TCLD impacts on 11T/CC

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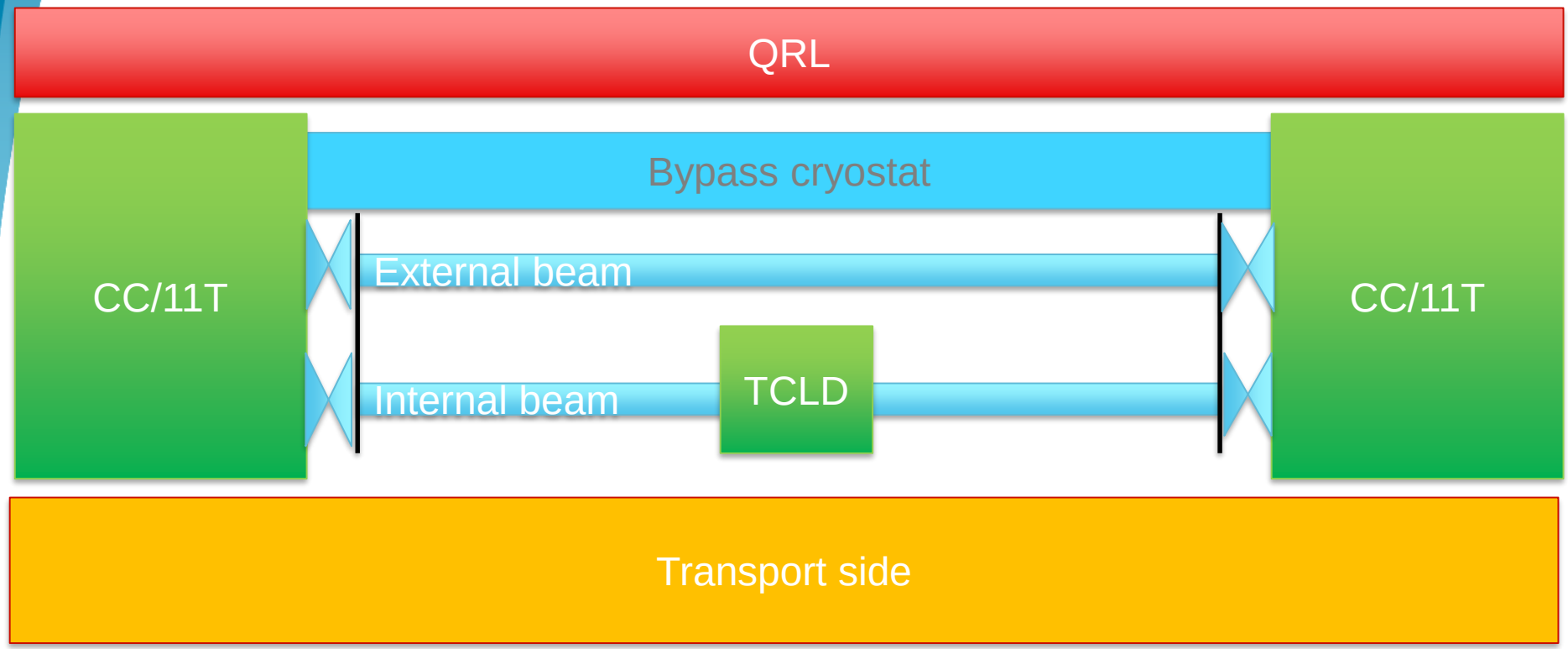
Outline

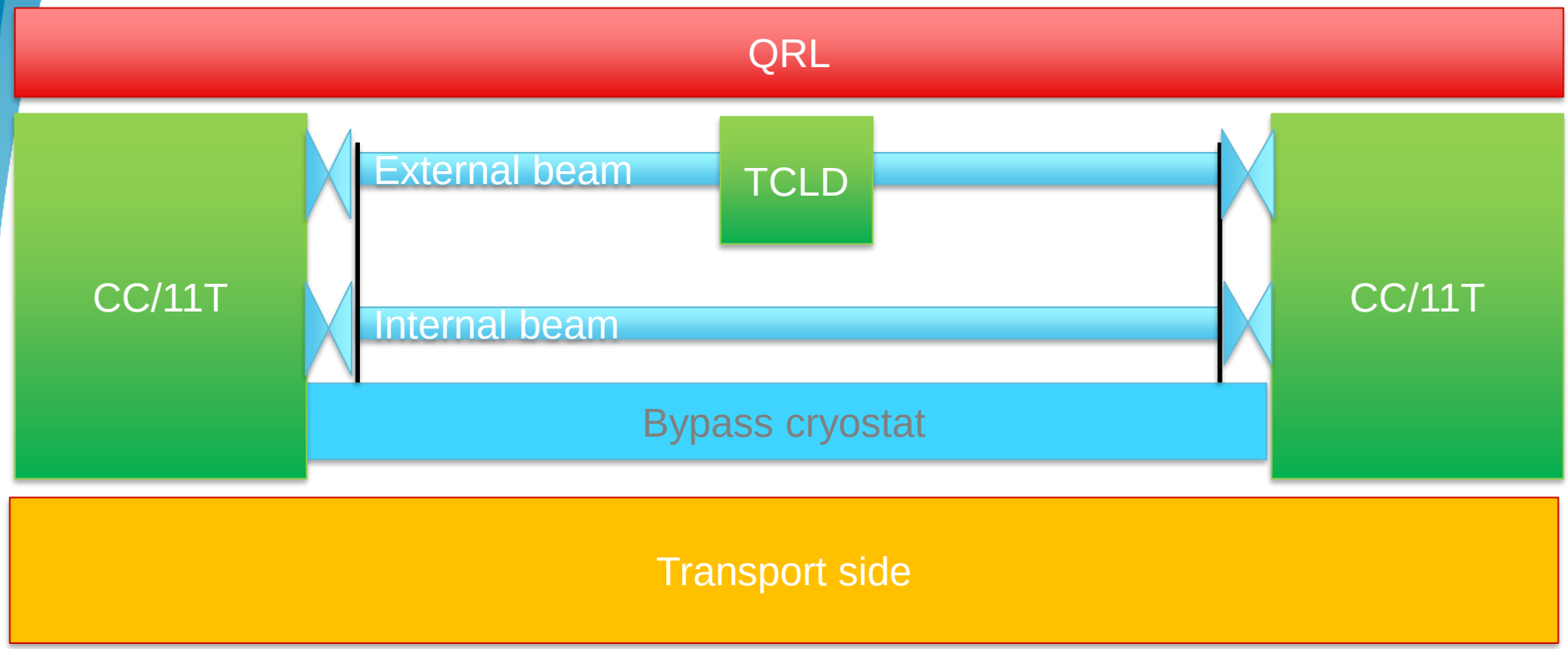
- Layout
- Failure modes
- Control measures
- Conclusion
- Homework

TCLD layout (schematic)



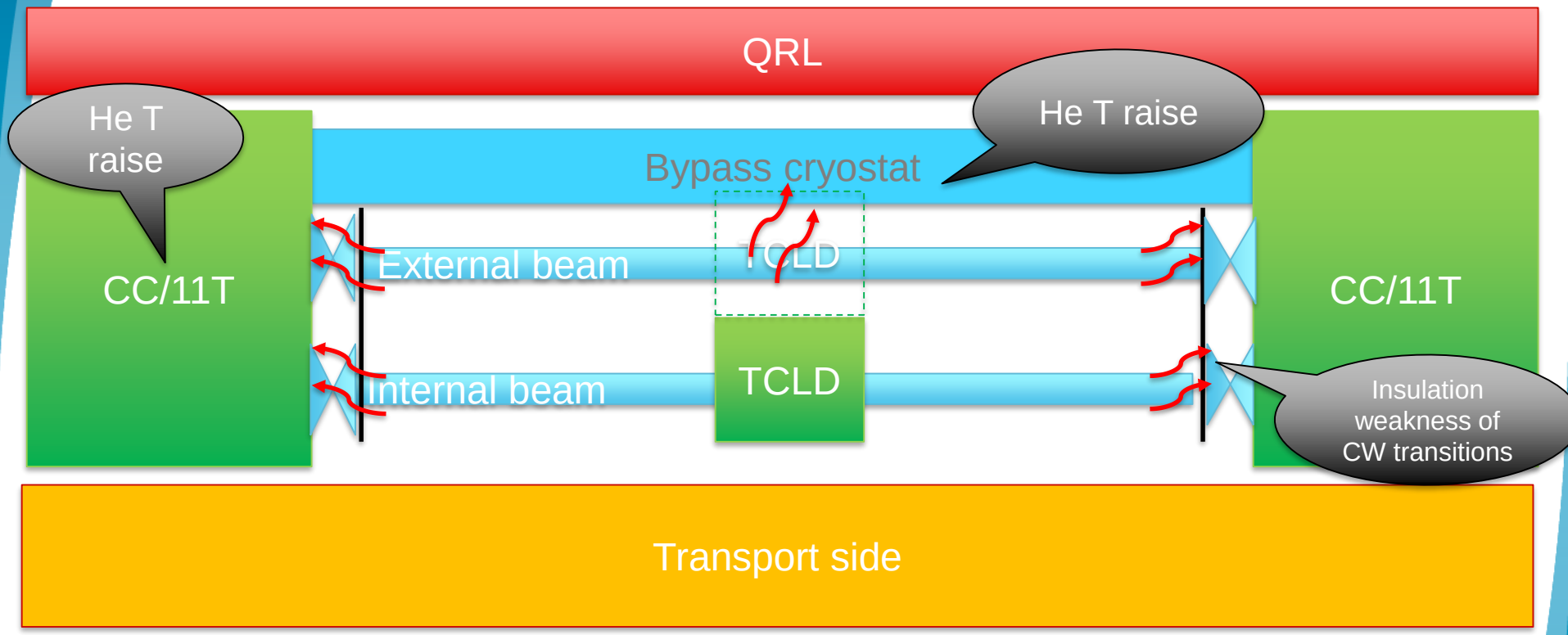
Position of new TCLD collimators at P2
(left and right sides) and P7 left side

TCLD layout (schematic)



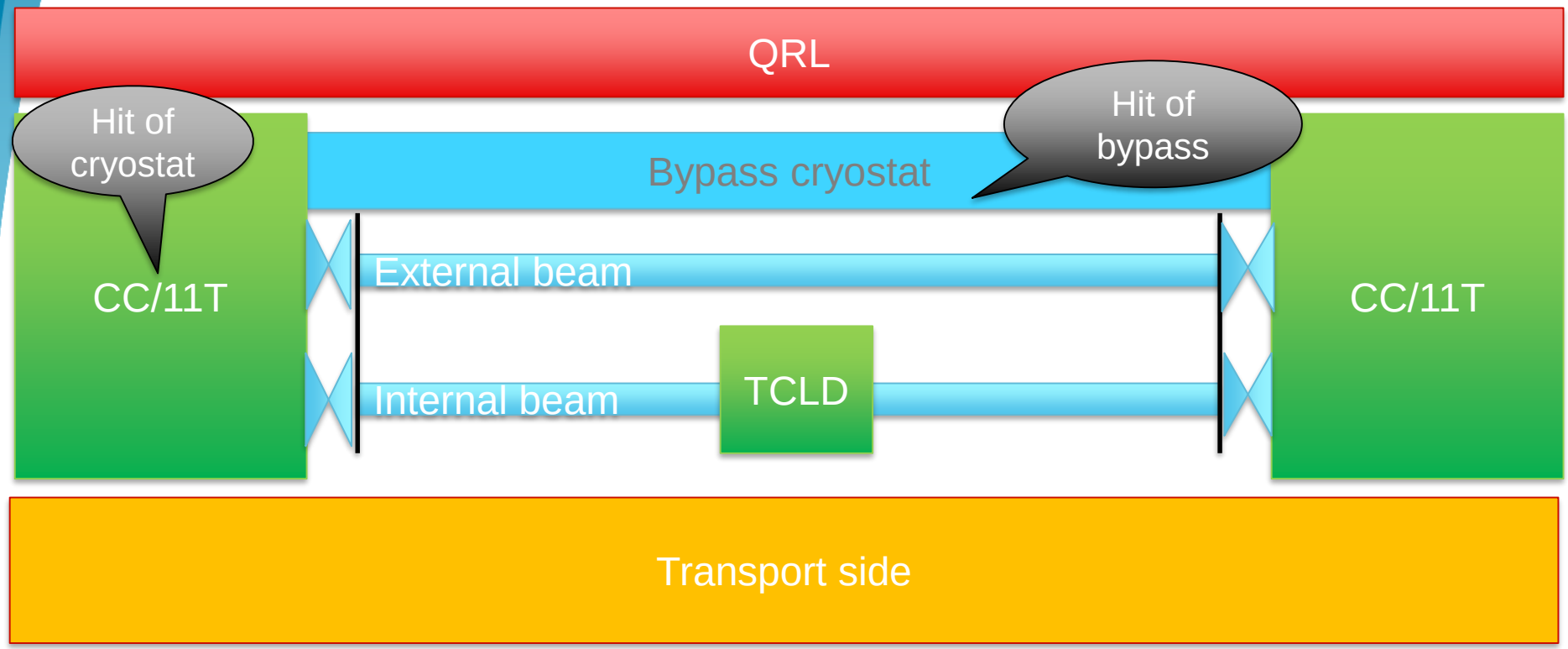
Position of new TCLD collimators at P7 right side

Failure modes during bakeout of TCLD (P2,P7)



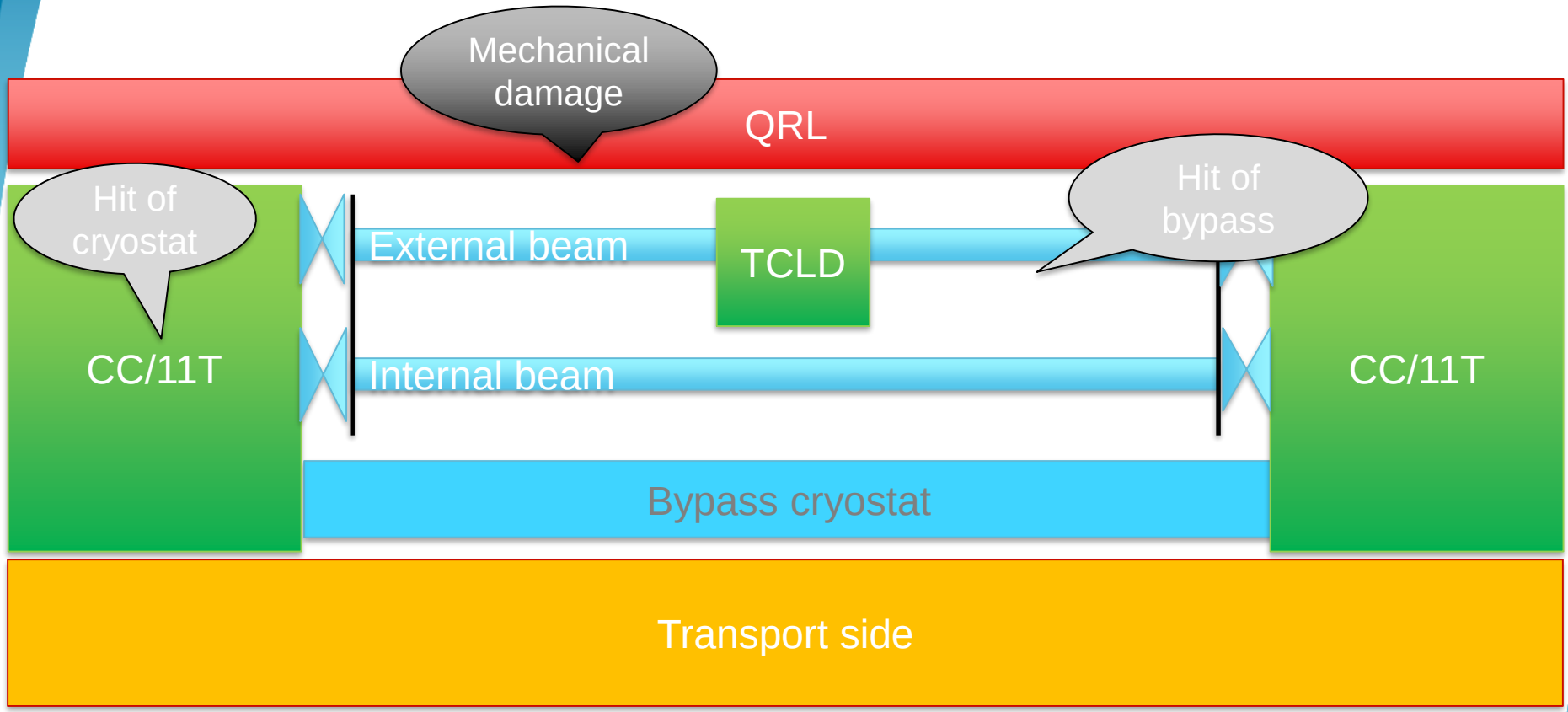
Position of new TCLD collimators at P2 and P7

Failure modes during TCLD handling (P2, P7L)



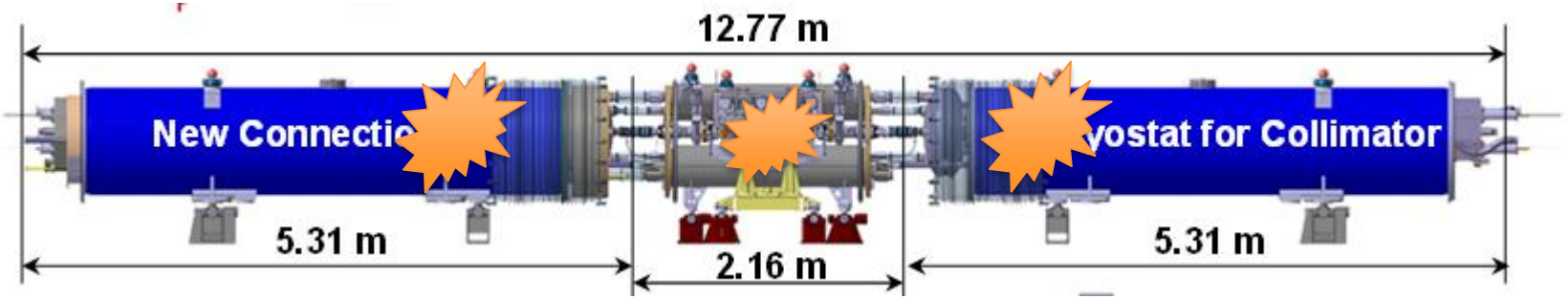
Position of new TCLD collimators at P2
(left and right sides) and P7 left side

Failure modes during TCLD handling (P7R)



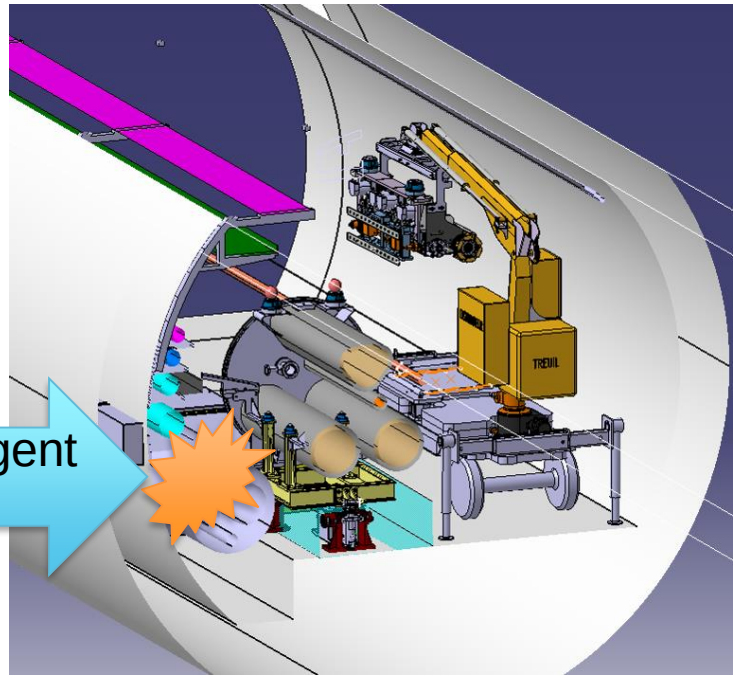
Position of new TCLD collimators at P7 right side

MCI 1: Mechanical hit during TCLD handling



- ODH, Cold jet
- Control:
  - relevant arc sectors and bypass must be emptied from lHe and heated up to 20K before TCLD change.
  - Transport procedure

MCI 3: Hit of QRL during TCLD replacement (Only P7 right side)



- ODH, Cold jet
- Control: QRL must be emptied from lHe and heated to 20K before TCLD replacement

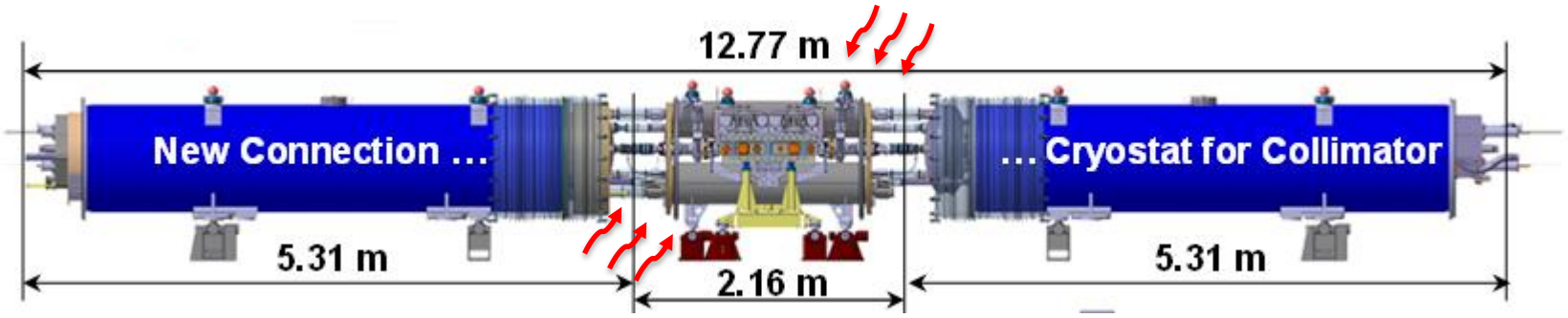
MCI 4: Insulation weakness of CW during bakeout

- Cold bore temperature build up during bakeout
- Damage of cold bore
- Heat-up of liquid helium
- Control:
  - VSC and CRG groups must show through a thermal simulation that the heat flow will be lower than the cryogenic capacity in order to keep the magnets at 1.9K during bakeout;
  - If not, cold masses and CC must be emptied from lHe and filled with 20K floating He before TCLD bakeout.

MCI 4a: Direct contact among magnet/CC components and bakeout elements

- He temperature raise in cryostats
- Overpressure
- Control:
  - Same as MCI 4
  - Visual inspection by Vacuum group

MCI 4b: Thermal radiations to bypass during bakeout



- Thermal radiation
- Bypass temperature build-up
- Heat-up of liquid helium
- Same design controls as MCI 4

Conclusion

- MCI 1: Hit of CC/11T during TCLD handling
  - Some arc sectors must be emptied and heated to 20K
- MCI 2: Hit of bypass during TCLD handling
  - => MCI 1 + bypass must be emptied and heated to 20K
- MCI 3: Hit of QRL during TCLD handling (R7)
  - => MCI1 + QRL must be emptied and heated to 20K
- MCI 4: Insulation weakness of CW during bakeout
  - VSC and CRG must calculate the heat flow and prove it is lower than cryogenic capacity. Otherwise, CC/Cold masses must be emptied and filled with 20K floating He
  - MCI4a: Direct contact among magnet/CC components and bakeout elements
    - => MCI 4
  - MCI4b: Lack of insulation of bypass during TCLD bakeout
    - => MCI4

Homework

- WP12 with WP9:
  - define the thermal radiation of the bypass
  - And the thermal conduction in the CW and cryostats.

- EN/HE:
  - TCLD handling procedure to guarantee the higher safety level to avoid mechanical damages to allow TCLD replacement at cryogenic temperature (on transport side).

- PSO:
  - Study impacts of regular mechanical maintenance (sensor/switch/cable replacement) with no impact on Vacuum.
  - First installation of TCLD