# Diffusion along the Drift Direction

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# Diffusion along Drift direction in LIME

- Both ER and NR tracks are selected between 0-10 mm far and 500-510mm far from the GEM.
- Tracks which are closer to the GEM (between 0-10mm from GEM) diffuse less.
- Tracks which are far from GEM (between 500-510mm from GEM) diffuse a lot.

#### He-NR

1050

1000

900

1350

1150

pic\_run13\_ev66

Mean x

Mean y

1250

Std Dev x

Std Dev y

5317636

1200

1000

57.9

57.92

130

120

110

100

1300

pic\_run14\_ev798

5317636

2000

1300

57.97

57.96 0

1200

1000

800

600

400

200

2100

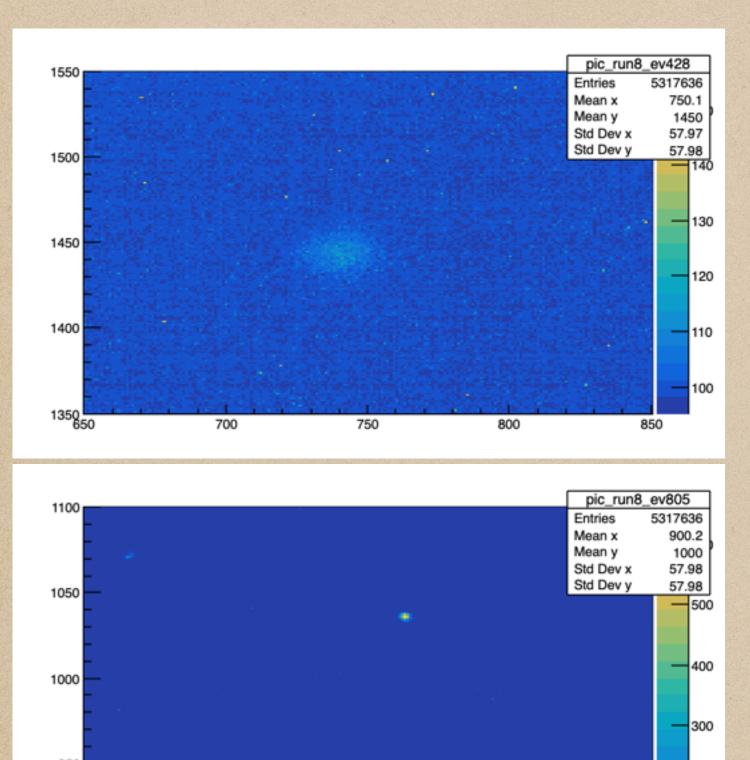
Entries

Mean x

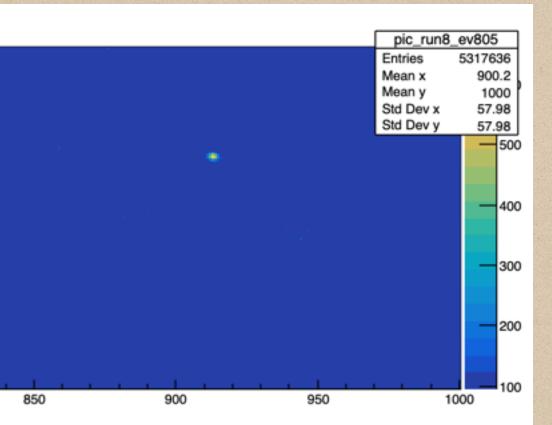
Mean y

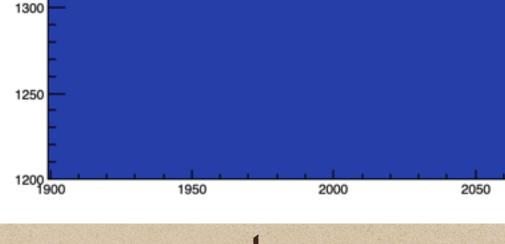
Std Dev x

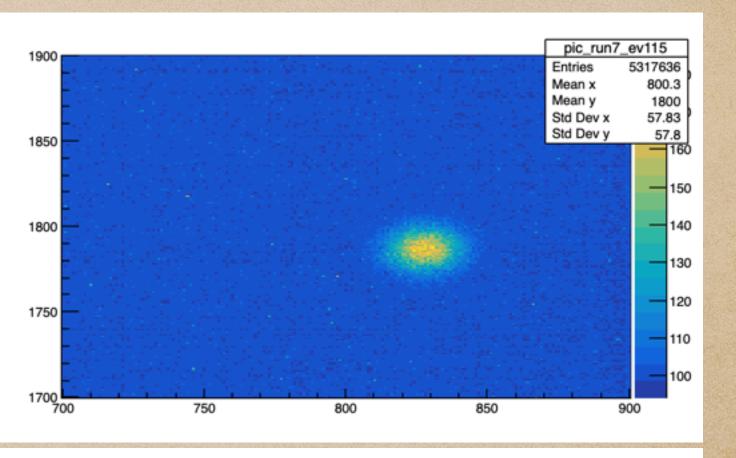
Std Dev y



10 keV NR







pic\_run7\_ev803

5317636 1700

1101

57.99

1600

1400

1200

1000

800

600

400

200

1800

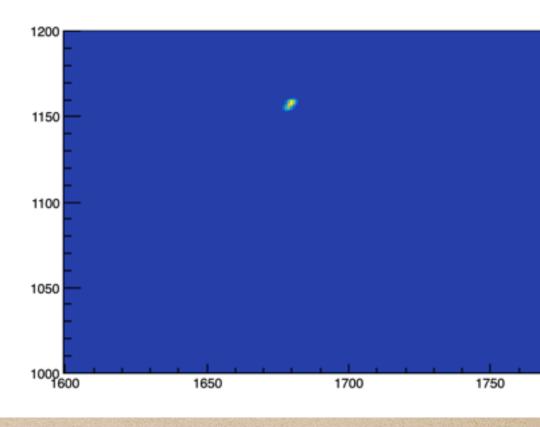
57.81

Entries

Mean x

Mean y

Std Dev x Std Dev y

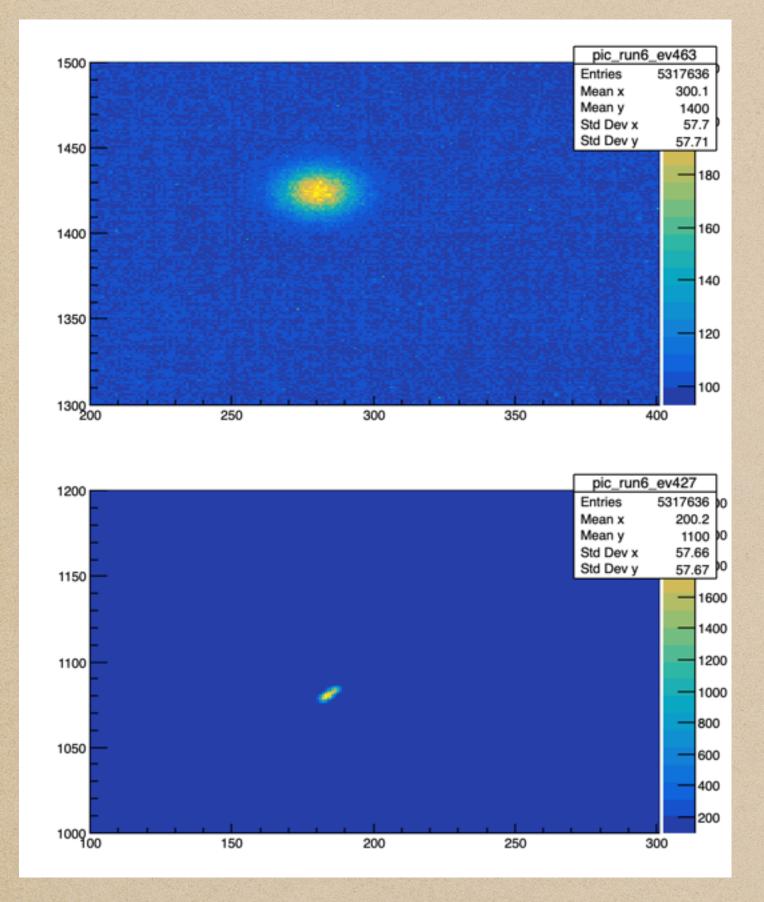


30 keV NR

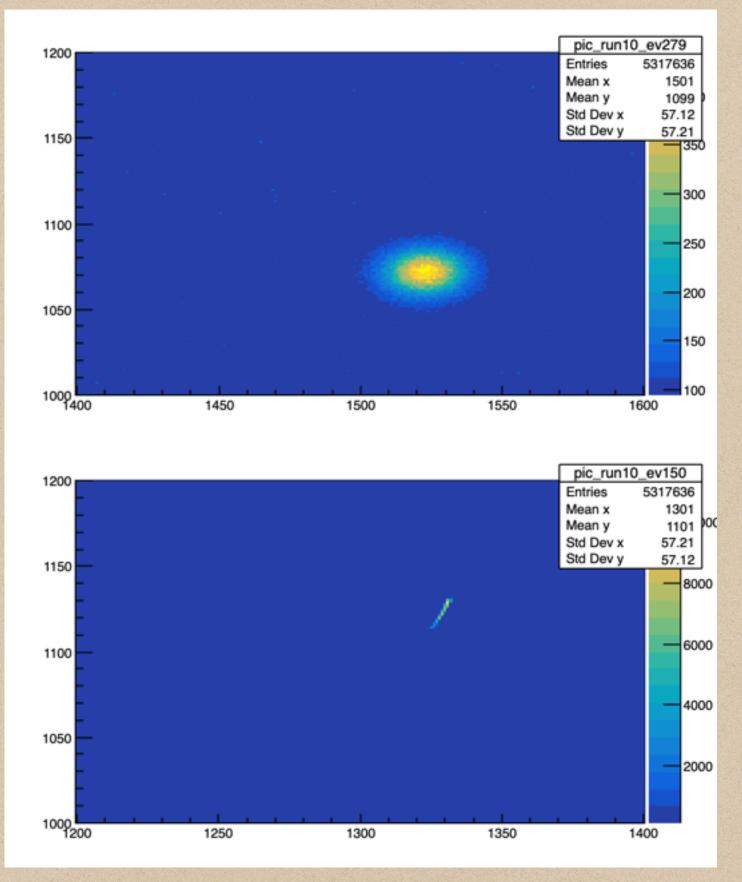
1200

60 keV NR

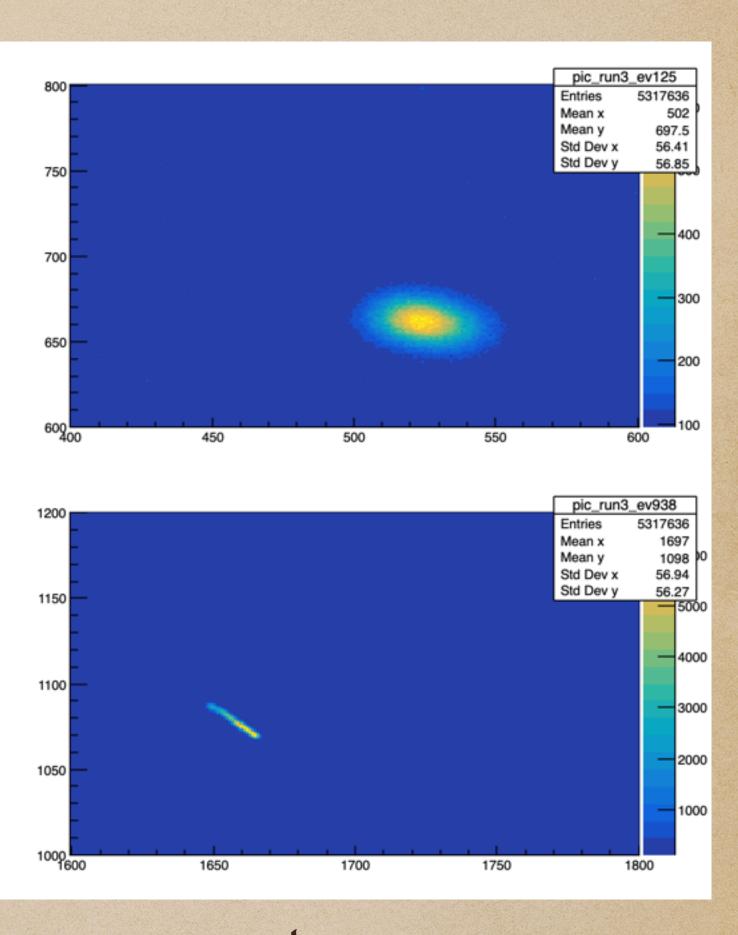
### He-NR



100 keV NR

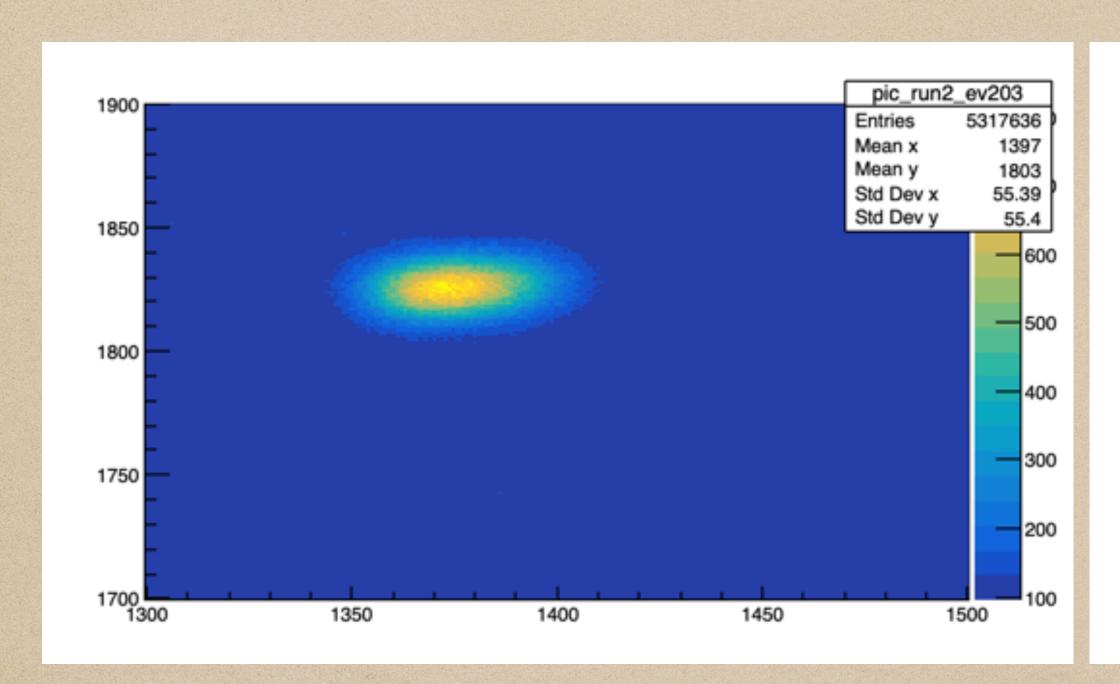


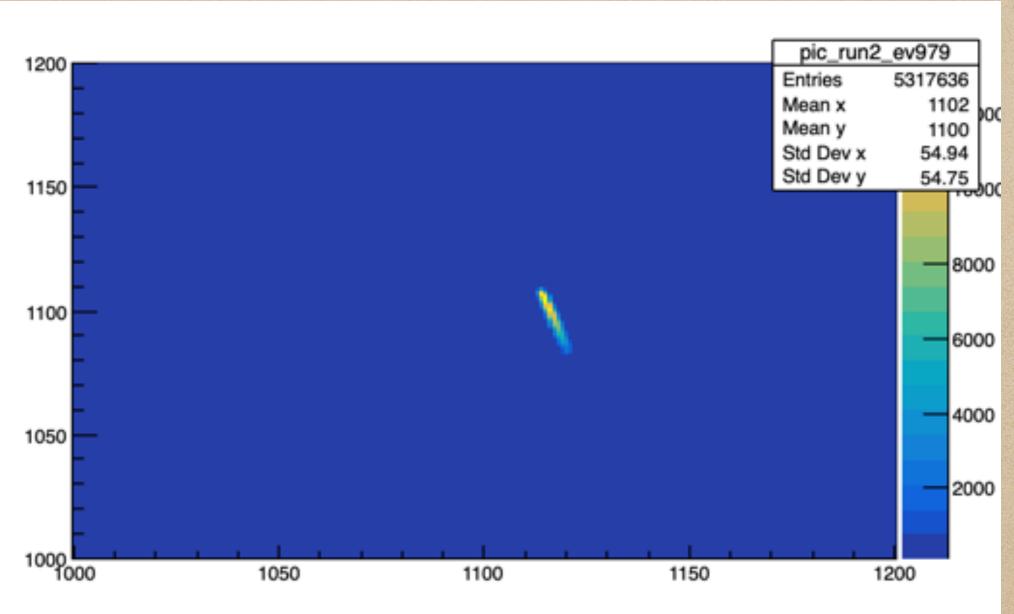
300 keV NR



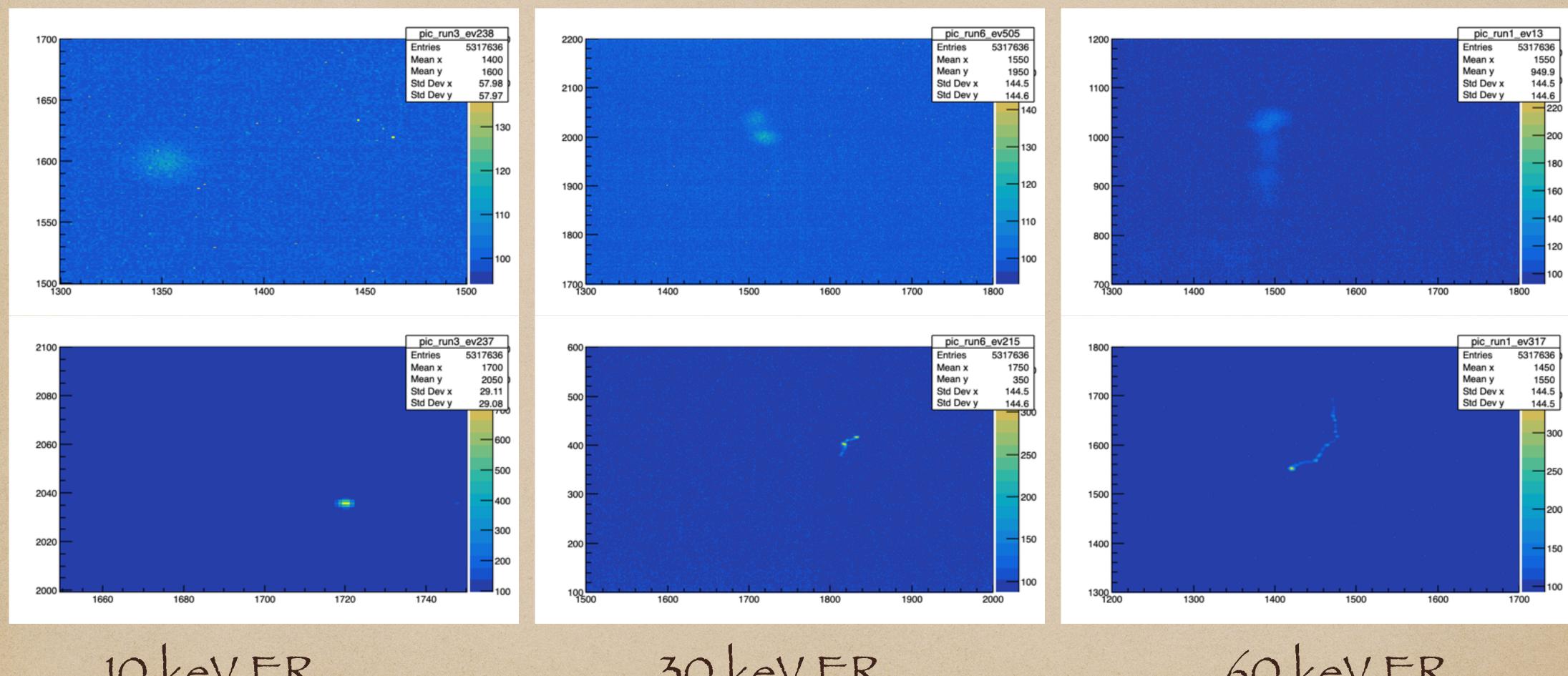
600 keV NR

#### He-NR





1000 keV NR

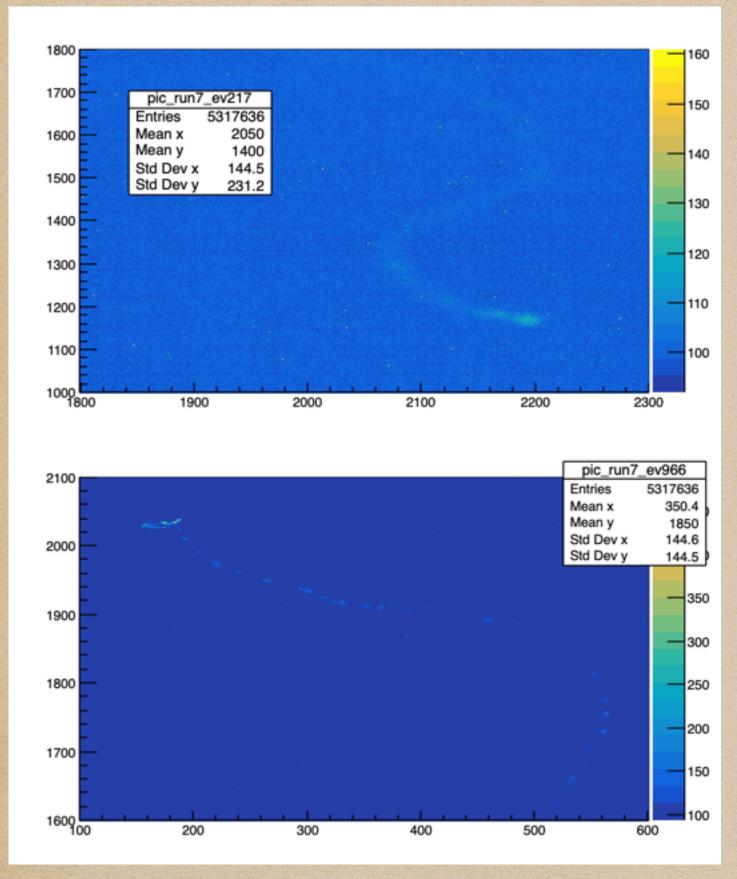


10 keV ER

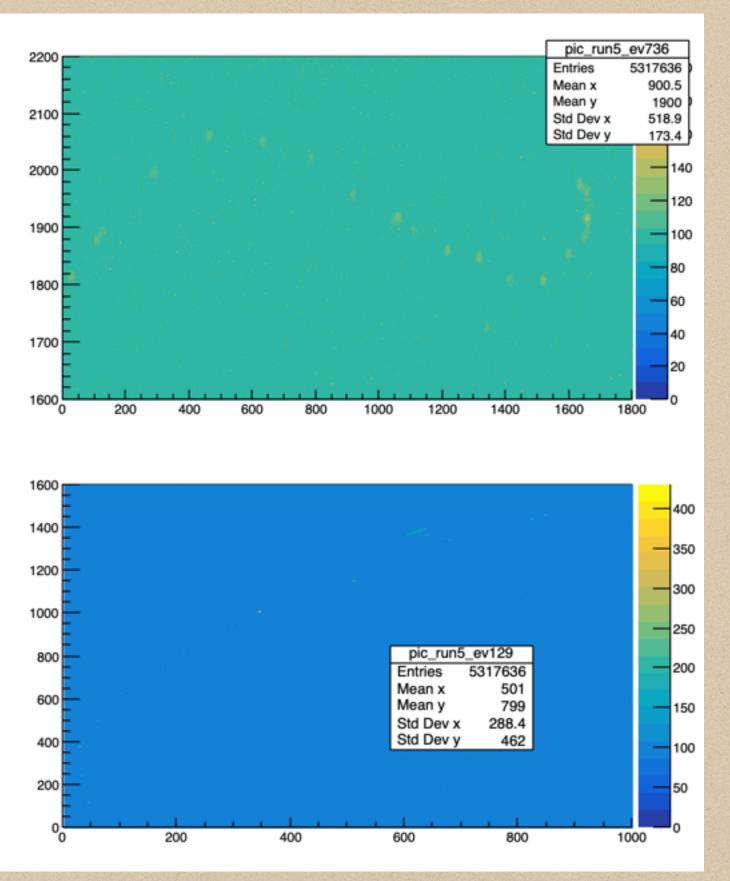
30 keV ER

60 keV ER

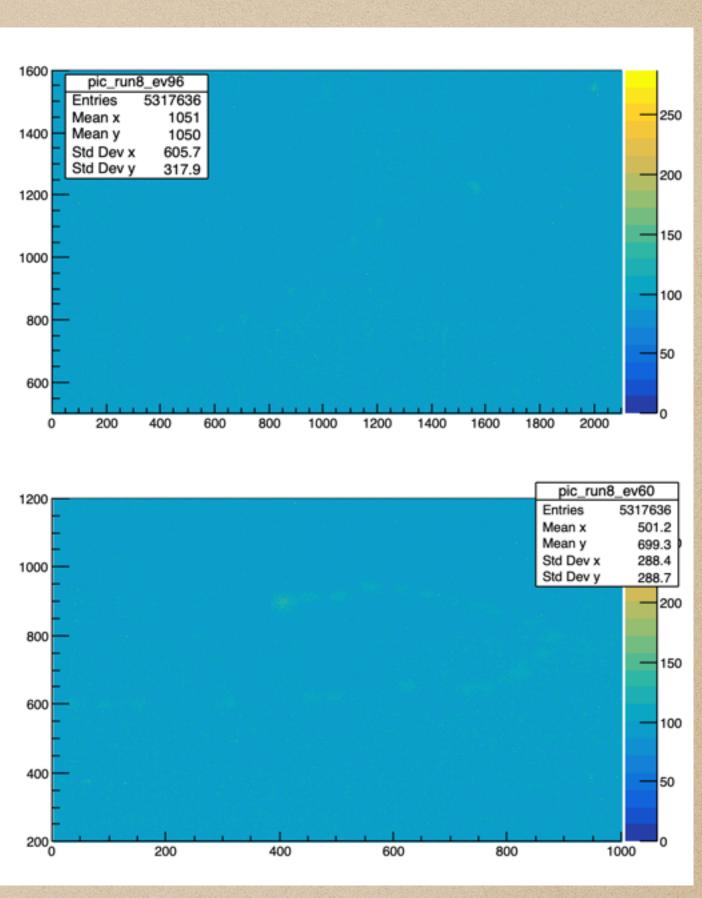
#### ER



100 keV ER

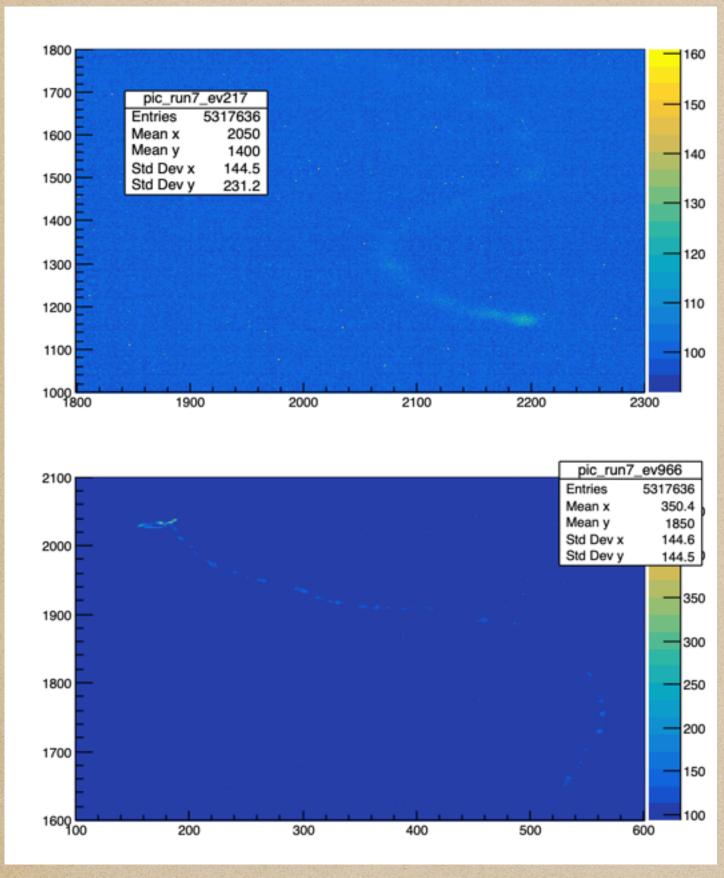


300 keV ER

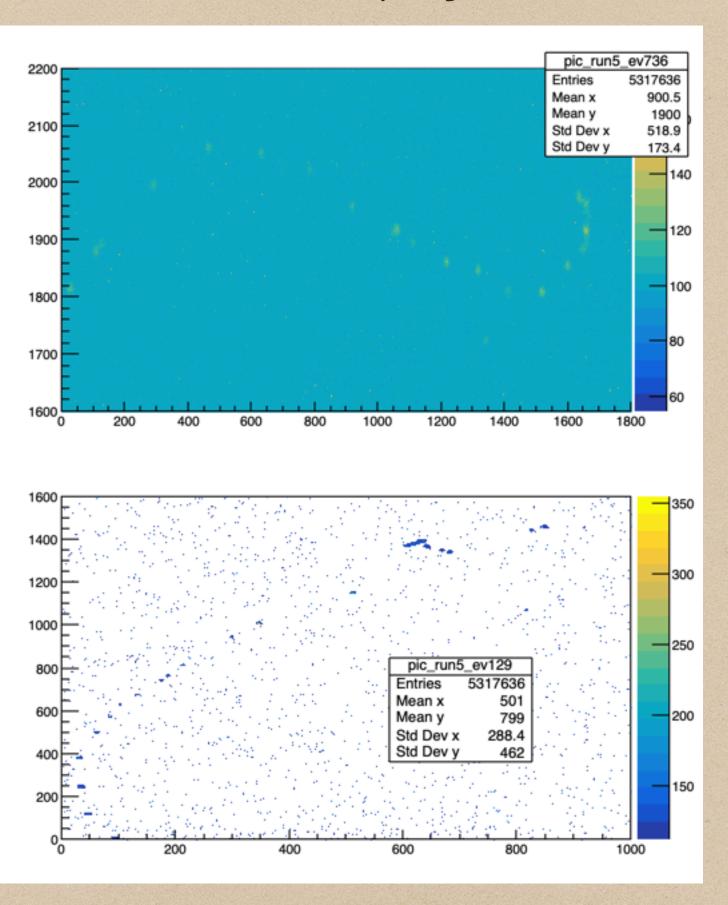


600 keV ER

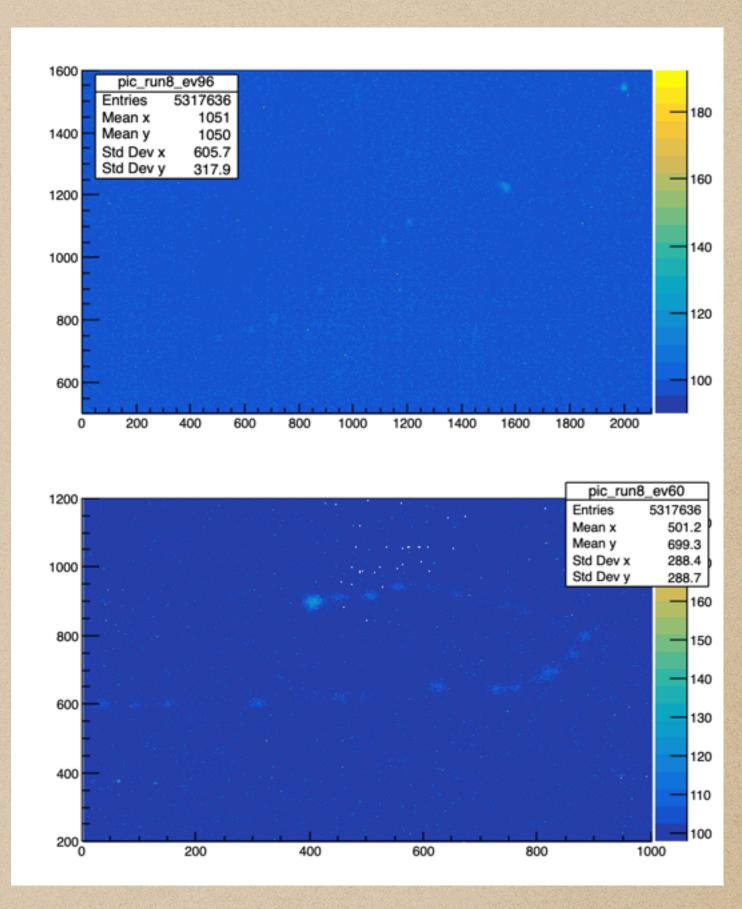
#### ER



100 keV ER

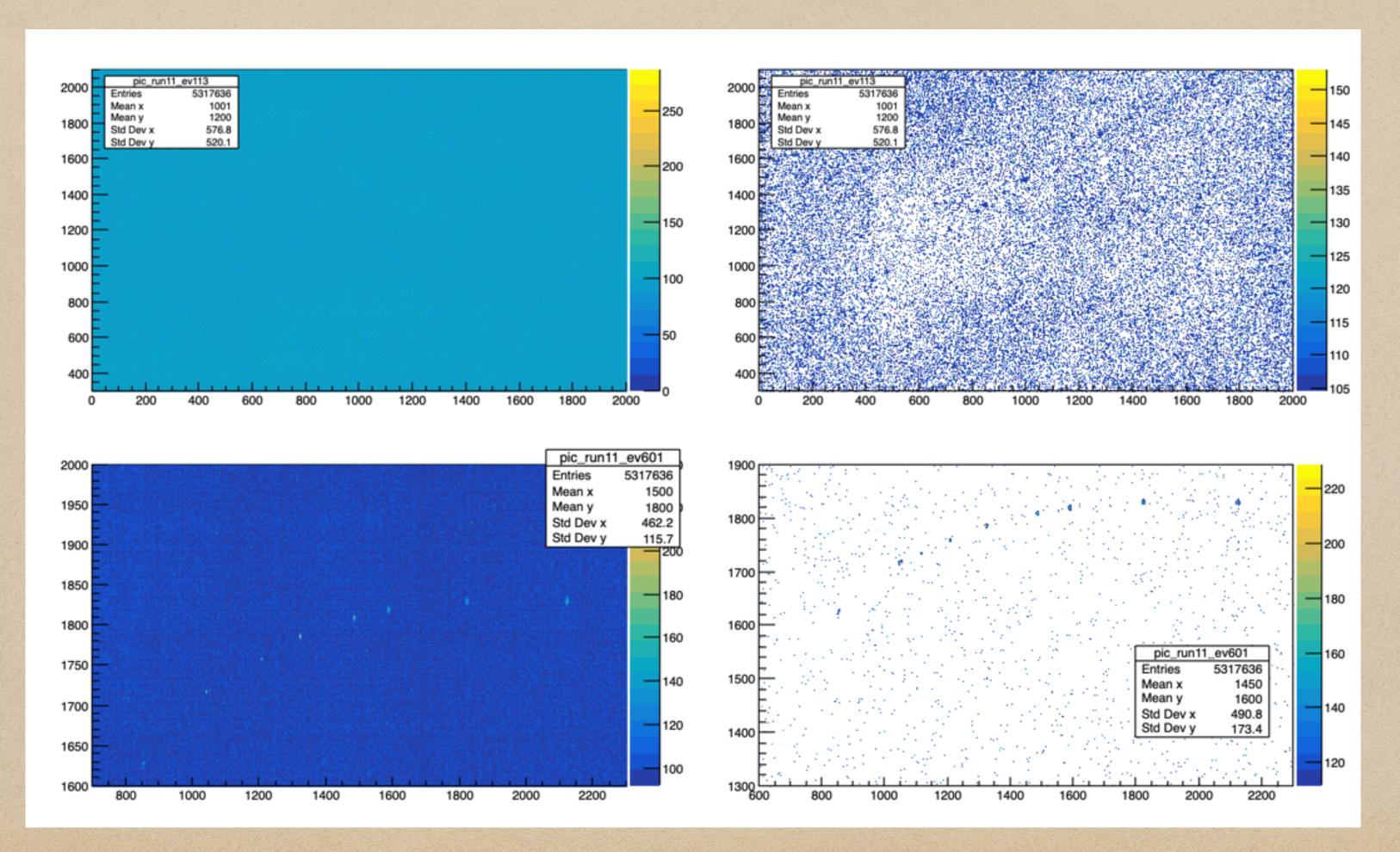


300 keV ER (Different colour scale)



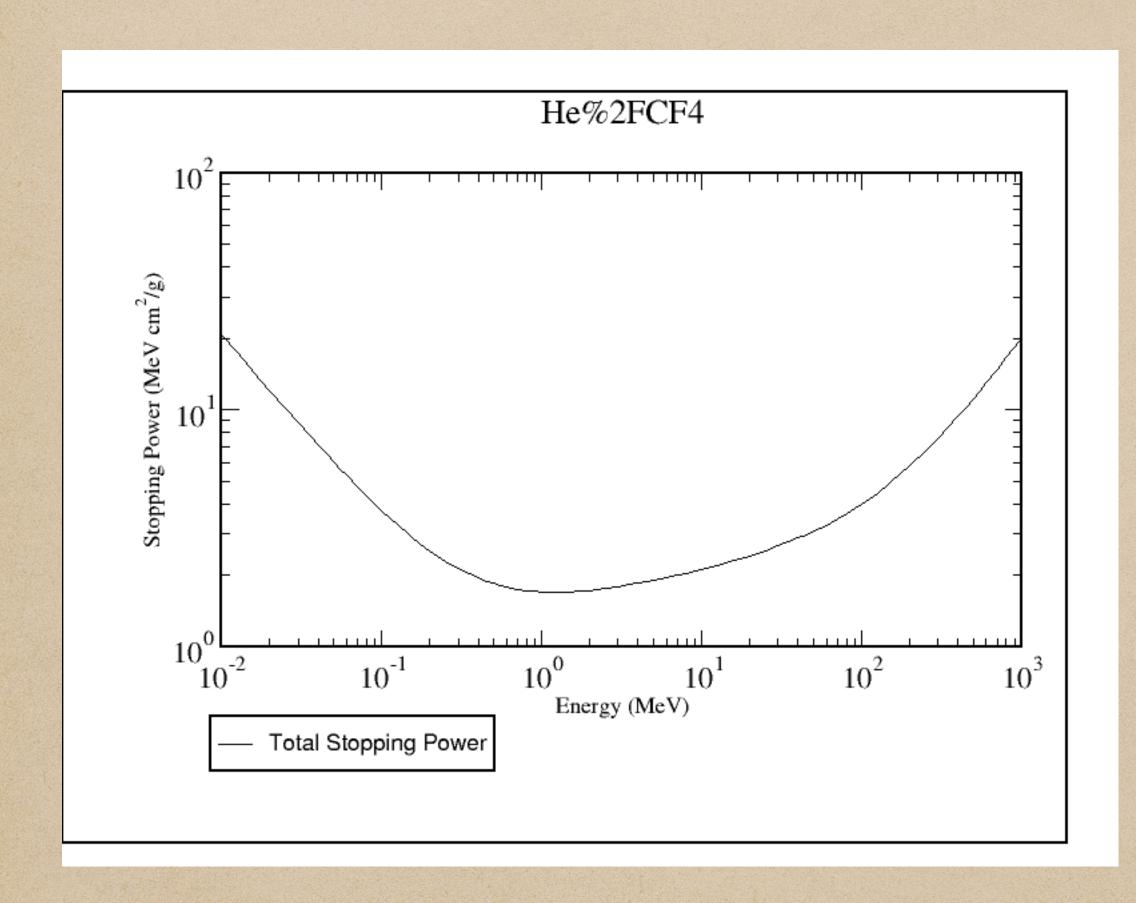
600 keV ER (Different colour scale)

#### ER



1000 keV ER

## Stopping Power for electron in He: CF4 Gas



$$\rho_{Tot} = 0.00159 \frac{g}{cm^3}$$

$$StoppingPower = 3.18 \frac{keV}{cm}$$
Near 1 MeV region

Source: https://physics.nist.gov/PhysRefData/Star/Text/ESTAR.html

## Conclusion

- Tracks which are far from GEM (between 500-510mm) diffuses a lot and because of this sometimes intensity of these tracks is similar the noise level of the camera. This is very evident in case of high energy ERs.
- 1 MeV electron is very difficult to fully contain inside the LIME, and it also deposits very low energy in the gas mixture. Therefore it is very difficult to find the tracks for high energy ER (1 MeV range).