Dynamic Range

Parts of readout chain have gain control:

- APV: ±20 in 5 steps%
- Laser Driver: 4 steps of ±?

But this is to compensate intrinsic variations in performance.

(Residual variations still ±20%).

⇒ Gain of readout chain effectively constant.

Dynamic Range

FED has two data taking modes:

Low trigger rates -

Raw Data: 10 bit ADC

High trigger rates -

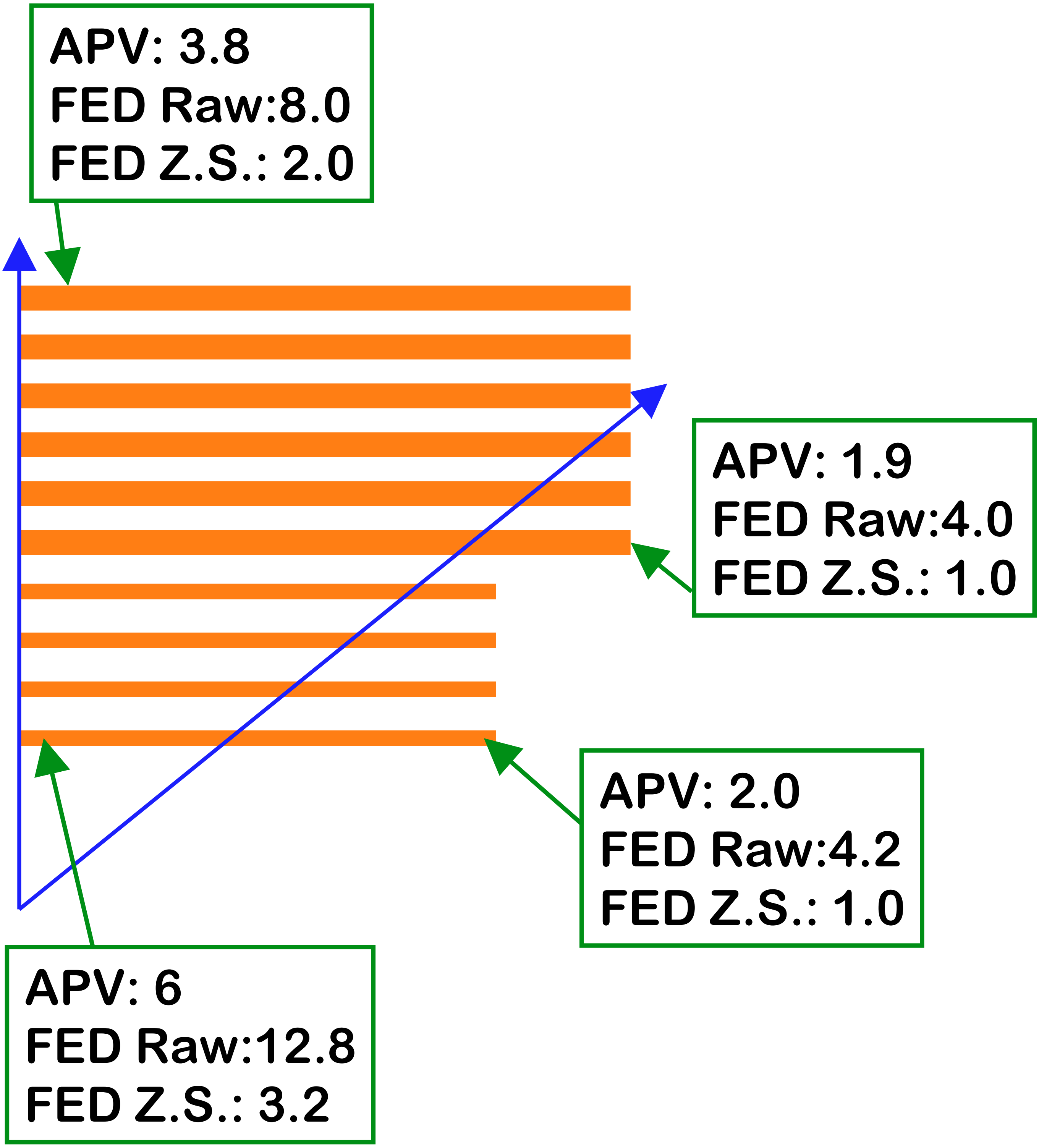
Zero Suppressed:

After pedestal + CM subtraction:

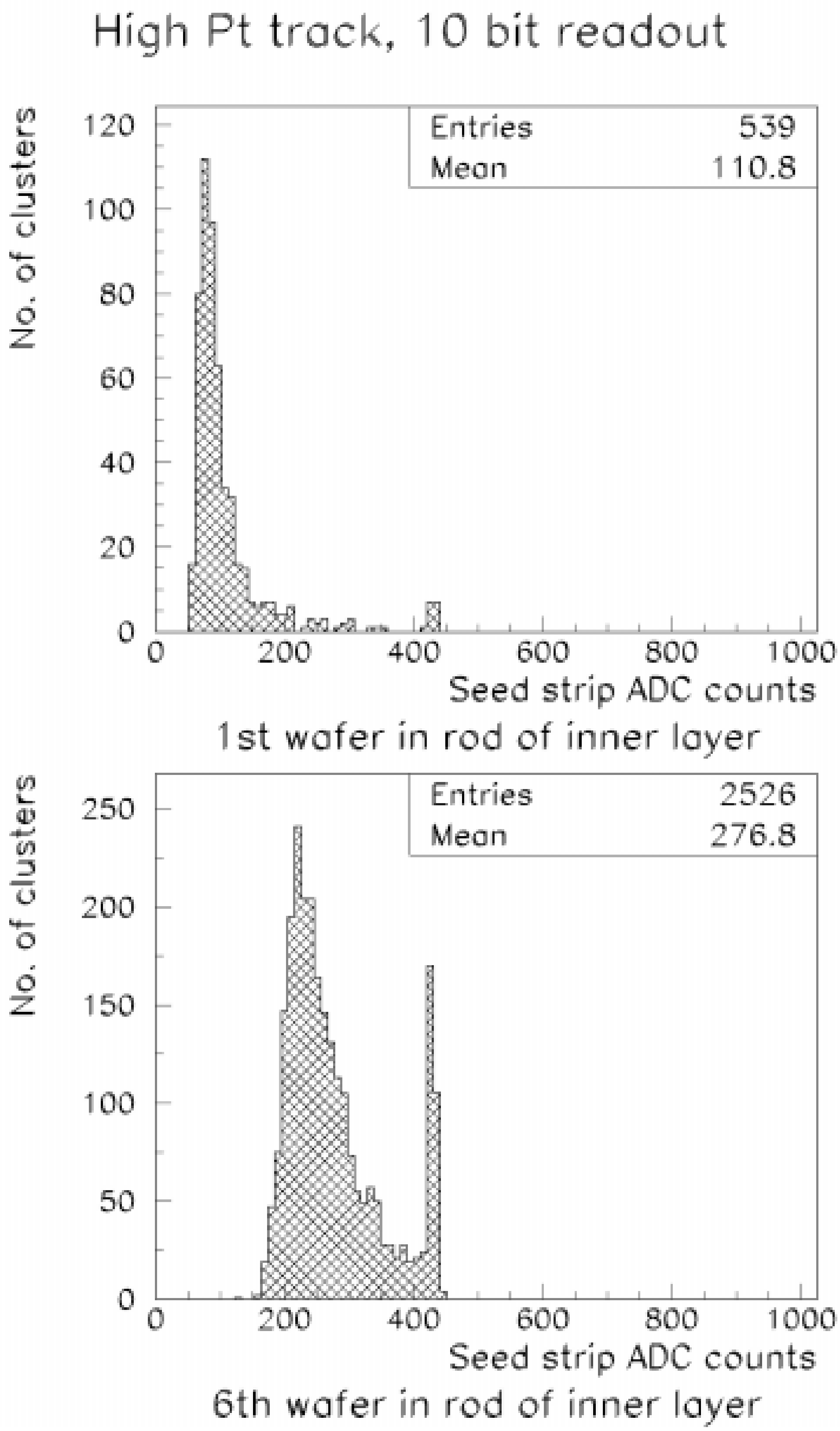
drops 2 MSBs $\Rightarrow$ 8 bits left.

Dynamic Range

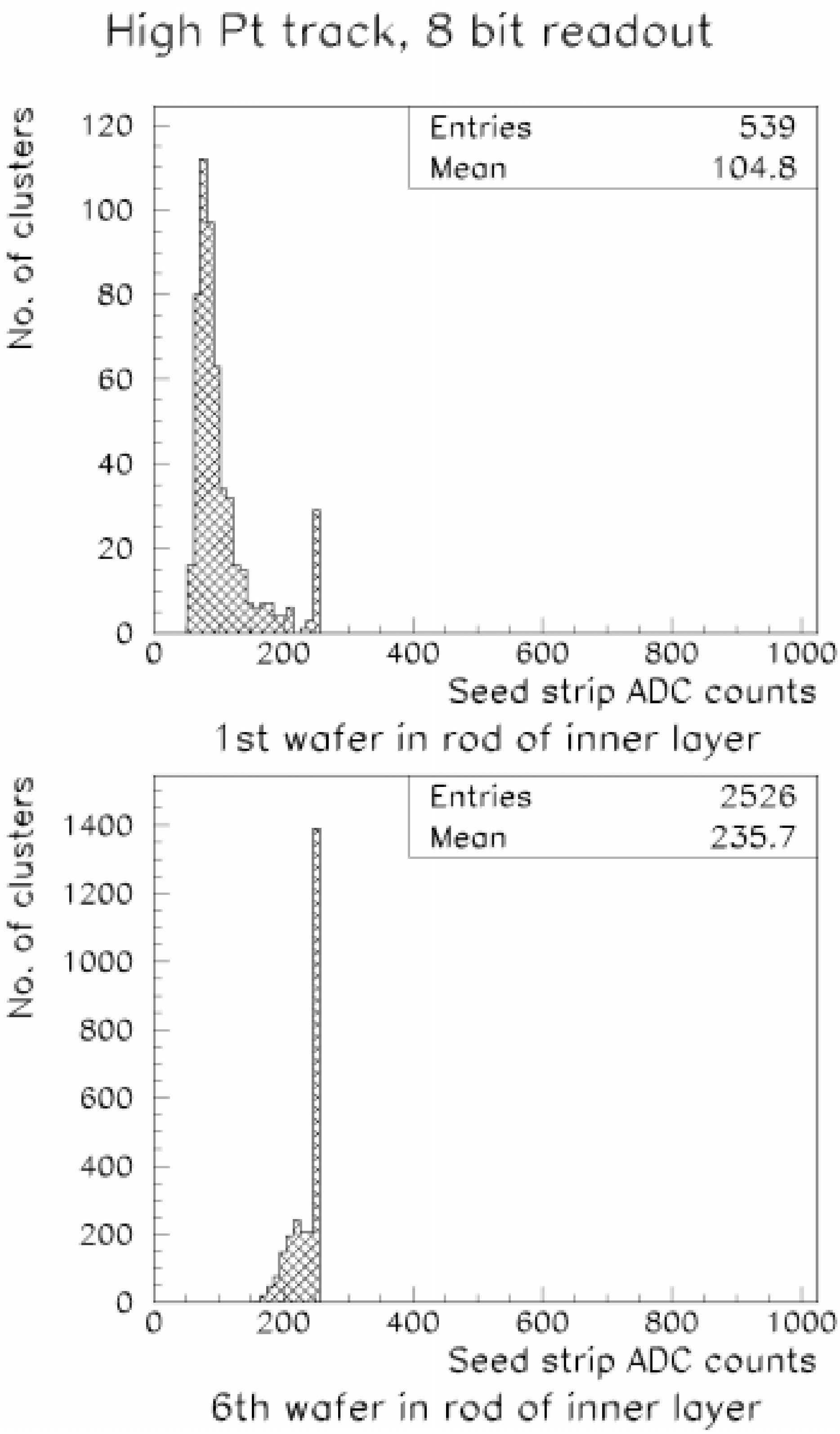
Dynamic ranges (in MIPs) in barrel



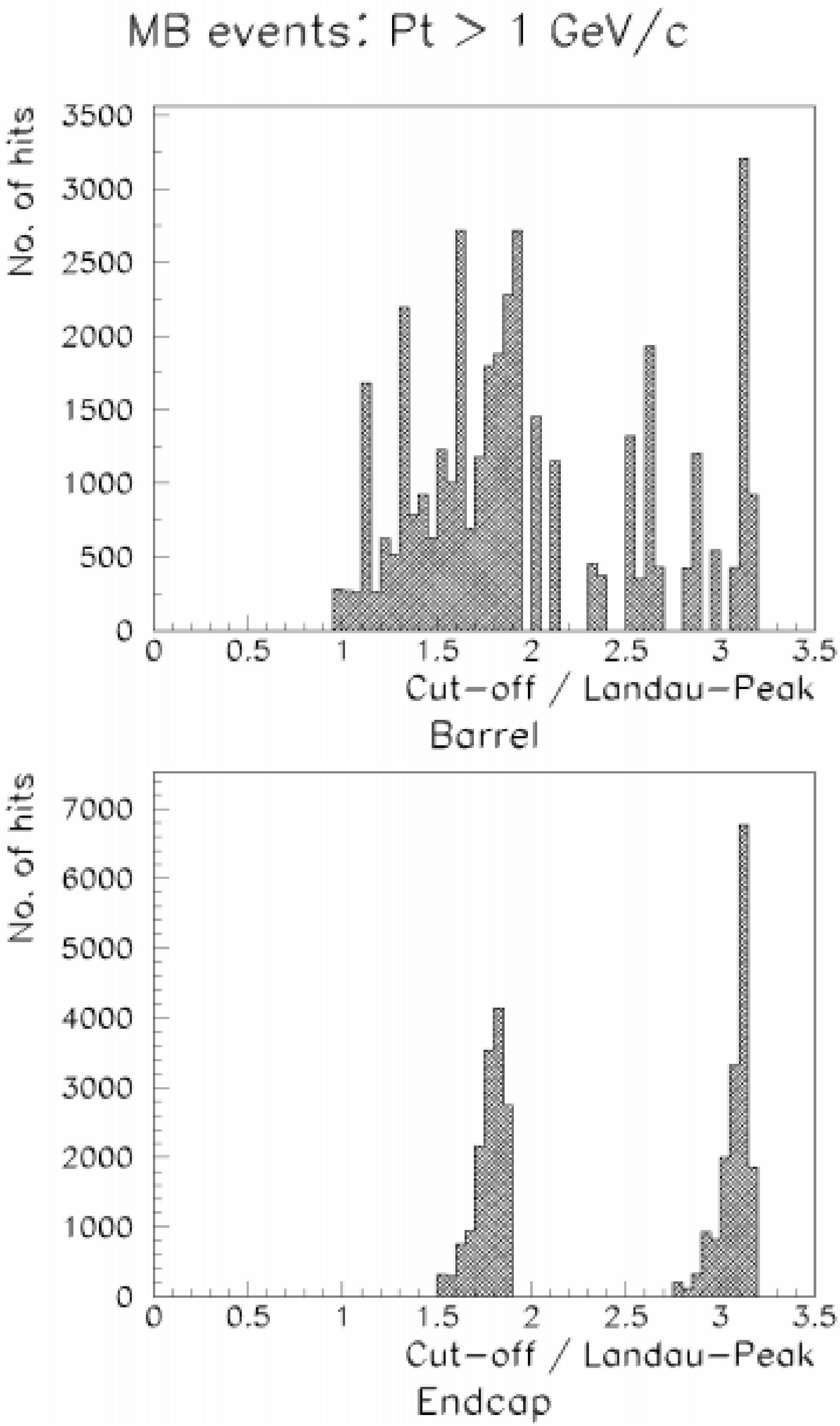
Dynamic Range



Dynamic Range



Dynamic Range



Dynamic Range

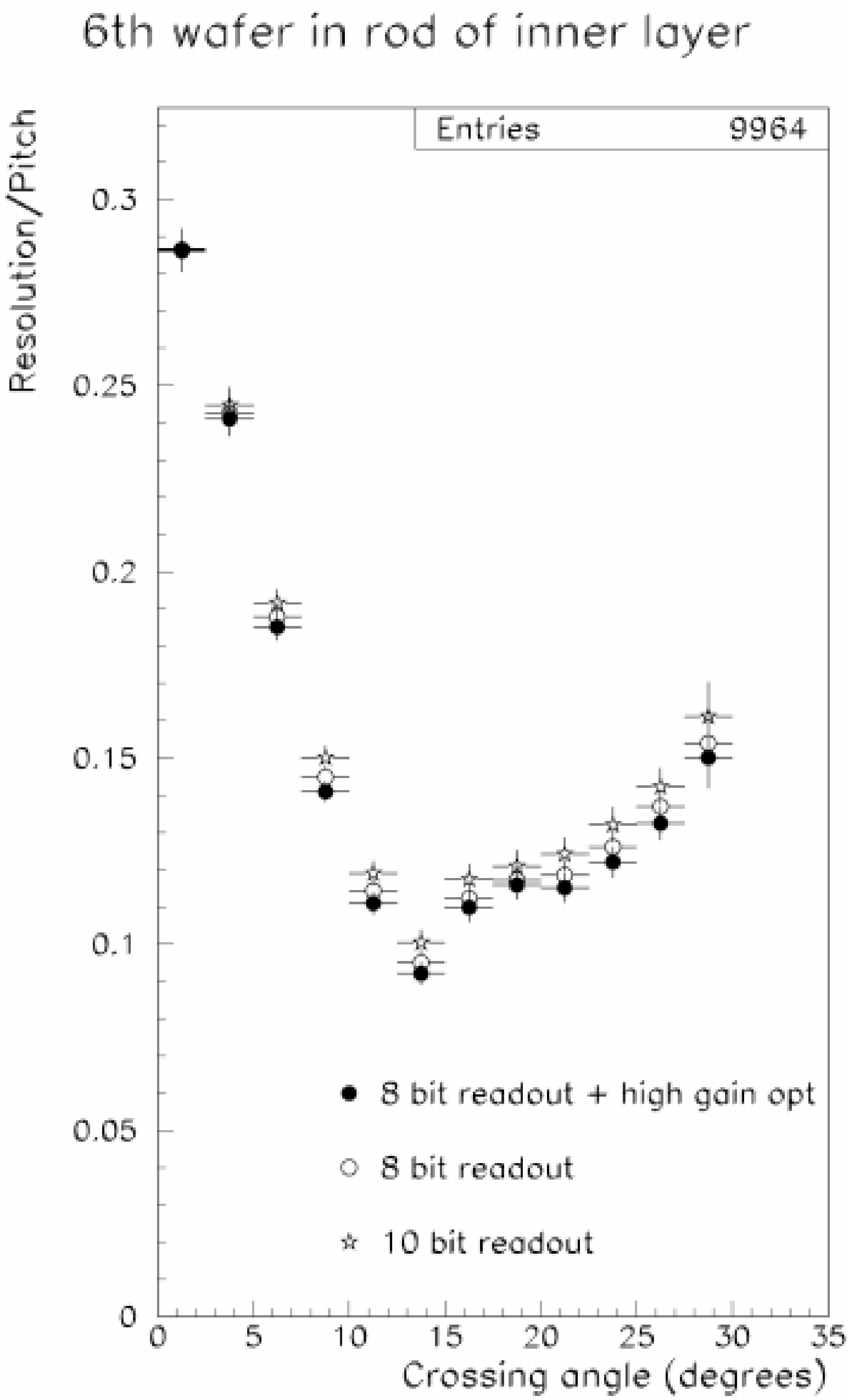
In normal data taking, Landau badly truncated in some parts of detector. Do we care ?

- Must measure signal size for:
  - Calibration of gain differences.
  - Tuning Monte Carlo
  - Tracker synchronization with tracks.
  - Monitoring detector depletion ?
  - dE/dx ?

Could this be done in calibrations runs ?

- Does truncation degrade position resolution ? Apparently not ...

Dynamic Range



Dynamic Range

Possible Solution (proposed F. Vasey)

Standard:

Raw Data: 10 bits

Zero Suppressed: Drop 2 MSBs $\Rightarrow$ 8 bits

New:

Zero Suppressed with gain 0.5:

Drop 1 MSB and 1 LSB $\Rightarrow$ 8 bits