

Strategies for characterizing and calibrating sources impacting time measurements (Project 7.3b1)

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On behalf of the 7.3.b-1 contributors

- Increasing need of timing detectors with very high resolution: projects ongoing in ATLAS (HGTD) and CMS (HGCAL & MTD ETL) for HL-LHC
- Very high precision and stability ($O(\text{ps})$) of clock signal distribution, along with the fastest signal development.

How to assess the different biases on this measurement ?

- Characterise the different sources of jitter;
- Develop a realistic and fast simulation of the effects;
- Investigate strategies to cope with them.

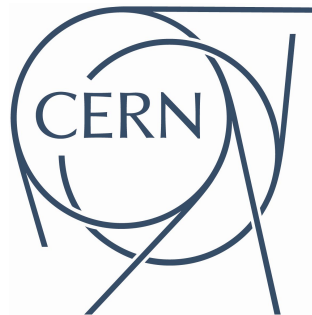


HGTD (ATLAS)



Louis D'Eramo
Jinlong Zhang
Mengqing Wu

HGCAL & ETL (CMS)

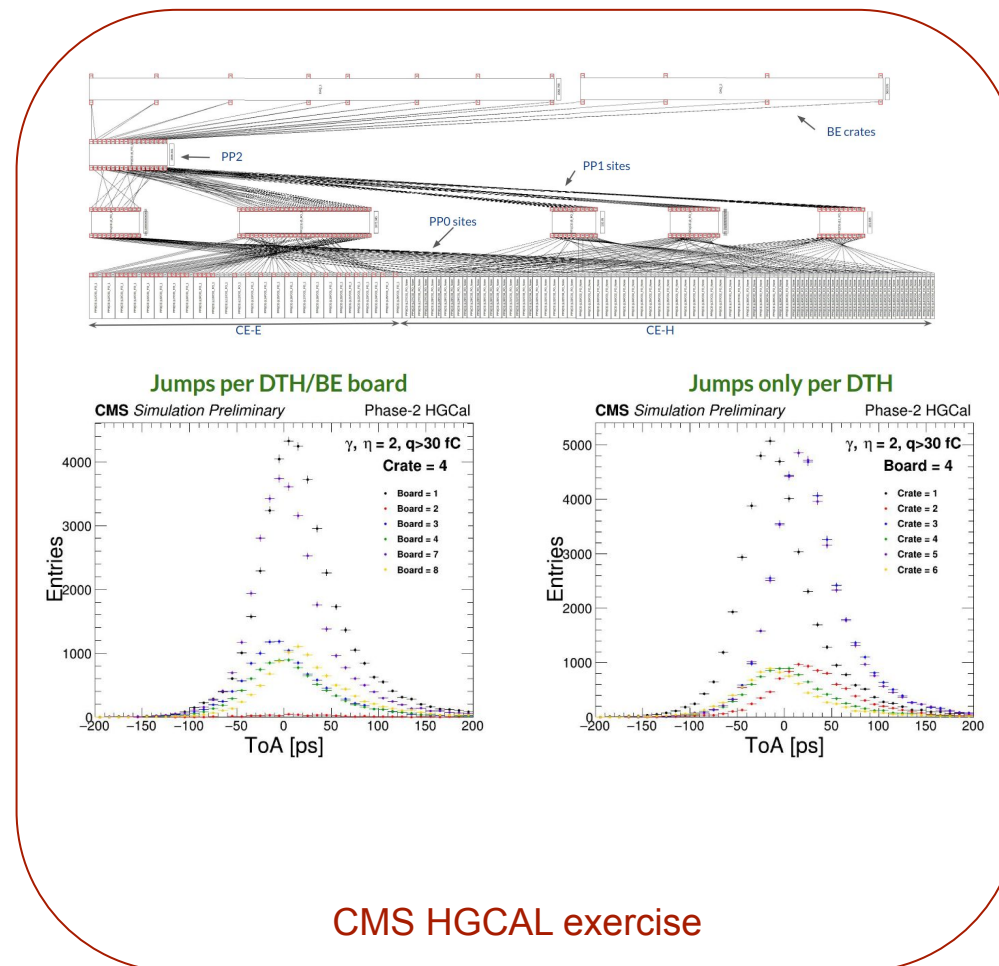
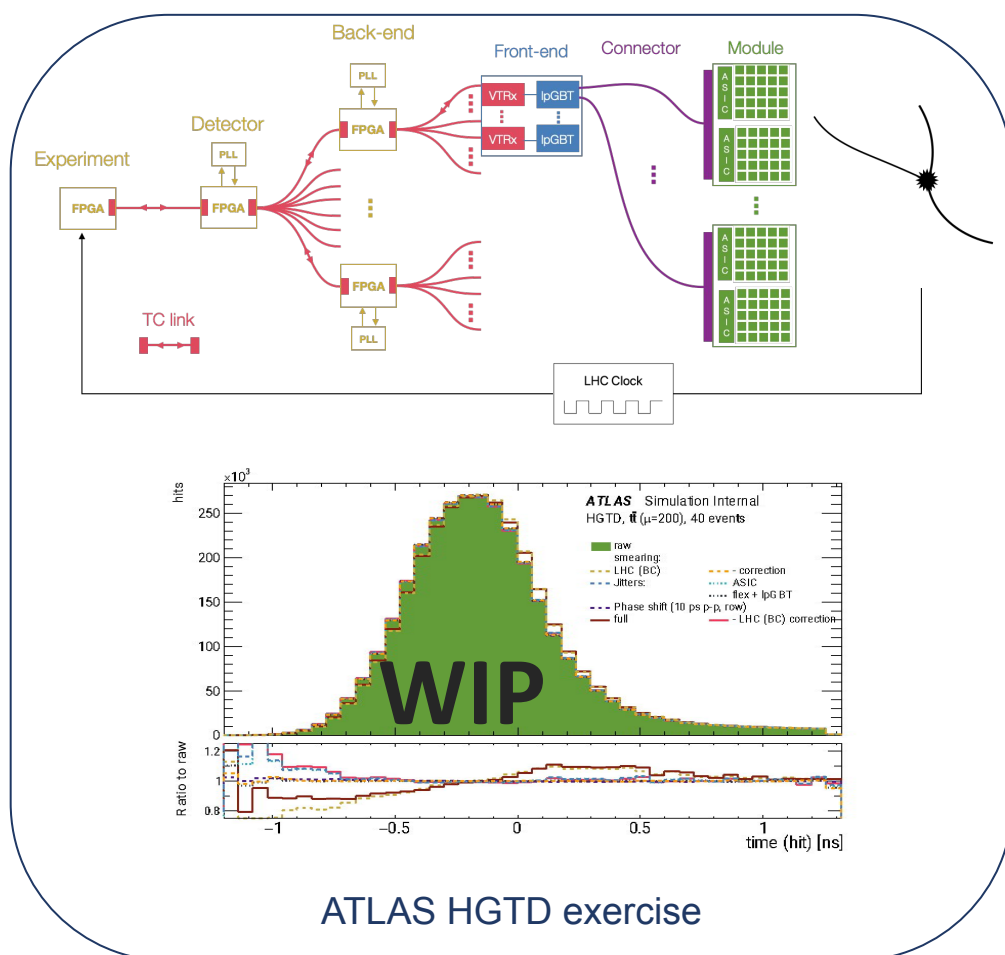


Giacomo Zecchinelli
Hayden Swanson
Pedro Silva
Andre Stahl

- Meetings: planning to run 2 meetings a year organised as a forum for discussions.
 - possibility to have dedicated informal discussion in between.
- PL:
 - rolling chair between Louis D'Eramo and Giacomo Zecchinelli for the first 2 years: idea is to have ATLAS and CMS represented with similar level in the coordination.
- Themes:
 - Develop a coherent simulation of all the factors impacting the time measurement;
 - Construct a set of figures of merit to asses the calibration;
 - Study the impact of the different factors and their mitigation.

Progress Report

- Both ATLAS and CMS started investigating this effects independently:



- Need to kick-off the common forum to discuss how to move forward

- Q4 2024-Q4 2025: Regular discussions each quarter or twice a year.
- Q1-Q2 2025: Define common metrics and description of the effects for simulation.
- Q3 - Q4 2025: Implementation of measurements on realistic DAQ chain.
- Q4 2025: Drafting a report summarising the items (hardware or software) to be improved for the next generation of experiments.

First meeting to be organised this October, to stay in the loop please register to the following e-groups:

[ECFA-DRD7-PROJECT7_3_b1-Observers](#) - (If you want to be informed of our meetings and discussions)

[ECFA-DRD7-PROJECT7_3_b1-Contributors](#) - (If you want to join the project)