LHC Collimation Working Group Meeting
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REQUIREMENTS and STATUS of the 1 m-SCALE APERTURE MODEL of the FULL LHC RING

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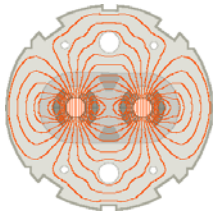


INTRODUCTION

Final goal:

Modelling of the aperture along the ring with a 1-m accuracy

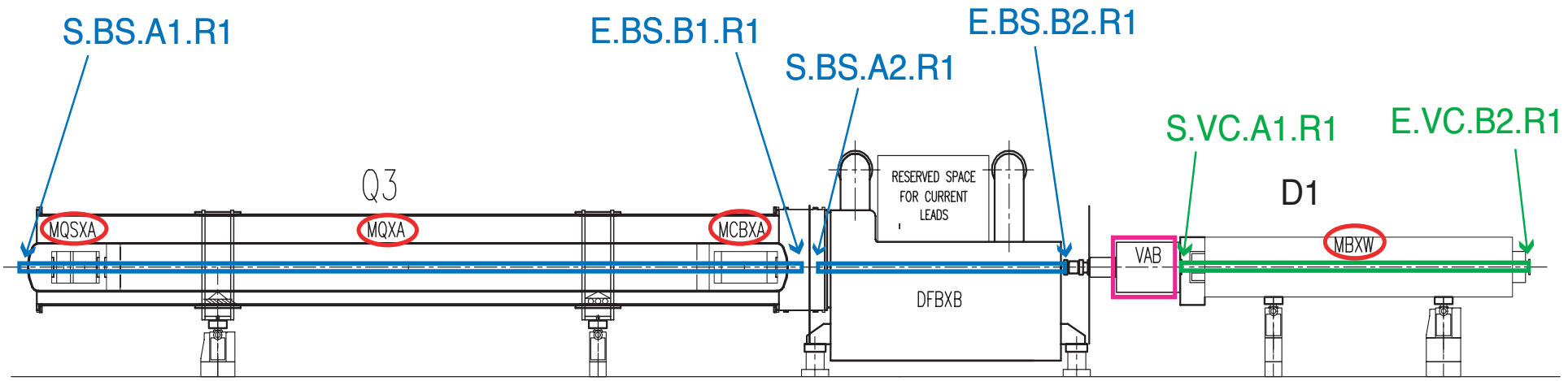
This is crucial for understanding the beam loss patterns in LHC!

Requirements:

1. Definition of apertures for all MAD lattice elements
2. Aperture at start / end of beam screens
3. Aperture at start / end of vacuum chambers
4. Definition of aperture in special elements (TANs, recomb. chambers)
5. Transitions between different beam screens or vacuum chambers
6. Settings of movable elements (collimators, movable absorbers)

What do we want to have?

Example - Cold-warm transition at the right side of IP1.



All aperture information should be available in **MADX** sequence files!

1. Definition of aperture for all lattice elements

Approach: *Layout 6.4*: Sequence prepared "by hand" (JBJ, TR)

Layout 6.5: Sequence automatically extracted from data base
(SC, with input from VAC)

Status: Information on main elements (MBs, MQs) is in the data base!

Aperture definition for some special cases (Q7,DFBs) (VK)

Missing: Generate a sequence and check it!

Check the consistency with the beam screen definition (see later)

Missing elements: BPMs (→ BDI), correctors, kickers,
RFs (flanges at start/end)

Time scale: Next week: generate a MAD sequence from DB (SC, SR).

2. Definition of aperture for Beam Screens

Approach: MADX “markers” denote start and end point of each beam screen

Status: Almost **all information** is available and usable!

Sequence files works well for *Layout 6.5*!

Missing: Problem with some dedicated element (B1≠ B2) → being done SC

Debugging ? (SR)

Timescale: Meeting next week to fix that (SC, SR)

3. Definition of aperture for the vacuum chambers

Approach: Same as beam screens: MAD “markers”

Sequence “easily” generated - information MUST be in data base

Status: A fraction of information is not yet available in the data base.

Available: IR1, IR2, IR4, IR8 (info from C. Rathjen).

But: Design not stable.

Missing: IR3 / IR7 → 80% to be re-defined according to V6.5 layout

IR5 → 100% missing

IR6 → 75% missing - waiting for input of M. Jimenez (next week)

Time scale: IR5 → Work starts next week (C. Rathjen/P. Le Roux) → 8th April.

IR6 - IR3 / IR7 → ?

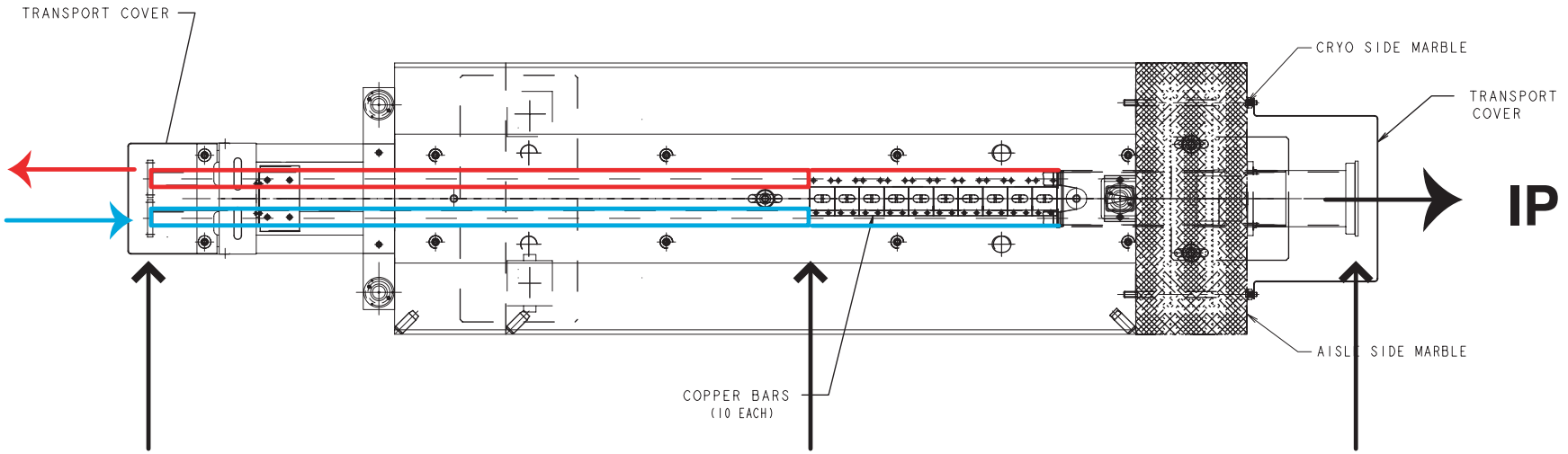
Freeze a study version as soon as possible, for check/debugging (SR)

4. Definition of aperture for special elements

- TANs
- Recombination chambers
- Detector aperture

Detailed, *ad hoc* aperture definitions are required (SR, VK, …)

Problem of beam centering in aperture



Time scale: Meeting next week with D. Macina for detector aperture

Full model with a few weeks?

… probably not time critical …

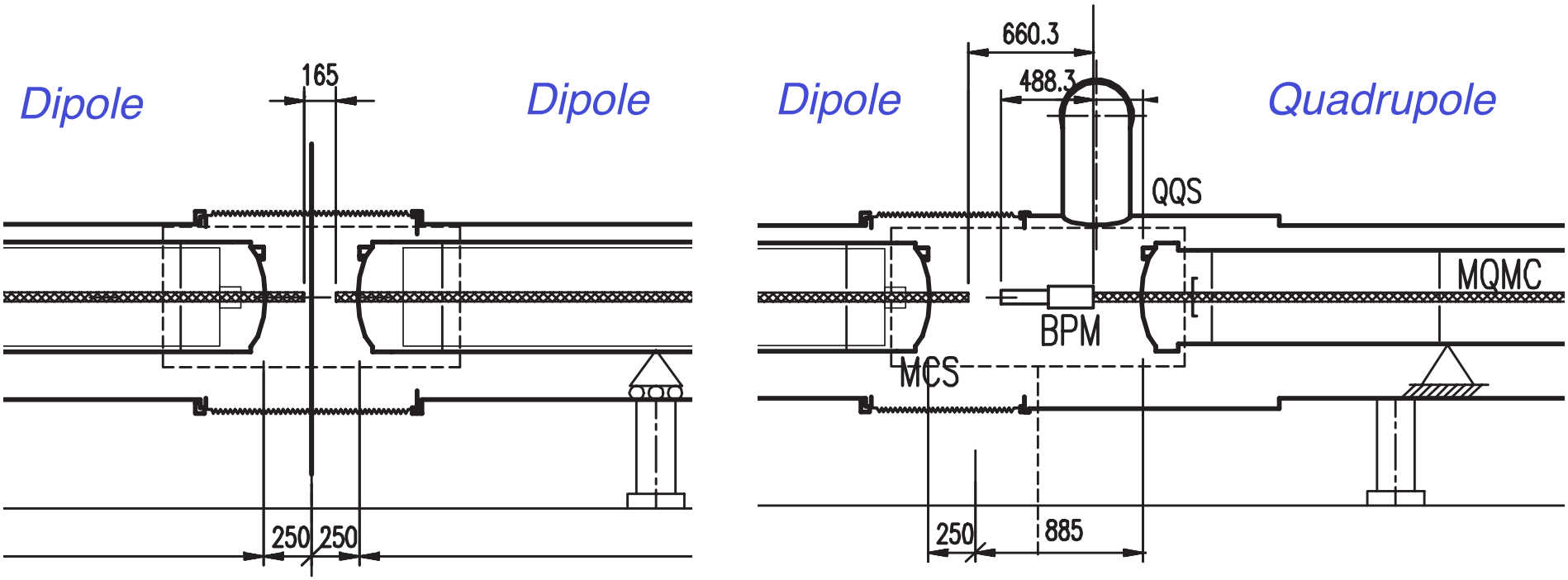
5. Definition of aperture for transition

- *Transition ≤ 1 m* → not relevant for our aperture simulations.

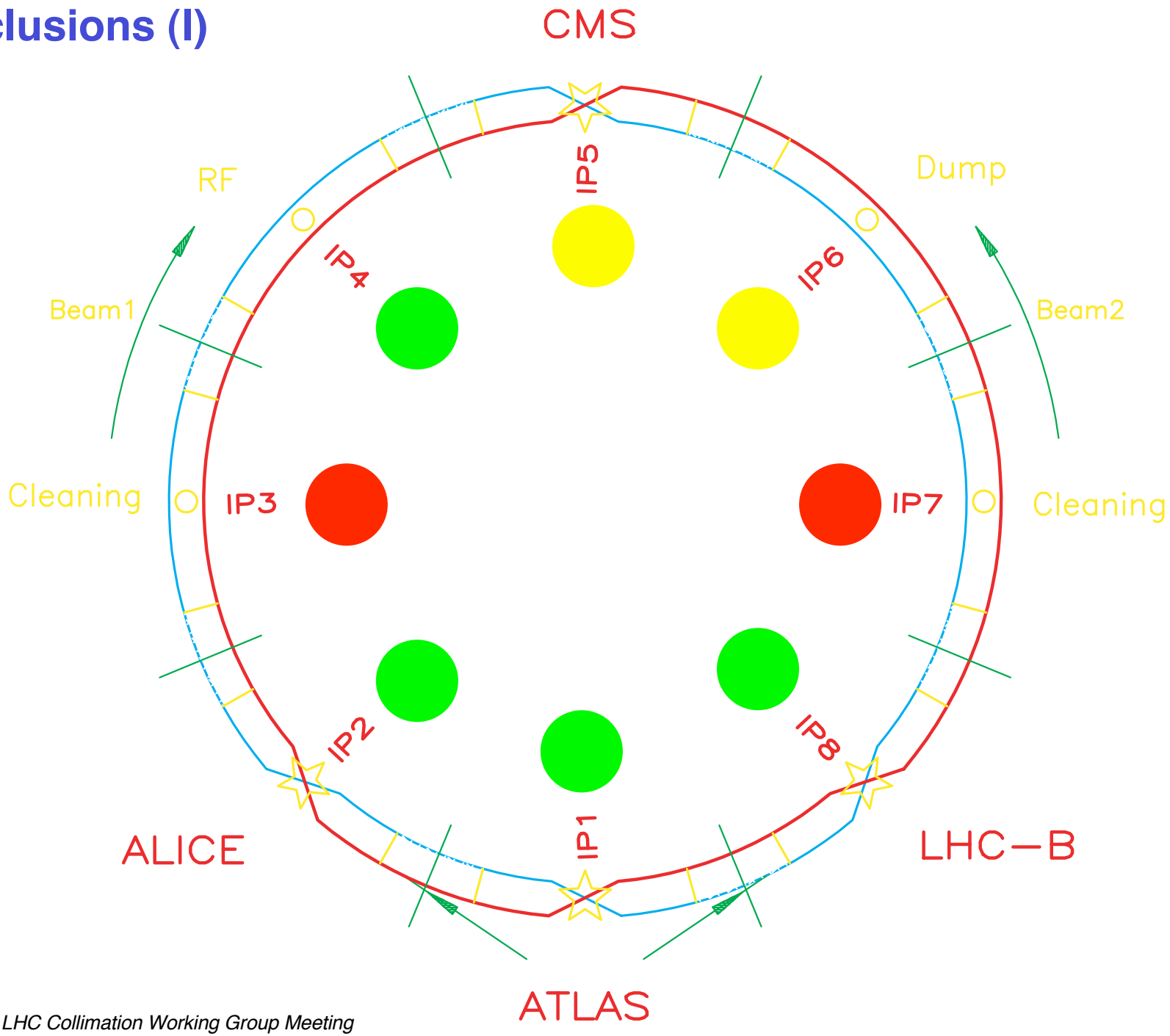
- *Transition > 1 m* → Interpolation between end / start

  (not critical for our studies- aperture gets larger in transition)

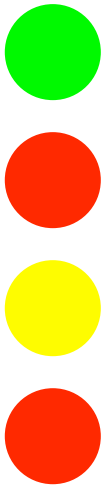
- Other requirements for BLM studies?



Conclusions (I)



Conclusions (II)



Beam screen

Vacuum chambers

MAD missing elements (BPMs, correctors, …)

Special elements (TANs, rec. chambers,…)

Time scale:

- Not easy to estimate - many people involved with different priorities.
- Next 2 weeks → important steps
- Otherwise: other approaches have to be followed….