8b+4e MD

- The MD aims at testing **8b+4e beams with large bunch intensity** (up to 1.6e11 p/bunch) at 6.5 TeV for **e-cloud**, **collimation** and **beam-beam studies**

- It is worth underlining that:
  - The **8b+4e scheme has been already used** for tests up to 1800 bunches at 6.5 TeV in 2015
  - **Single bunches with larger bunch intensities have been taken** multiple times for MDs and tests (and used routinely in 50 ns operation during Run 1)
  - The total **intensity in the machine will not exceed 3e14 p/beam** (similar values were used in operation this year)

- The major concern that was identified is **beam-induced heating** which can be significantly different due to the different beam spectrum and large bunch intensity:
  - Proposed an intensity **ramp-up in three steps: 100b → 600b → 1900b**
  - The high pile-up run requested by the experiments will be used as a first step
  - At each step beam induced **heating on sensitive items will be monitored** as done for intensity ramp-up in physics
  - Plan to spend **~3h at high energy at each step**

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- For all steps we plan to use the **operational cycle to bring the beams in collisions** at β^*=40 cm

- **Octupole current** during the cycle will be increased to improve beam stability with larger bunch intensity

- **ADT** settings for high intensity already exist and were used previously this year → expert to be called at the beginning of the MD to load them. Possibly the gain along the cycle will be increased to improve stability

- **No change on the RF system** is required

- **No identified problem with diagnostics**. Anything to be expected? Will orbit measurement and feedback operate correctly?
  - Issues, if any, should be identified early, i.e. at the first ramp with ~100 bunches

8b+4e MD: beam-beam studies

Beam-beam studies. Proposed procedure:

- During the **600b fill**, the **crossing angles** in IP1&IP5 will **be reduced in steps** following the procedure used in physics
- We plan to use small **steps of 5 urad** (10 urad used in physics) monitoring the evolution of the beam lifetime
- To prevent fast losses during the Xing angle changes, we will **limit the speed of the angle change to 0.25 urad/sec** (0.5 urad/sec used in operation)
- Small **tune trims** will be performed at each step to optimize lifetime
- **Octupoles and Q'** might also be reduced in steps (in collisions there should be margin for stability)
- If lifetime is under control we would use the full range that has been commissioned for Xing angle leveling, down to **90 urad**

- **Open questions**
  - Stable beams will be declared. Should we move to adjust for the test?
  - If time allows, and this is compatible with the other planned tests, can we repeat the same in the fill with the 1900b?