Firmware Updates

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ROD Firmware work-in-progress

1) Separate **data-taking** and **Calibration** firmwares 

2) **Stabilize** firmware **generation** 

3) **Cleaner merger** in PIXEL firmware 

4) (Major) change in **git structure**

5) **Consolidate new FW loading procedures**

6) **Smart L1ID Forwarding** FW 

7) Create a **ROD fw test-bench**

SMART L1ID Firmware results

Run on **multiple slots** in SR1
C1_S7
C1_S17
C3_S8

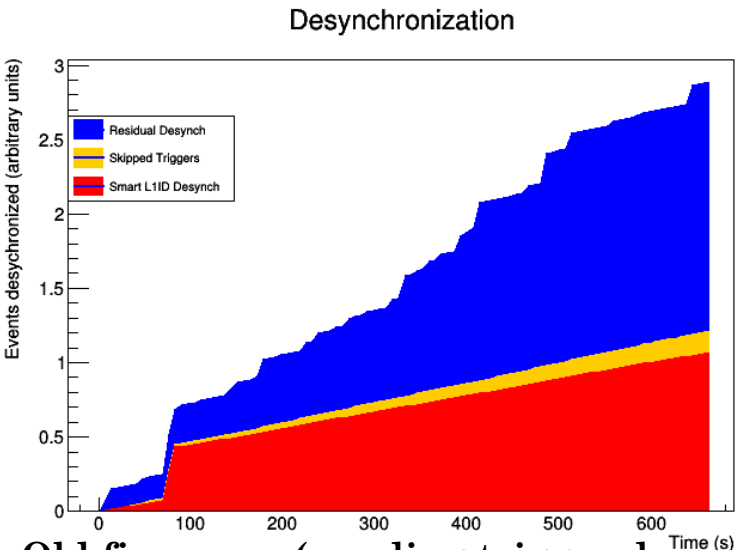
HV off, preamps ON

Running for several hours, **no ROS error found** (apart from very few errors when disabling a module in C3_S8)

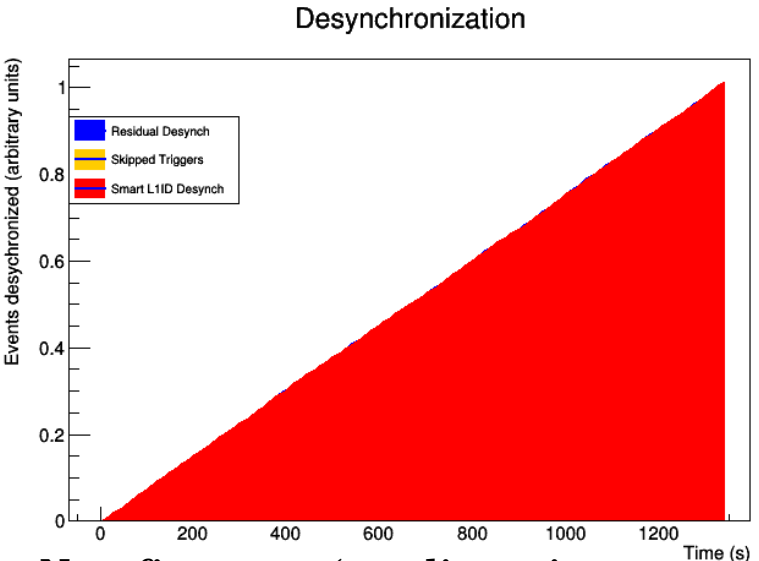
Pending trigger is now **decreased** when the **module trailer** is detected → now skipped triggers are generated only if **pending threshold > 15**

SMART L1ID Firmware results

EXAMPLE: C1_S7, slave South, channel 10,
pending trigger threshold = 15



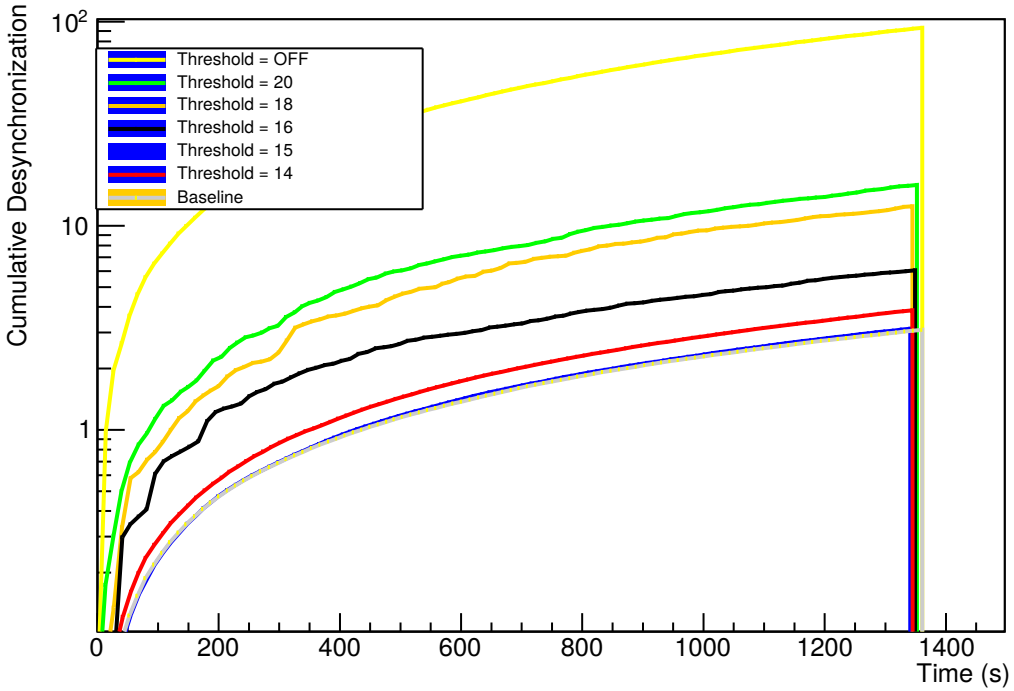
Old firmware (pending trigger decreased after module header)
Skipped trigger generated, residual trigger generated



New firmware (pending trigger decreased after module trailer)
NO skipped trigger generated, NO residual trigger generated

SMART L1ID Firmware results

EXAMPLE: C1_S7, slave South, channel 10, trig frequency = 100kHz, average occupancy = 6-8 hits



Best result when threshold = 15

Almost identical to "baseline" = number of skipped triggers when running with mechanism off → minimum level of desynch that can be reached

Similar result obtained for different modules at different trigger rates (see root plots attached)

If skipped triggers generated → residual desynchronization is very high → bug in skipped trigger generation???

SMART L1ID Simulation results

Interaction between skipped triggers and SMART L1ID algorithm **was simulated**

MCC emulator from Marius (skipped trigger emulation already implemented, changed some delay parameters to "enable" skipped triggers → still looking for a realistic value of delays)

NO problem in the skipped-SMART L1ID interaction **found**

BUT

Weird behavior in the skipped trigger generation found

SMART L1ID Simulation results

Extremely difficult (for me) to explain

In case of: **Skipped triggers + long pause (no triggers) + trigger**
→ information about skipped triggers is lost

Happening in **BOC MCC emulator**… Behavior similar to real detector… **Could it be also a bug in the MCC?**

Next step: test it sending very specific trigger patterns. (e.g. 24 consecutive triggers + 2000 BC pause + new trigger)
Custom Master FW created to do it.