



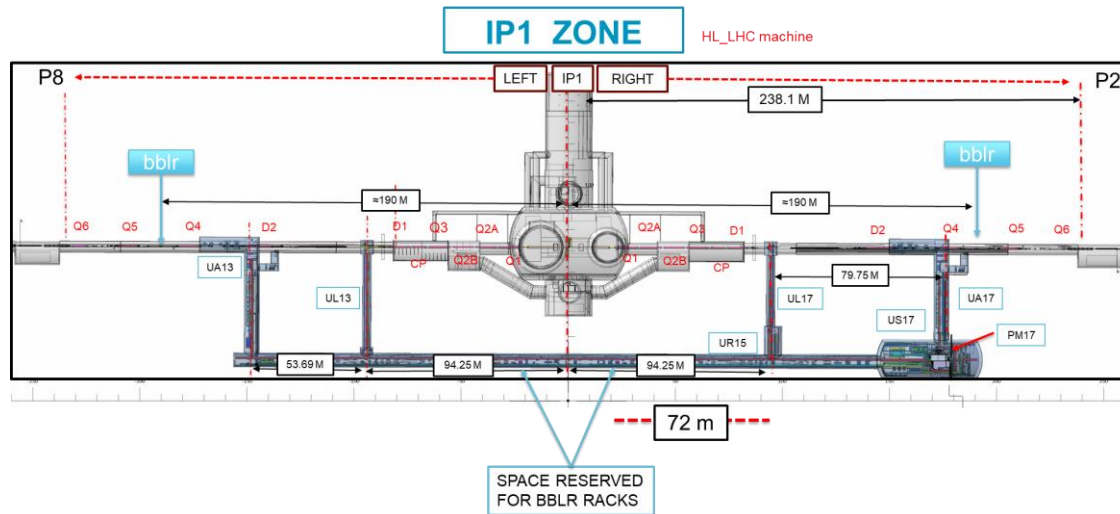
Design and Tests of BBWC Short Demonstrator

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- Context
- Preliminary Design
 - Initial Design Assumptions
 - Rationale: Existing Applications
 - Features and Layout
 - Simulations
- Demonstrator
 - Experimental Results
- Updated Preliminary Design
 - Additional Design Requirements
 - Updated Design
- Conclusions

- **Beam-Beam Long-Range Compensators with physical DC wires** are considered a valuable options for HL-LHC to increase dynamic aperture at small crossing angles
- A space reservation of **> 4.5 m** on both beams was made on either sides of **IP1** and **IP5**, allowing 1 unit per beam per location



- These assumptions are a **preliminary set of requirements** defined for mechanical design purposes:
 - **1 wire per beam and per side** of IP1 and IP5 → **8 wires**
 - **Single wire** positioned in a vacuum chamber per beam
 - **Round wire** cross-section
 - Wire total **active length 3 m**
 - **450 Am DC** per wire, i.e. **150 Am/m**
 - Wire positioned **in the shadow of Tertiary Collimators** ($>10.4 \sigma$)
 - Wire to beam **orientations**: horizontal (IP1) and vertical (IP5)
 - **Beam and RF losses** considered **negligible** vs Joule heating
- **CAVEAT: design assumptions partly obsolete due to latest developments**

- Use a slim, light design with a **thin, bare, metal** wire, allowing to move as close as necessary to the beam, while minimizing interactions with beam particles
- Bond the metal wire onto a support being both an **electrical insulator** and a **thermal conductor (ceramic)**
- Keep design simple and affordable, using a **mobile vacuum chamber**, integral with wire, which can be shifted horizontally and vertically. Host **two parallel assemblies**, side by side on Beam 1 and 2
- Ease fabrication, assembling and installation, splitting the **active length (3 m)** in **three independent modules**
- Each module mounted and aligned on a **single support** structure, which can be rigidly **actuated in both horizontal and vertical** directions