Present situation and issues integration in MS areas Point 1 & 5

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Sumary

- New optics
- Current status
  - Point 1
- Modifications and consequences in MS1
- Current status
  - Point 5
- Modifications and consequences in MS5
- Conclusions

Conclusions (1/2)
Open questions and to do list

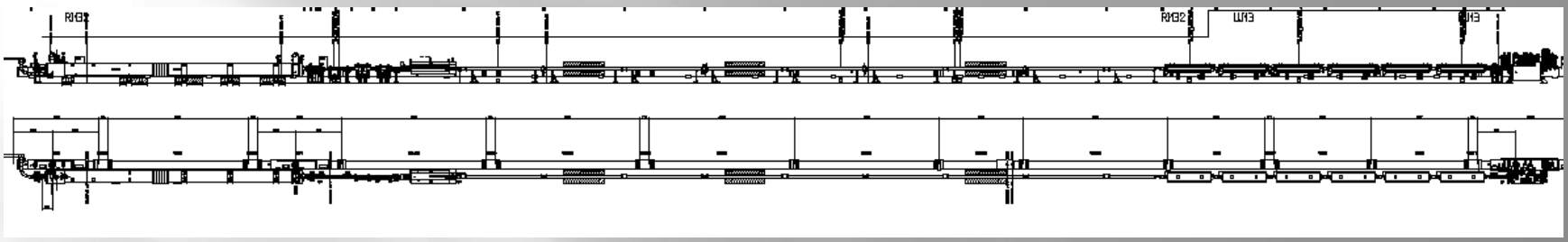
- The **LSS aperture** is the main limiting factor.
  - → **What is the min. acceptable n1 in the LSS @ 7 TeV w/o additional absorber?**
  - → **(1)..$n1_{LSS}$ =7+ε , (2) $n1_{LSS}$ =9-10 or (3) $n1_{LSS}$ >>10 ??**
  - → Could be checked quickly with the nominal LHC optics by reducing artificially the D2/Q4/Q5 aperture in LSS1 & LSS5.
  - → Sticking to β^* =25 cm, and depending on the reply to the above question,…
    - **(1)** **the LSS could be kept unchanged** and the triplet aperture could range in between ~110 mm (no aperture margin in the triplet) →~120 mm (no matching found for 130 mm aperture triplet and $n1_{LSS}$ ~7), **with a preference for 120 mm** and a gradient pushed up to ~125 T/m, **i.e. 156 T/m for the short sample limit.**
    - **(2)** **D2/Q4/Q5 have to be moved w/o b.s. rotation** (but perhaps in some Q5's) and the triplet aperture could range in between ~110 mm (no aperture margin in the triplet) →130 mm (strength limitation in the LSS, essentially Q7), **with a preference for 120 mm.**
    - **(3)** **D2/Q4/Q5 have to be moved, b.s. rotation have to be performed** (essentially Q5), **additional tertiaries will be needed in front of Q5** and the triplet aperture could range in between ~110 mm → 130 mm.

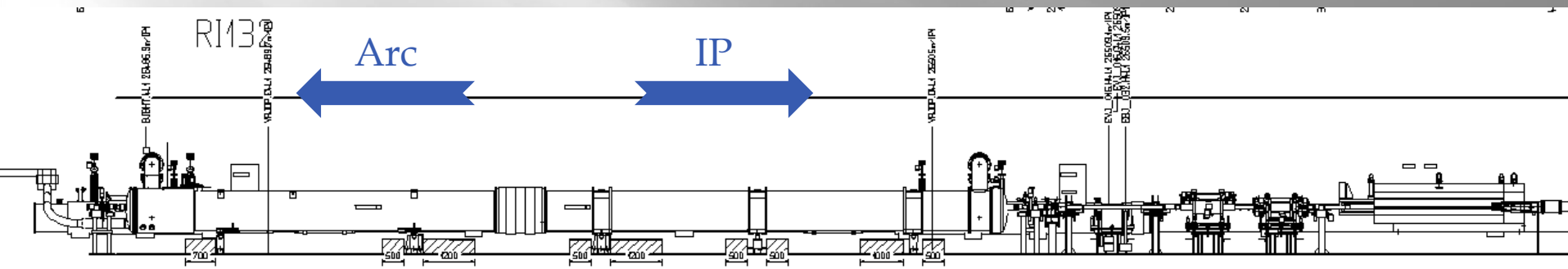
- Magnets displacement
  - Q4-D2 ~16 meters towards the arc.
  - Q5 ~10 meters towards the arc.

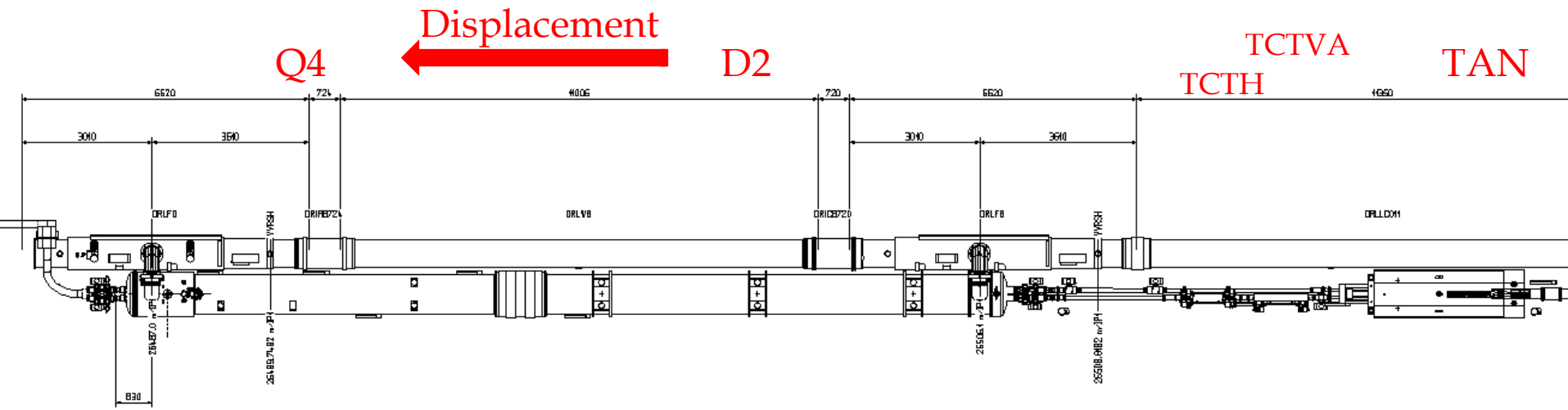
M.S. POINT 1 LEFT

Current status

C4L1







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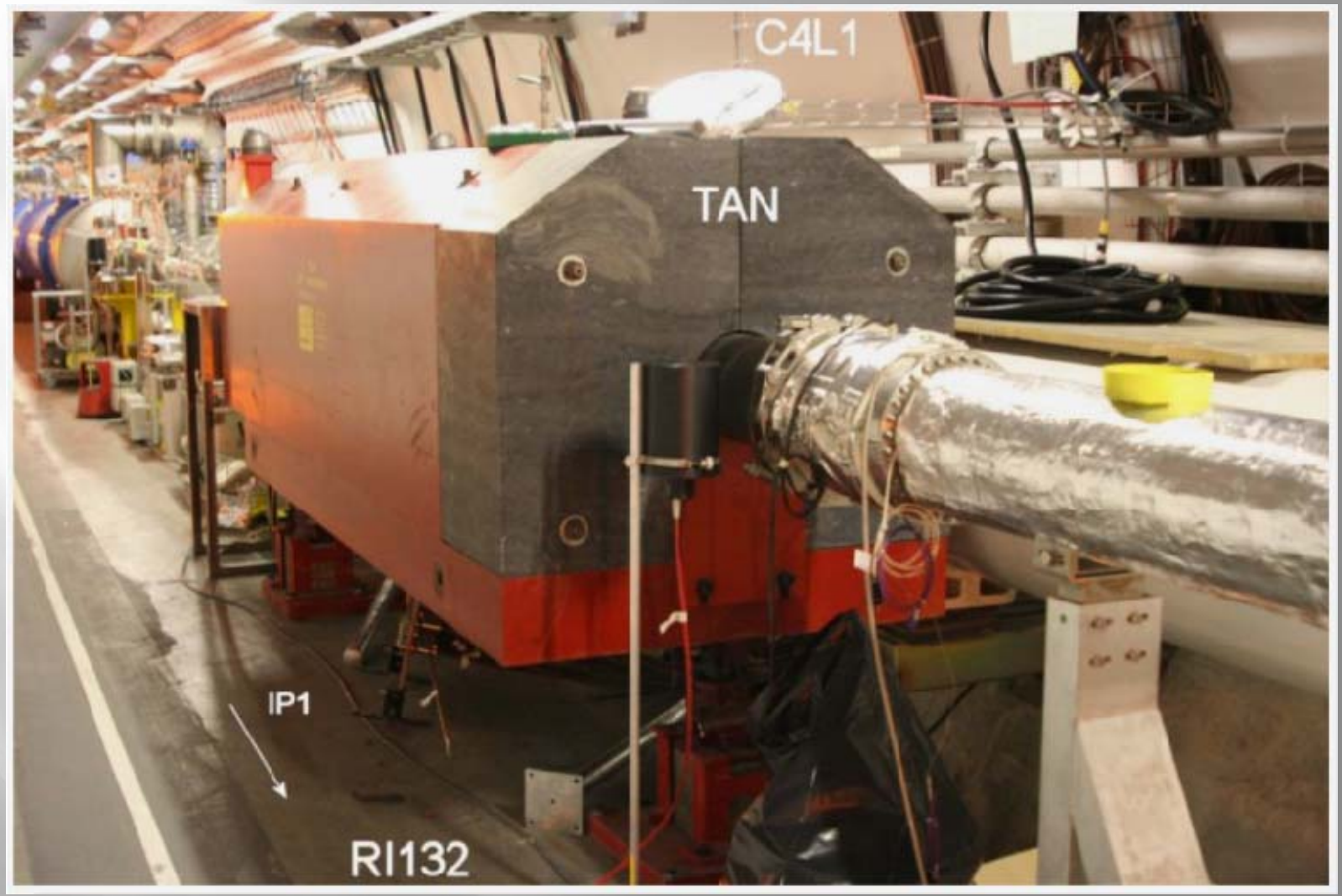
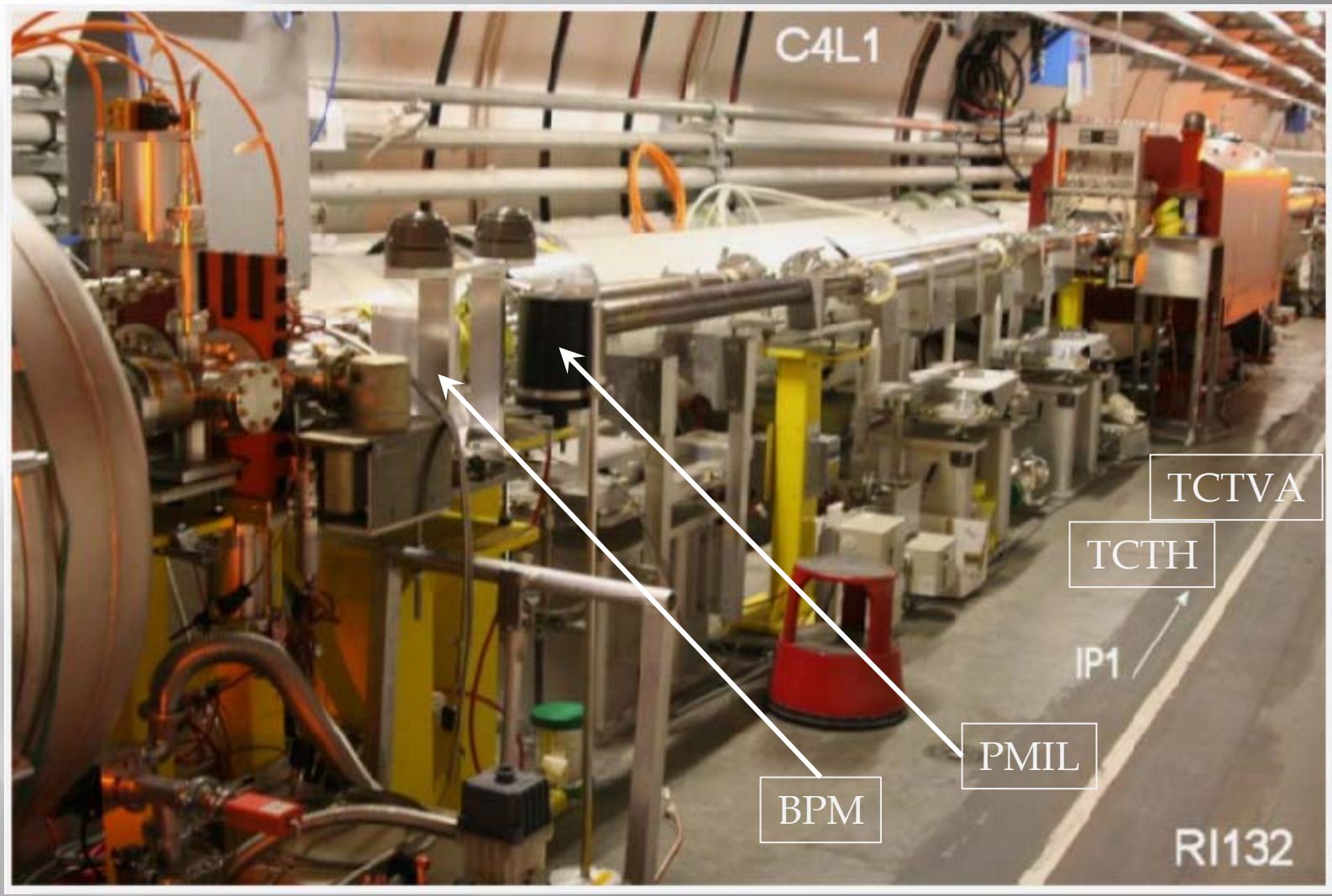


C4L1

C4L1



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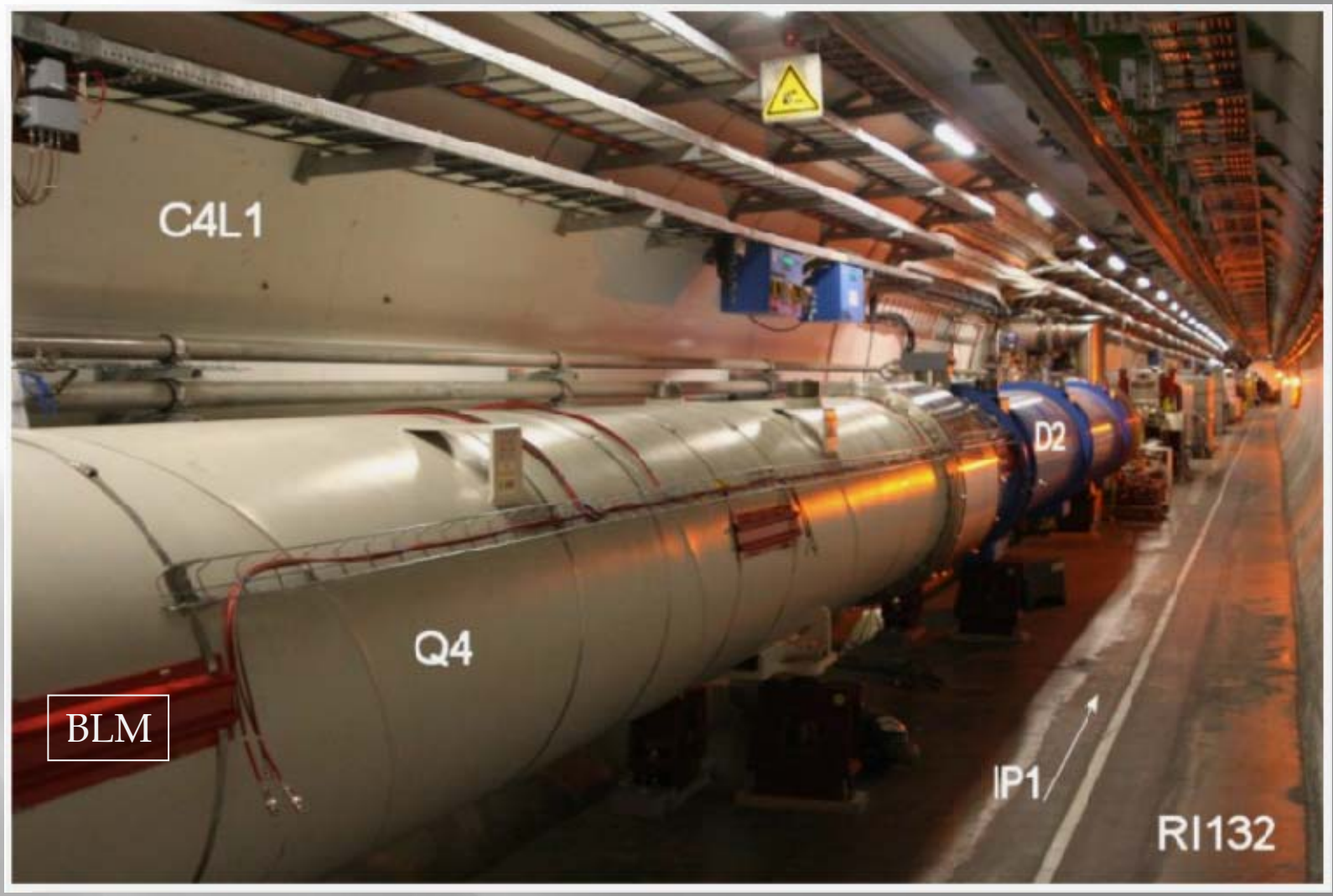
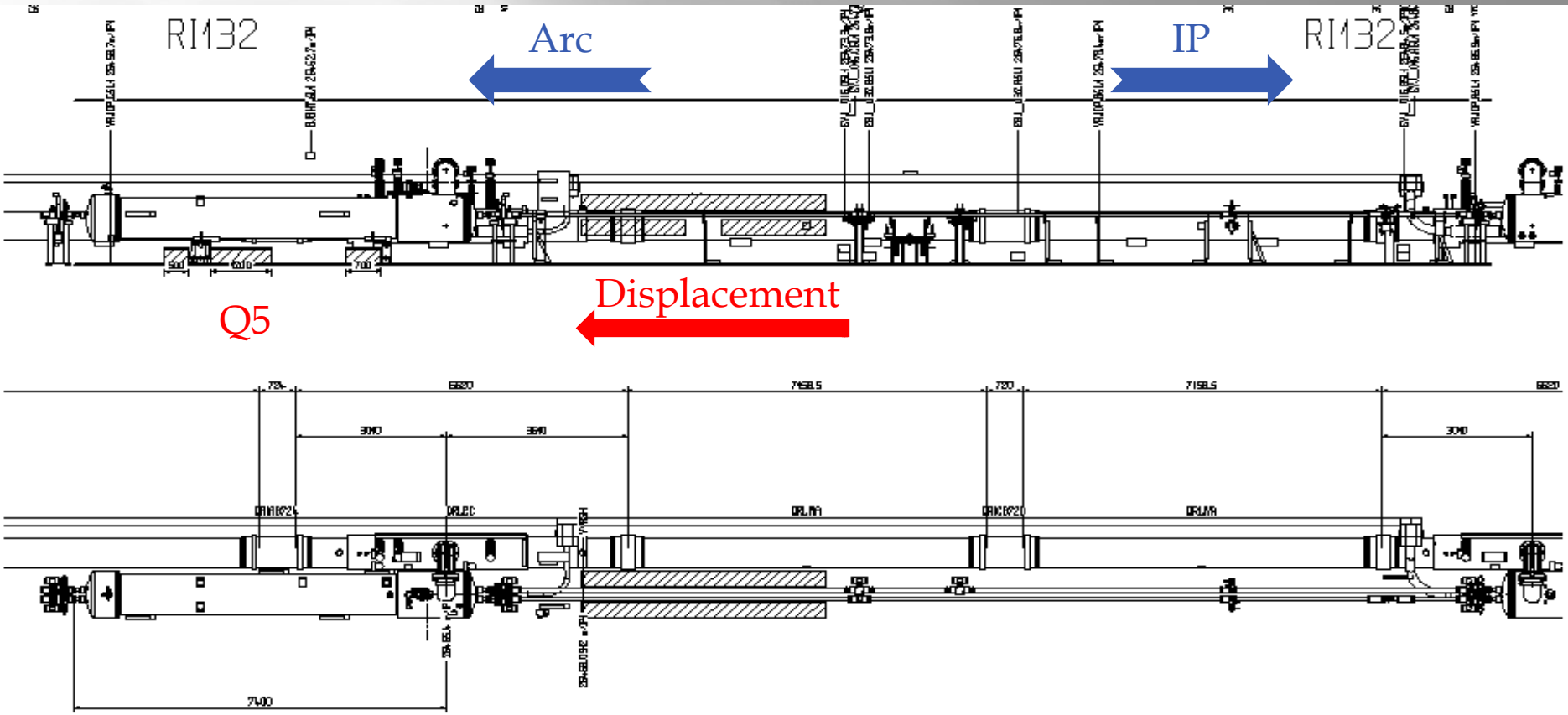


C5L1



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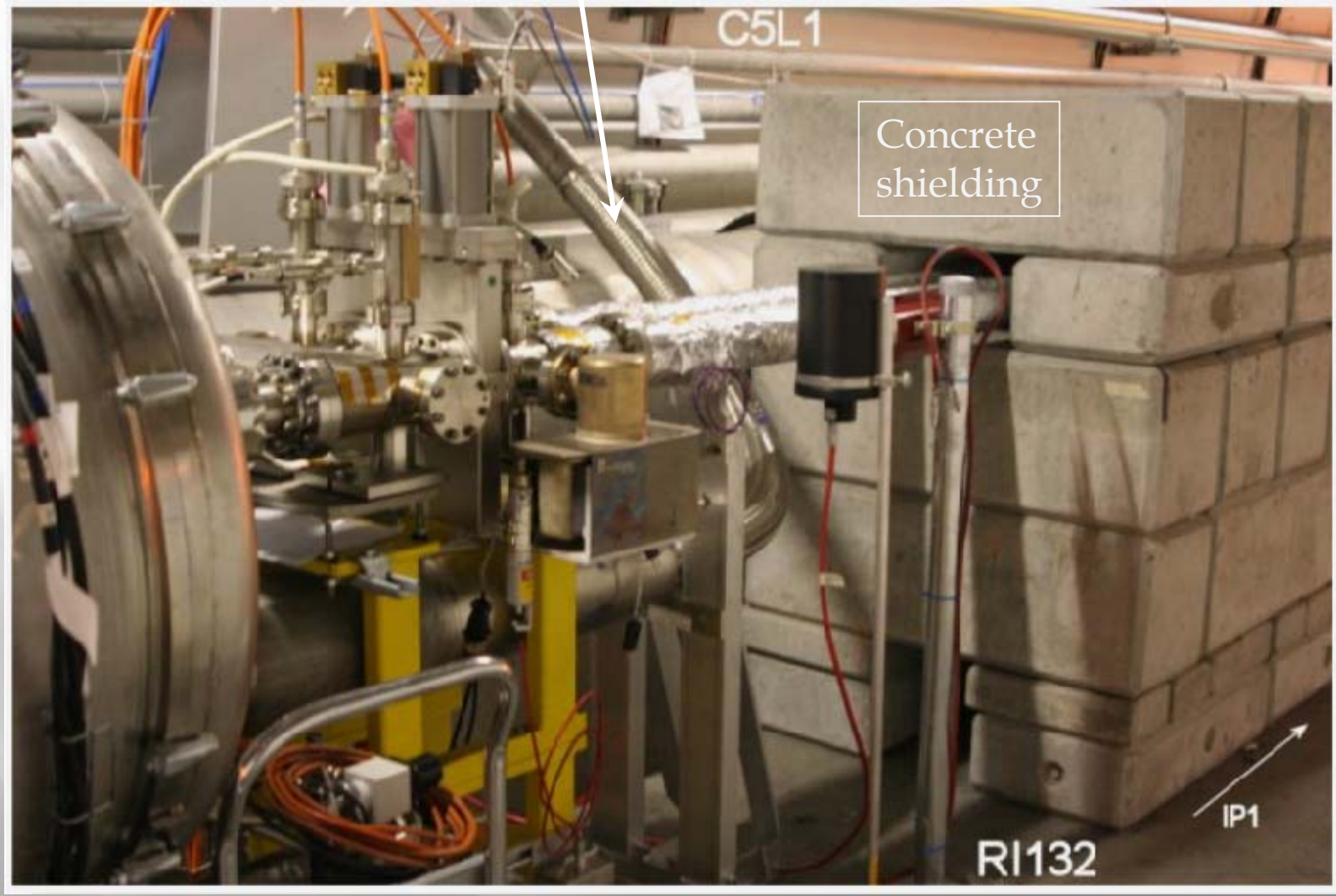
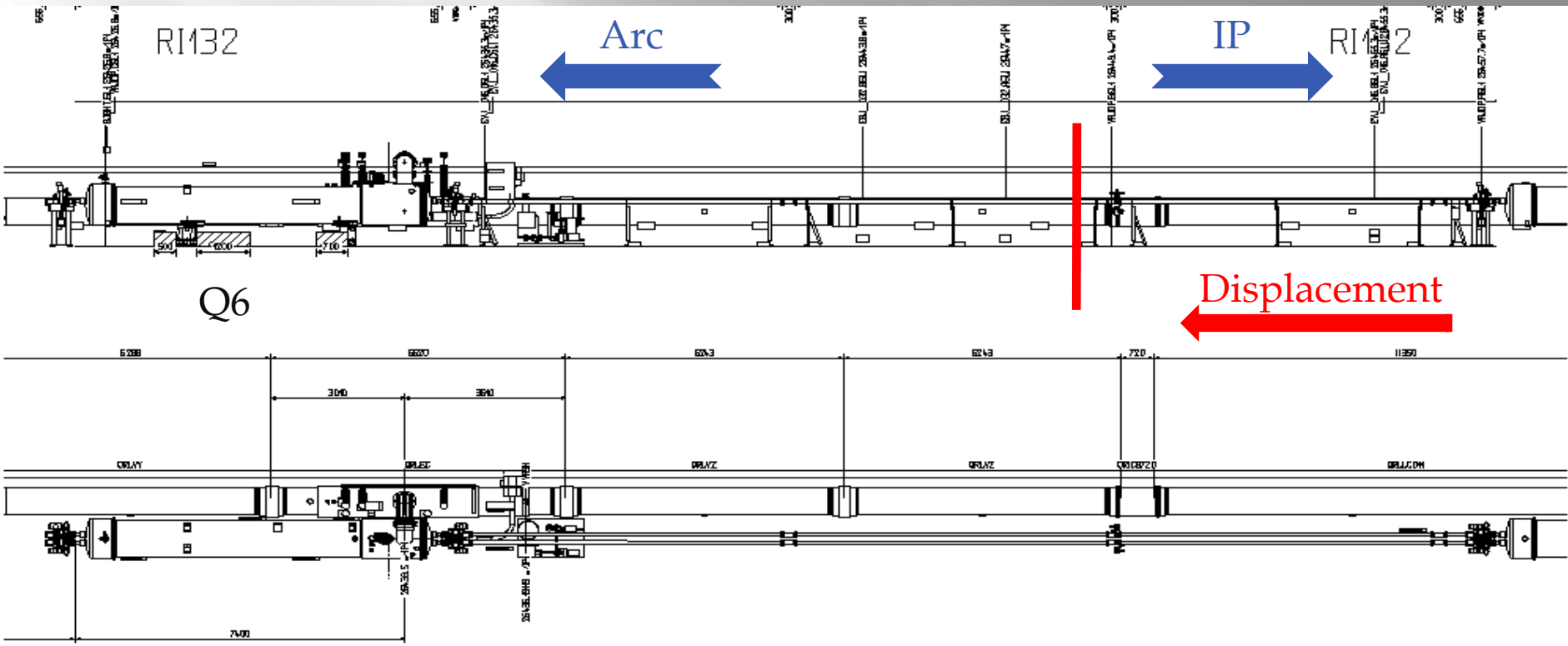


C6L1



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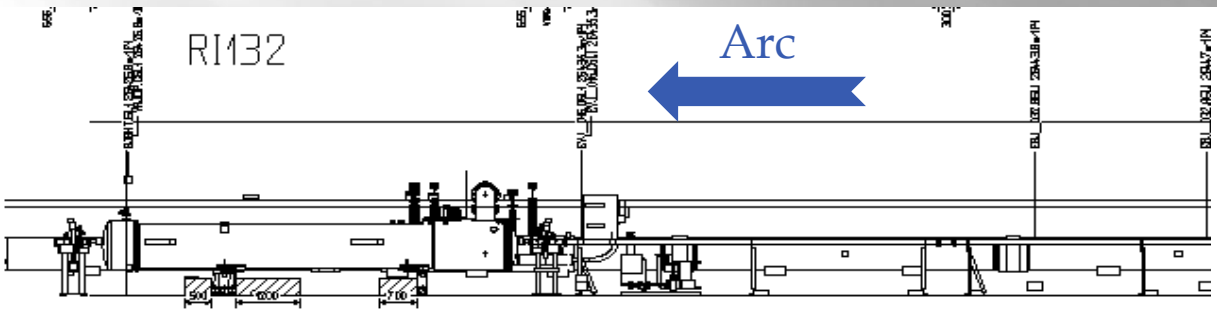
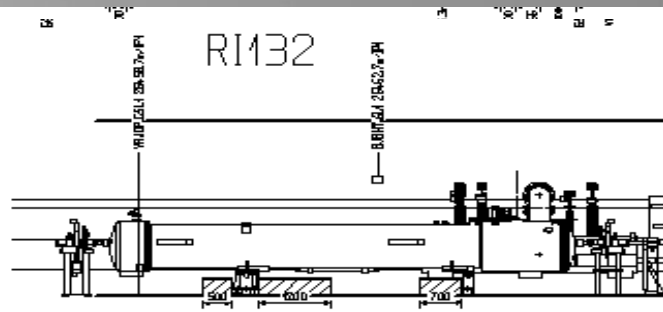
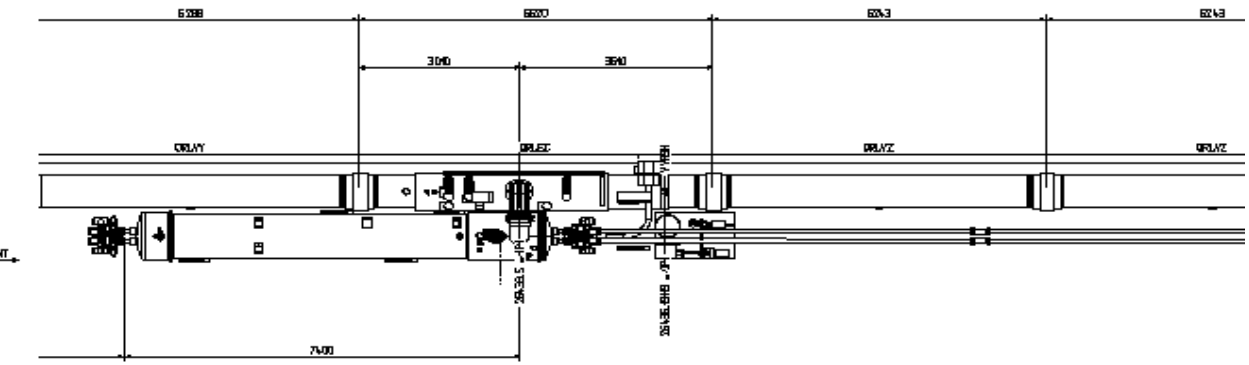
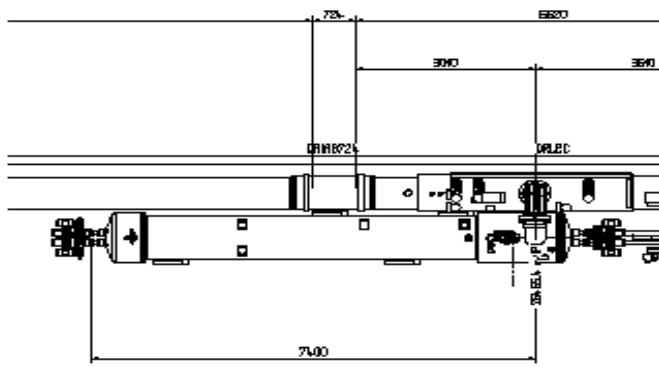




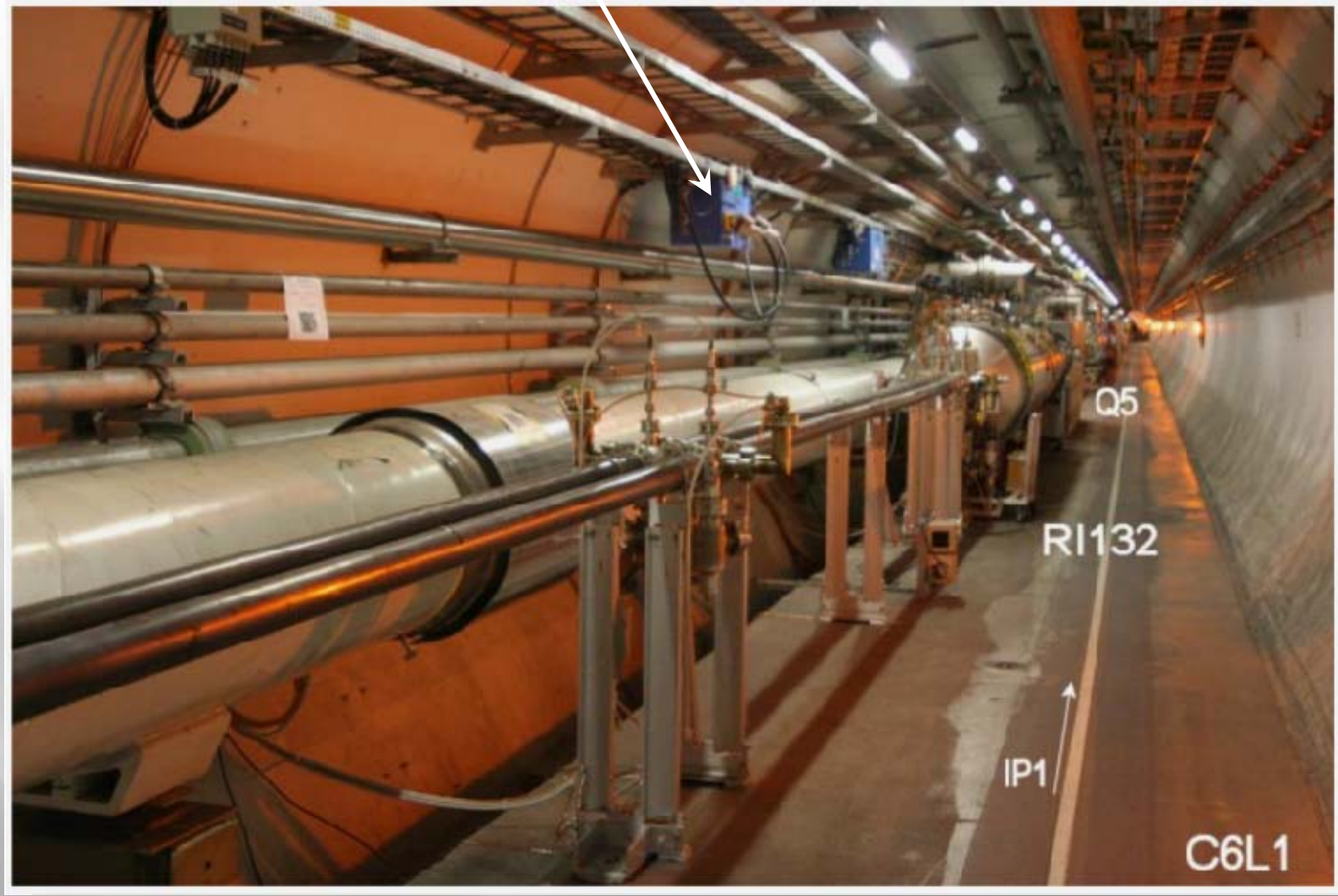
Q6





C6L1

Electrical
Power boxes



M.S. POINT 1 LEFT

Modifications and consequences

Equipments displacement

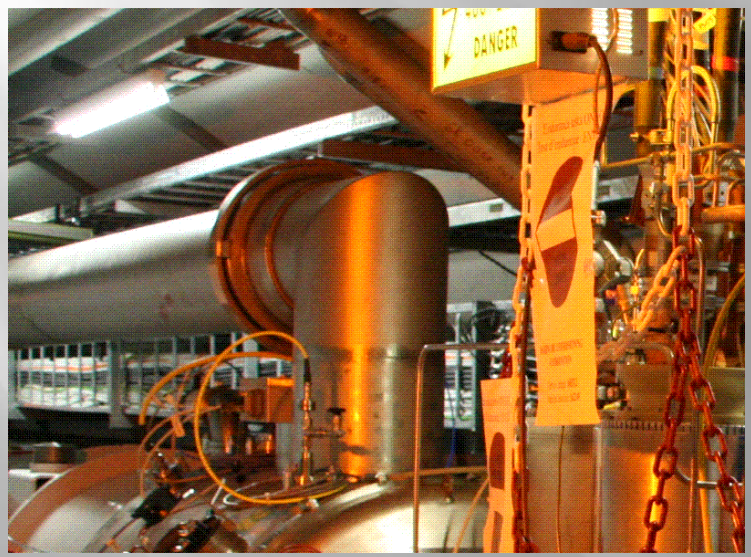
- Cryostats.
- Vacuum equipments(Chambers, pumps, gauges).
- TAN and experimental detectors (LHCf, BRAN, Atlas ZDC HCAL).
- Collimators.
- Absorbers.
- BPM.

Services displacement

- DSL (Superconducting bus-bar line).
- BLM (Beam lost monitors).
- PMIL (Radiation monitors).
- Electrical boxes 16A/32A on the floor.
- Electrical power boxes (behind cryogenic link).
- Services for the experimental detectors inside. the TAN (Remote handling).
- Signal cables probably to be changed.
- Concrete shielding.

New equipements

- Vertical or horizontal step for the cryogenic link
  - For a vertical step the SSS jumper should be turned by 90 degrees.
  - It is necessary to install supports on the tunnel vault.



New equipements

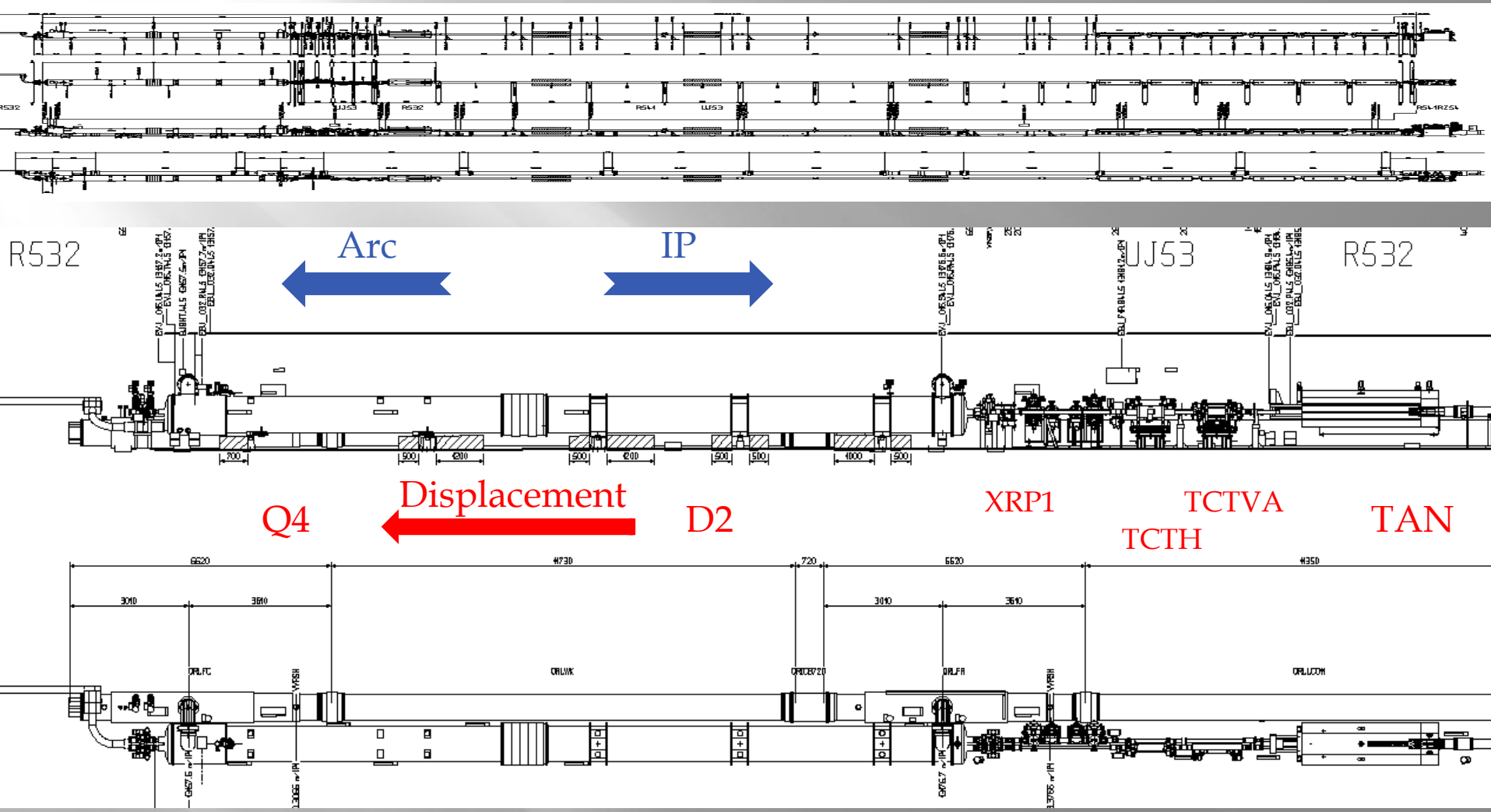
or

- QRL service module displacement
  - New pipe elements (t.b.d.) manufacturing has to be asked.
  - Cable trays above the service module should be twisted (for the removal of the cryogenic valves).
  - Compensators and supports for the CV pipes should be removed.
  - New taps on the helium warm recovery line should be created.

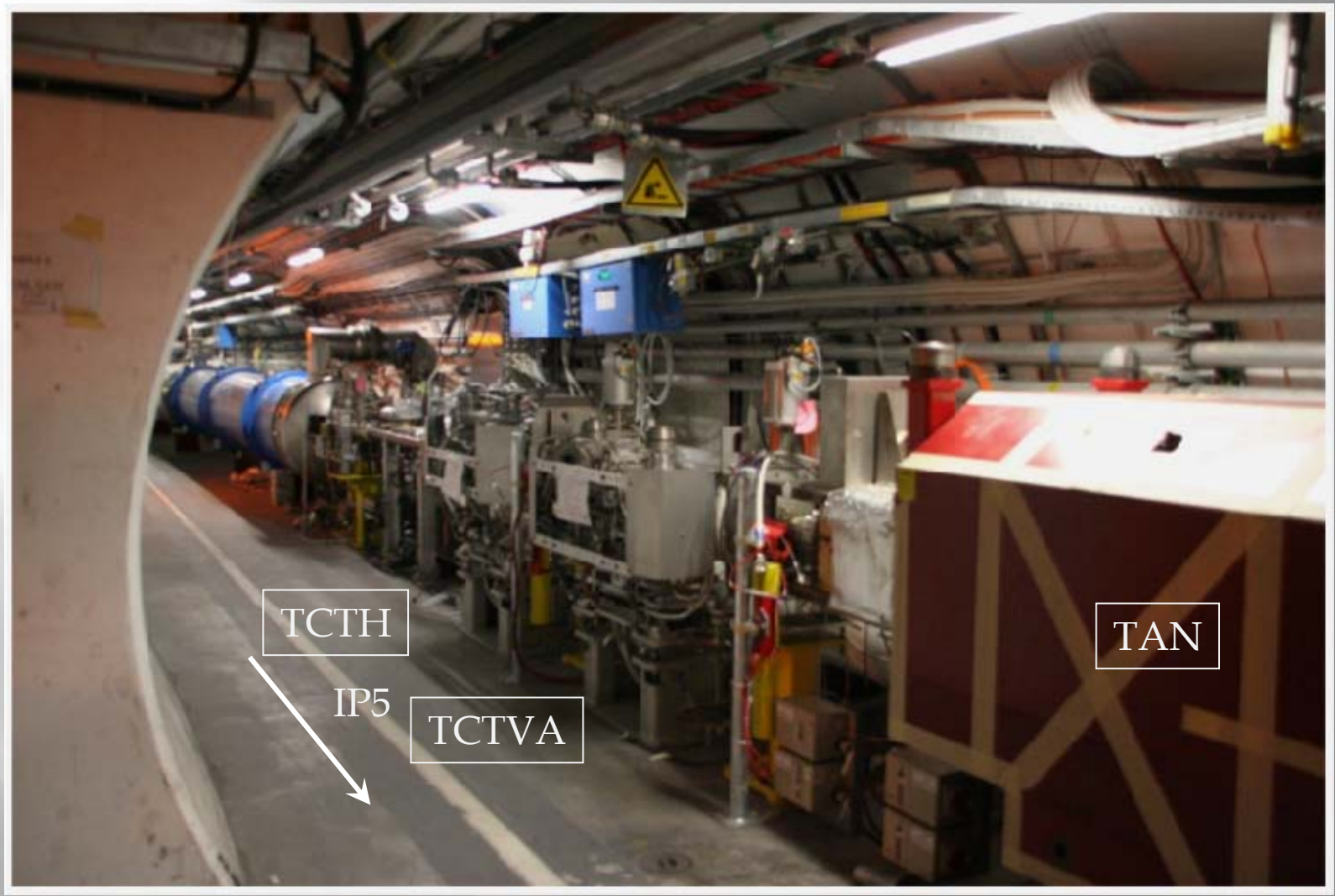
M.S. POINT 5 LEFT

Current status

C4L5



C4L5



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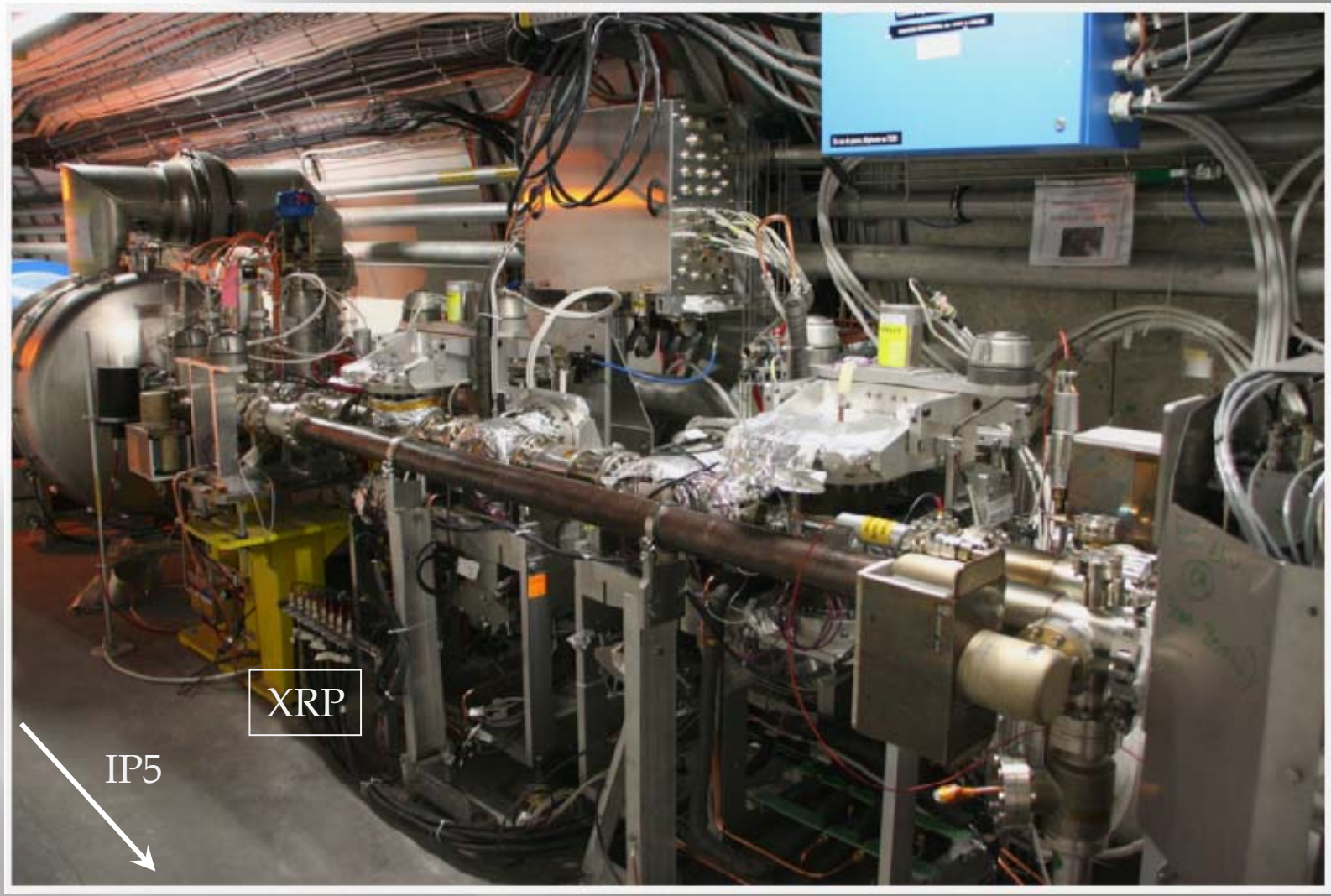
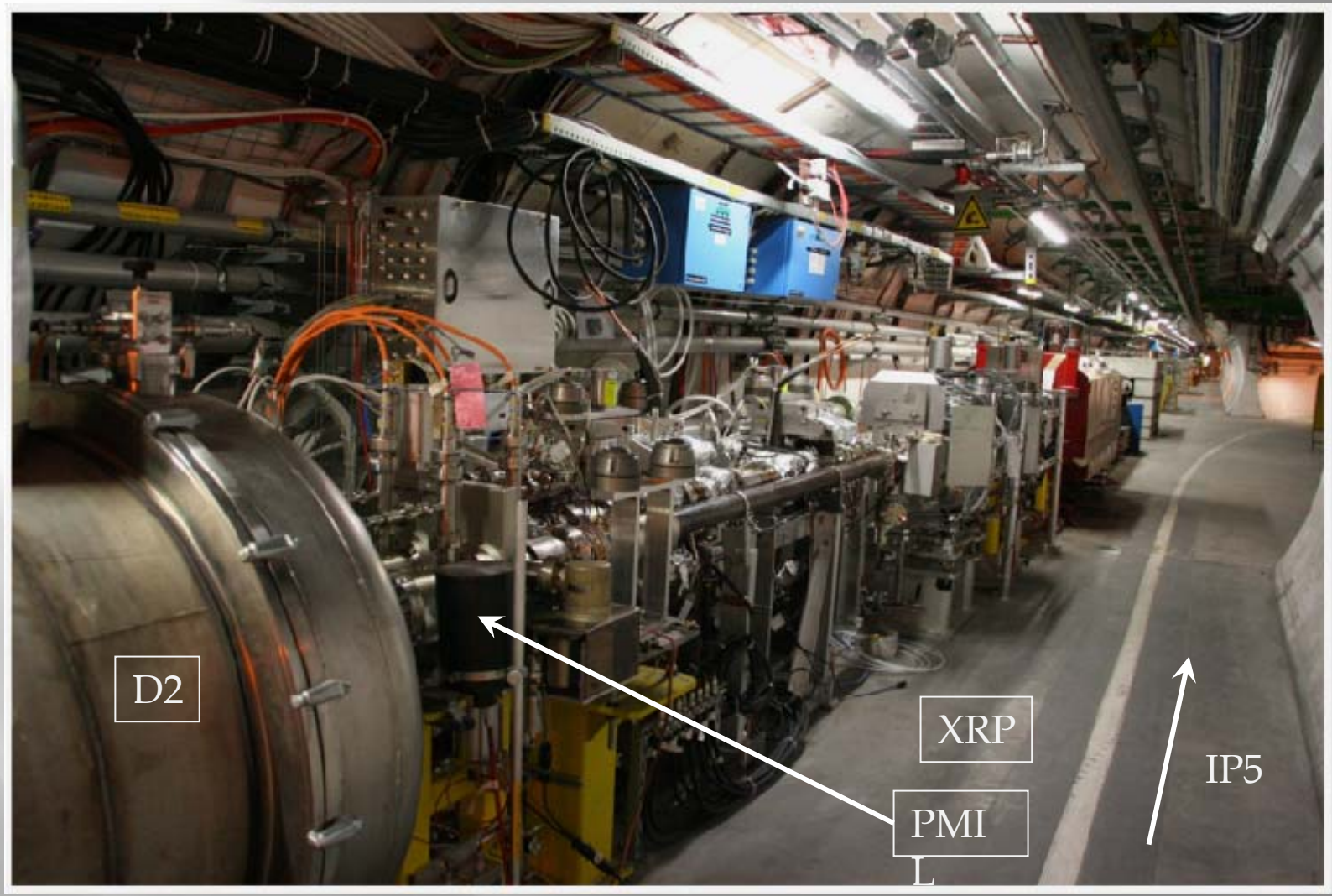


C4L5



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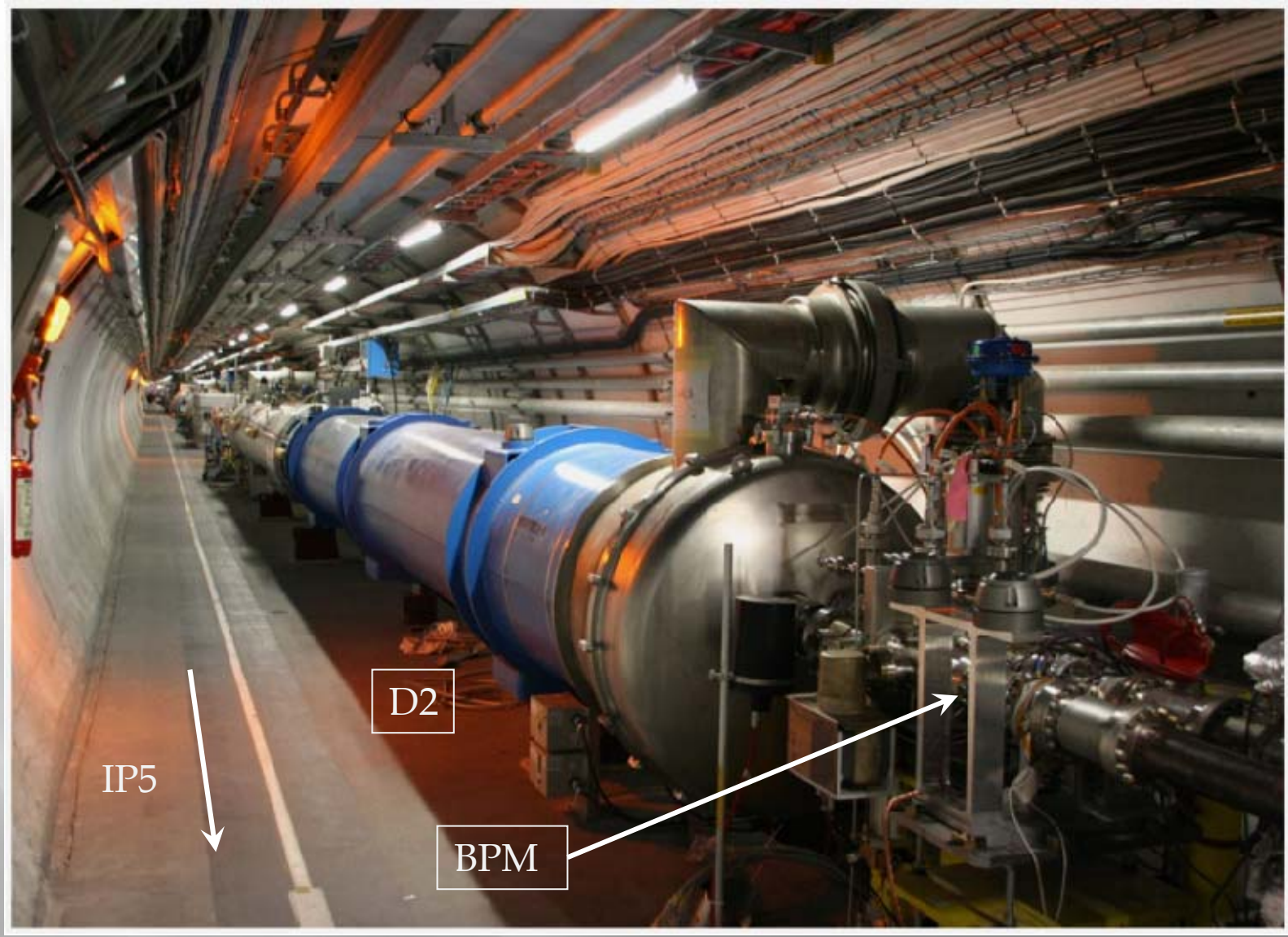

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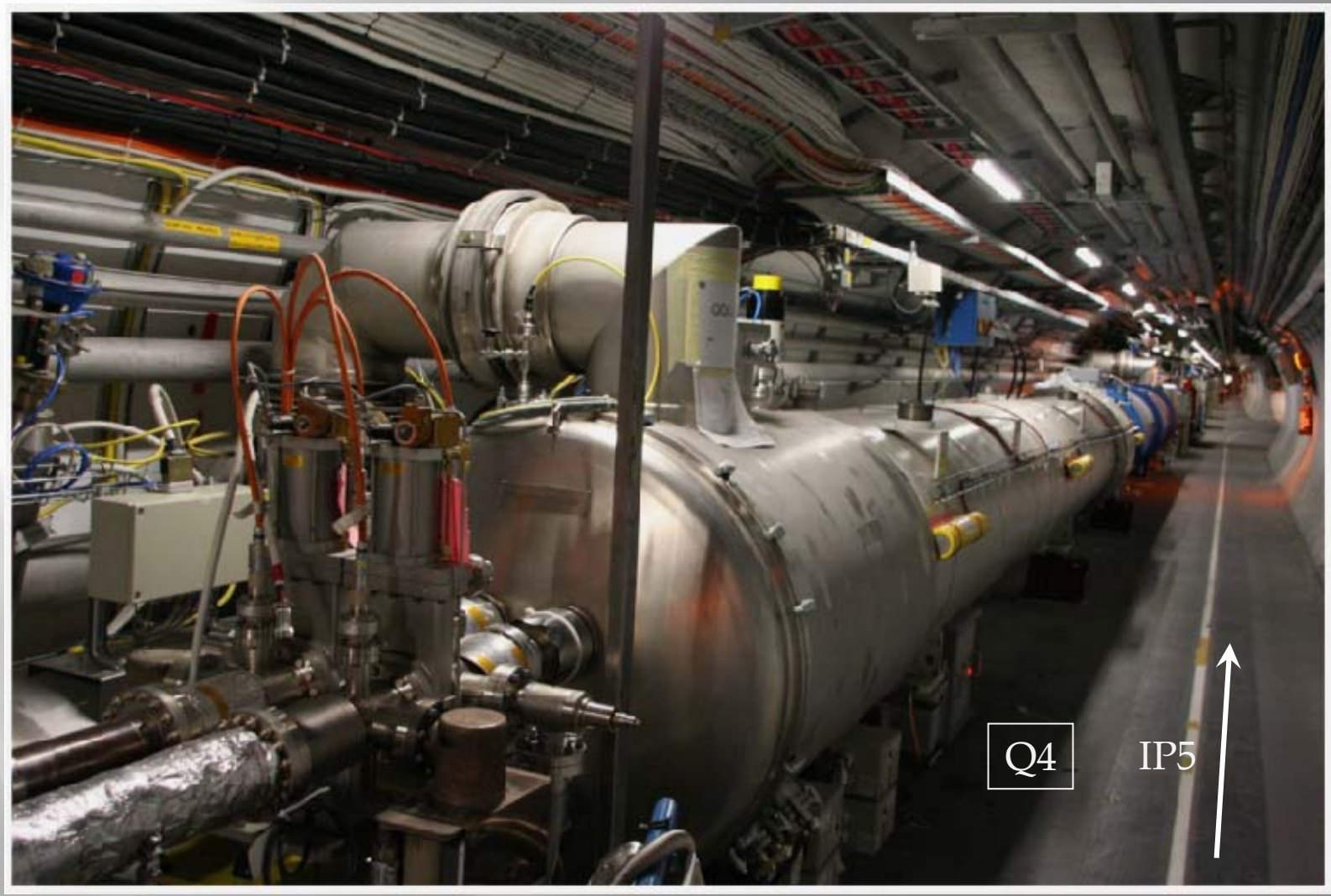
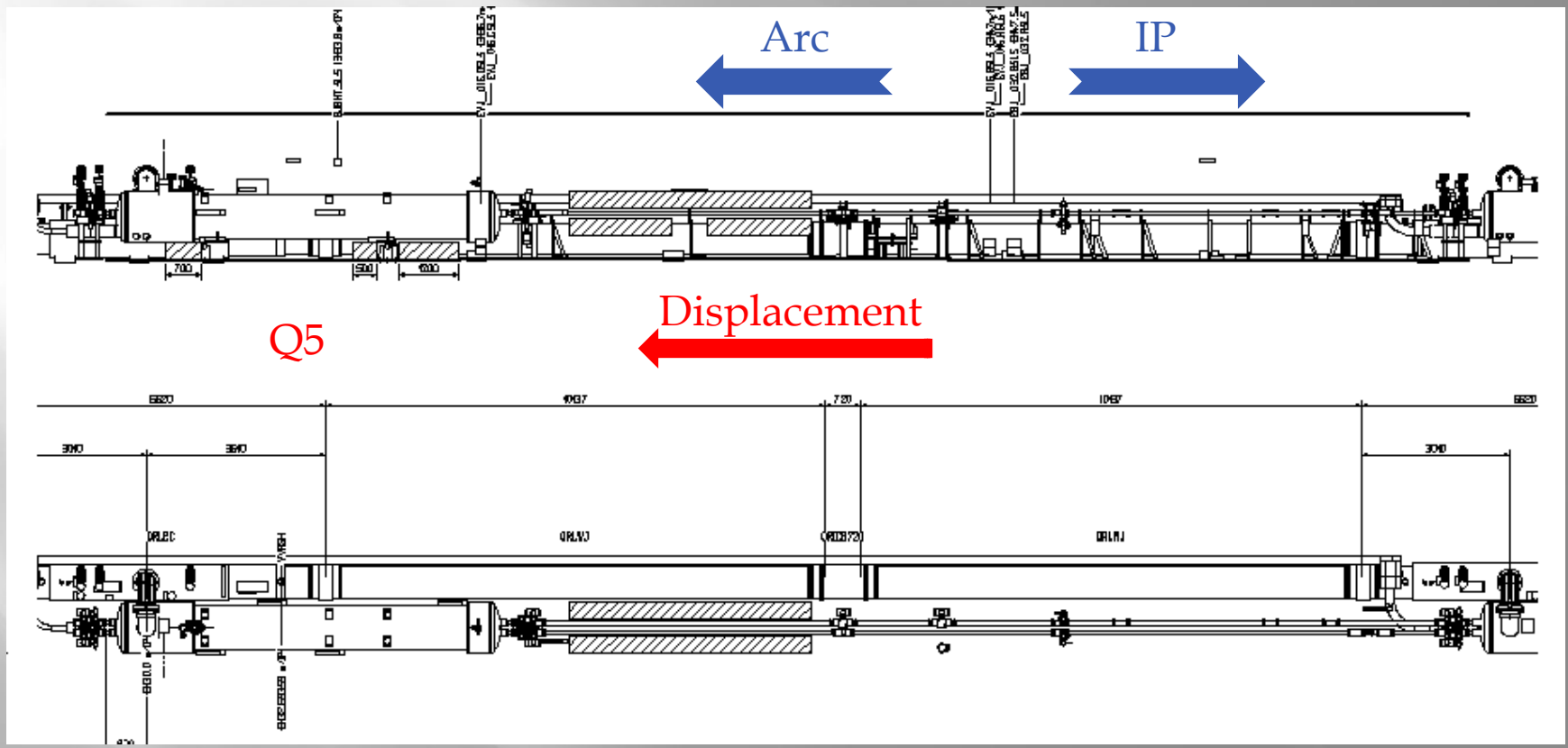


C5L5



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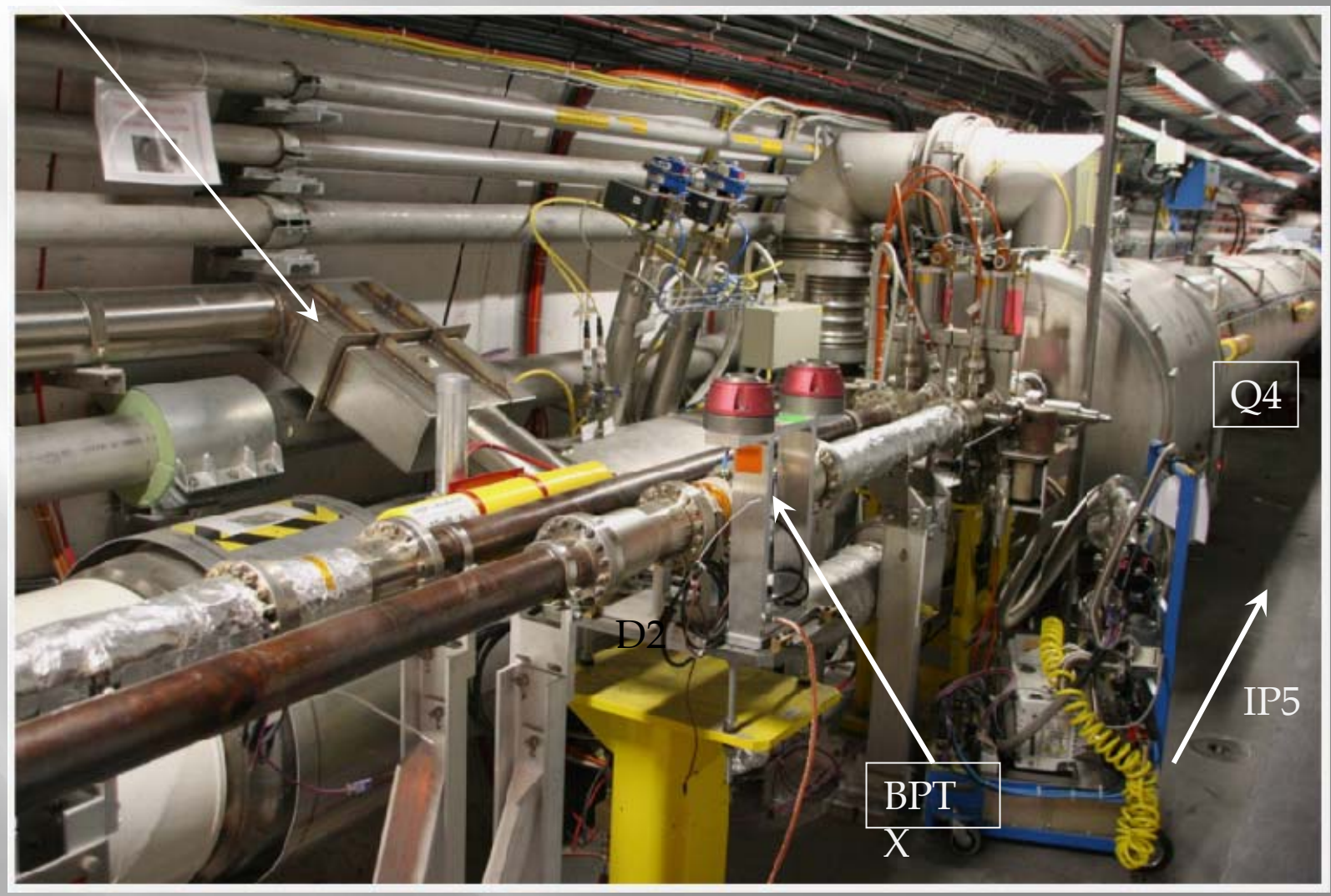
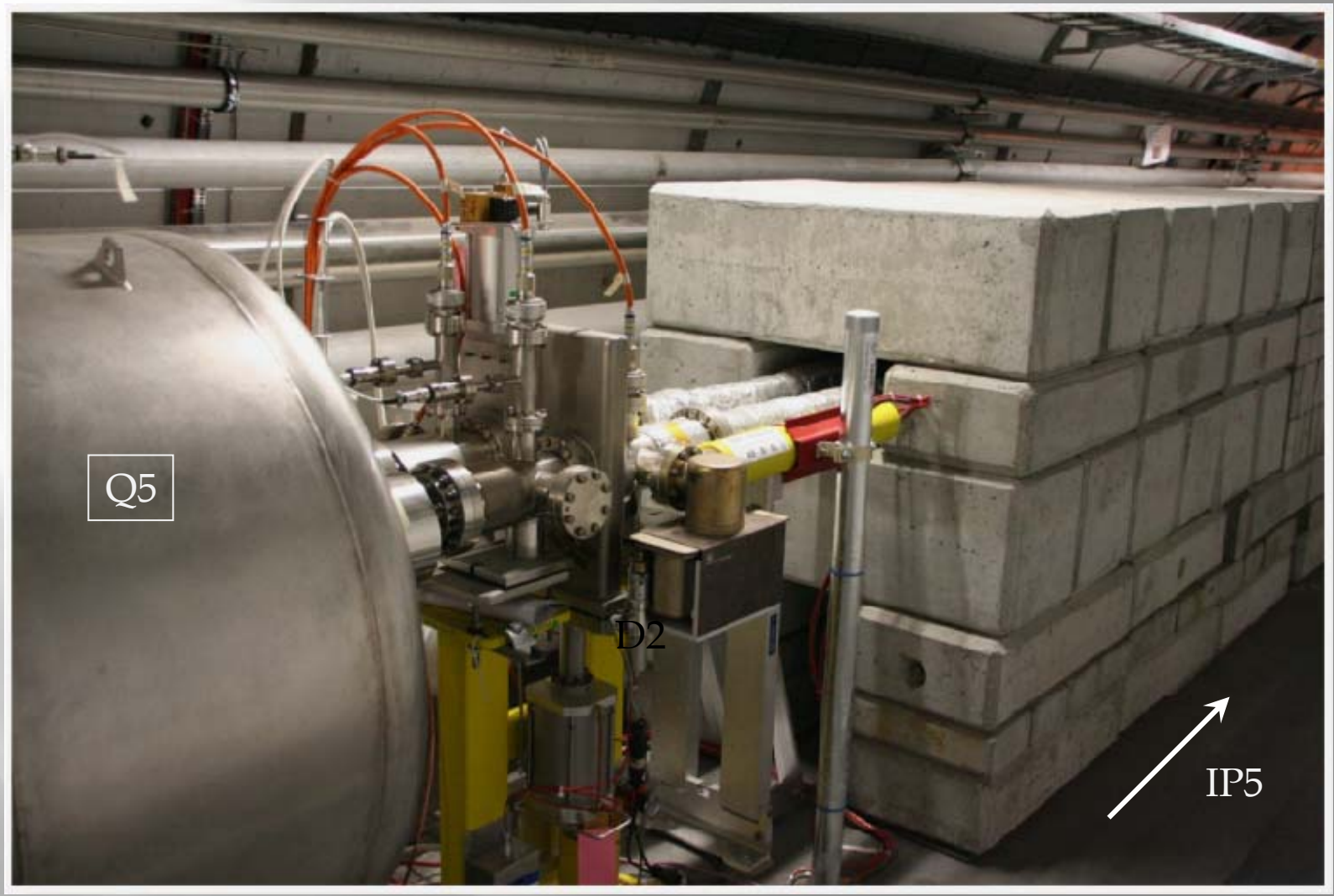


C6L5



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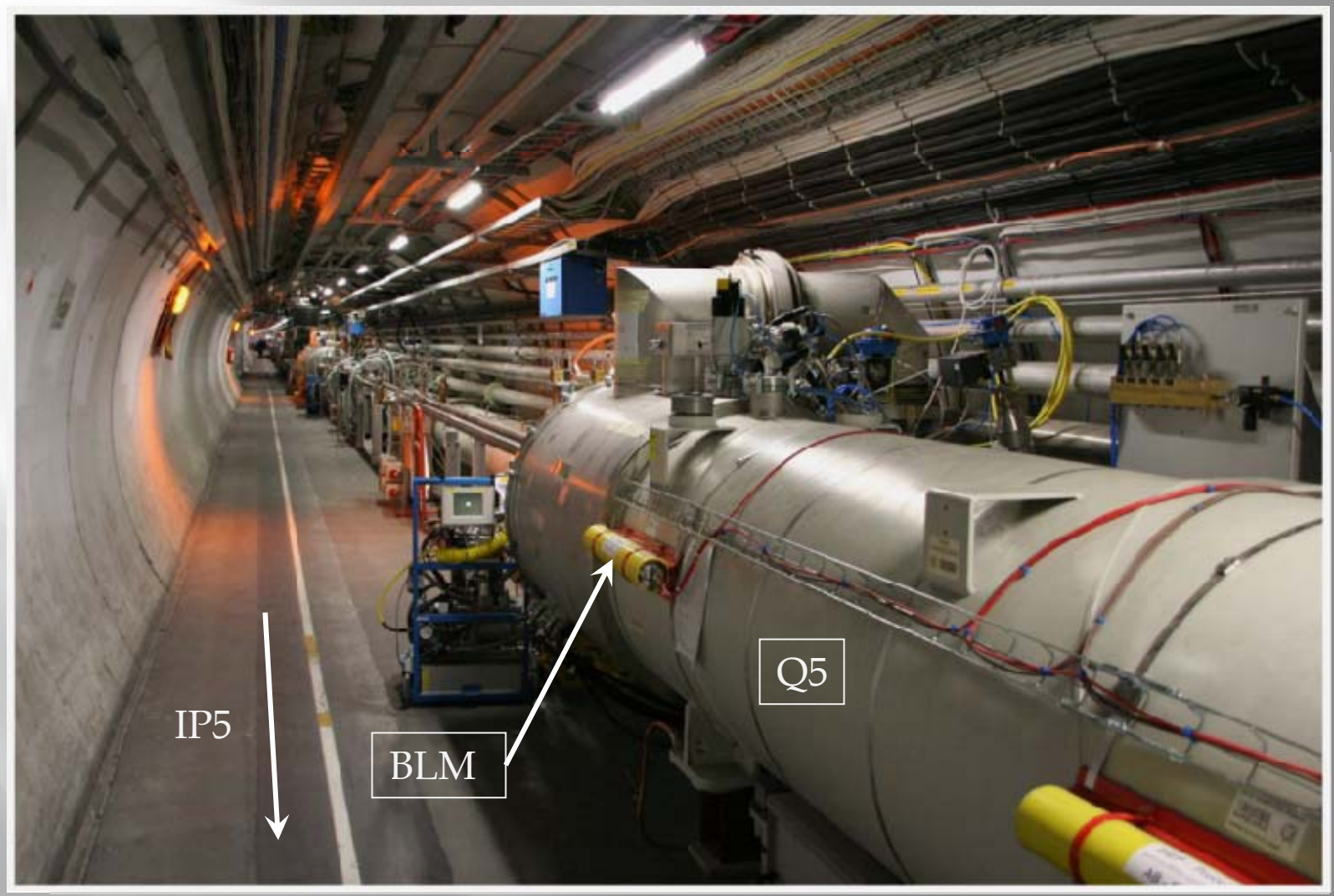

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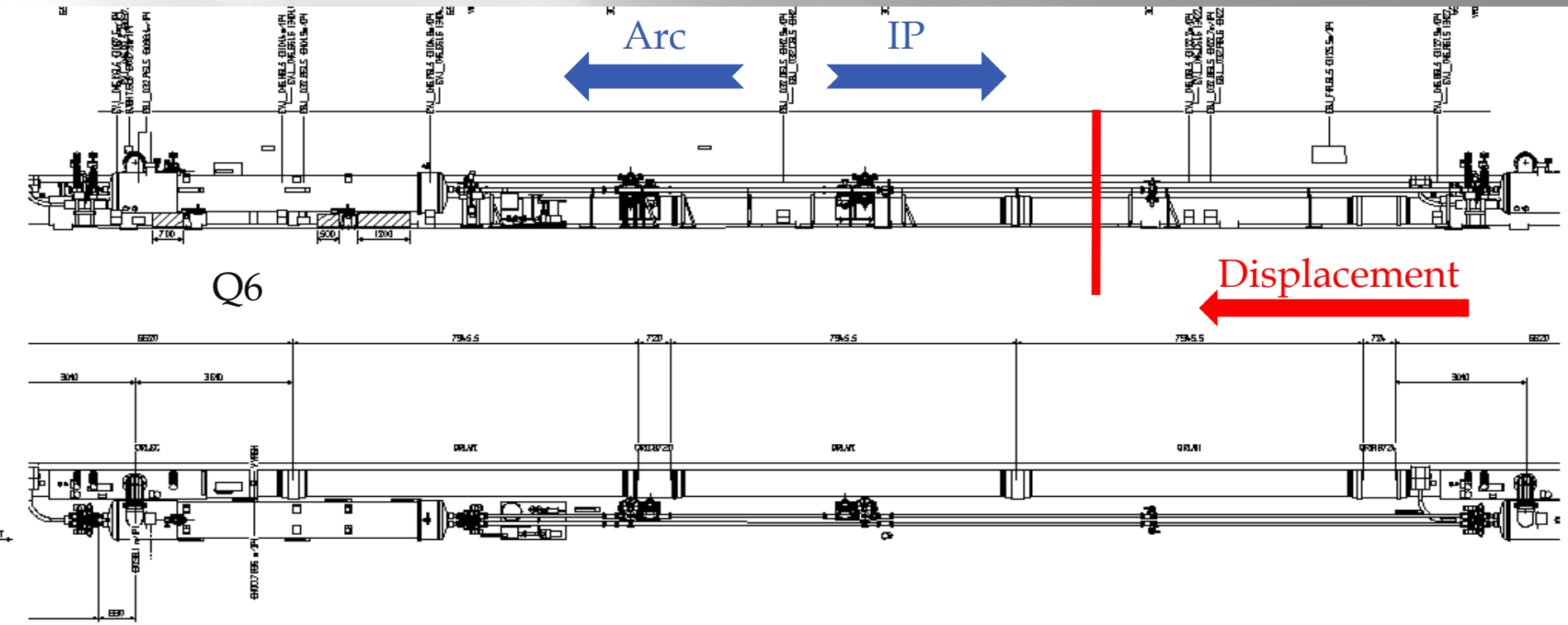

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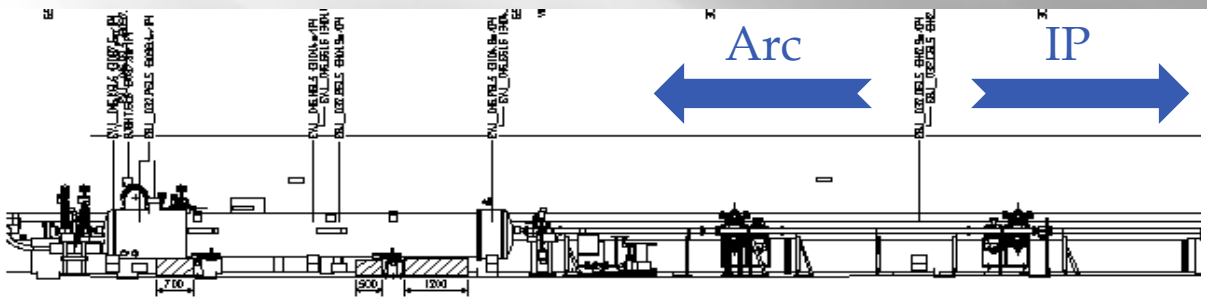
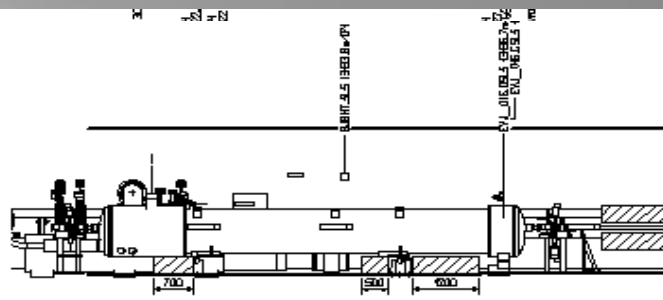
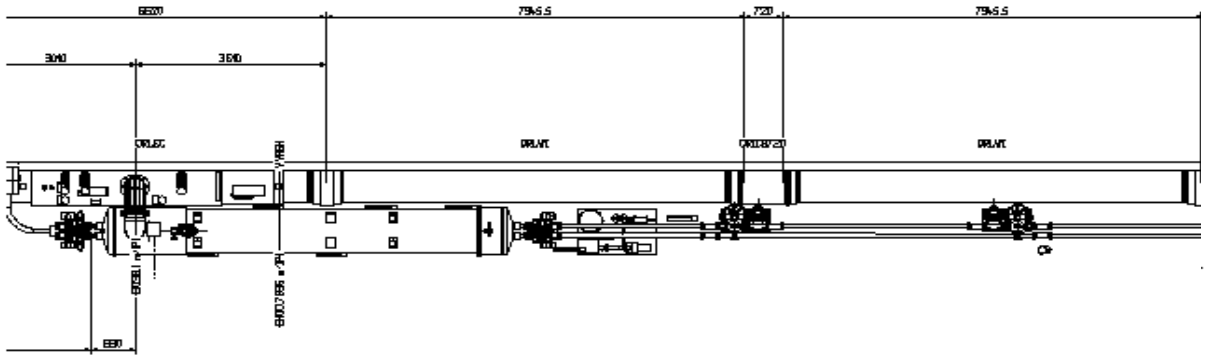
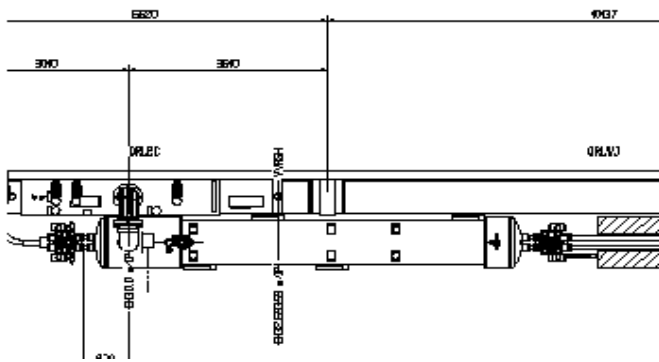


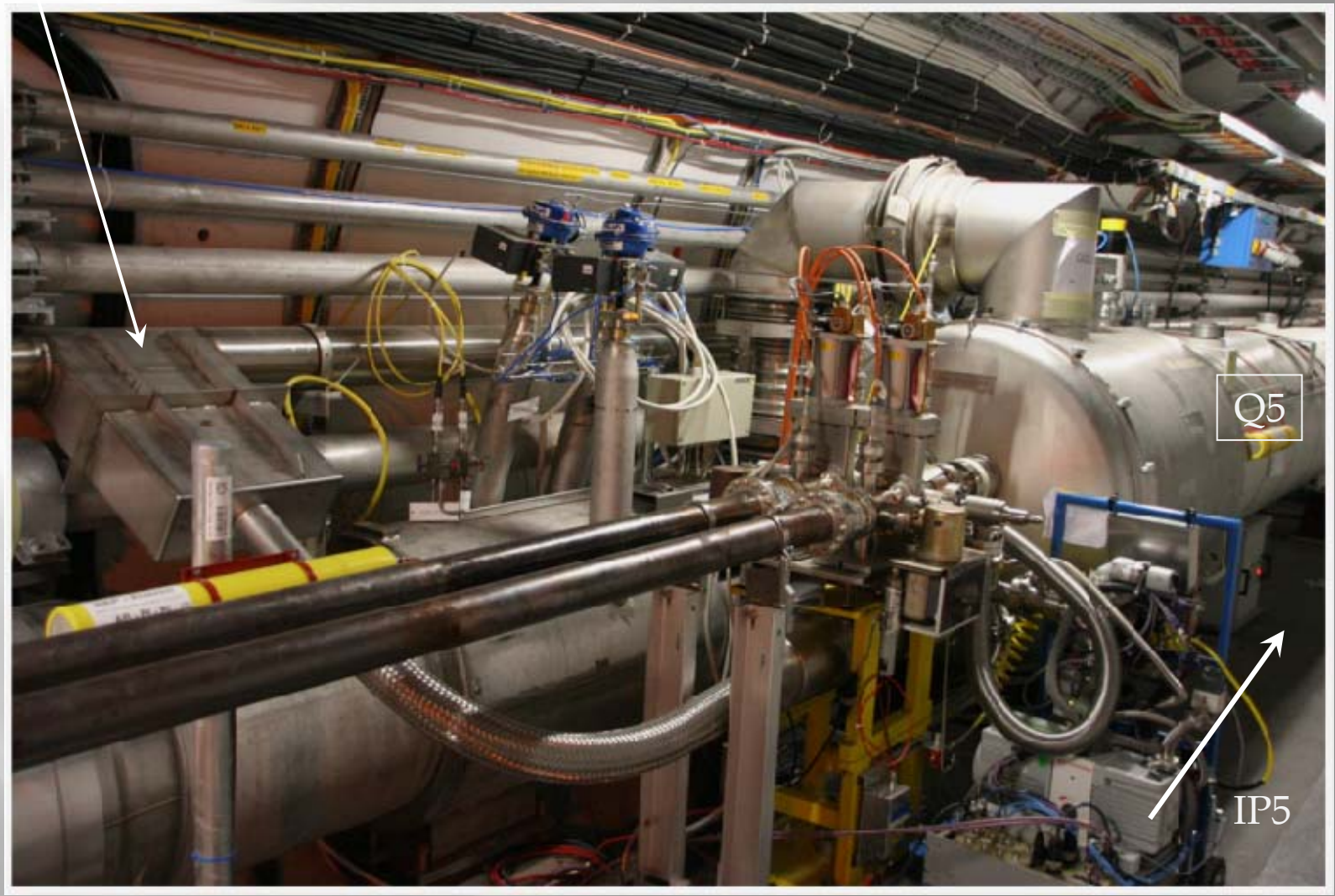


Q6





C6L5



M.S. POINT 5 LEFT

Modifications and consequences

Equipments and services displacement
New equipments

- Same modifications as in point 1 except for the XRP (Roman pots).

Conclusions

- Beam screen rotation and jumper rotation (if vertical step solution retained) should be done outside the tunnel in a manufacturing workshop.
- The displacement of the service module requires the taking off of current QRL elements, the manufacturing of new pipe elements, the twisting of the cable trays and the alignment to be redone by the survey group.
- Logistics has to be carefully studied.
- Radiation level after four years of beam !!