Status report on testbeam analysis

2011 and 2012 data

Alberto Lusiani, Marcin Chrząszcz

15th February 2013

2011

2012

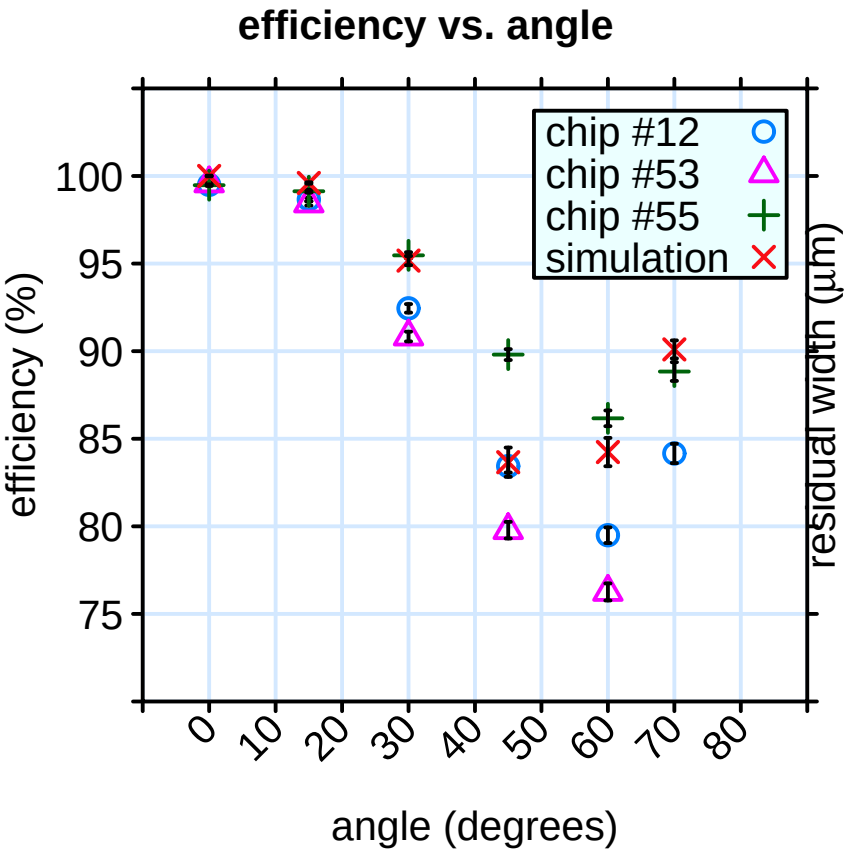
2011 testbeam

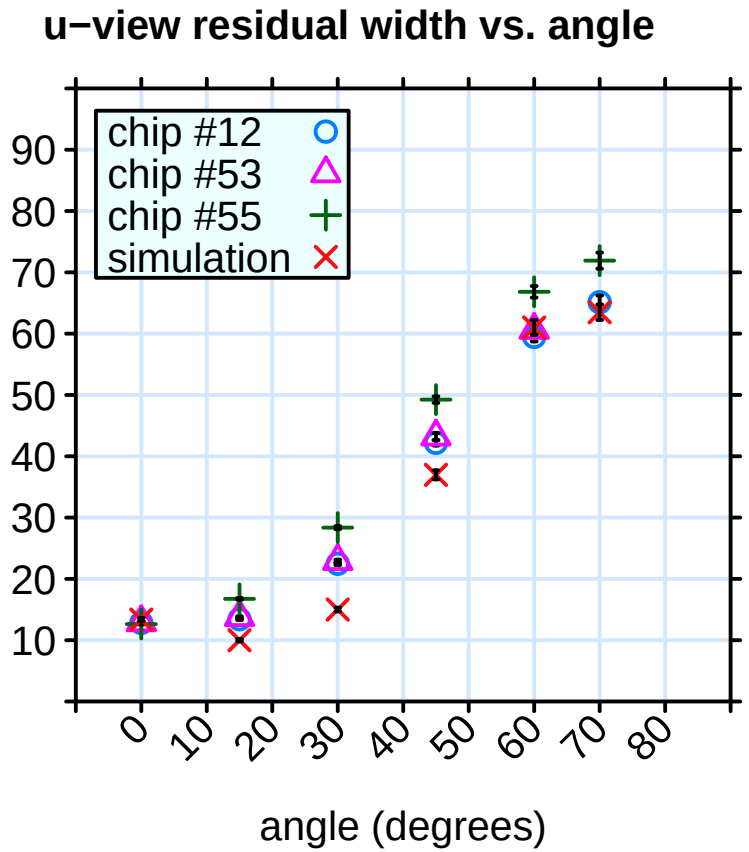
1. Analysis finished.
2. Described in paper.
3. Agreement MC with data with threshold discrepancy: 0.25MIP and 0.29 MIP.
4. Both simulation and analysis procedure were described in paper.
5. TO DO: fully understand the ęffective"threshold in the lab.

A.Lusiani, M.Chrząszcz 2013

2011 testbeam

6 Fiducial cut





A.Lusiani, M.Chrząszcz 2013

2012 testbeam

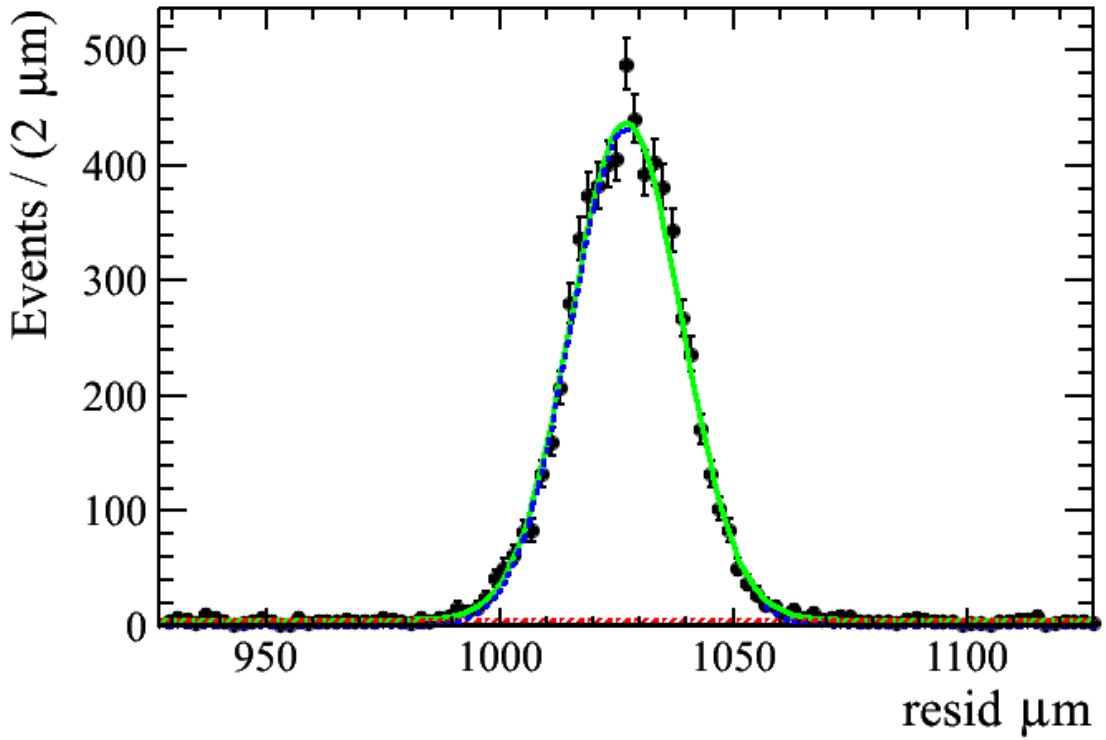
2012

A.Lusiani, M.Chrząszcz 2013

Analysis strategy

① Alignment

- Alignment is done by fitting the residual distribution.
- PDF used: $f(x) = \alpha Gauss(x; \sigma, \overline{x}) + (1-\alpha)c$ where c is const.
- Free variables: σ, $\overline{x}$, α.

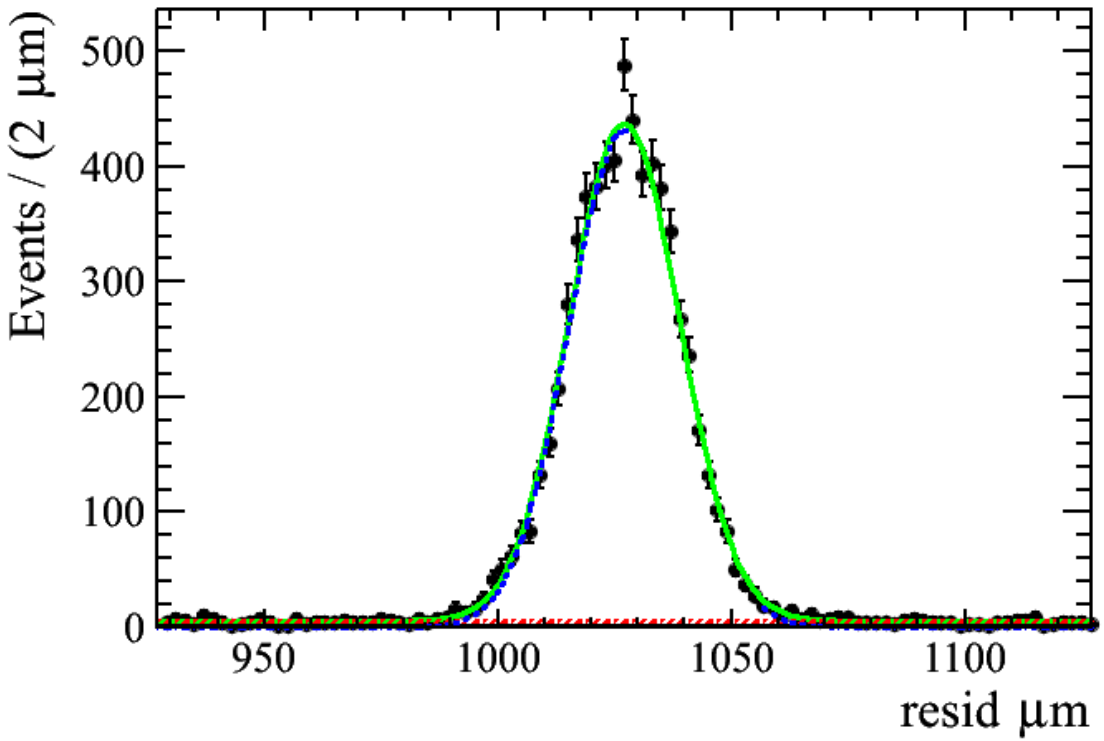


A.Lusiani, M.Chrząszcz 2013

Analysis strategy

(2) Efficiency

- Using parameters from the fit we extract number of signal events.
- We assign a systematic error from fit parameters.
- Efficiency is calculated using Bayesian formula:
  $Eff = \frac{n + 0.5}{t + 1}$, where
  n- number of hits
  t- number of tracks

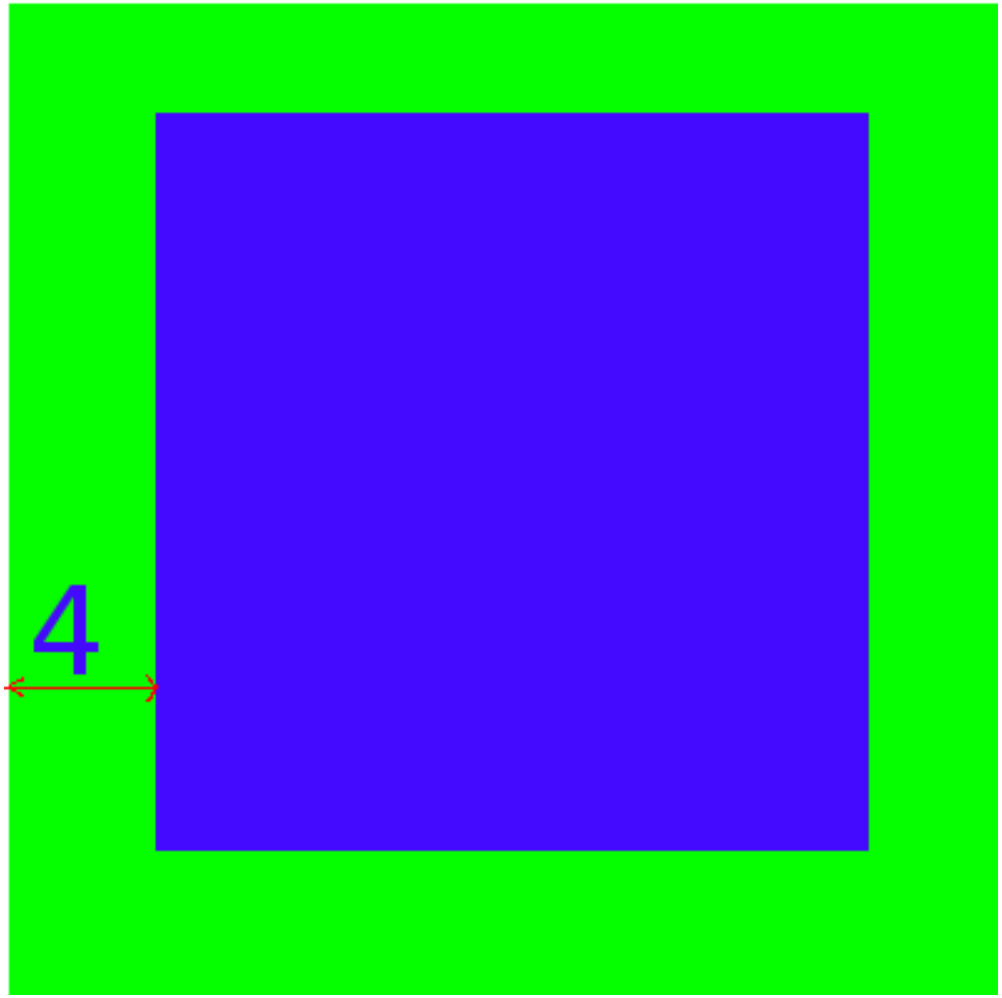


A.Lusiani, M.Chrząszcz 2013

Analysis strategy

③ Fiducial cut

- Borders of DUT have been seen to be less efficient.
- 4 pixel fiducial cut around the DUT is used

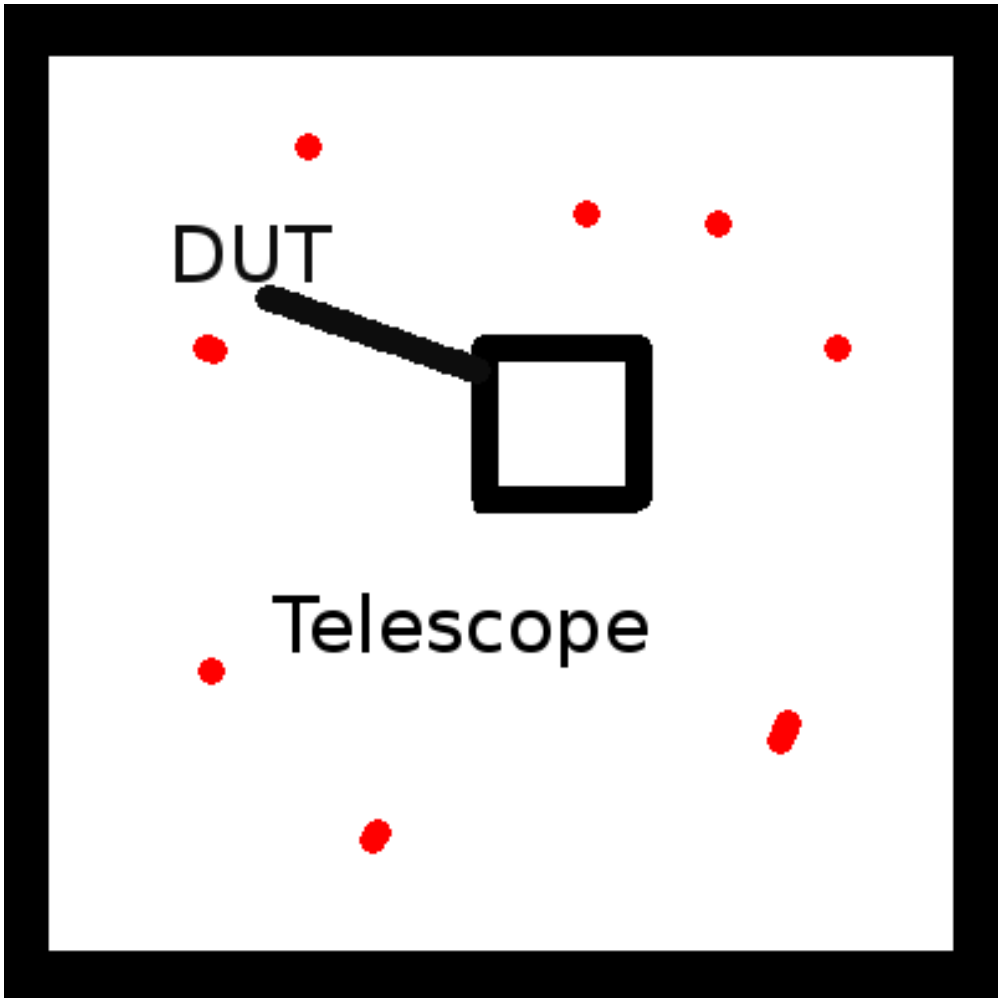


A.Lusiani, M.Chrząszcz 2013

Analysis strategy

3 Noise rate

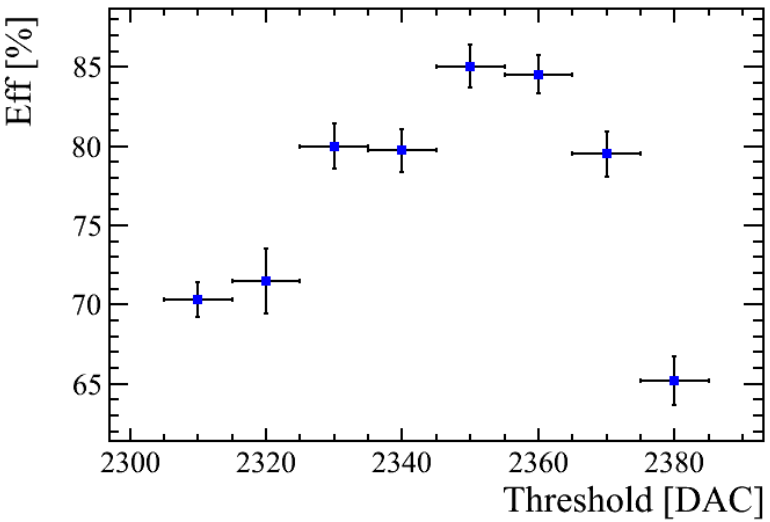
- To study noise appearance we select the events that have extrapolate track outside the DUT.
- Noise rate is defined: $NR = \frac{nfp}{ntrks}$, where *nfp* is the number of fired pixels, *ntrks* is the number of tracks.



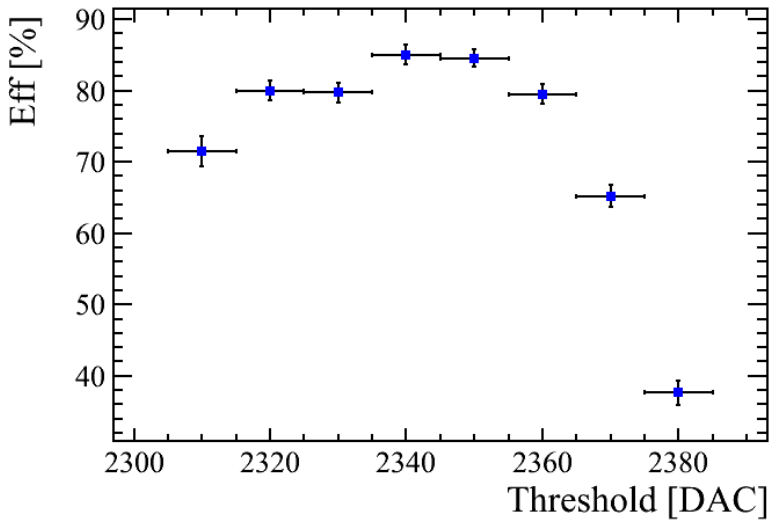
A.Lusiani, M.Chrząszcz 2013

Efficiency vs threshold

CHIP 13



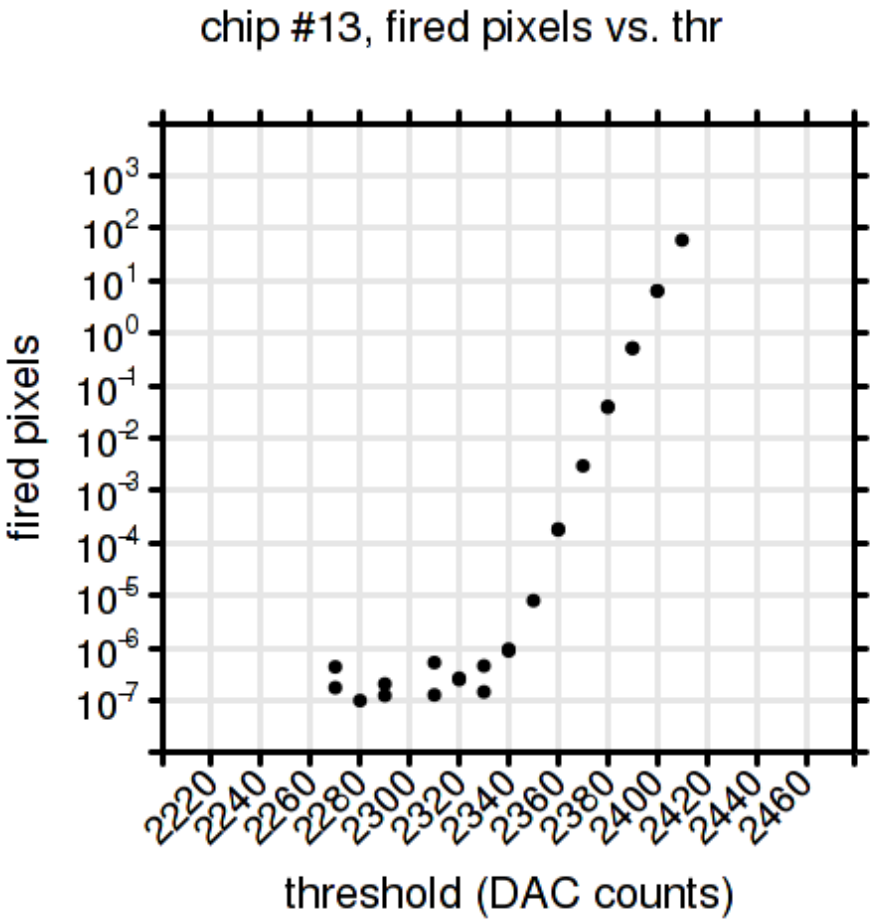
CHIP 14



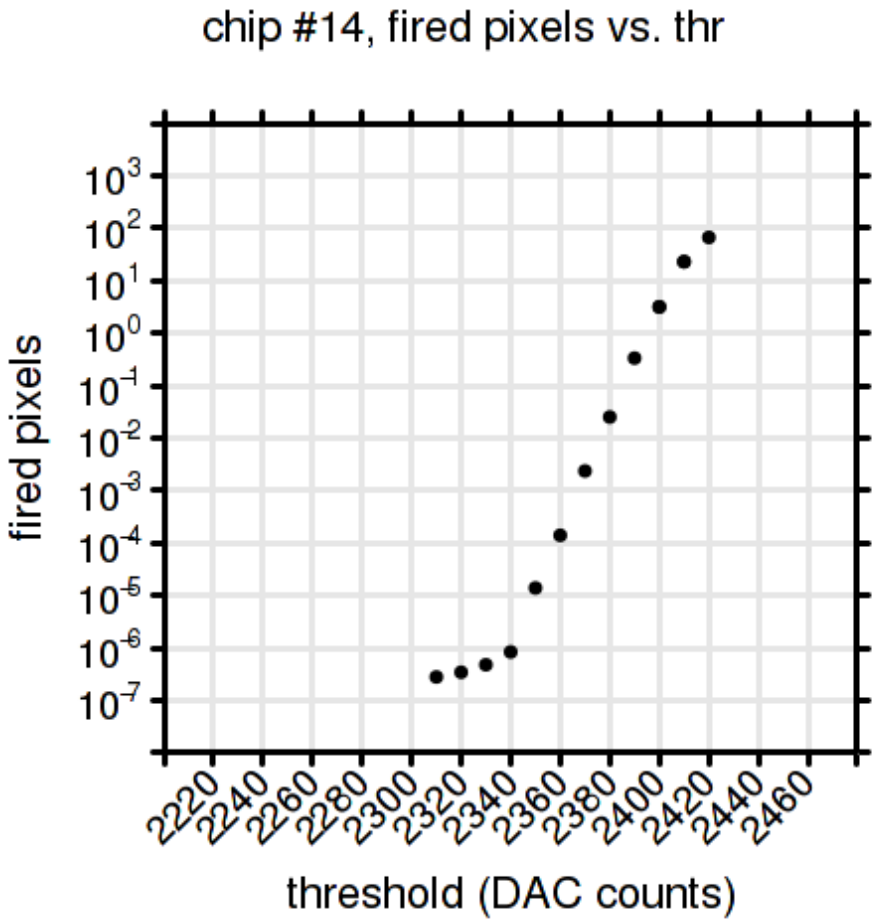
A.Lusiani, M.Chrząszcz 2013

Noise rate

CHIP 13



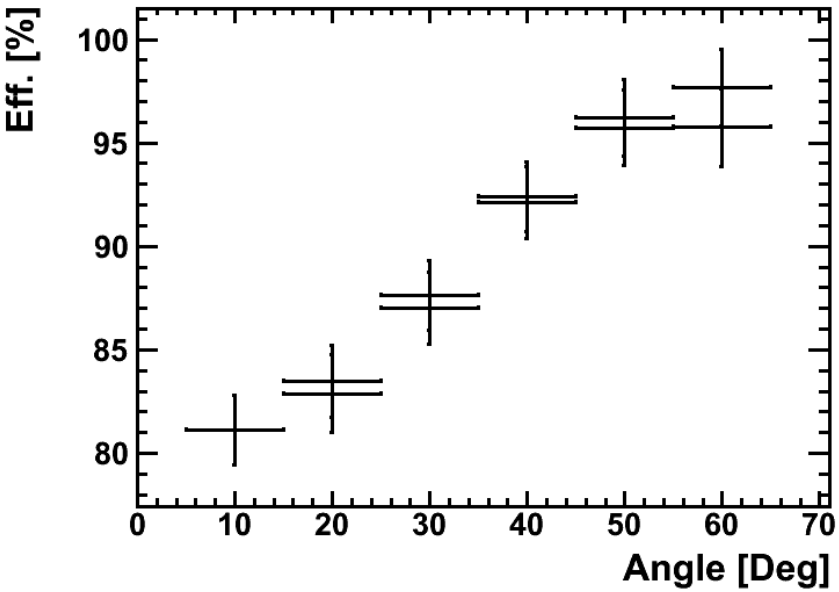
CHIP 14



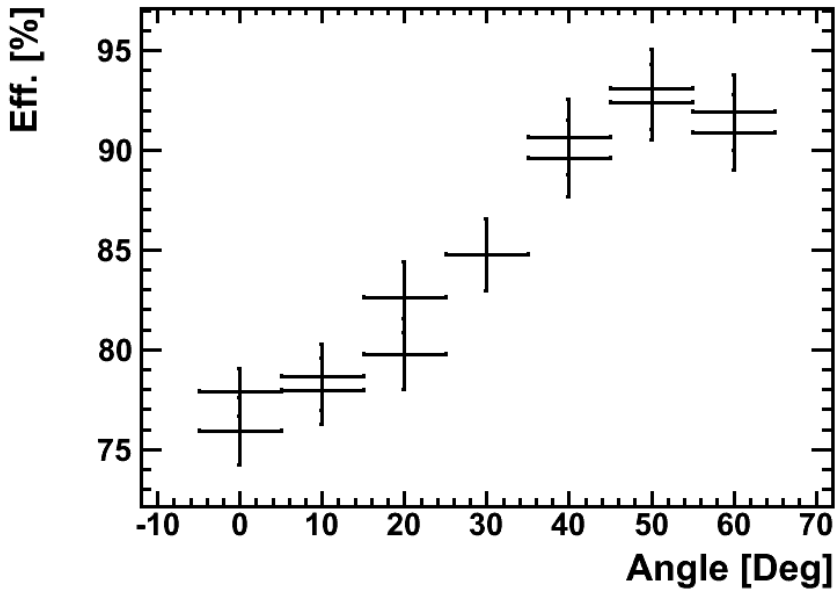
A.Lusiani, M.Chrząszcz 2013

Eff vs. angle

CHIP 13



CHIP 14

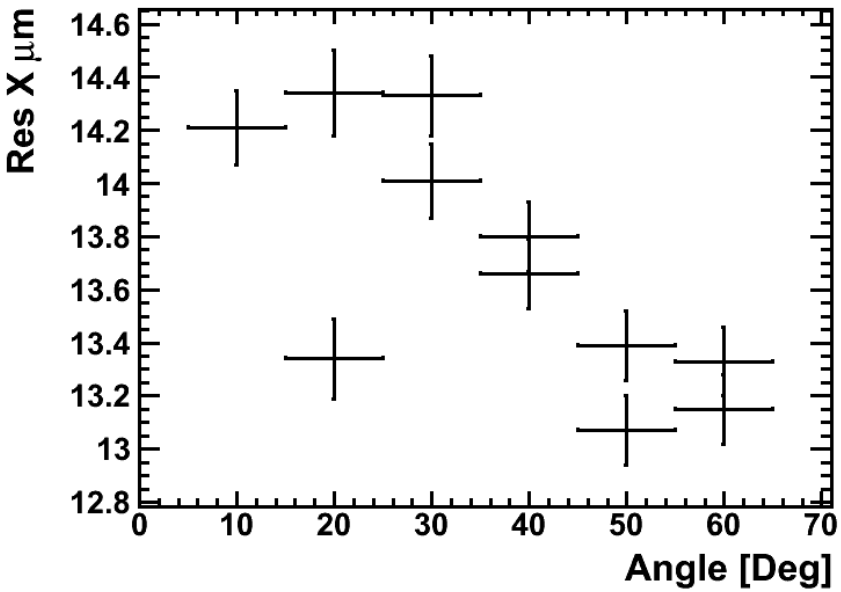


THRESHOLD: $2360 \rightarrow 280e \pm 5\%$

A.Lusiani, M.Chrząszcz 2013

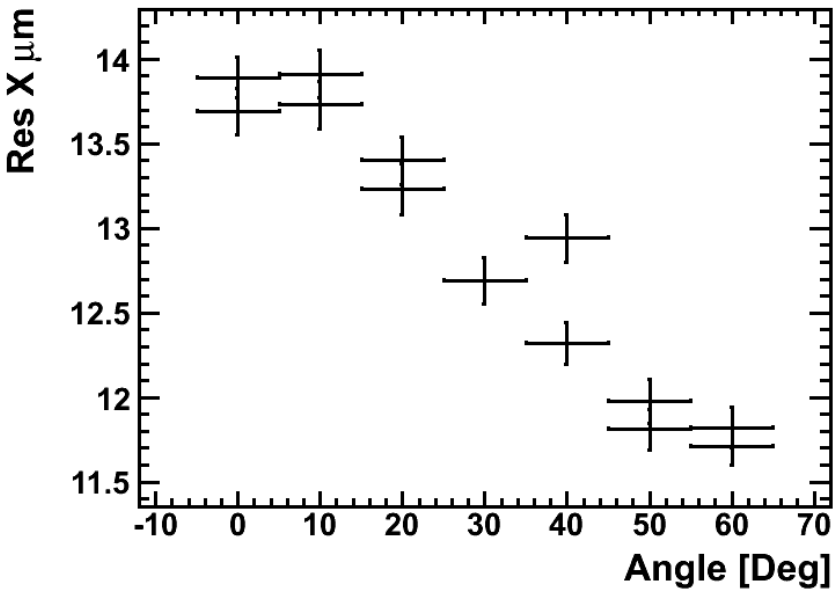
Resolution X vs angle

CHIP 13



THRESHOLD: 2360

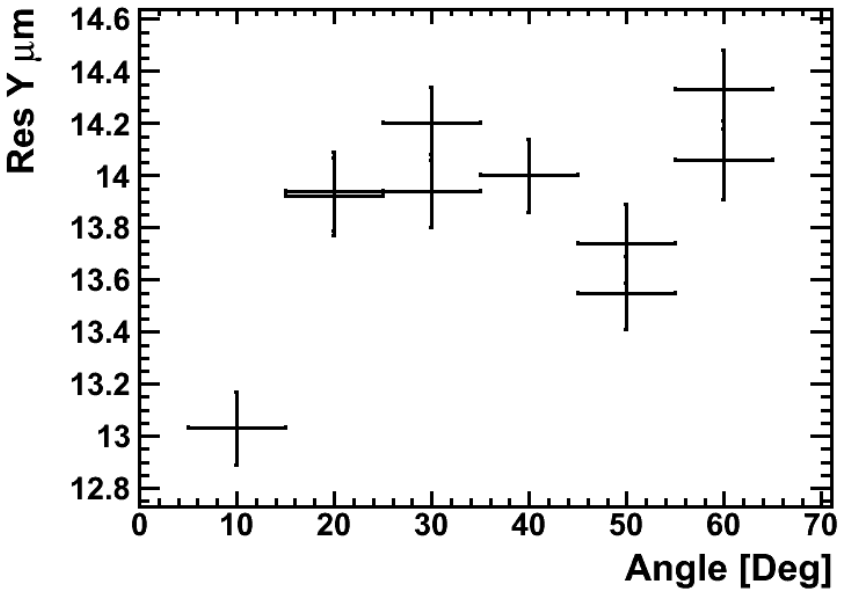
CHIP 14



A.Lusiani, M.Chrząszcz 2013

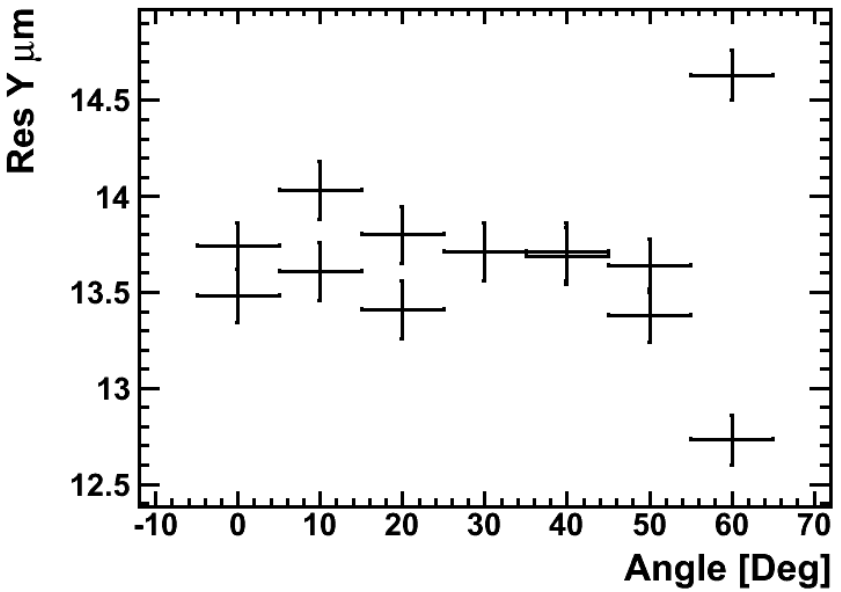
Resolution Y vs angle

CHIP 13



THRESHOLD: 2360

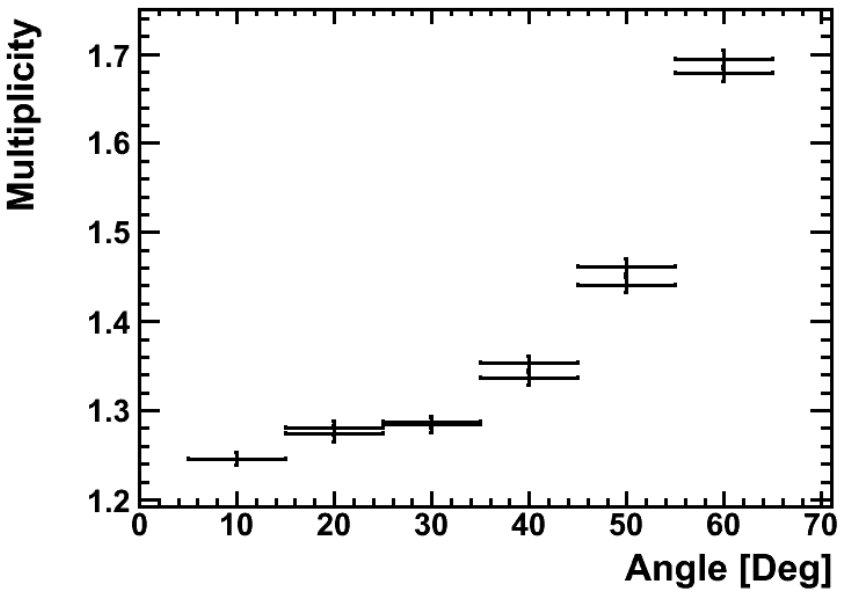
CHIP 14



A.Lusiani, M.Chrząszcz 2013

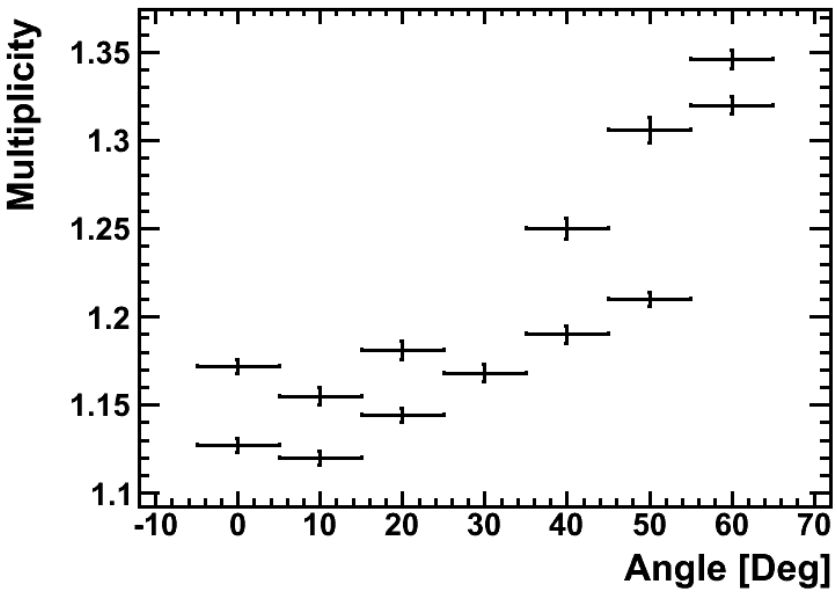
Multiplicity vs angle

CHIP 13



THRESHOLD: 2360

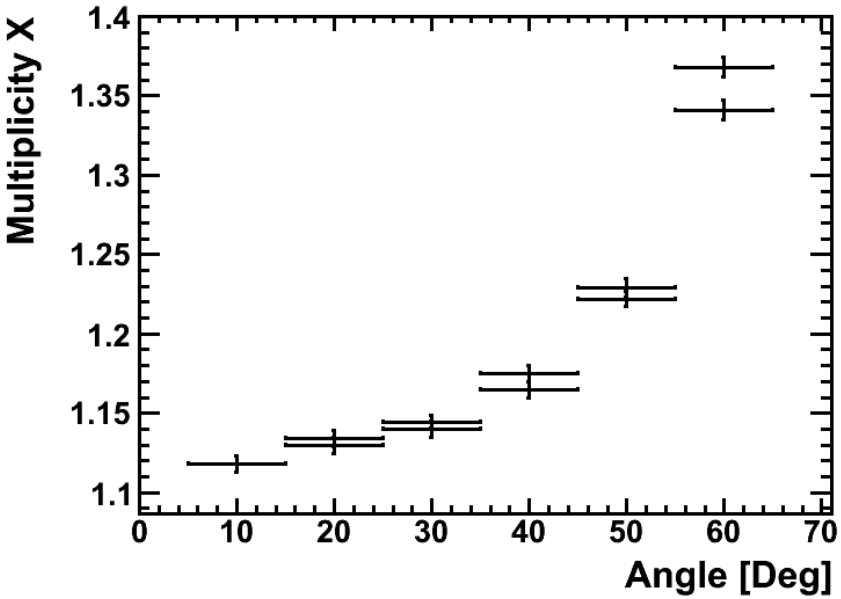
CHIP 14



A.Lusiani, M.Chrząszcz 2013

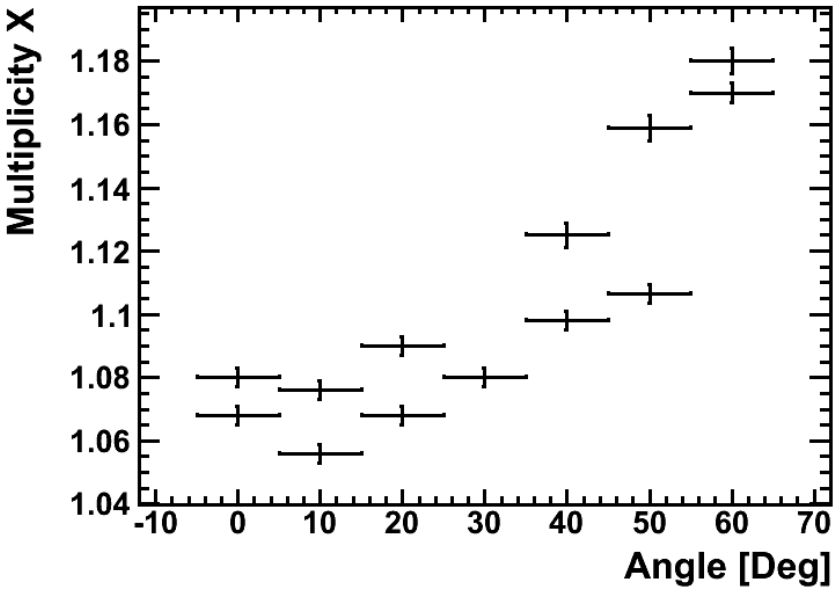
Multiplicity X vs angle

CHIP 13



THRESHOLD: 2360

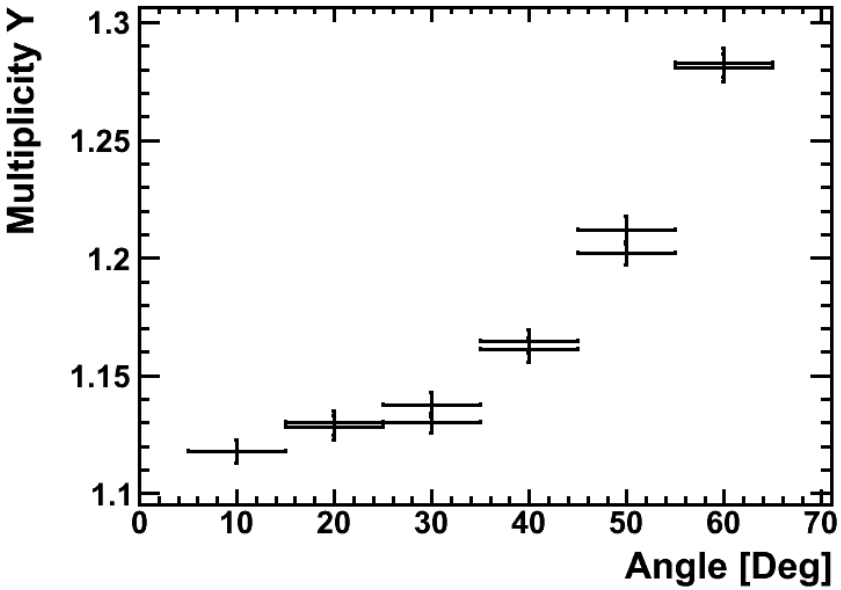
CHIP 14



A.Lusiani, M.Chrząszcz 2013

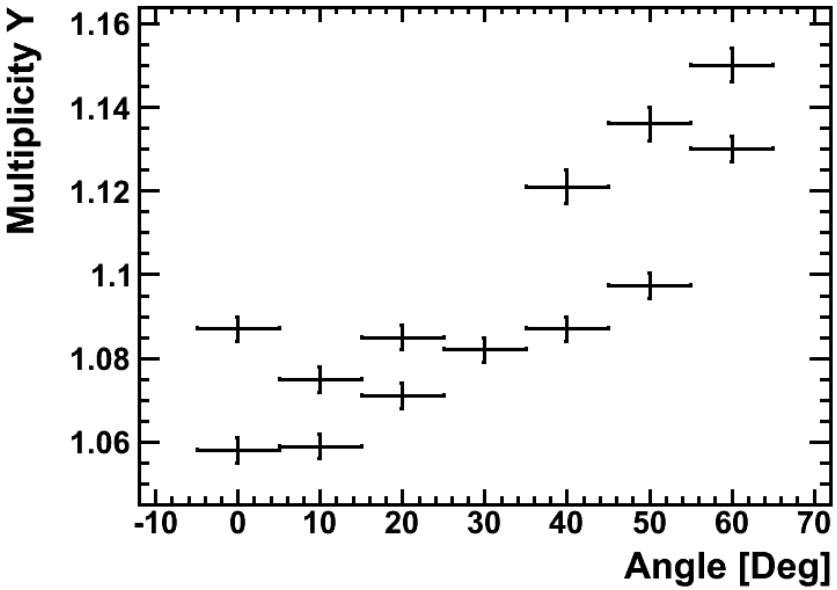
Multiplicity Y vs angle

CHIP 13



THRESHOLD: 2360

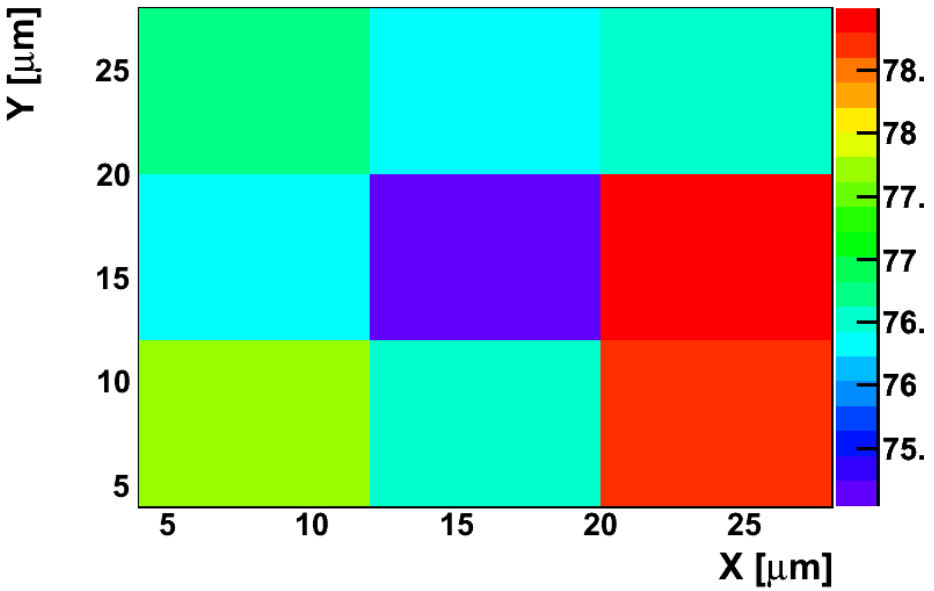
CHIP 14



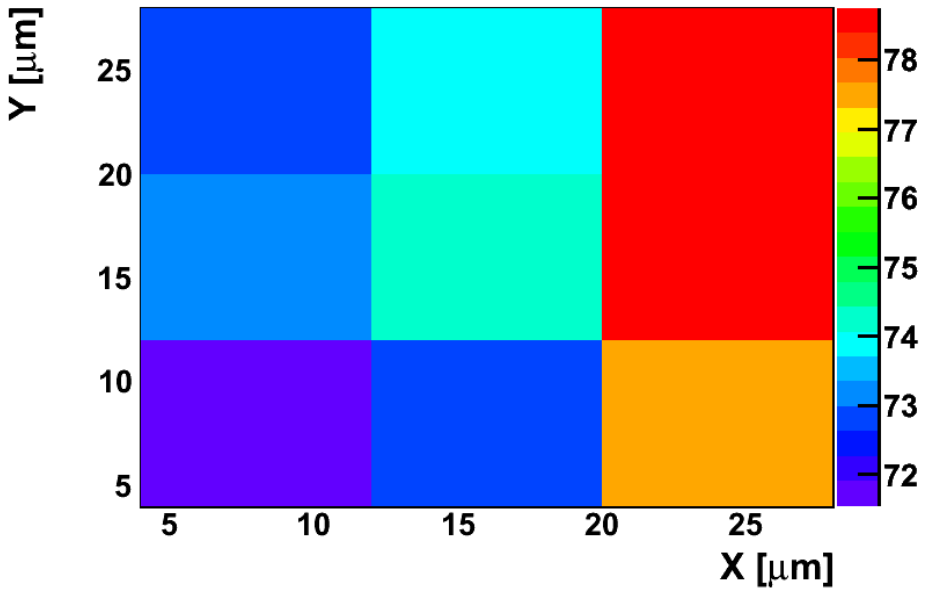
A.Lusiani, M.Chrząszcz 2013

Lattice isotropy

CHIP 13



CHIP 14

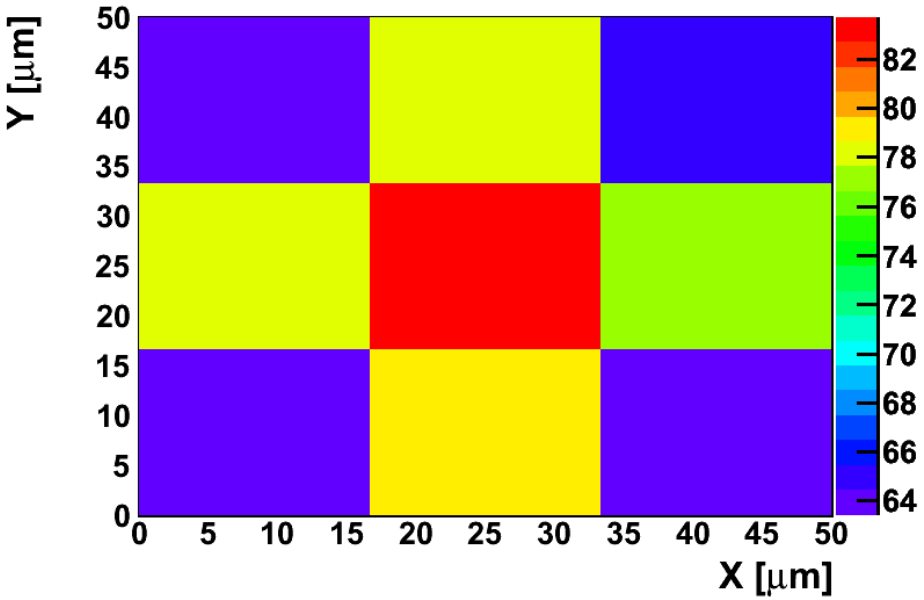


THRESHOLD: 2360

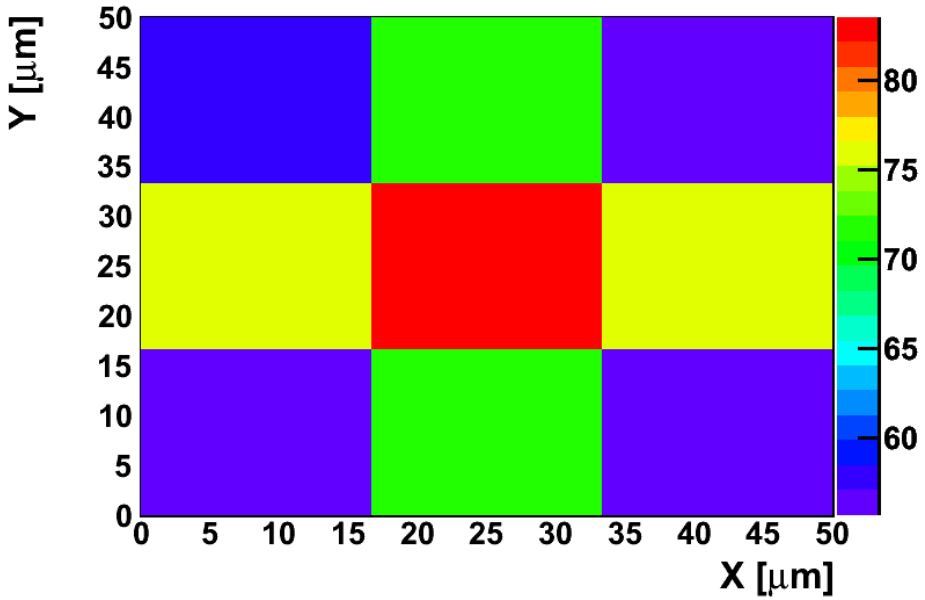
A.Lusiani, M.Chrząszcz 2013

Pixel isotropy

CHIP 13



CHIP 14

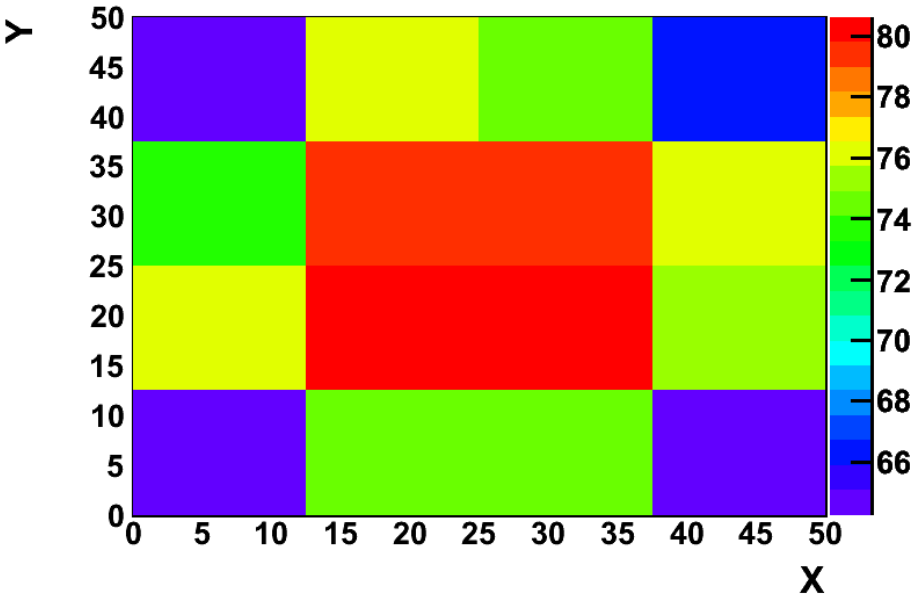


Before deconvolution the telescope resolution!
THRESHOLD: 2360

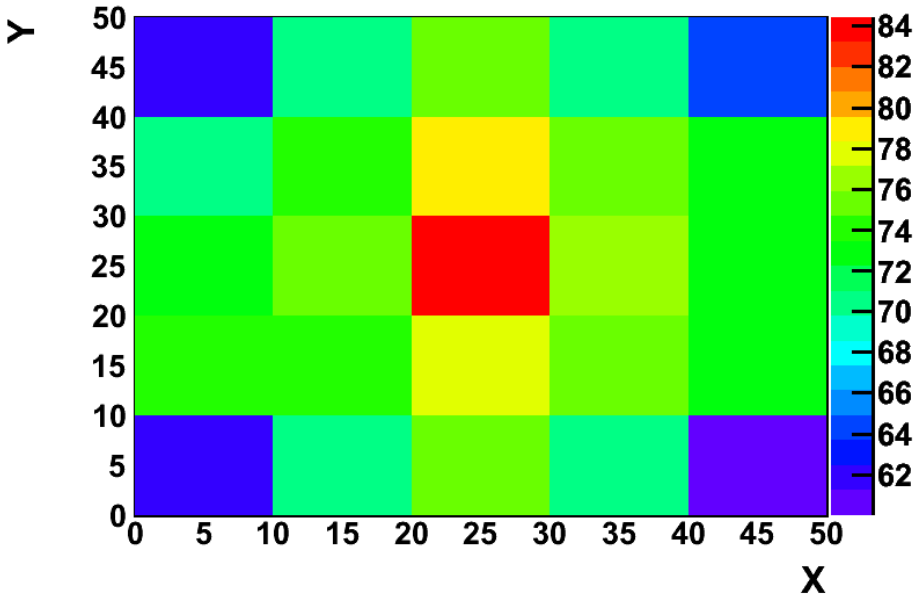
A.Lusiani, M.Chrząszcz 2013

Pixel isotropy NEW!!!!

CHIP 13



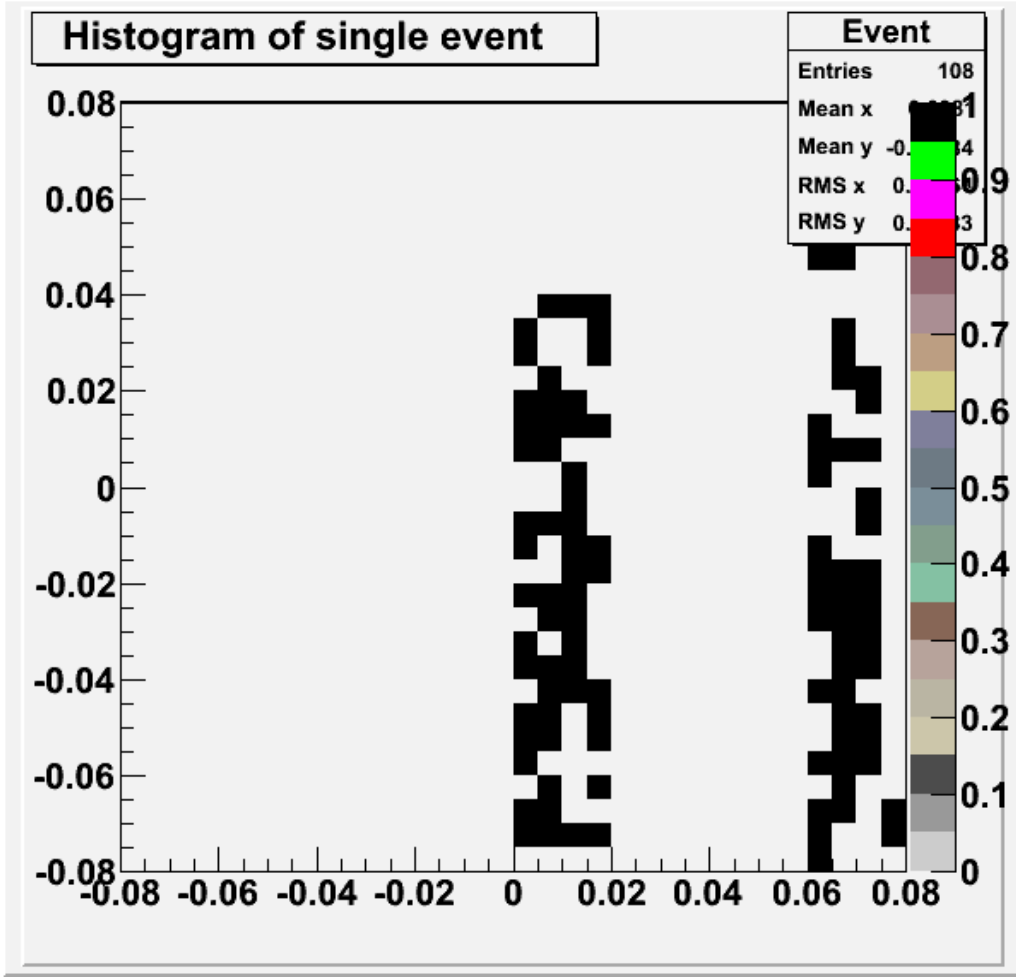
CHIP 13

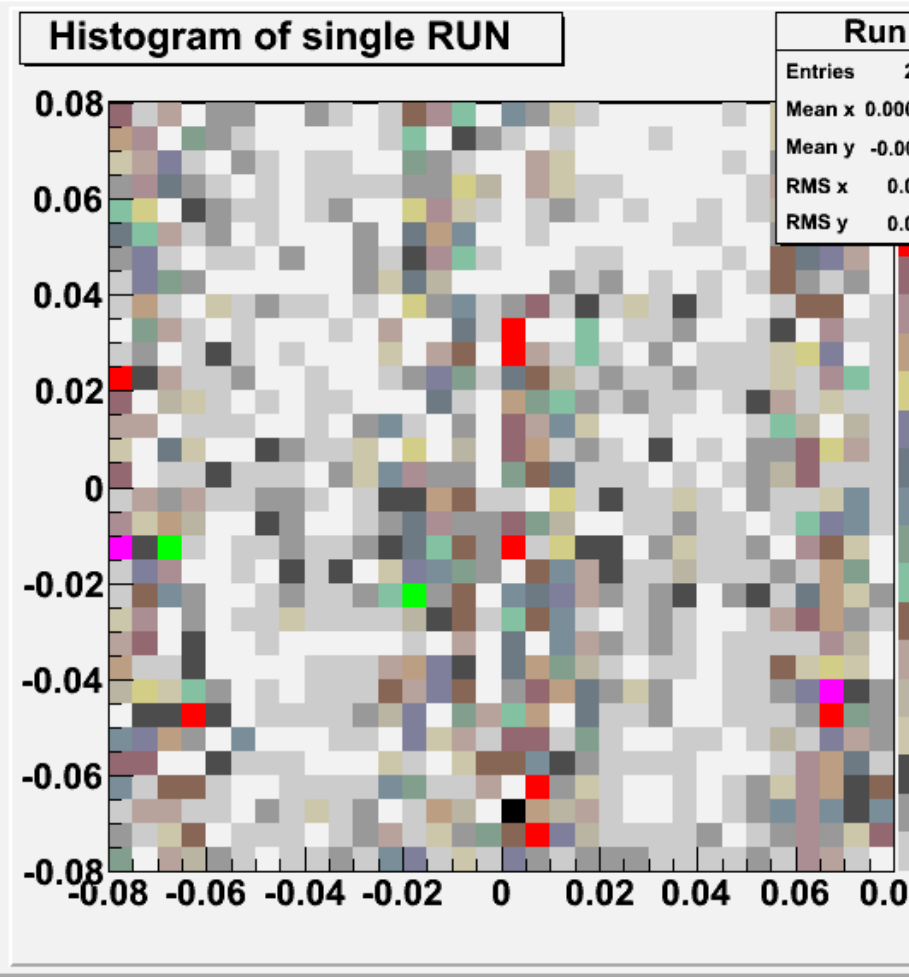


Before deconvolution the telescope resolution!
THRESHOLD: 2360

A.Lusiani, M.Chrząszcz 2013

Backup





A.Lusiani, M.Chrząszcz 2013

TO DO

Work that needs to be done

- Understand the induction in the lab.
- Are we 100% sure we understand pixel isotropy?
- From analysis point of view don't see any step that needs to be done right now.

A.Lusiani, M.Chrząszcz 2013