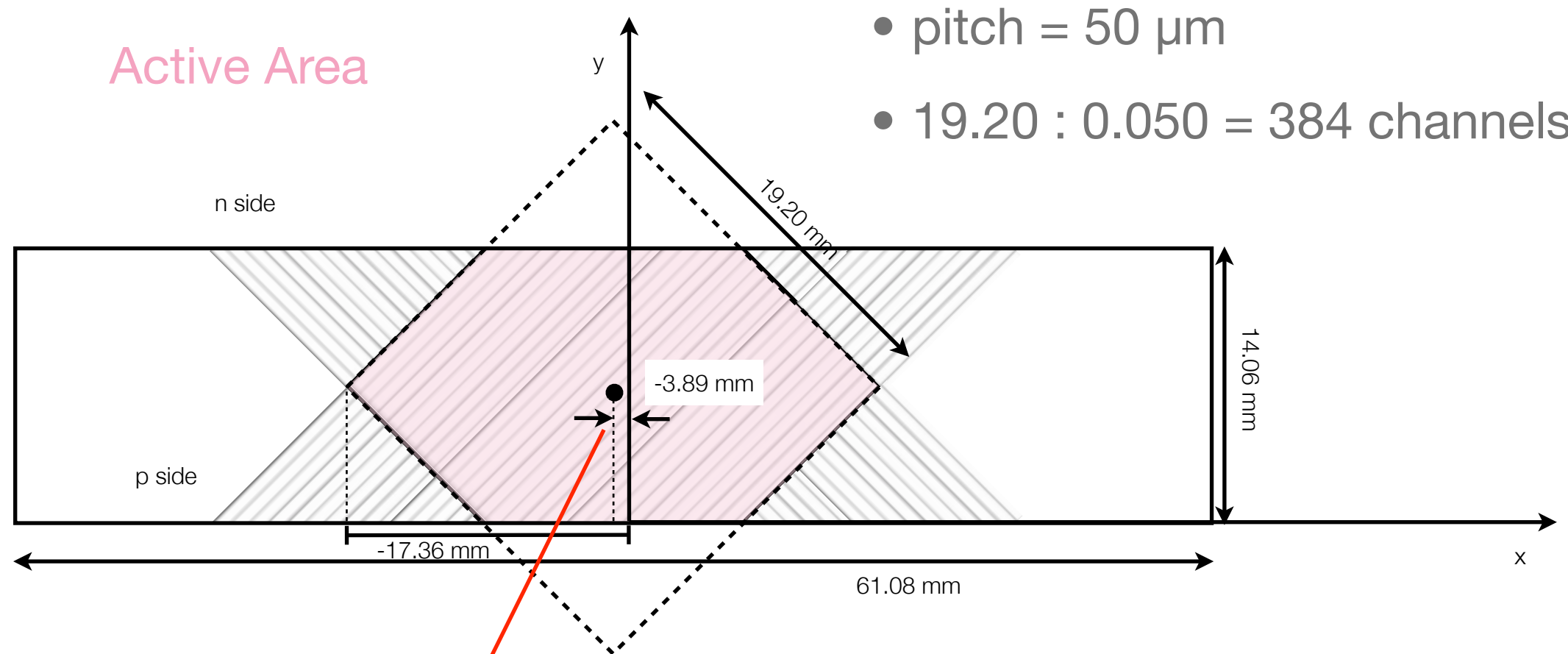


BEAM TEST DATA ANALYSIS IN BOLOGNA

SuperB beam test (Sept 2011)

STRIPLETS ALIGNMENT



config/config11_run2276.dat

ID
detector type (ID of DetectorType)
xpos, ypos, zpos
phi, theta, psi (Eulero rotations)
u, v orientation
the next line is the tag

6
3
-0.389 0. 43.40
0. 0. 0.
-1 1

alignment/alignment11_run2276.dat

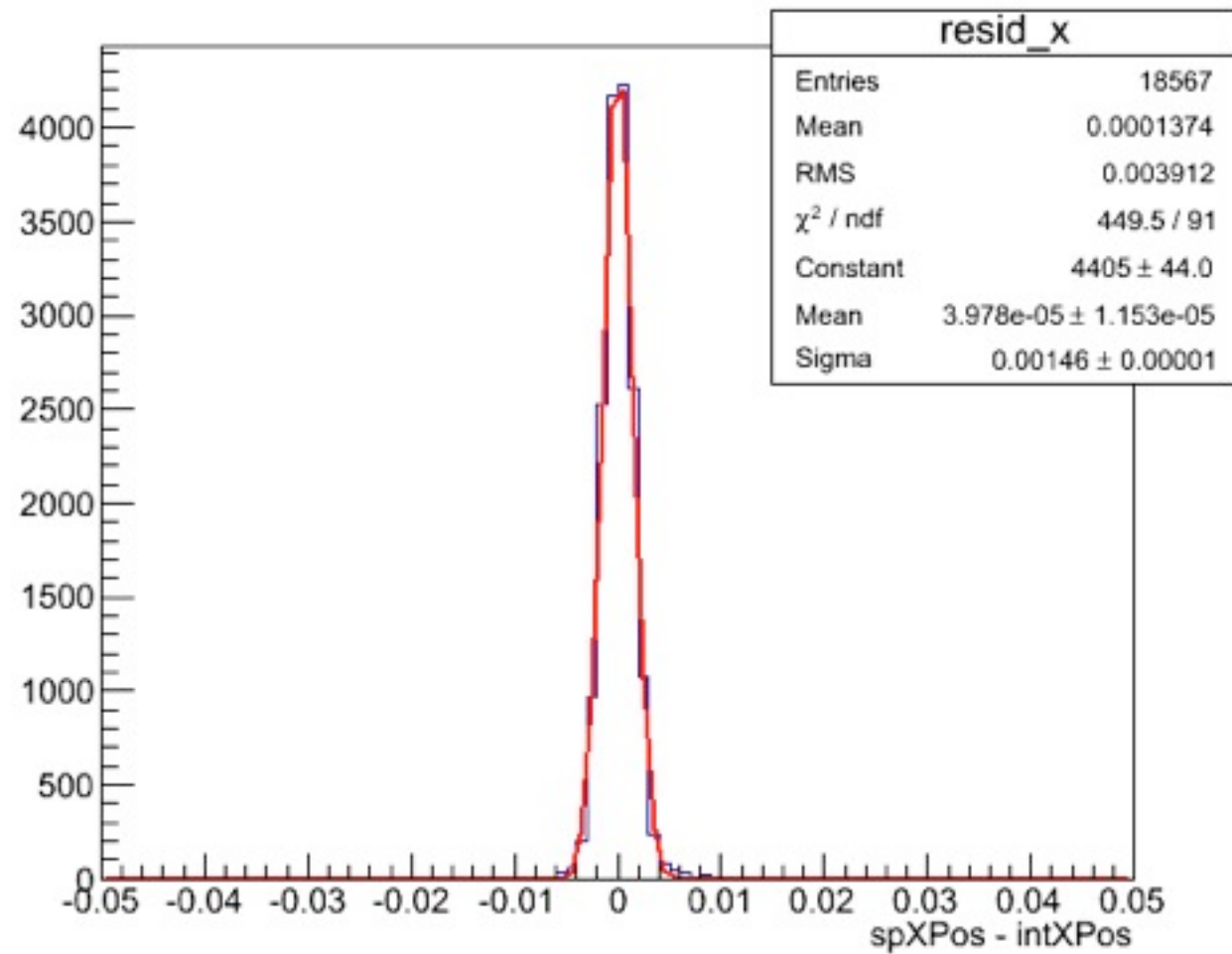
Alignment Parameters extracted from data
number of detectors 1
detElem ID 6
phi, theta, gamma (deg) -0.136354 0 -0
deltaX, deltaY, deltaZ (cm) 0.302637 0.060754 0

testDataAlignment reported the DUT in the central position

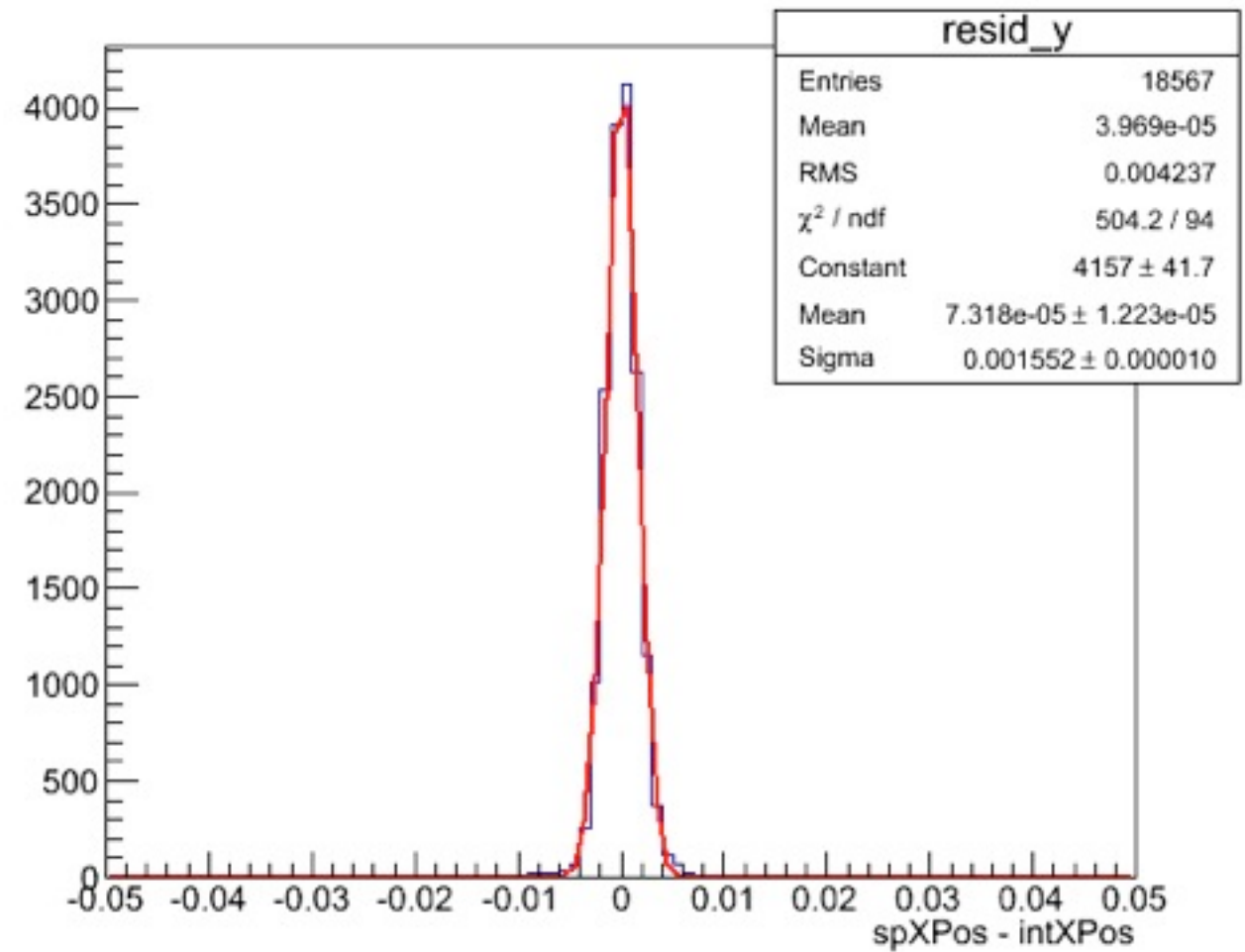
Residuals

run 2276

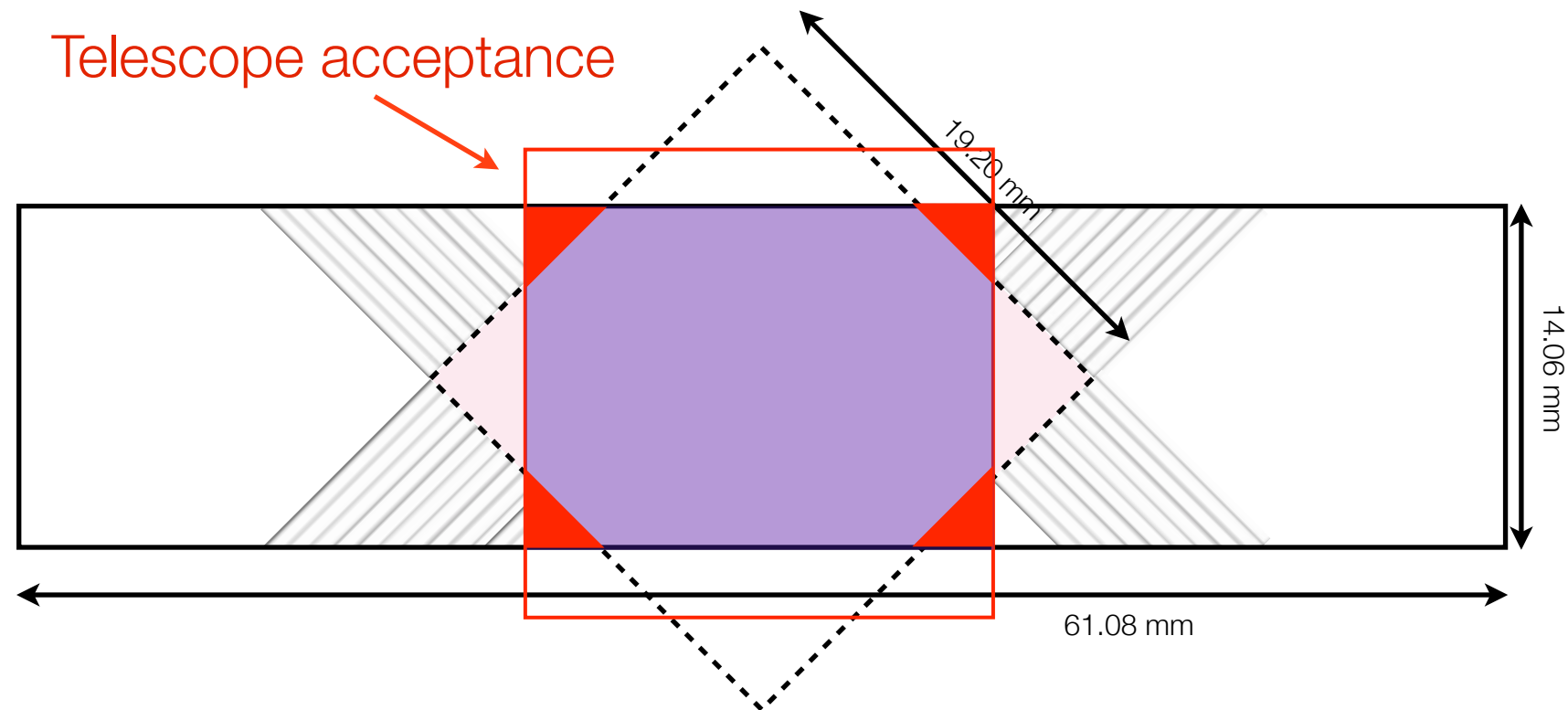
S1 residual X



S1 residual Y



Analysis on Ntuple from EventReco



ntrk = # tracks in the **violet region**

nhit_u = # clusters on the p side closer than 56 μm to track

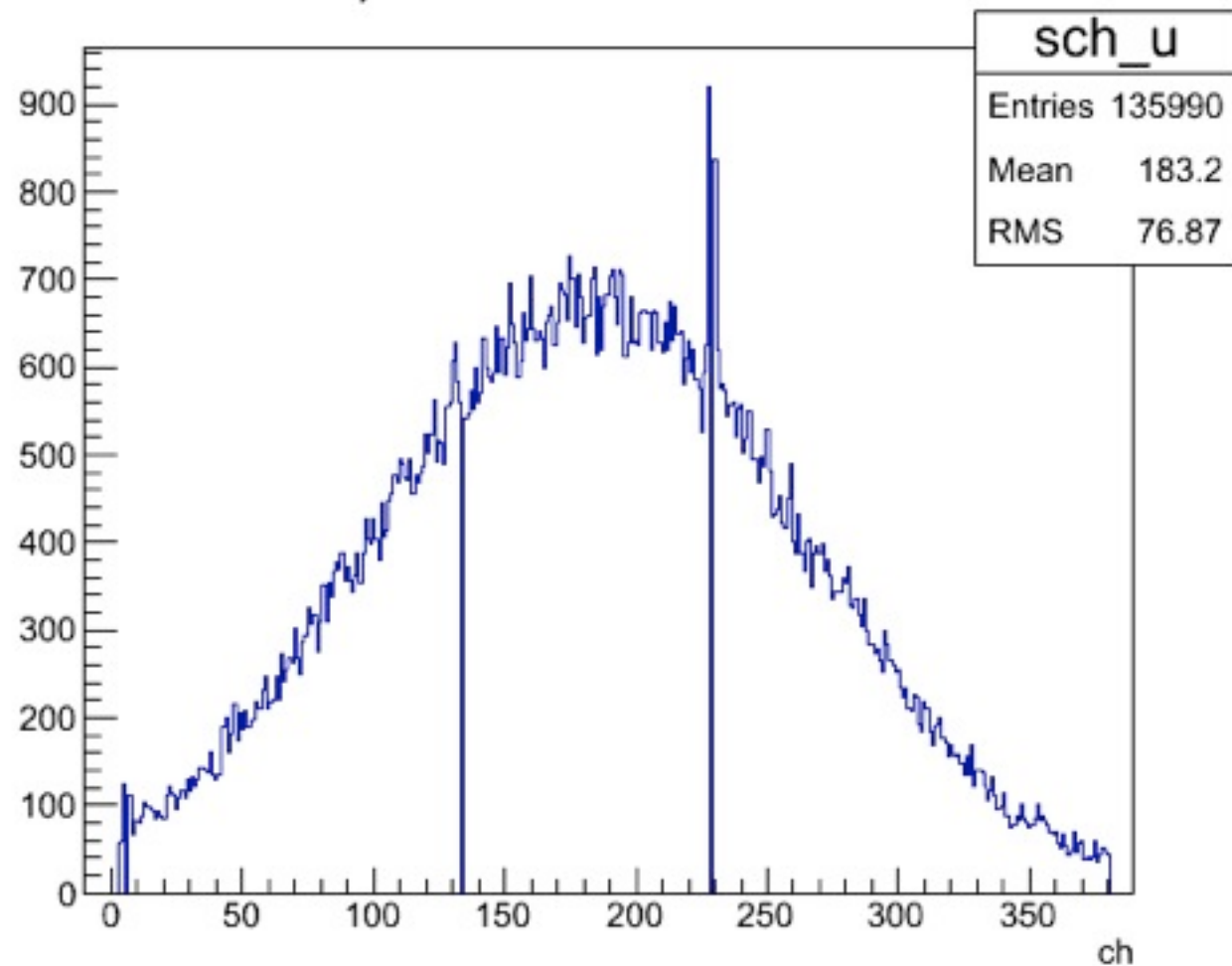
nhit_v = # clusters on the n side closer than 56 μm to track

nhit = # clusters closer than 80 μm to track

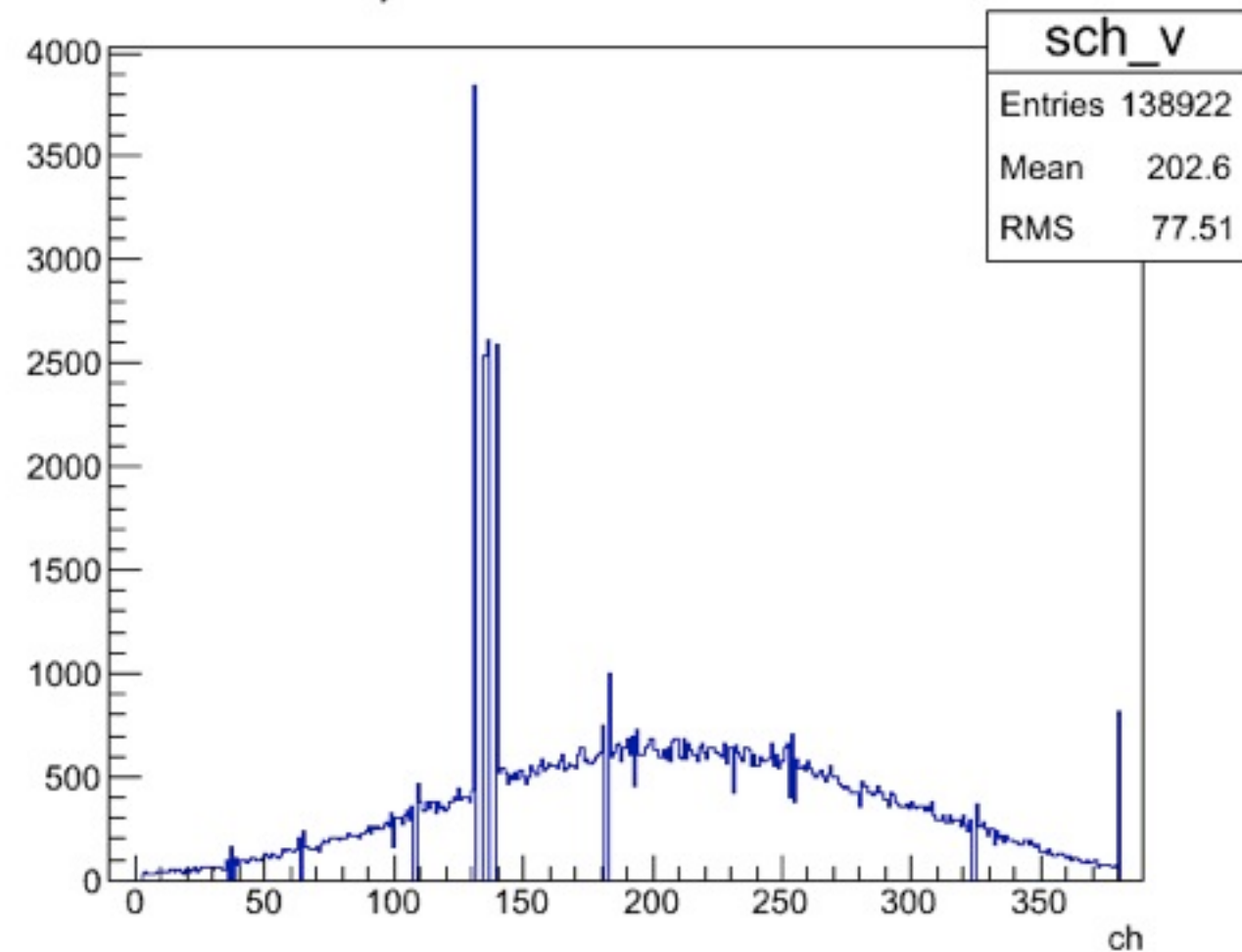
Triplet channels frequency

run 2276

Triplet channel side U det S1



Triplet channel side V det S1



S1 inactive channels:

- **Side U:** 0, 1, 2, 6, 134, 229, 381, 382, 383
- **Side V:** 0, 1, 2, 36, 38, 64, 108, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 182, 324, 381, 382, 383

Efficiencies: side u, side v and combined

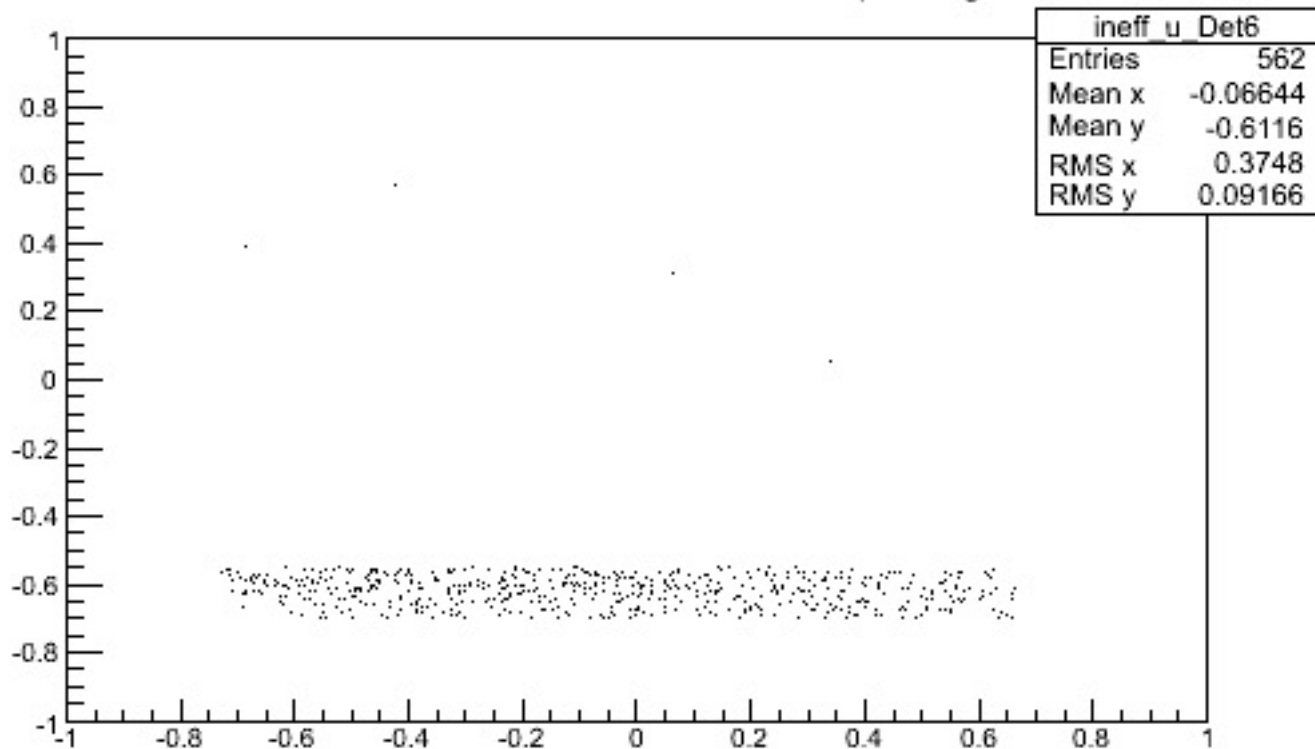
$$\epsilon_u = \frac{n_{\text{clusters}} \mid \text{abs}(\text{clustUpos-intUpos}) < 0.056}{n_{\text{int}} \subset \text{active U region}}$$

$$\epsilon = \frac{n_{\text{clusters}} \mid \sqrt{(\text{clustUpos-intUpos})^2 + (\text{clustVpos-intVpos})^2} < 0.080}{n_{\text{int}} \subset (\text{active U region} \cap \text{active V region})}$$

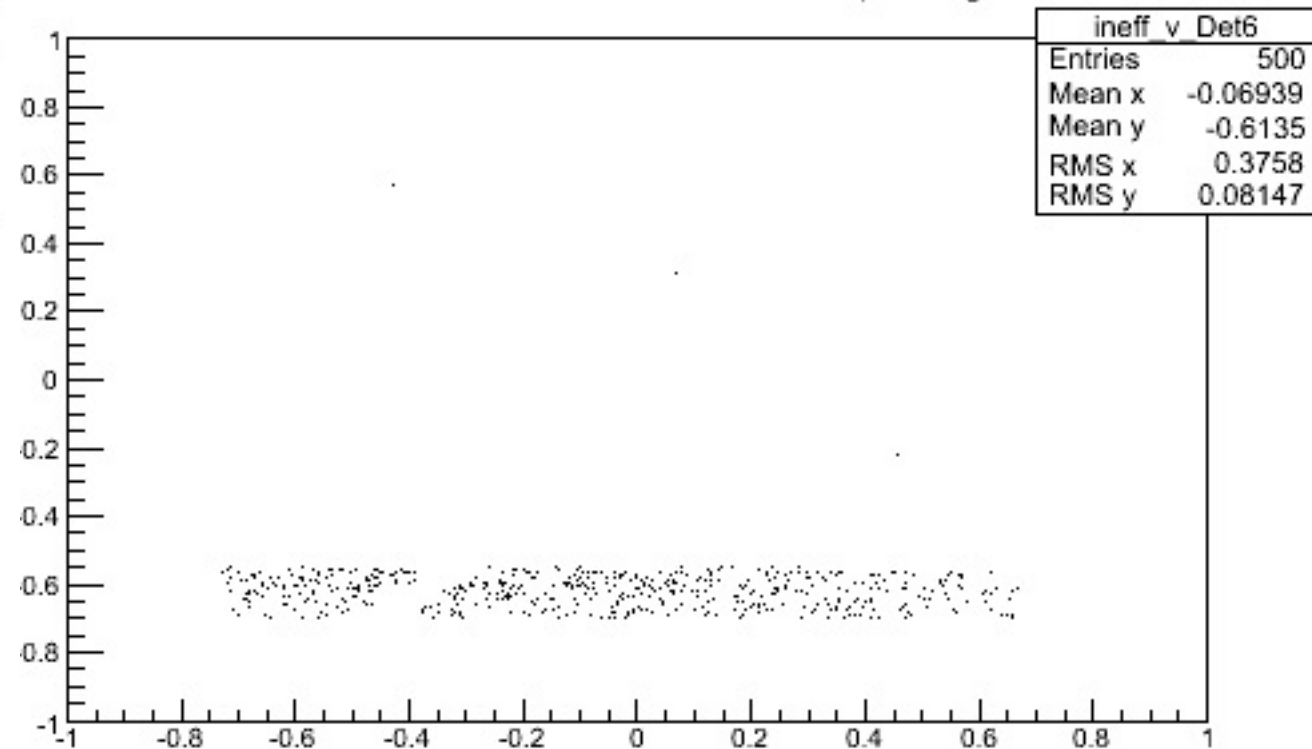
run	2276
# entries	96 820
# trks	~20k
ϵ_u	96.56 ± 0.13
ϵ_v	97.00 ± 0.13
ϵ	96.59 ± 0.14

Inefficiencies

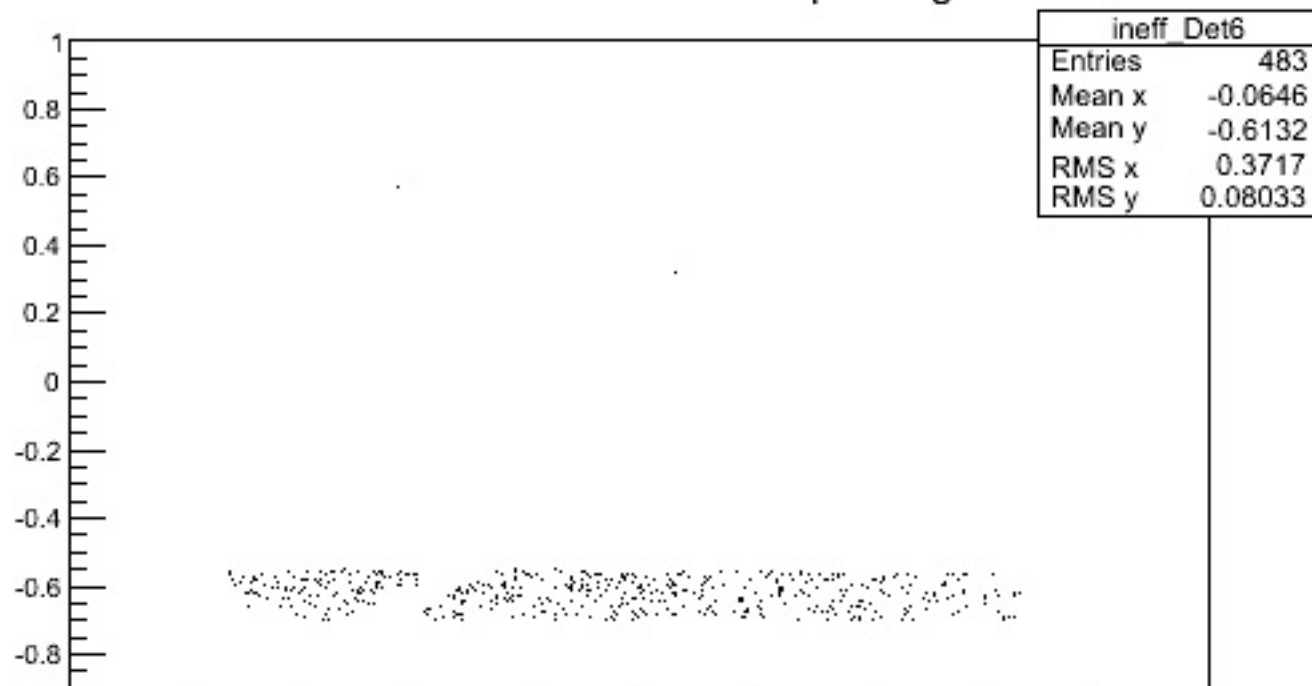
Tracks inside fiducial in U side without corresponding cluster



Tracks inside fiducial in V side without corresponding cluster

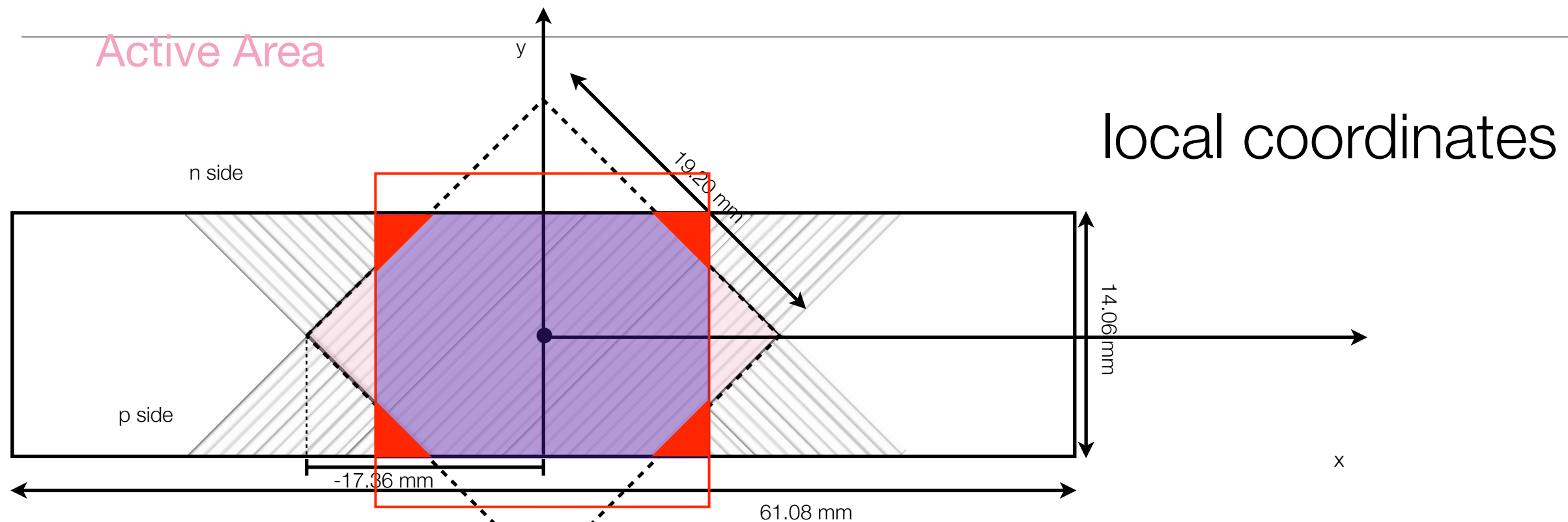


Tracks inside fiducial without corresponding cluster



run 2276	
$1-\epsilon_U^{\max}$	2.97%
$1-\epsilon_V^{\max}$	2.84%
$1-\epsilon^{\max}$	2.83%

REMEMBER STRIPLETS ALIGNMENT!

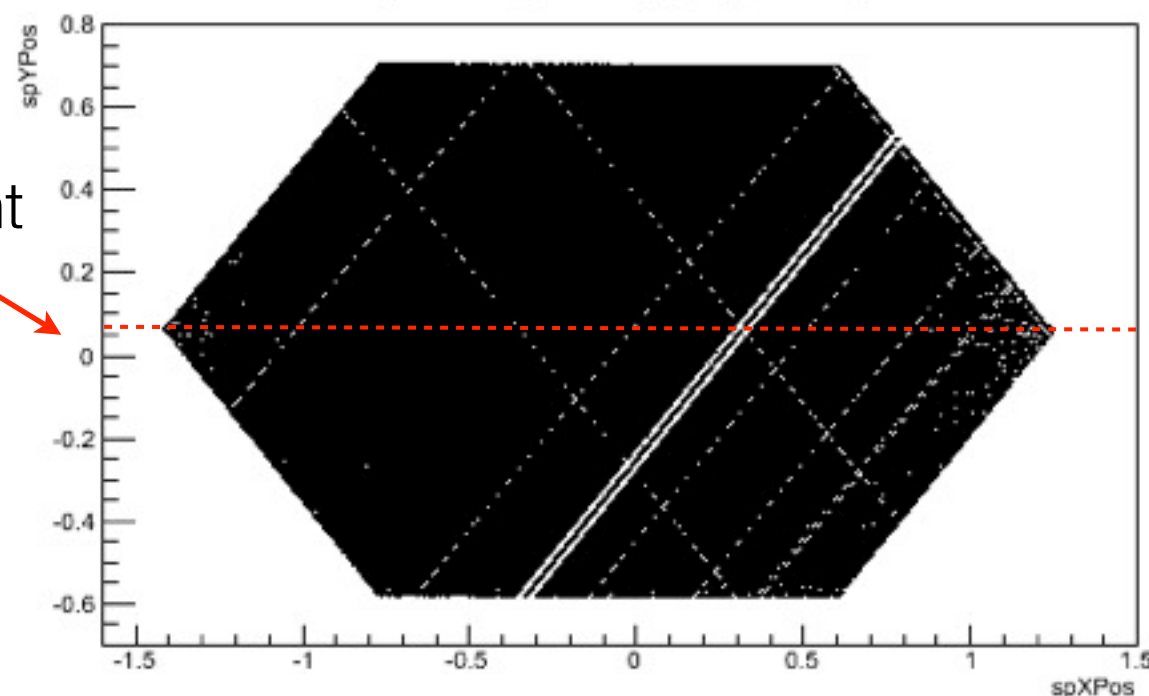


spYPos:spXPos {spLayer== 6}

global coordinates

in the next the fiducial cut is made stronger

alignment



Efficiencies: side u, side v and combined

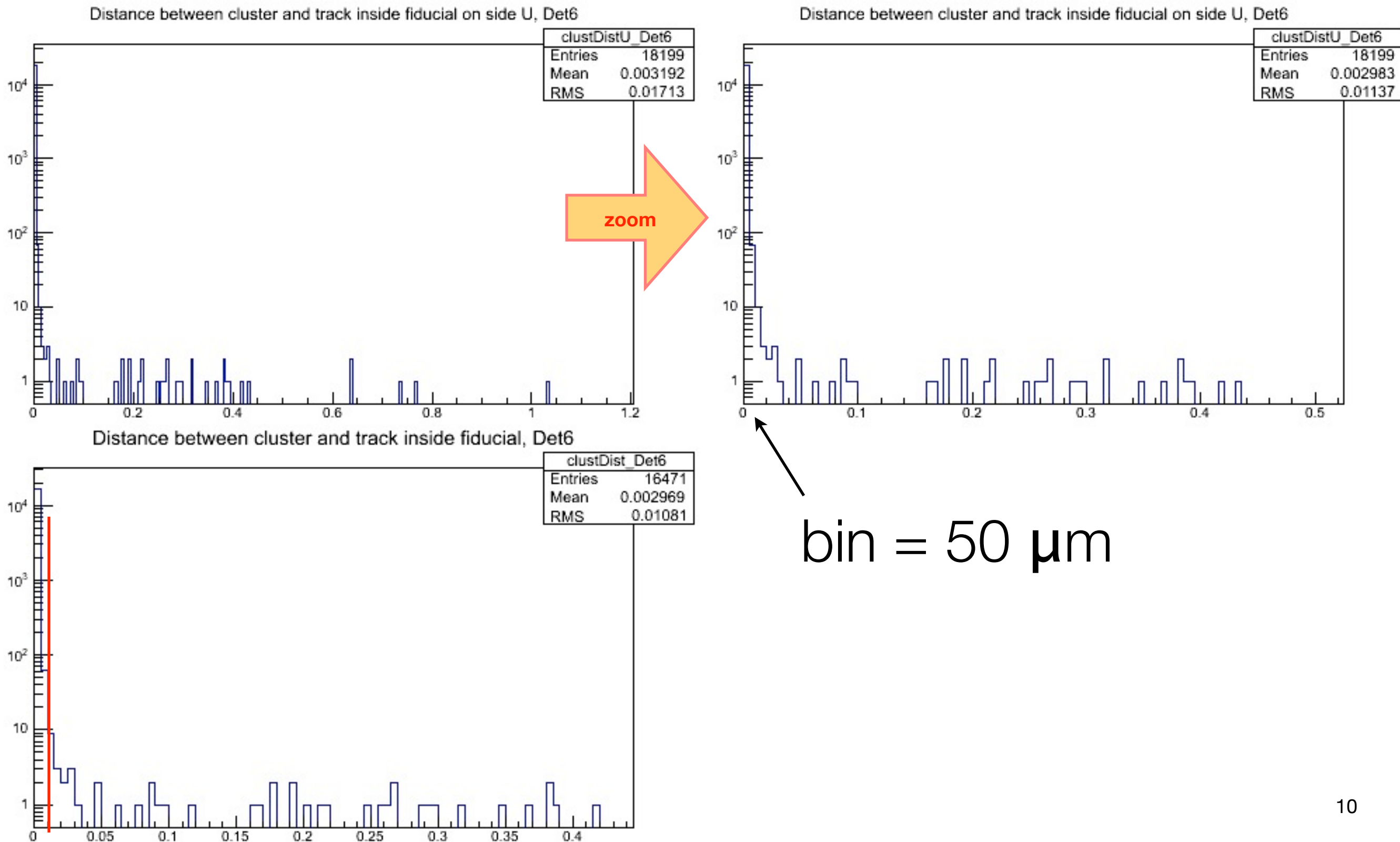
$$\epsilon_u = \frac{n_{\text{clusters}} \mid \text{abs}(\text{clustUpos-intUpos}) < 56\mu\text{m}}{n_{\text{int}} \subset \text{active U region}}$$

$$\epsilon = \frac{n_{\text{clusters}} \mid \sqrt{(\text{clustUpos-intUpos})^2 + (\text{clustVpos-intVpos})^2} < 80\mu\text{m}}{n_{\text{int}} \subset (\text{active U region} \cap \text{active V region})}$$

run	2276	2277	2278
# entries	96 820	1 072 699	1 075 580
# trks	~20k	~200k	~200k
ϵ_u	99.35 $\pm$ 0.06	99.45 $\pm$ 0.02	99.44 $\pm$ 0.02
ϵ_v	99.97 $\pm$ 0.01	99.977 $\pm$ 0.0003	99.977 $\pm$ 0.0003
ϵ	99.58 $\pm$ 0.05	99.44 $\pm$ 0.02	99.60 $\pm$ 0.01

Cluster - Intersection distances

run 2276



Alignment of run 2276

- version 792
- 50 000 evts

run 2276

Alignment Parameters extracted from data

number of detectors

detElem ID

phi, theta, gamma (deg)

deltaX, deltaY, deltaZ (cm)

AlignmentParmsTag

4

1

0.294529 0 -0

-0.023702 -0.0192505 0

2

0.319392 0 -0

-0.0124184 -0.02063 0

3

0.00442885 0 -0

-0.00967988 -0.00334105 0

4

0.0664849 0 -0

-0.0101811 -0.00313825 0

run 2665

Alignment Parameters extracted from data

number of detectors

detElem ID

phi, theta, gamma (deg)

deltaX, deltaY, deltaZ (cm)

AlignmentParmsTag

4

1

0.258223 0 -0

-0.0246577 -0.0196499 0

2

0.272616 0 -0

-0.0134526 -0.0212108 0

3

0.010902 0 -0

-0.0112197 -0.00327846 0

4

0.0623404 0 -0

-0.0109731 -0.00312442 0

<7 μm ; OK



$\Delta x_{\text{rep-r}}$ (μm)	$\Delta x/x$	$\Delta y_{\text{rep-r}}$ (μm)	$\Delta y/y$
9.6	4%	4.0	2%
10.3	7%	5.8	3%
15.4	14%	-0.6	-2%
7.9	7%	-0.14	-0.4%

STRIPLETS ALIGNMENT

config/config11_run2276.dat

```
# ID 6
# detector type (ID of DetectorType) 3
# xpos, ypos, zpos -.389 0. 43.40
# phi, theta, psi (Eulero rotations) 0. 0. 0.
# u, v orientation -1 1
# the next line is the tag
```

alignment/alignment11_run2276.dat

```
# Alignment Parameters extracted from data
# number of detectors 1
# detElem ID 6
# phi, theta, gamma (deg) -0.136354 0 -0
# deltaX, deltaY, deltaZ (cm) 0.302637 0.060754 0
```

testDataAlignment reported the DUT in the central position



config/config11_run2276.dat

```
# ID 6
# detector type (ID of DetectorType) 3
# xpos, ypos, zpos 0. 0. 43.40
# phi, theta, psi (Eulero rotations) 0. 0. 0.
# u, v orientation -1 1
# the next line is the tag
```

alignment/alignment11_run2276.dat

```
# Alignment Parameters extracted from data
# number of detectors 1
# detElem ID 6
# phi, theta, gamma (deg) -0.13765 0 -0
# deltaX, deltaY, deltaZ (cm) -0.0862852 0.0607445 0
```

$-0.389 + 0.3026 = -0.0864$
same result

