Si-W ECAL Test Beam 2017 analysis

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MARIE CURIE ACTIONS

PRESTIGE
POSTDOCTORAL RESEARCH FELLOWSHIPS IN FRANCE
A MARIE CURIE FELLOWSHIP PROGRAMME

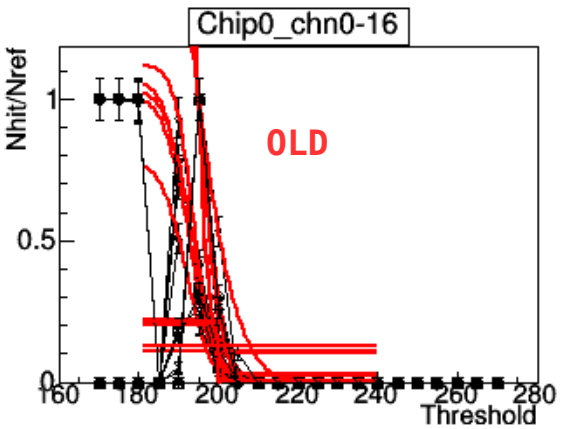
LABORATOIRE DE L'ACCÉLÉRATEUR LINÉAIRE

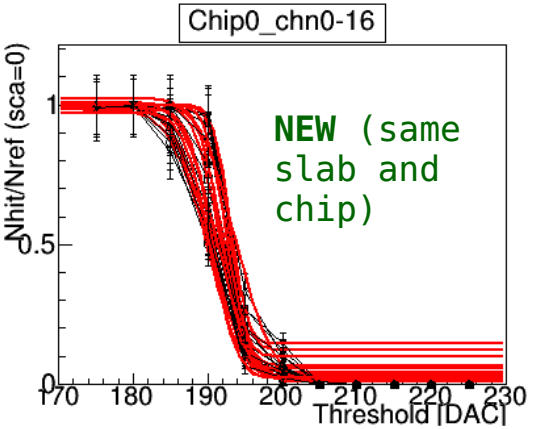
Settings and statu of the slabs for the TB2017

- 7/10 slabs passed the passport control.
- Layer 1, Slab 21 → 43.4% **(one wafer+1 chip)**
- Layer 2 – 6 , slabs 16,-21 **~6-8%**
- Layer 7, slab 22, **~ 16% (one chip)**
- 5% are masked manually just before starting the commissioning → same patter in all slabs:
  - Chn 37 in all chips; Chn 41-53, chips 1,9; Chn 5, chips 0 and 8; Chn 3, 9, 10, chip 7 and 15;
  - Conservative selection!
- Total # of channels available: 6204 (87%)
- Once the noise was under control, the next step is the choice of the working settings. Most of them taken from Omega or previous test beams:
  - Spill settings: 5 Hz, 3.7 ms width (0.9 start acq + 0.5 val evt + 2.3 ms)
  - Gain: PA = 1.2pF, CC=6pF (cc does not afect to the gain)
  - Threshold >= 225/230 DAC (chip based)

Improved commissioning procedure

- A lot of debugging (data integrity, data conversion, etc)
- Understanding of the noise sources: specific search of spark sensitive channels (ADC=4 channels).
- Optimize algorithm and timing criteria (spill width is very important when looking for noise sources). Recursive method:
  - Relatively high trigger threshold: mask the most noisy ADC=4 channels, then the "super noisy" channels (1 per mill or less!), then perform fine search using cosmic rates.
  - Perform the scurve analysis and select the optimal threshold
  - Repeat with chip wise trigger threshold: most of the steps of the first iteration with the optimal thresholds.





Improved commissioning procedure

- Improvement for
  - Slab 18: from 75 to 45 noisy channels masked
  - Slab 19: from 72 to 33 noisy channels masked
  - Slab 22: from 173 to 48 noisy channels masked
  - From ~8% to ~4%
- It is better established (and tested)
- It will make easier the channel-wise threshold optimization (sk2a)
- It is generic and flexible
  - usable for short and long slab
- Includes calibration and pedestal analysis!
  - With cosmics or source
- Between 0.5-2 h in total
- Already in pyrame3: features/calicoes3_commissionings
- Twiki (work in progress!) https://twiki.cern.ch/twiki/bin/view/CALICE/SiWDESY201706Commissioning