



Measuring crabbing induced by Head-On Beam Beam (HOBB)

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Measuring crabbing induced by Head-On Beam Beam (HOBB) -> 1 h

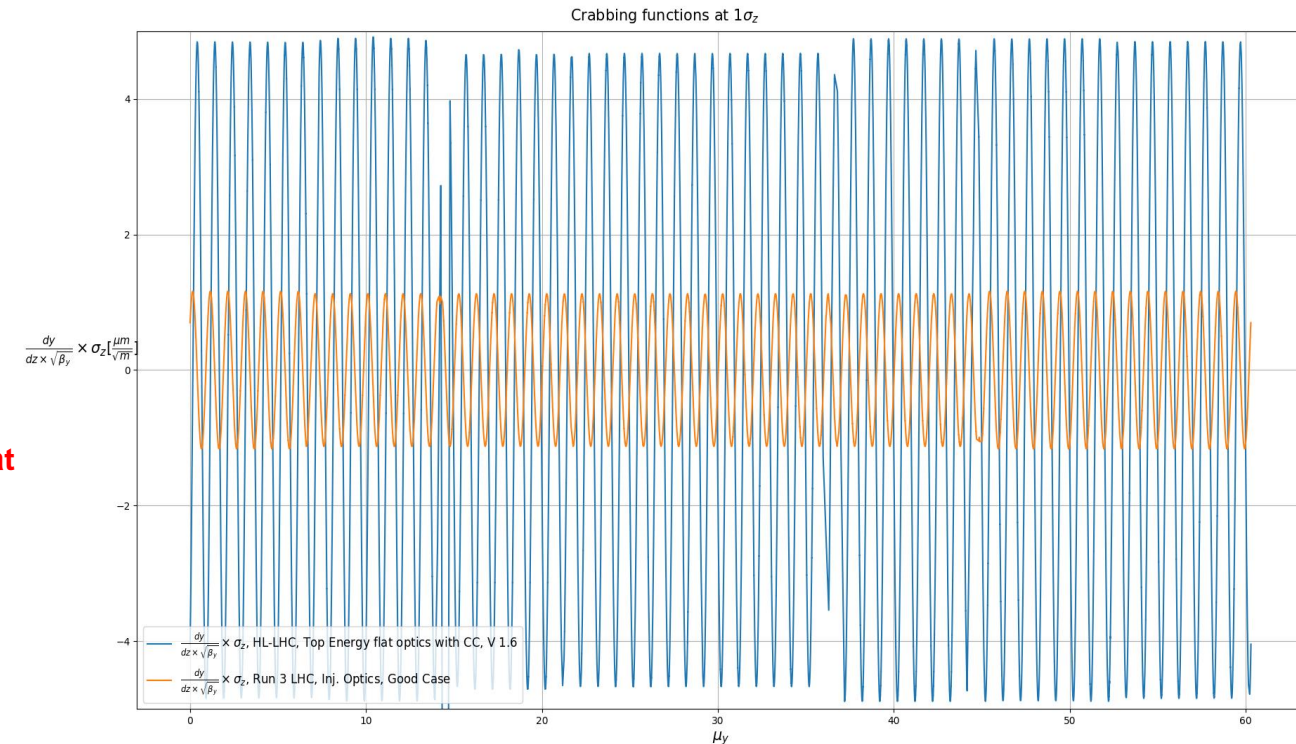
Aim of the MD: to measure **HOBB** induced crabbing for the first time in the LHC.

MD short description:

- **Collisions at Injection**; 1 bunch/beam, colliding in IP1 (separated in IP5);
 - Bunch Intensity 2.1×10^{11} ppb; emittance $2.0 \mu\text{m}$ (**SETUP BEAM FLAG ON, PC Interlock automatically masked**);
 - **Dynamical change in the crossing angle (only IP1 vertical)** from -170 to $170 \mu\text{rad}$.
- Taking into account this config, we can reach **$\sim 20 \mu\text{m}$ peak-to-peak signal at $1\sigma_z$** at the HT monitor, reasonable for a measurement.

Strong synergy with MD11643:

- Almost **same team**;
- Almost **same machine configuration**;
- **MD11603** is **fast** (less than 1h needed for a full scan in **optimal conditions**).



Comparison between **Residual Crabbing in HL-LHC** lattice and the **HOBB Crabbing** we aim to produce in the MD: the two are of the **same order of magnitude**.

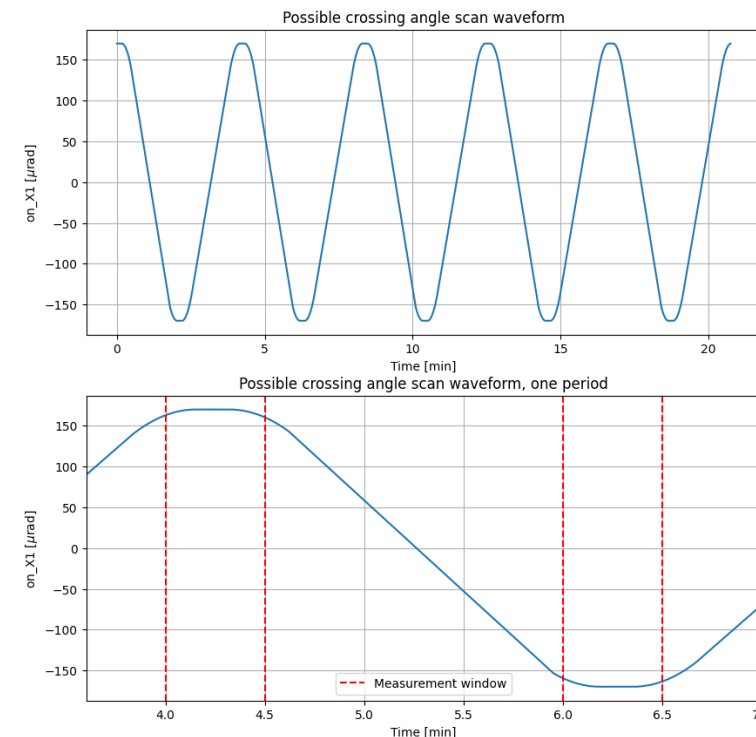
Steps to be taken

- Turn off the octupoles (beams enter already in collision);
- Separation in IP5, Collision in IP1, starting angle in IP1 $+170 \mu\text{rad}$ (same configuration used in Collisions at Injection, 21/03/2024).
- Inject B1, 1 bunch, bunch slot 1.
- Inject B2, 1 bunch, bunch slot 1 in collision with B1 (only one bunch per beam).
- Dump both.
- Inject B2, 1 bunch, bunch slot 1.
- Inject B1, 1 bunch, bunch slot 1 in collision with B2.

Start scanning in crossing angle, from $+170 \mu\text{rad}$ to $-170 \mu\text{rad}$ and back, several times (NLO optics at Injection collimation settings).

Ideally we would like to have 5 points for $+170 \mu\text{rad}$ and 5 points for $-170 \mu\text{rad}$.

Instrumentation needed: HT-Monitor, BSRT, WS, Longitudinal Pick-Up.



Highly compatible with simulations (minimum is **17 seconds according to LSA**)

Thank you