IR collimator layout baseline for background studies
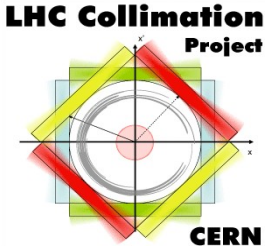
R. Bruce, R. Kwee, A. Lechner, A. Marsili, S. Redaelli, collimation team

Introduction

- Next WP5 deliverable on experimental backgrounds

- Several sources to be studied for HiLumi

  - Beam-gas interactions close to the detector (treated by FLUKA team)

  - Halo particles impacting on TCTs, shower reaches detector (topic of this talk)

  - Global beam-gas

  - Cross-talk

- Recent reference for studies of LHC Run 1 conditions: *NIM A 729 (2013) 825*

- Beam-halo simulation consists of two steps

  - SixTrack simulation of cleaning around ring, store impacts on TCTs

  - Monte-Carlo simulation of shower from TCTs to experiment

Simulation setup for SixTrack

- Using optics HL-LHC v1.0 as provided by optics team

- Overview of layout from MADX: IR5 incoming beam
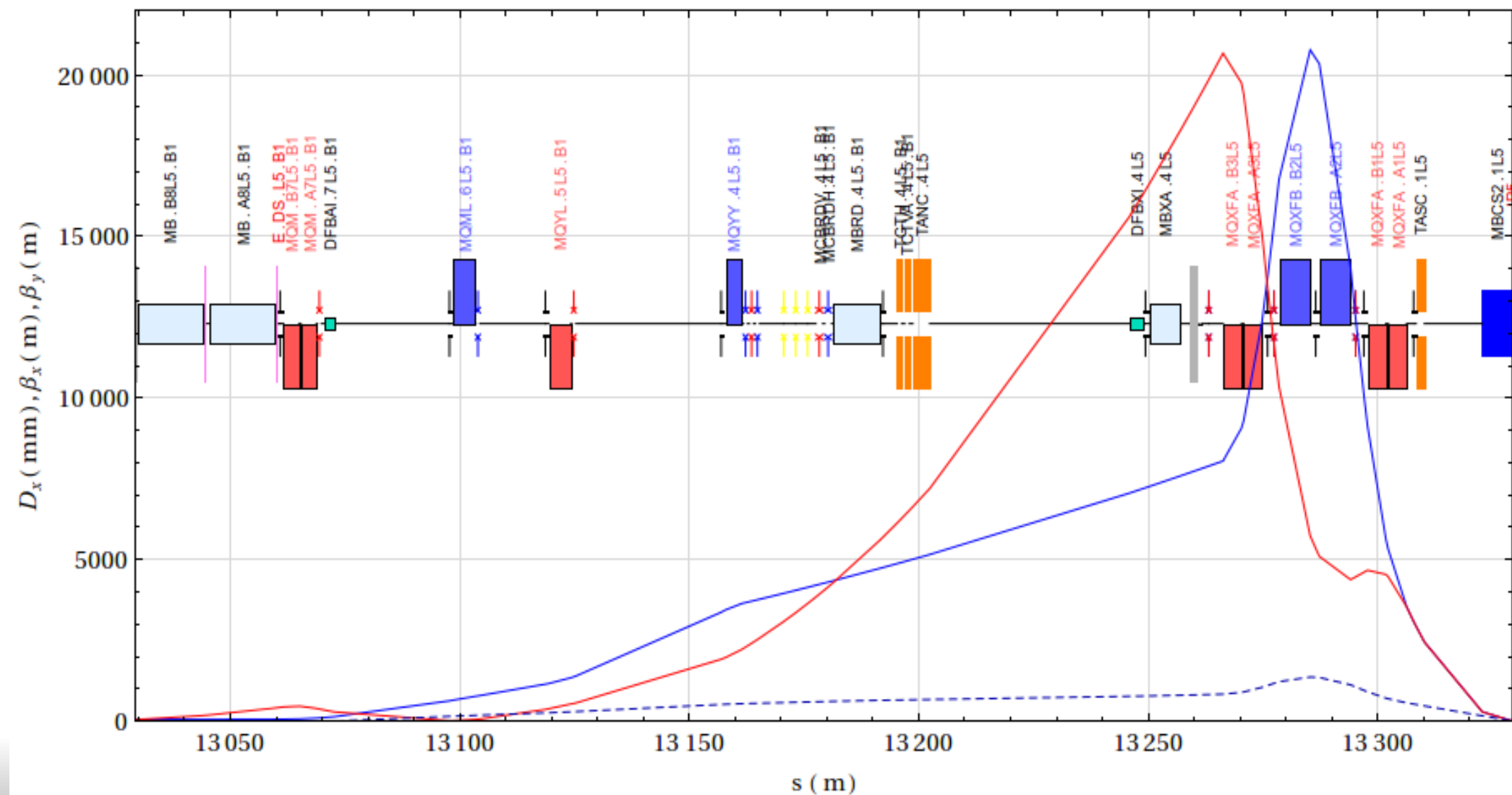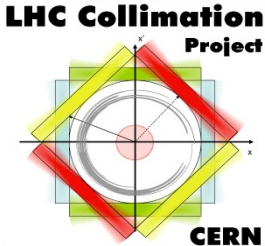
Additional TCTs

- With squeezed ATS optics, risk to have aperture bottlenecks also in Q4 and Q5 (see talk WP2 meeting 2013.08.13)

- Possible solution under study: install additional TCTs

  - Installed as thin markers in IR1 and IR5, both H and V, in drift upstream of Q5. Assuming same space as for the TCT4 (1m jaw + 70cm)

- To be studied: move/remove TCT4 to gain space on IP side of D2 for the TAN? (idea S. Fartoukh)

Layout with TCT5

New TCTs
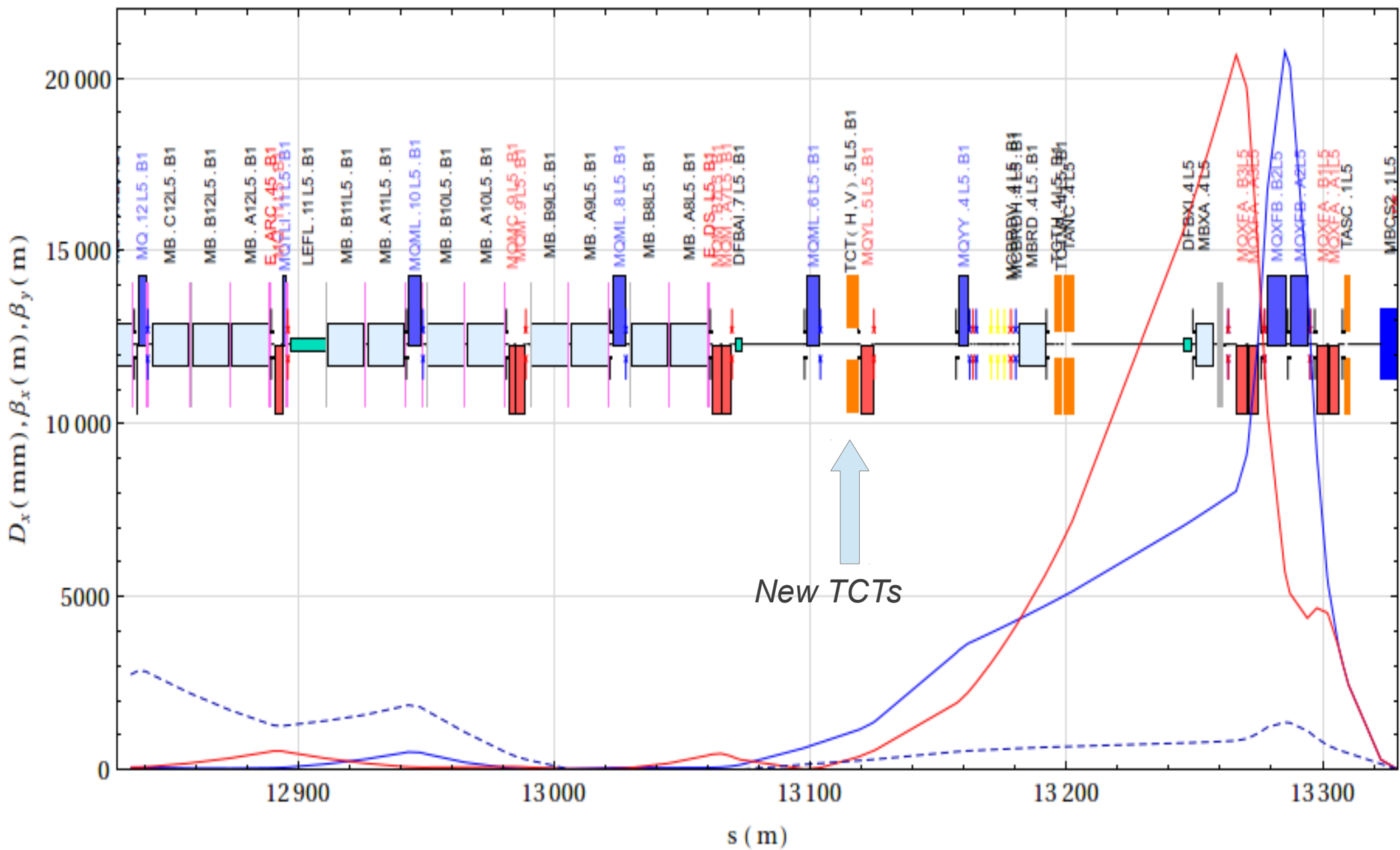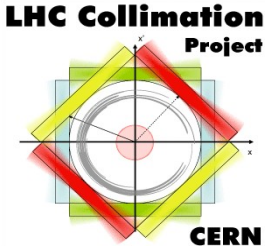
Side remarks on TCLs

- TCLs installed in SixTrack lattice (4,5,6) but not relevant for background

  - DS collimators not needed with this configuration (see studies L. Esposito). To be re-evaluated when layout is frozen.

- Open question: dedicated TCLs for crab cavities? Improve though vertical TCLs?

Aperture definition for SixTrack

- New aperture file implemented for SixTrack studies
  - based on collimation aperture and HL MAD sequence from optics team
  - So far only B1. B2 soon to come (A. Marsili)
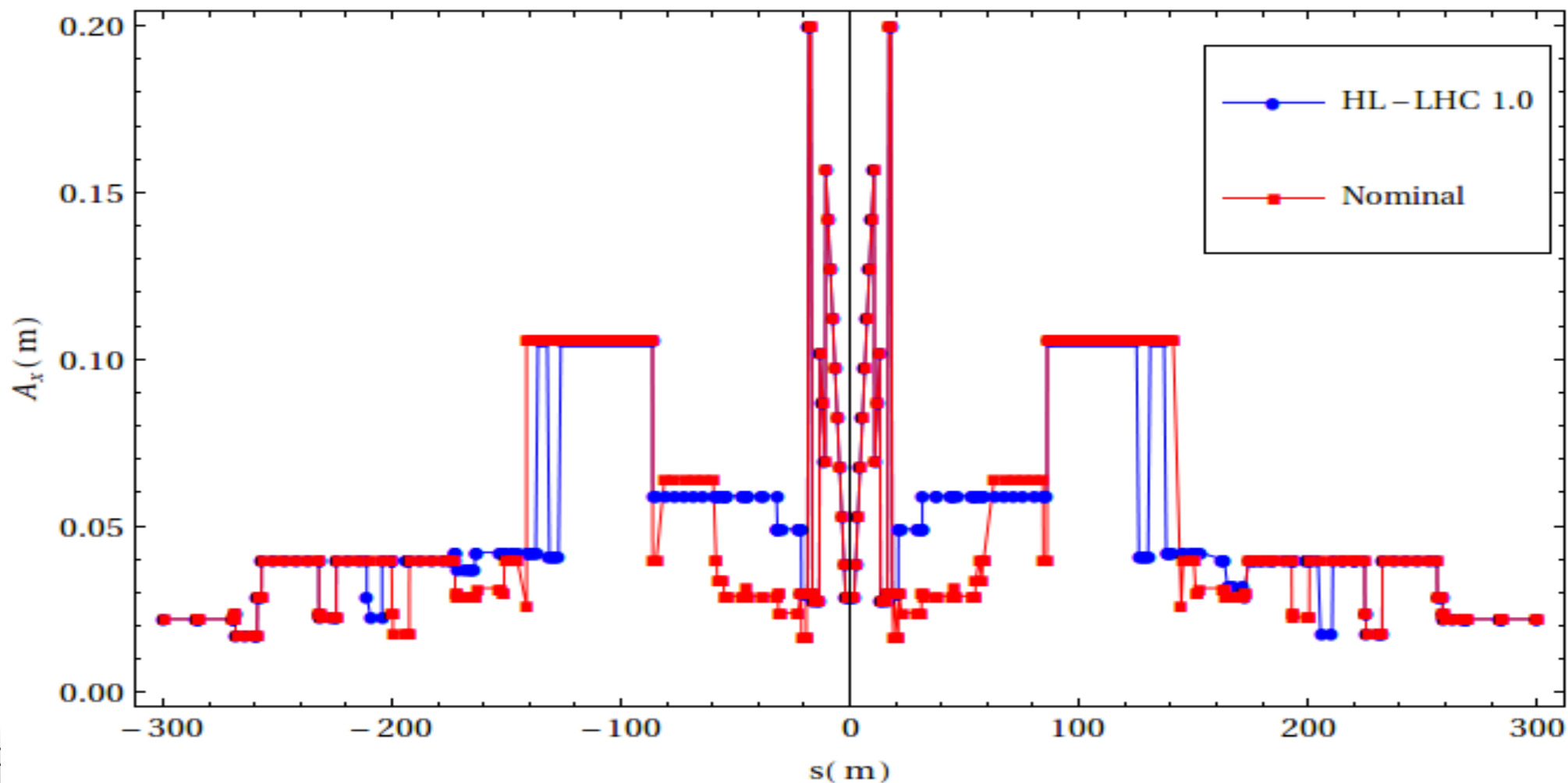
Work status

- **SixTrack simulation setup ready** for HL-LHC v1.0 B1

  - Thin optics provided by optics team

  - New TCTs added in front of Q5

  - Updated aperture file implemented for B1, B2 underway

- SixTrack simulations of cleaning for B1H and B1V with optics HL-LHC v1.0 ongoing (R. Kwee)

  - For most pessimistic background conditions, the TCT5 are OPEN for these first runs. Additional runs with TCT5 in to come later

  - First results (loss maps, TCT impacts) to be expected soon

- When FLUKA geometry is ready, shower simulations from the TCT could be started relatively quickly

- Additional case to be studied: both beams, different collimator settings, flat beams, ATS pre-squeeze