Observations of instabilities in the LHC at top energy
Update 06.06.2016

X. Buffat, L. Carver, G. Iadarola, E. Métral, G. Rumolo

- Observations
- Test with higher chromaticity
  - Time scale
Several bunches blow up on a time scale of ~1s
- End of the 72b trains
- Widely spread over hours of stable beam
- Bunches at the end of the trains have slightly higher transverse emittance at the start of stable beam
- Blow during stable beam of the end of the trains of both beams
Bunches at the head of the 72b trains are more intense

No losses observed on the FBCT during the instabilities
The bunch length of all bunches behave similarly during stable beam.
- Bunch intensity and length distribution at the time of the instabilities follow the natural evolution both parameters as a function of time

→ Does not define an area of stable parameters
The coherent signal is sometime visible in the BBQ amplitude.

→ It is not excluded that the signal generated by a single bunch becoming unstable stays below the noise level.

- HT monitor is triggering based on the BBQ amplitude
  → A lot of data acquired, but nothing above the noise level detected

- ADTObsBox needs to be triggered manually
  → Offline analysis is ongoing. For the moment, nothing above the noise level has been detected.
Colliding partners in IP1,5 and 8 are often blown up, but not always

→ Likely an incoherent transmission of the oscillation, TBC
A similar behaviour is observed fill after fill, yet blow up happened at different times.

- Correlation with e.g. lumi-scans, leveling in IP2-8, orbit variations are not obvious, further analysis needed.
During fill 4980, the vertical chromaticities of both beams were increased by 5 units when first instabilities were observed and later again by 2 units.
Latest fills with higher chromaticity

- Blow up of few bunches still observed after about 8h in stable beam
The increase of chromaticity had a clear impact on the time scale of the instabilities.