



## **WP2 pending actions: status and plans**

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# Alignment

- Organize a discussion at the alignment WG to review the required maximum offset for VAX area bellows and the potential of their impedance reduction.
  - Discussions with WGA and WP8 are in progress.
  - The baseline is to compensate 10 mm (H/V) of TAXS alignment.
  - Tests are currently in progress with a prototype and the final definition of the bellows will start after the results on the misalignment due to the quick connections.
  - Tests already started on the vacuum side and are foreseen in the VAX prototype for end of **Q1 2019**: a WGA discussion will be organised by then.

# Field quality

- 11T dipoles
  - Is the Field quality of the 11 T magnets now taken to account systematically in the studies of the field quality? : **yes. The situation should be reviewed (but no major differences are to be expected) once the new slot is endorsed by TCC.**
- D2
  - Check the status of the field quality of D2: **to be followed up with Ezio**
- D2 correctors
  - Impact of large b3: **to be checked with simulations**
- Q4/Q5
  - Review error assignment routines based on the slot of existing quadrupoles: **to be done**

Actions to be completed by end 2018 or beginning of January 2019 (depending also on input)

# Field quality

- Non-linear correctors
  - DA simulations of the impact of
    - Misalignment
    - Roll angle
    - Transfer function error

available. We need to check the mechanical tolerances: **this is being followed up by WGA, but people in charge will be ready in the coming weeks.**

- Acceptance of IT field quality based on correctors' strength: **to be done by Friday**
- MCBXF
  - Impact on DA already computed: **it will be added systematically to future DA simulations (without corrections)**

# Field quality

- Electron lens
  - Studies to be launched (in collaboration with collimation team)
- Crab cavities
  - SixTrack ready for simulations: **mask file to be finalised**

Actions to be started/completed by Q1 2019 (depending also on input)

# Field quality

Actions to be completed (globally) by mid 2019

## General

- Check the sensitivity to failure of circuits, e.g. how many RCS circuits and where can we lose them. The same should apply for the triplet corrector circuits. Need to document this in one note.
- A note should be written, summarizing the DA studies performed so far including the effect of corrections and requirements on the magnet field quality and the observed dependence on the phase advance as well as B1/B2 differences. Action: **Massimo**
- In general the requirements on field quality/alignment tolerances/waviness/transfer functions knowledge should be documented in a note for the new HL-LHC magnets.
- Are the critical magnet multipoles remaining the same after optimization of the phase advance? Action: **Massimo**
- Impact of coupling on DA without beam-beam.
- Specification of power converter noise from DA simulations without beam beam. Summarize in a note. Include potential effect of larger noise due to triplet trims.
- After the completion of the note on operational scenario (CERN-ACC-NOTE-2018-0002) need to verify that the proposed operational scenario is robust both for the nominal and ultimate scenario:
  - Injection with the new working point and without/with beam beam)
  - ramp and squeeze and pre-squeeze/squeeze
- Crossing angle at injection Gianluigi suggests using the maximum possible. Action: Riccardo to find the largest possible crossing angle compatible with aperture. A scan of the crossing angle (within the aperture constraints) should then be done to evaluate the impact on dynamic aperture in the presence of field errors and beam-beam. Action: **Massimo** and Yannis.
- Impact of flat optics on field quality considerations. Is anything changing?

# Field quality

Actions to be completed (globally) by end 2019

## General

- Dynamic aperture. Does it make sense to consider DA larger than collimation settings? Critical review of the requirements in terms of dynamic aperture based on experience from Run I and Run II and on observables like lifetime and emittance blow-up. Determine what is the DA that corresponds to a given beam lifetime:
  - a) In the presence of beam-beam the beam lifetime should be significantly larger than the burn-off lifetime (this is varying from 20 to 10 hours during the fill for the nominal luminosity), not to affect significantly the luminosity lifetime.
  - b) In the absence of beam-beam (injection to collision) the lifetime should be comparable to other mechanisms (e.g. beam-gas) and in any case it should be in the range of few tens of hours from operational experience (at least in the design phase).
- Action: Massimo and Yannis possible targets based on these considerations.
- The DA determined from the expected field quality is sufficient to guarantee an acceptable lifetime at injection. Further studies need to be done for the collision to determine the correlation between DA and lifetime (for a given distribution) and the impact on the core. Action: Massimo, Yannis, Pascal, Dario.
- Note on the minimum requirements on DA without and with beam-beam based on assumptions on lifetime. WE should define a goal for lifetime when we are not in collision and when we are in collision. The DA aperture should be based on the nominal beam emittance. This should be written by Massimo and Yannis. The note should include benchmarks with the present LHC and the results of the MDs on DA and beam-beam. Need to individuate impact of power converter ripple and vibrations on DA and lifetime without beam-beam.



***Thank you for your attention!***