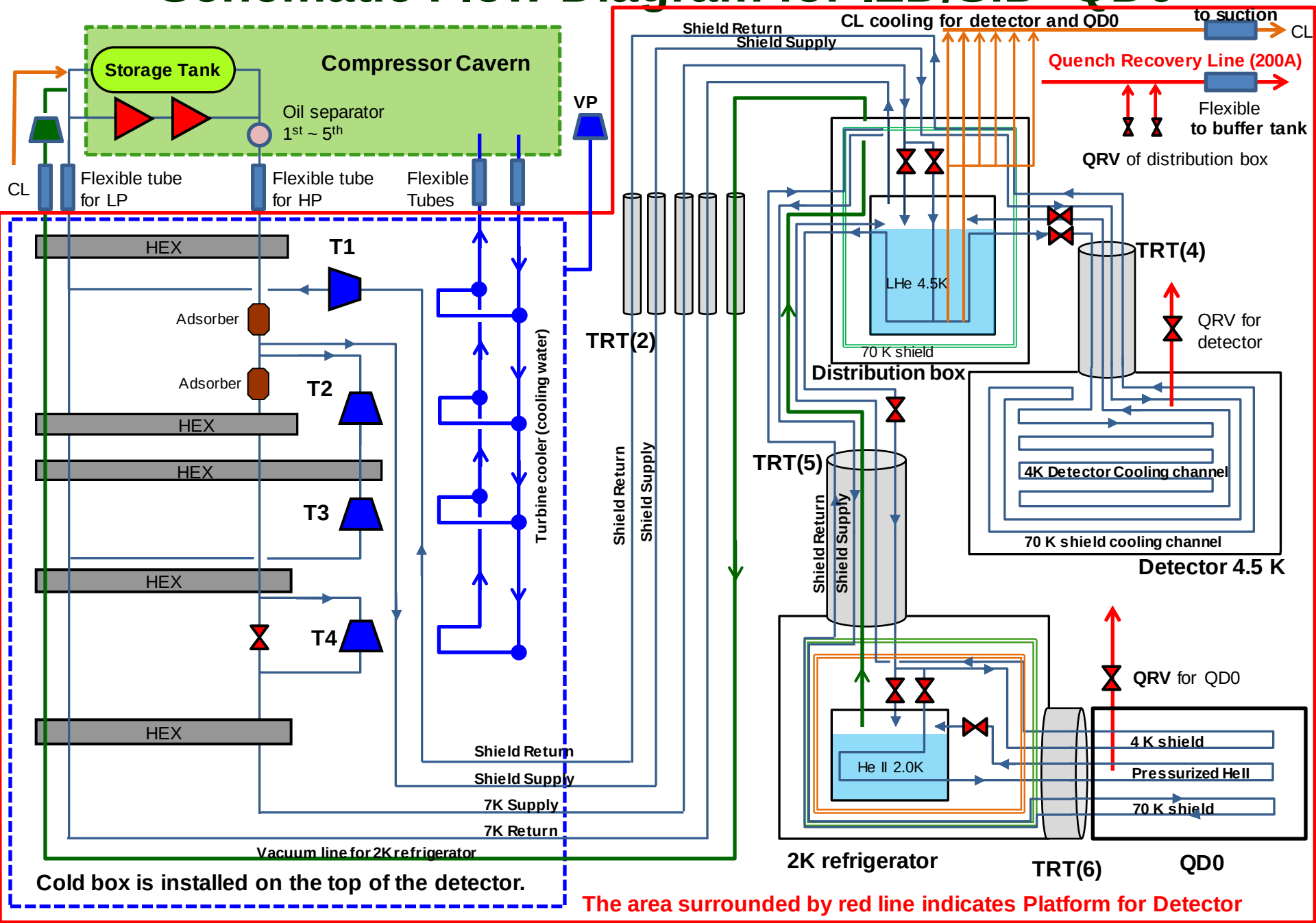
- On the each detector
  - One Cold box
  - One Distribution box for 4.5K
  - Two Distribution boxes for 2.0 K (QD0)
  - Power supply for Detector and QD0

Size and Spec of Cold Boxes

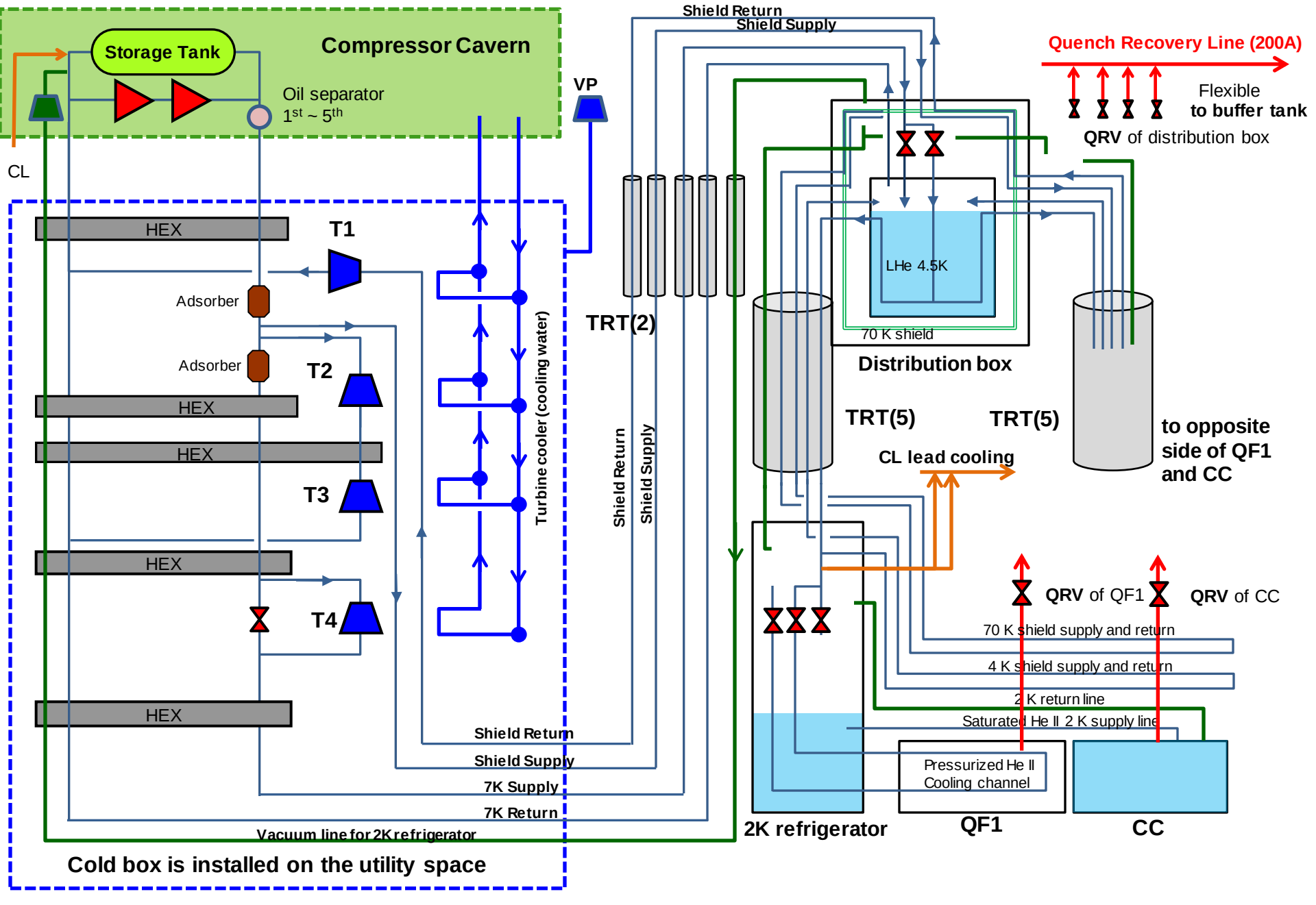
- CB for SiD+QD0, 2.0 kW @4.2 K
  - Located on the detector
- CB for ILD+QD0, 2.0 kW @4.2 K
  - Located on the detector
- CB for QF1, Crab cavity, 2.0 kW @4.2 K
  - Located on the utility space (5F or 6F)

- Each cold box has following dimension and weight.
  Diameter=2m, Length=6.7m, Height=3m, Weight ~ 5000 kg

Schematic Flow Diagram for ILD/SiD+QD0



Schematic Flow Diagram for CC+QF1



Ordinary Flexible Tube for each detector

Following ordinary single layer flexible tubes are adopted for pushpull operation per each detector.

	Diameter of Flex. tube	Number	Bending radius (mm)	References
Helium gas supply line	**OD ~ 60.5mm**	**1**	**225 mm**	**Allowable pressure ~ 2.0 MPa**
Helium gas return line	**OD ~ 200 mm**	**1**	**750 mm**	**Allowable pressure ~ 2.0 MPa**
Helium gas vacuum line	**OD ~ 200 mm**	**1**	**750 mm**	**Allowable pressure ~ 0.2 MPa**
Cooling water for turbine	**OD ~ 30 mm**	**2**	**145 mm**	**Supply & Return**
Quench relief line	**OD ~ 128 mm**	**1**	**350 mm**	**Allowable pressure ~ 2.0 MPa**
Return line for Current lead cooling	**OD ~ 30 mm**	**1**	**180 mm**	**Allowable pressure ~ 2.0 MPa**

Bending radius is the value of Tuf Omega Tube.

To do list for DBD

We have to estimate following items.

- Total Heat Load
- Practical Flow Diagram and Design of Cryogenic equipment.
- Cost estimation
- Vibration reduction of QD0
  - ✓ Fundamental research of vibration source
  - ✓ Modal analysis of QD0
  - ✓ Development of absorption scheme.
- Laid down method of ordinary flexible tubes (see previous page)
  Now we consider the several schemes.
  - ✓ 5F and 6F by means of Cable chain
  - ✓ 6F utility space
  - ✓ On the floor of experimental hall