

Proposed beam-beam studies

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Proposed beam-beam studies

- Find possible head-on limits: Unequal beam sizes (emittances and/or β^*), noise
- Find possible long-range limits: 25 ns, 50 ns (high intensity, different β^* , \rightarrow criteria for separation)
- Collisions with alternative working point (half integer)
- Collisions (possibly also levelling) with (pseudo-) flat beams ($\beta_x \neq \beta_y$)
- Luminosity levelling (β^*), effect on beam-beam
- Coherent beam-beam modes (measurement and mitigation schemes)
- Passive long-range compensation (alternating crossing)

- BACKUP SLIDES -

Beam-beam limits (● ● ●)

- Find possible head-on limit:
 - Unequal beam sizes (emittances and/or β^*)
 - Head-on collisions with noise (damper) on one beam
- Some can be done at injection energy (first)
- Some can be done as end-of-fill studies



Beam-beam limits (● ● ●)

- Find and quantify long range limits (partly done 2011):
 - 2 different bunch spacings (25 ns, 50 ns)
 - If possible: one fill with different β^* (e.g. 2 m)
 - High intensity trains (1 per beam), 50 ns
- Some can be done as end-of-fill studies



Collisions with external noise (● ● ●)

- In view of operation with crab cavities
 - With and without long range, damper used for excitation
 - Probably later in the year (or 2012)



Coherent beam-beam modes (● ●)

- Verify whether coherent beam-beam modes are excited
 - Can be done at 450 GeV
 - No damper, few bunches, high intensity (parasitic to head-on limits ?)
 - Verify with bunch by bunch measurements (Schottky etc.)
 - Verify with mitigation schemes



Crossing plane and compensation (●)

■ Passive compensation necessary ?

- Needs significant long range (50 ns, better 25 ns)
- Later in the year (or 2012)



(Pseudo-) flat beams (● ●)

■ Flat: $\beta_x \neq \beta_y$

- Aspect ratio about 4 would be ideal, 2 o.k.
- With and without trains and crossing angle
- Can be combined with leveling (squeeze in one plane)
- Detrimental effect on levelling with offset ?
- Optics not yet available (later in 2012)

