Offline Test Beam Analysis

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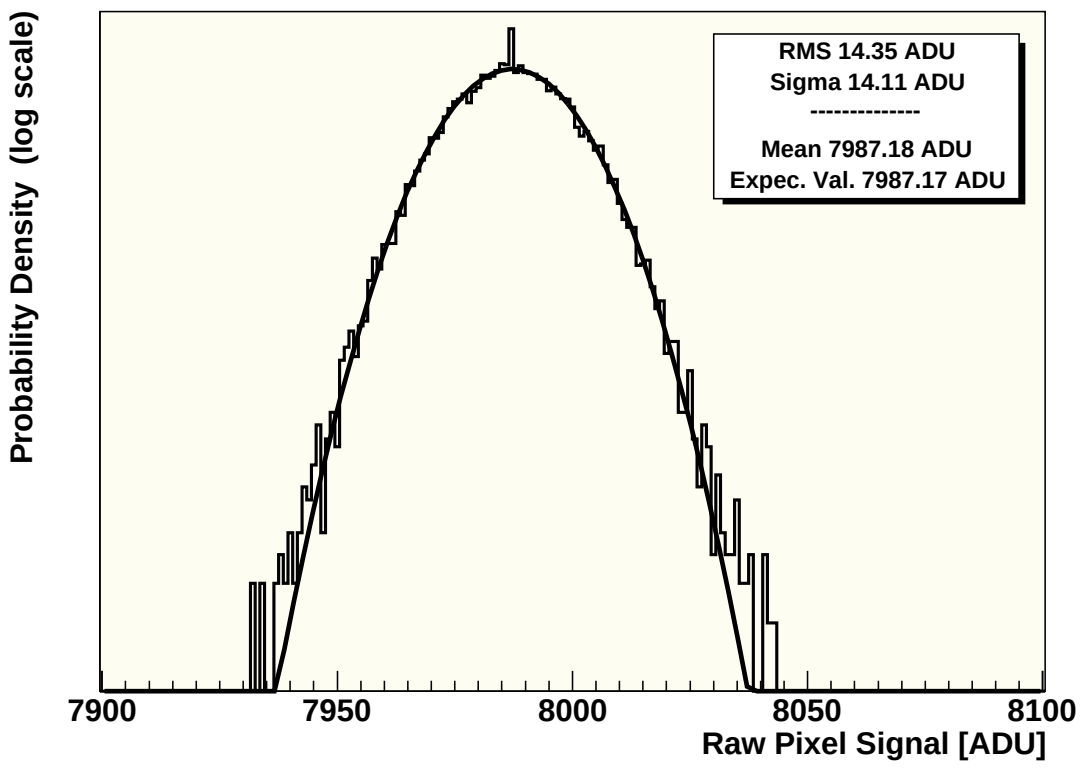
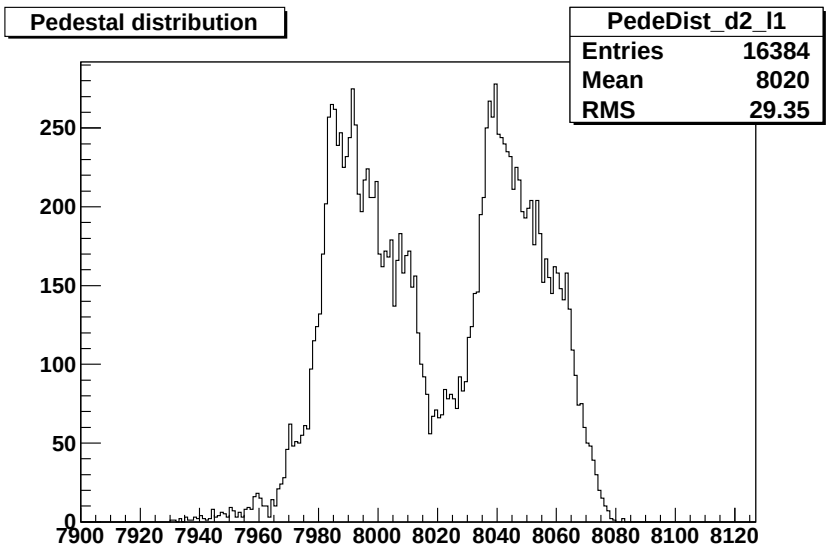
Raw Data Calibration

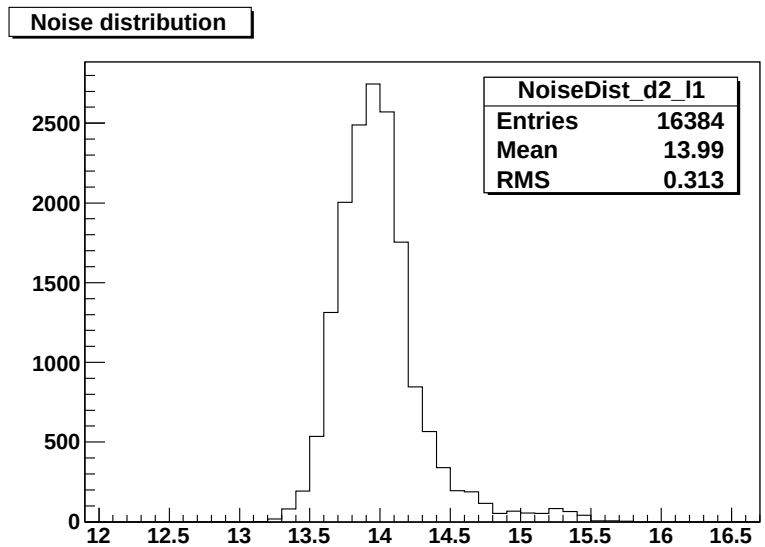
- each 20.000 events
- common mode correction as the single full row median
- $S_{ped} = 1/n_e \Sigma S_{raw}$
  $S^2_{rms} = 1/n_e^2 \Sigma S^2_{raw}$
  $\sigma^2 = S^2_{rms} - S^2_{ped}$
- three loops to improove noise estimates



Hot Pixel Masking

- Absolute Noise Value (min 5ADC; max 20ADC)
- Absolute Pedestal Value (min 7000ADC; max 9000ADC)
- Noise Distribution (Noise<9Sigma)
- The same cuts for all modules





Filtering

High quality cluster filter for alignment:

- ClusterSig > 1000 (for DUT depends on dip in distribution $\approx$2000ADC)
- Quality $= 0$
- Blocking a boder of 16px around the matrix
- Manual selection of blocked pixel

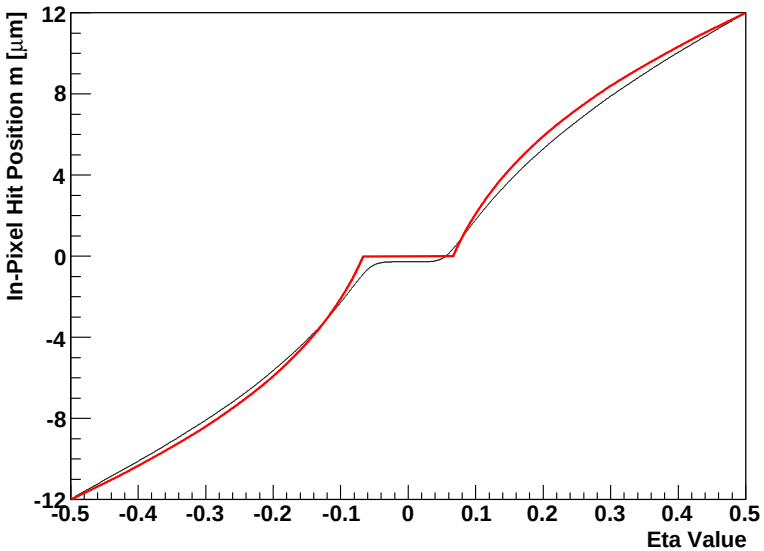
Low quality cluster filter for overall performance:

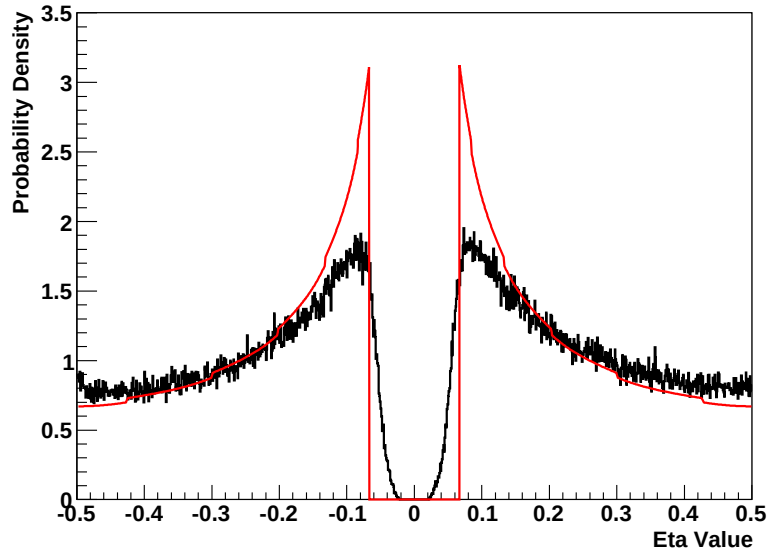
- SeedSNR > 7
- Quality $= 0$
- Manual selection of blocked pixel

Typical ratio of
wo cut : hq cut : lq cut
100% : 30% : 66%

Hit Reconstruction

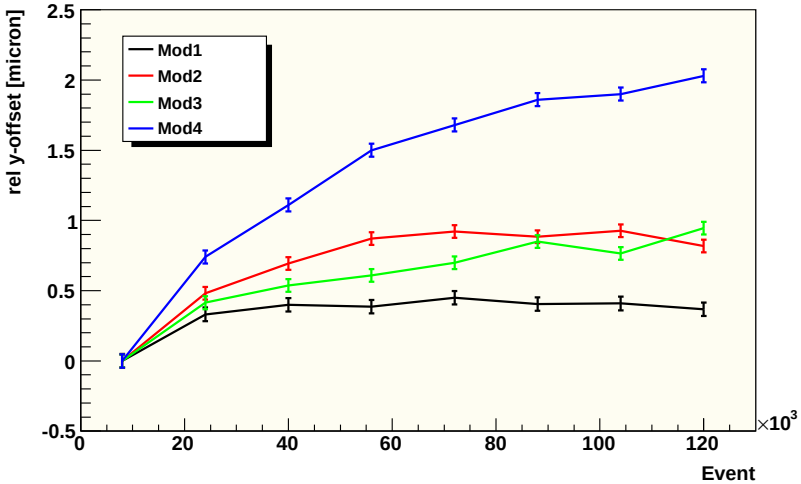
- Full frame clustering (usually 3×3 or 5×5)
- Noise rejection ($<$ 2.6 Noise)
- Pixel-couple-eta
- $$\eta = \begin{cases} -\frac{S_N}{S_N+S_S} & \text{if } S_N \text{ to the left} \\ \frac{S_N}{S_N+S_S} & \text{if } S_N \text{ to the right} \end{cases} \quad (1)$$
- One pixel cluster are not taken into consideration for the calculation of the eta distribution

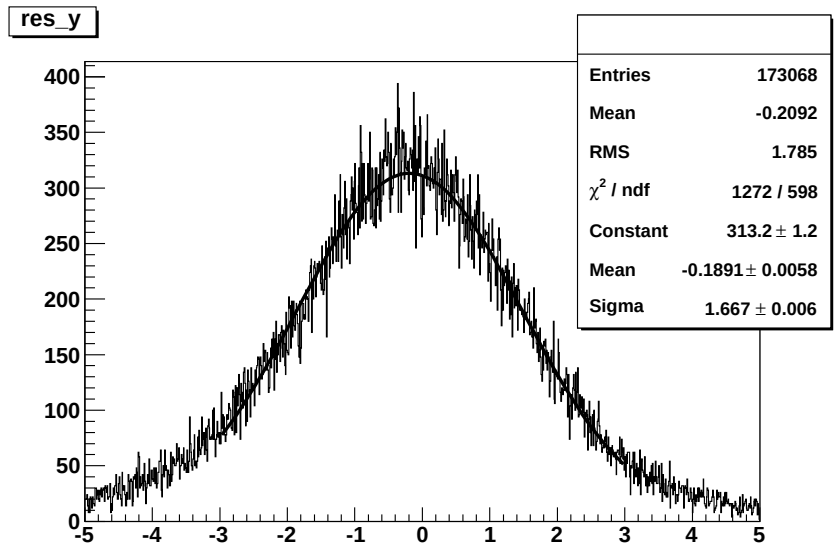




Alignment

- Millepede II
- Recalculation of the alignment constants every 15-20k events





Efficiencies and Tracking

146007 cluster have been found on the DUT of Run 2169
136870 (94 %) hits could be reconstructed within 5 sigma (i.e. 9.35μm)
126860 (87 %) hits could be reconstructed within 3 sigma (i.e. 5.61μm)

- gaussian is fitted in the range from -3 to 3 micron
- boder region (i.e. 16px) not taken into consideration when residuals are stated
- chi2 cut at 95%