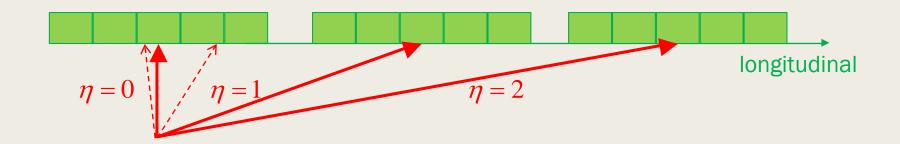
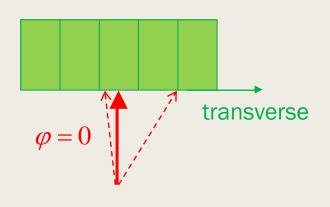
## Pixel ToT precision study

**Fuyue Wang** 

#### $\eta$ and $\varphi$





- In every  $\eta$ , classify between 1 particle and 2 particle.
- 1 particle: Randomly shot in the middle pixel
- 2 particle:
  - 1<sup>st</sup> randomly in the middle pixel
  - $2^{nd}$  randomly in nearby  $5 \times 5$  pixels in training and with a fixed distance to the 1st in testing

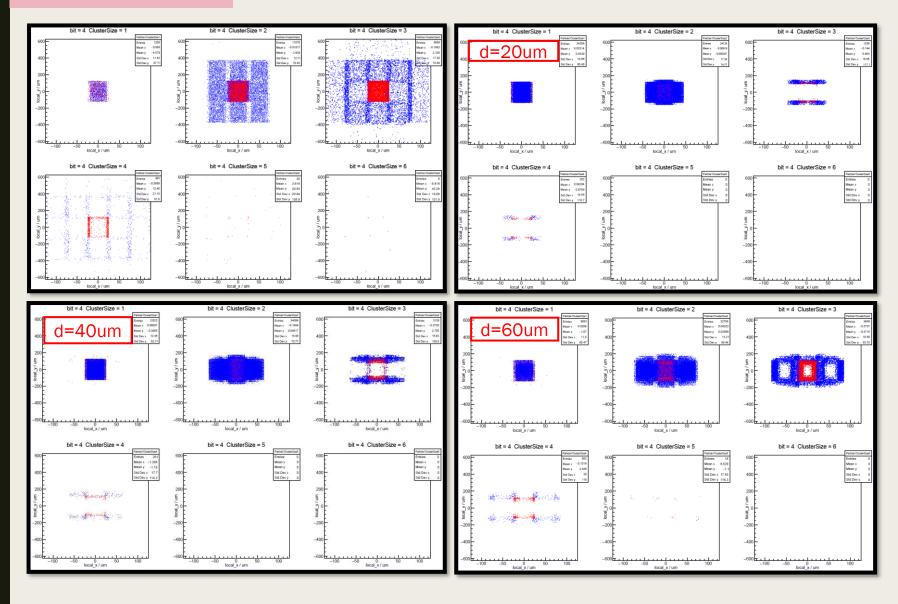
#### $\eta = 0$ $\varphi = 0$ 1 particle bit = 4 ClusterSize = 2 bit = 4 ClusterSize = 1 Bit=2 bit = 2 ClusterSize = 3 bit = 2 ClusterSize = 4 bit = 4 ClusterSize = 3 bit = 4 ClusterSize = 4 local\_x/um bit = 6 ClusterSize = 1 bit = 6 ClusterSize = 2 bit = 8 ClusterSize = 1 bit = 8 ClusterSize = 2 Bit=6 bit = 6 ClusterSize = 3 bit = 6 ClusterSize = 4 bit = 8 ClusterSize = 3 bit = 8 ClusterSize = 4

3

Bit=8

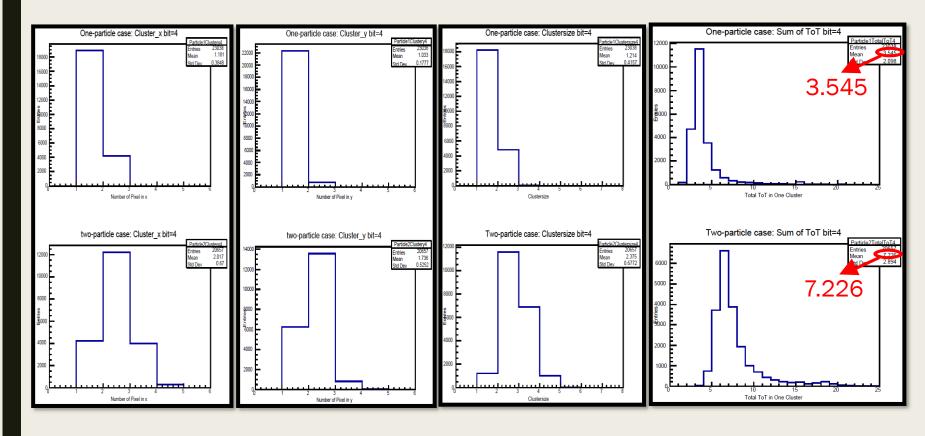
Bit=4

## $\eta = 0$ $\varphi = 0$ 2 particle



Red: 1<sup>st</sup> particle, Blue: 2<sup>nd</sup> particle

## $\eta = 0 \quad \varphi = 0$



- 4 parameters: Cluster\_x, Cluster\_y, Clustersize, Sum of ToT
- Sum of ToT distribution is peaked twice the value for 2 compared to 1
  - Larger than twice (especially for small tot bit): energy below threshold for 1 particle may be above threshold for 2 particle when superposed.

5

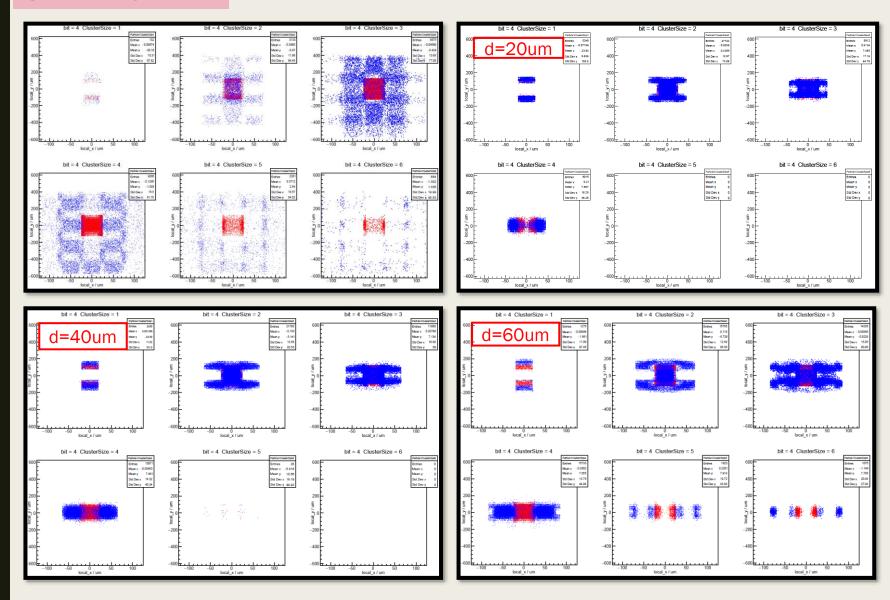
#### $\eta = 1$ $\varphi = 0$ 1 particle bit = 4 ClusterSize = 1 bit = 4 ClusterSize = 2 Bit=2 bit = 4 ClusterSize = 3 bit = 4 ClusterSize = 4 bit = 2 ClusterSize = 3 bit = 2 ClusterSize = 4 bit = 8 ClusterSize = 1 bit = 8 ClusterSize = 2 bit = 6 ClusterSize = 2 Bit=6 bit = 6 ClusterSize = 3 bit = 6 ClusterSize = 4 bit = 8 ClusterSize = 3 bit = 8 ClusterSize = 4

6

Bit=8

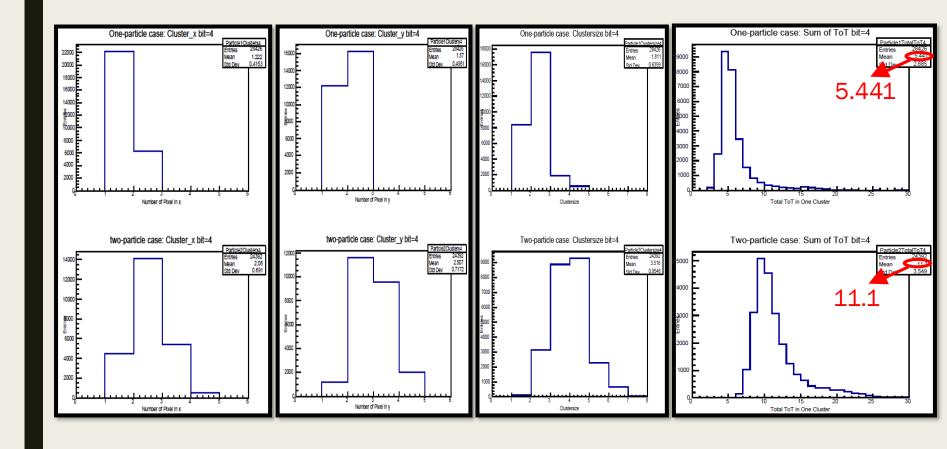
Bit=4

#### $\eta = 1$ $\varphi = 0$ 2 particle



Red: 1<sup>st</sup> particle, Blue: 2<sup>nd</sup> particle

$$\eta = 1 \quad \varphi = 0$$

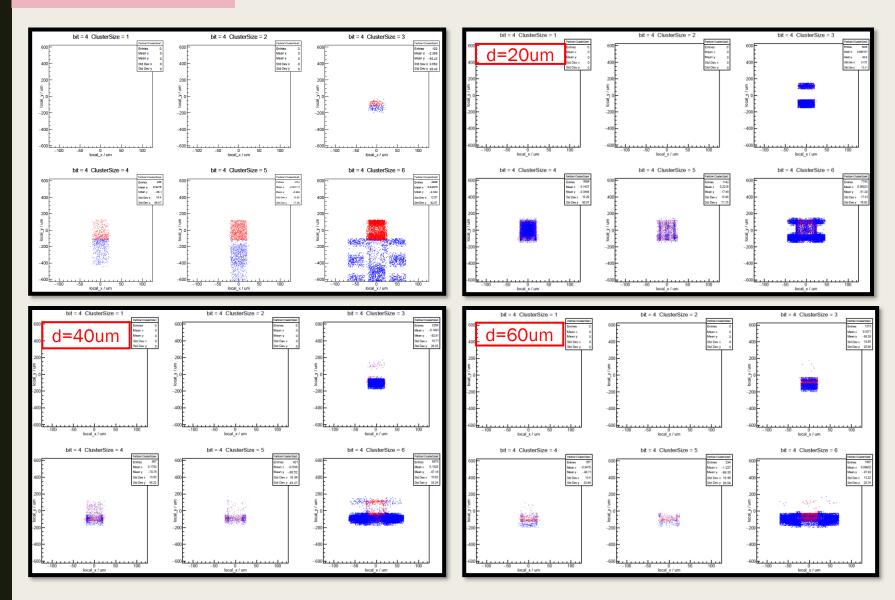


■ 4 parameters: Cluster\_x, Cluster\_y, Clustersize, Sum of ToT

#### $\eta = 2$ $\varphi = 0$ 1 particle bit = 4 ClusterSize = 2 bit = 4 ClusterSize = 1 -5 0 5 local\_x/um Bit=2 Bit=4 bit = 4 ClusterSize = 3 bit = 4 ClusterSize = 4 bit = 2 ClusterSize = 3 bit = 2 ClusterSize = 4 local\_x / um bit = 8 ClusterSize = 1 bit = 8 ClusterSize = 2 bit = 6 ClusterSize = 1 bit = 6 ClusterSize = 2 Mean x Mean y Std Dev x Std Dev y Mean x Mean y Std Dev x Std Dev y Bit=6 Bit=8 bit = 6 ClusterSize = 3 bit = 8 ClusterSize = 3 bit = 8 ClusterSize = 4 bit = 6 ClusterSize = 4

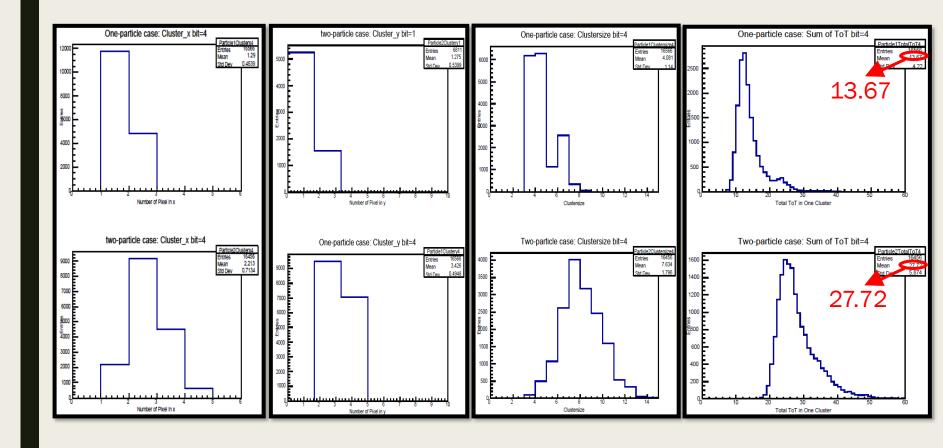
9

## $\eta = 2$ $\varphi = 0$ 2 particle

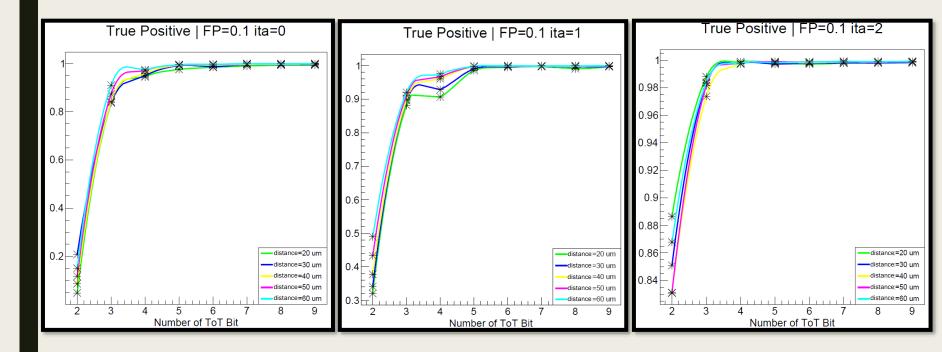


■ Red: 1<sup>st</sup> particle, Blue: 2<sup>nd</sup> particle

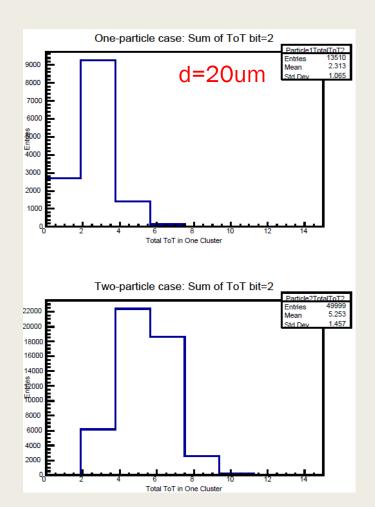
$$\eta = 2 \quad \varphi = 0$$

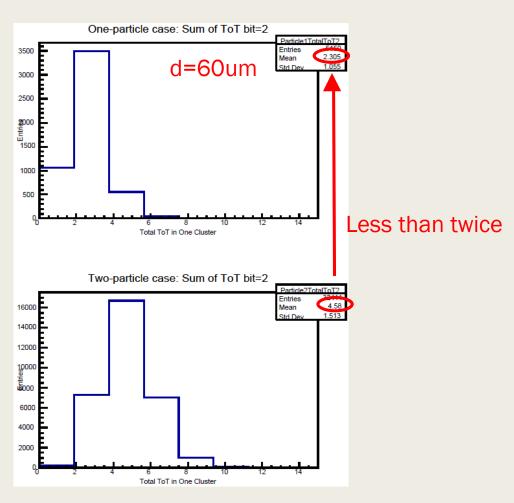


■ 4 parameters: Cluster\_x, Cluster\_y, Clustersize, Sum of ToT



- False Position=0.9
- ToT>4, True Position is near 1
- Ita=2, TP is not decreasing with distance increasing when tot bit is small





#### ■ Larger distance:

- Overlap pixels of the 2 particles are less
- More pixels are below threshold
- Especially in small tot bits

- Fix ita=2
- Start regression of position

# Thanks!