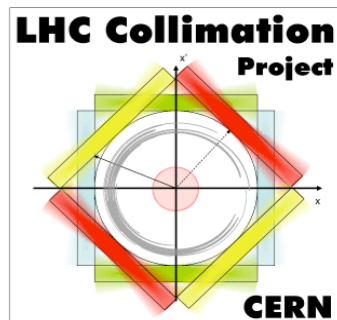# Status of the aperture model for the LHC optics version 6.500

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Outline:
1. *Comparison with John s model*
2. *Bug fixes, model updates*
3. *Full package of aperture scripts*
4. *Conclusions*

Comparison with John's model

Reminder: JJ's model contained the latest database information + collimator model in what was left uncovered.

Main differences between the models

Some beam screen tilted by 90 degrees

Minor discrepancies at transitions (new beam screen lengths)

BPM replaced in the arc by beam screens

Errors in the database for transition pieces of MQW's, ...

→ *review full package of aperture installation scripts for collimation loss map studies with V6.500*

Status of beam screen apertures

Pending requests from 2004: Correct length at cold

➡ This is now calculated w.r. to fixed points

Implementation of new orientation

➡ Several bugs found! (also seen in comparison with John's model)

➡ Errors transmitted to Samy and corrected

(fast feedback - problems fixed in a few days)

New features

Wiggler will have a beam screen - added by hand
(information from D. Tommasini)

Real beam screen dimensions available - ready for use if needed!

Update of the BPM aperture

BPM CLASS	Aperture [mm]	Length [mm]	Left [mm]	Right [mm]
BPM	48.0	459.4	335.0	124.4
BPMC	48.0	459.4	335.0	124.4
BPMCA	48.0	459.4	335.0	124.4
BPMR	48.0	459.4	335.0	124.4
BPM_A	48.0	459.4	335.0	124.4
BPMYA	60.0	168.0	123.0	45.0
BPMYB	60.0	168.0	123.0	45.0
BPMW	60.0	169.0	122.5	46.5
BPMWA	60.0	169.0	122.5	46.5
BPMWC	60.0	169.0	122.5	46.5
BPMWE	60.0	169.0	122.5	46.5
BPMS	60.2	223.0	133.1	89.9
BPMSW	60.0	267.0	133.5	133.5
BPMSX	80.0	285.0	142.5	142.5
BPMSY	80.0	285.0	142.5	142.5
BPMSA	80.0	285.0	142.5	142.5
BPMSB	0.0	285.0	142.5	142.5
BPMSE	130.0	285.0	142.5	142.5
BPMSD	100.0	285.0	142.5	142.5

Significant changes of BPM layout
   New BPM types / some old removed

➜ Review of all BPM reviewed with
   R. Jones and C. Boccard

➜ Information transmitted to Samy is
   now *implemented into the DB*!!
   (Prompt feedback: new feature setup
   within 2 day + debugging!!)

BPM MADX installation scripts contains markers with aperture information at START and END!

Status of vacuum chamber apertures

Database contains far too much information

     very short transitions, zero length elements (tilted in MADX), ...

Database contains several errors!

     See John's reports at previous meetings
     Rotation of transition pieces between MQW's

I concluded that:

     ➜ A thorough debugging would require a long time
     ➜ Absolutely required aperture information concerns "few" elements (MQW, MBW, ...)
     ➜ Following the old approach is the best solution:

       Semi-automatically generated script for warm magnets
       + standard 40mm chambers for long drifts

List of required MADX scripts

```
call, file = "MarkersFiles/BeamScreens_2005-12-07.madx";
call, file = "ap/DefineWithinBS.b1.madx";
call, file = "ap/DefineWithinBS.b2.madx";
call, file = "ap/DefineWarmMagnets_new.b1.madx";
call, file = "ap/DefineWarmMagnets_new.b2.madx";
call, file = "MarkersFiles/BPMs_2005-12-13.madx";
call, file = "ap1/DefineIR1.madx";
call, file = "ap1/DefineIR2.madx";
call, file = "ap1/DefineIR5.madx";
call, file = "ap1/DefineIR8.madx";
call, file = "ap1/DefineIR1.b2.madx";
call, file = "ap1/DefineIR2.b2.madx";
call, file = "ap1/DefineIR5.b2.madx";
call, file = "ap1/DefineIR8.b2.madx";
call, file = "ap/DefineFixHoles.b1.madx";
call, file = "ap/DefineFixHoles.b2.madx";

call, file = "MarkersFiles/MaskAperture.madx";

call, file="ap/DefineDrifts.b1.madx";
call, file="ap/DefineDrifts.b2.madx";
```

Conclusions

- ◉ No major errors found in the 2004 collimation model!

- ◉ New model for V6.500 features significant upgrades / improvements
  - ➜ Model now setup for BOTH BEAMS (B1, B4 and also B2)
  - ➜ BPM's aperture (~elements) now available as standard output
  - ➜ Fixes of previously reported bugs (BS lengths at cold, ...)
  - ➜ Warm element apertures and experimental insertions still defined manually
  - ➜ Real beam screen dimensions available and ready for use

- ◉ New model is being thoroughly cross-check with loss map simulations

- ◉ Files being used for several weeks (Alex, Verena, ...) - no complains yet!

- ◉ Required follow-up:
  - ➜ Define clear strategy to deal with the jungle of vacuum chamber markers!
  - ➜ Which information do we really need? If we want something, we should
    closely follow this up with Samy (precise requests, prompt feedback on bugs)

*We have now for both beams a well-setup aperture model
that we will use (with minor changes) 'til the LHC commissioning!*