

# Update on Timepix3 test-beam data analysis for 300 $\mu\text{m}$ thick sensors

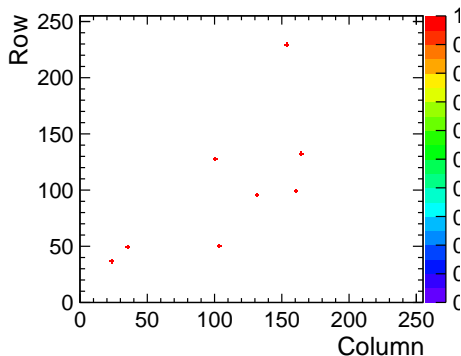
Niloufar Alipour Tehrani

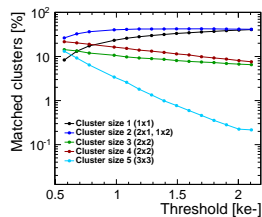
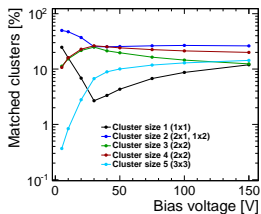
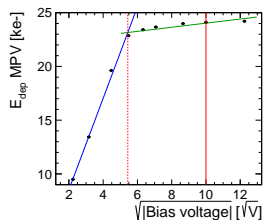
CERN  
13 October 2016



# Introduction

- Assemblies with 300  $\mu\text{m}$  thick sensor bump-bonded to Timepix3 readout ASICS tested at SPS:
  - W0018\_G10: produced by Canberra
  - W0002\_J05: produced by Advacam
- Both sensors are p-in-n
- Observation of 5-pixel clusters: physics or cross-talk?





- Depletion voltage at 30 V and operated at 100 V in nominal conditions

# Charge sharing for W0018\_G10

- At the operating threshold  $THL=1065 \Rightarrow 573$  electrons
- Track position within pixel for:

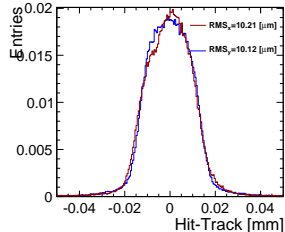
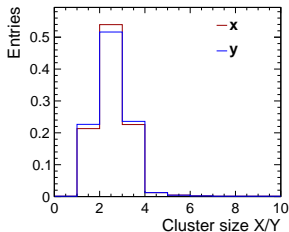
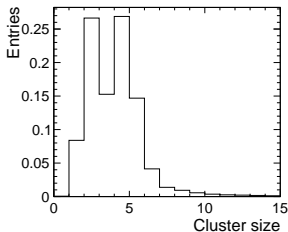
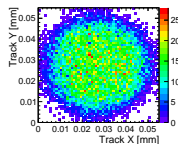
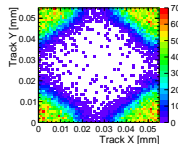
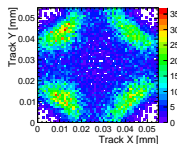
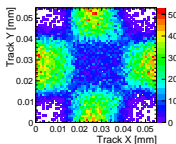
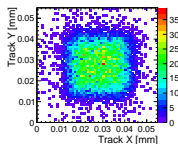
• 1-pixel cluster

• 2-pixel cluster

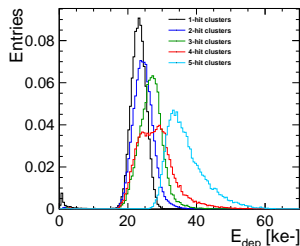
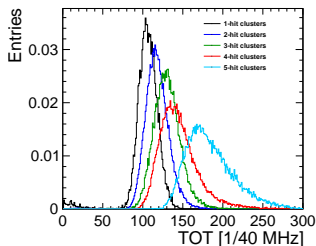
• 3-pixel cluster

• 4-pixel cluster

• 5-pixel cluster



- TOT distribution and application of pixel-by-pixel calibration with test-pulse to the test-beam data.



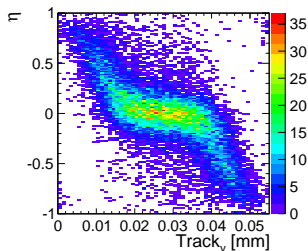
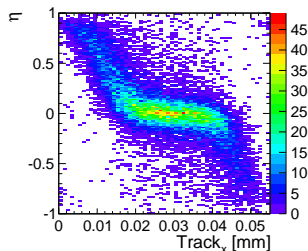
- The 5-pixel clusters correspond to high depositions of the energy.

## 5-pixel clusters

- If charge sharing  $\Rightarrow$  the charge in the extremities of the cross is correlated to the hit position in the center pixel of the cluster.
- Definition of an  $\eta$ -function:

$$\eta_x = \frac{E_{dep}(\text{left pixel}) - E_{dep}(\text{right pixel})}{E_{dep}(\text{left pixel}) + E_{dep}(\text{right pixel})} \quad (1)$$

$$\eta_y = \frac{E_{dep}(\text{down pixel}) - E_{dep}(\text{up pixel})}{E_{dep}(\text{down pixel}) + E_{dep}(\text{up pixel})} \quad (2)$$

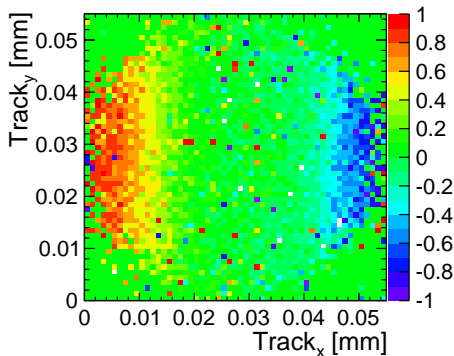


- $\eta$  depends on the track position within the pixel in the center of the cluster

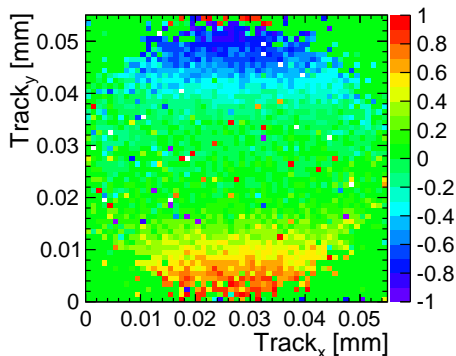


## 5-pixel clusters (2)

•  $\eta_x$



•  $\eta_y$



- The charge depends on the track position  $\Rightarrow$  5-pixel clusters are due to the charge sharing

- The 5-pixel clusters (cross-shaped) seem to be due to the charge sharing.
- By using the charge information in the hit reconstruction, the resolution can be improved.