
# VGEM and z scan analysis

## Underground data

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# Summary

- VGEM1 and z scan measurements
  - Energy mean and resolution
  - Cluster rate map
  - Number of iron spots
  - tgausssigma

→ **VGEM from 260V to 440V**

→ **z = 3/4, 10/11, 17/18, 24/25, 32/33**

RUN,DESCRIPTION,VGEM1,Z,N
12258,S010:DATA:Fe,260,17/18,402
12257,S010:DATA:Fe,280,17/18,405
12256,S010:DATA:Fe,300,17/18,401
12255,S010:DATA:Fe,320,17/18,402
12254,S010:DATA:Fe,340,17/18,402
12253,S010:DATA:Fe,360,17/18,405
12252,S010:DATA:Fe,380,17/18,401
12251,S010:DATA:Fe,400,17/18,403
12250,S010:DATA:Fe,420,17/18,405
12249,S010:DATA:Fe,440,17/18,401
12248,S010:PED:Fe,440,-,104
12238,S010:DATA:Fe,260,32/33,402
12237,S010:DATA:Fe,280,32/33,405
12236,S010:DATA:Fe,300,32/33,402
12235,S010:DATA:Fe,320,32/33,403
12234,S010:DATA:Fe,340,32/33,405
12233,S010:DATA:Fe,360,32/33,406
12232,S010:DATA:Fe,380,32/33,404
12231,S010:DATA:Fe,400,32/33,405
12230,S010:DATA:Fe,420,32/33,403
12229,S010:DATA:Fe,440,32/33,402
12228,S010:PED:Fe,420,-,104
12227,S010:DATA:Fe,260,24/25,403
12226,S010:DATA:Fe,280,24/25,406
12225,S010:DATA:Fe,300,24/25,401
12224,S010:DATA:Fe,320,24/25,401
12223,S010:DATA:Fe,340,24/25,403
12222,S010:DATA:Fe,360,24/25,402
12221,S010:DATA:Fe,380,24/25,401
12220,S010:DATA:Fe,400,24/25,405
12219,S010:DATA:Fe,420,24/25,402
12218,S010:DATA:Fe,440,24/25,406
12217,S010:PED:Fe,420,-,104
12216,S010:DATA:Fe,420,17/18,378
12215,S010:DATA:Fe,440,17/18,401
12214,S010:PED:Fe,260,-,101
12213,S010:DATA:Fe,260,10/11,401
12212,S010:DATA:Fe,280,10/11,405
12211,S010:DATA:Fe,300,10/11,402
12210,S010:DATA:Fe,320,10/11,401
12209,S010:DATA:Fe,340,10/11,403
12208,S010:DATA:Fe,360,10/11,403
12207,S010:DATA:Fe,380,10/11,405
12206,S010:DATA:Fe,400,10/11,403
12205,S010:DATA:Fe,420,10/11,402
12204,S010:DATA:Fe,440,10/11,404
12203,S010:PED:Fe,260,-,104
12202,S010:DATA:Fe,260,03/04,405
12201,S010:DATA:Fe,280,03/04,402
12200,S010:DATA:Fe,300,03/04,403
12199,S010:DATA:Fe,320,03/04,405
12198,S010:DATA:Fe,340,03/04,404
12197,S010:DATA:Fe,360,03/04,401
12196,S010:DATA:Fe,380,03/04,403
12195,S010:DATA:Fe,400,03/04,404
12194,S010:DATA:Fe,420,03/04,406
12193,S010:DATA:Fe,440,03/04,403
12192,S010:PED:Fe,440,-,103

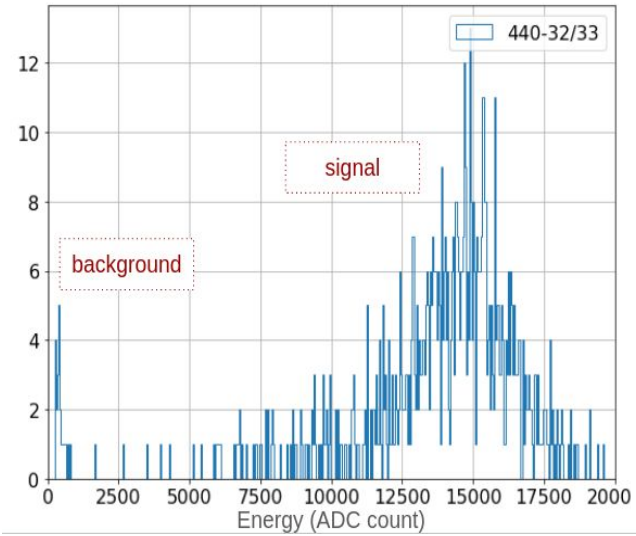
# Energy distributions

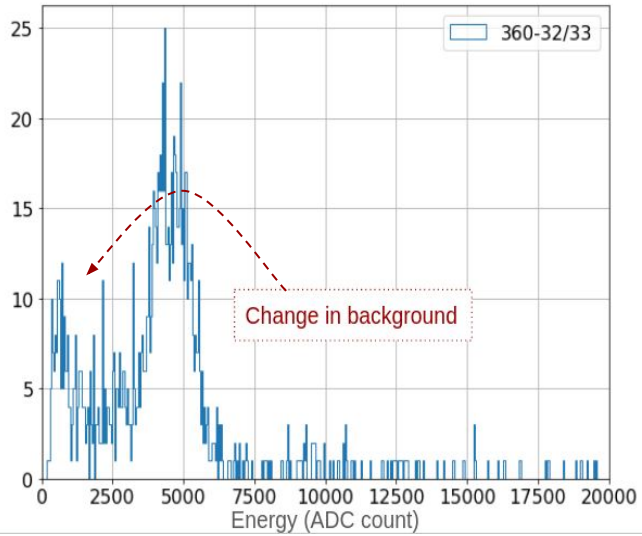
# Energy Distributions

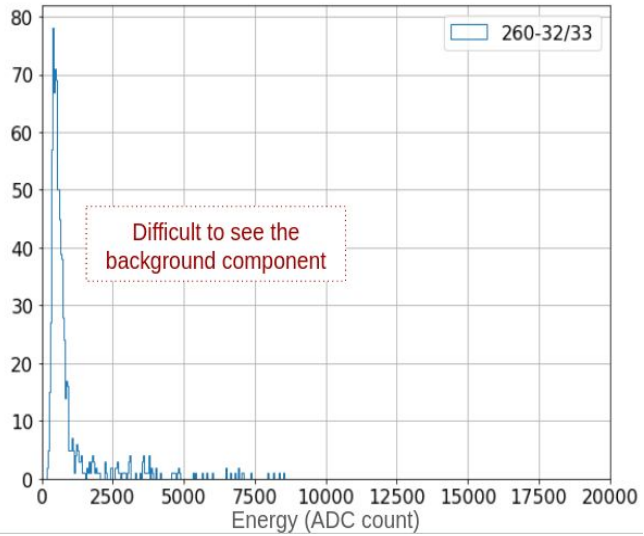
Test for z = 32/33

- cut = (track_x[i]>250)&(track_x[i]<2050)&(track_y[i]>700)&(track_y[i]<1600)
- same bin size

**SOME CONSIDERATIONS…**



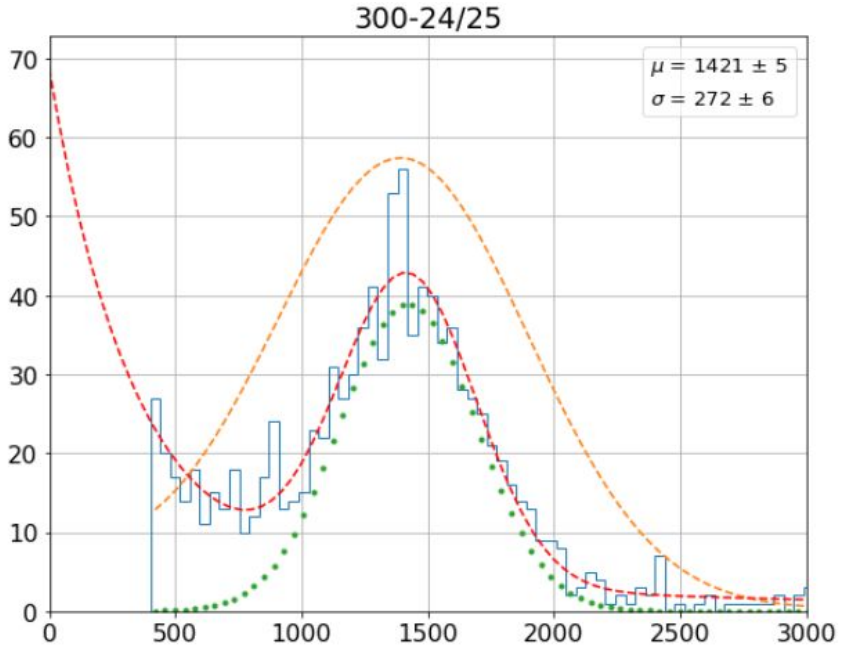



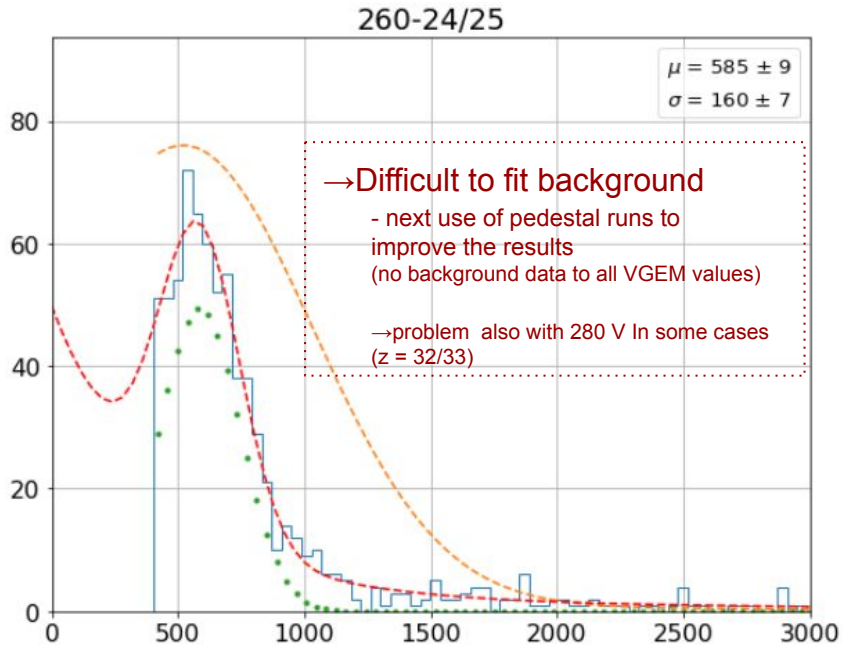



# Energy Distributions

- cut = (track_x[i]>250)&(track_x[i]<2050)&(track_y[i]>700)&(track_y[i]<1600)
- same bin size

**SOME CONSIDERATIONS…**



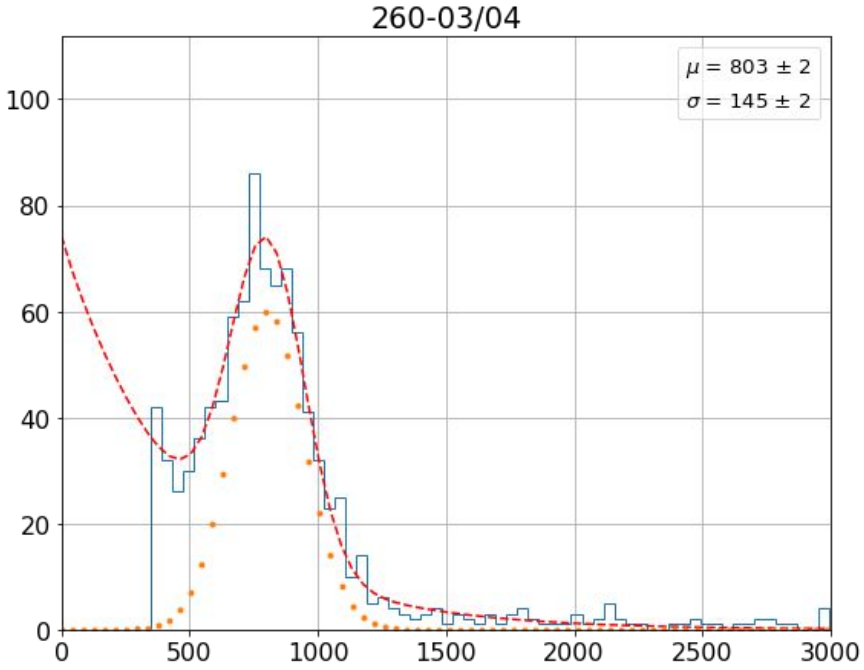



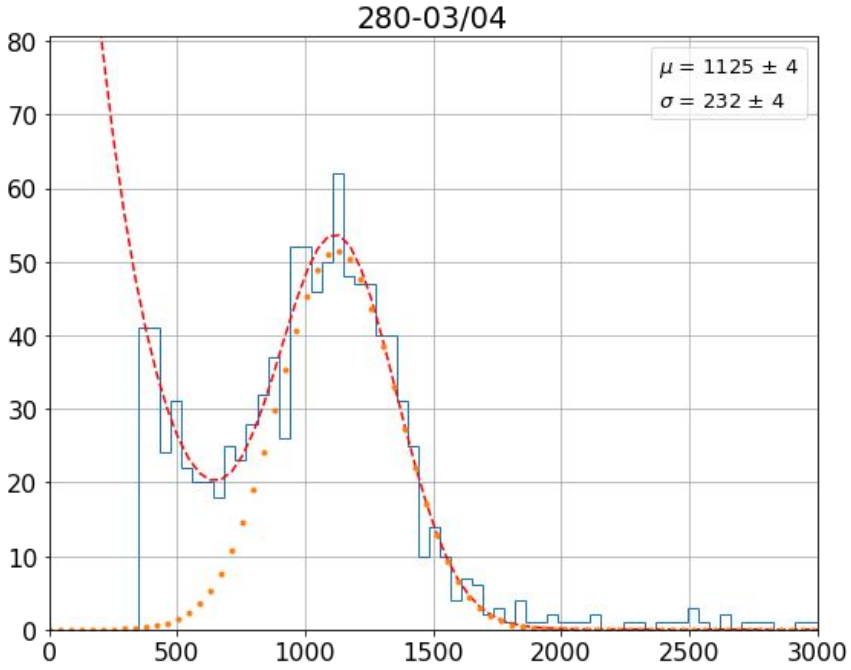
# Energy Distributions

- cut = (track_x[i]>250)&(track_x[i]<2050)&(track_y[i]>700)&(track_y[i]<1600)
- same bin size

**SOME CONSIDERATIONS…**

→For z < 24/25, fits for 280 V worked fine
→For z = 03/04 all the fits seem to be fine



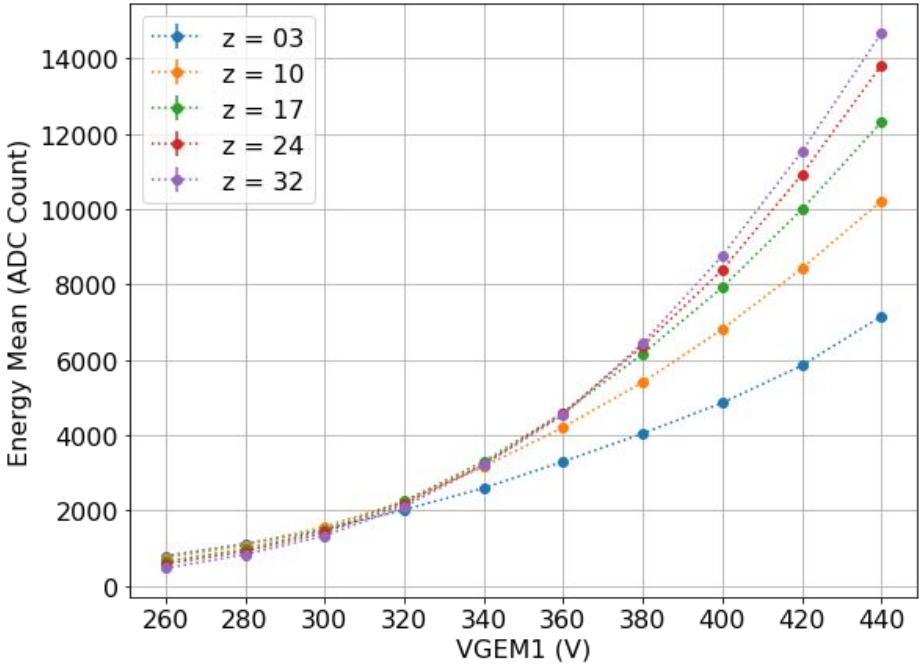



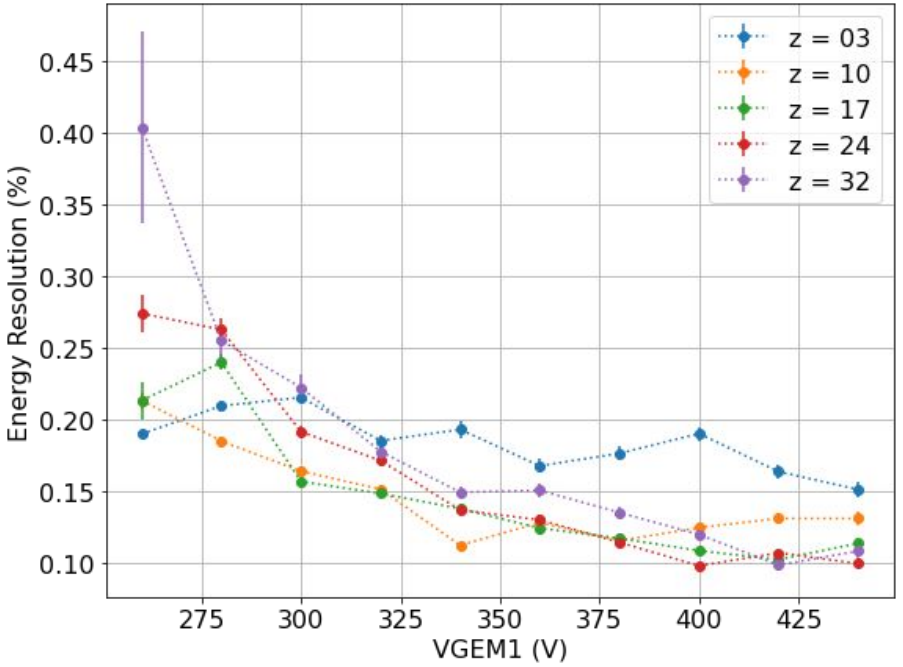
# Energy *vs* VGEM

High VGEM → better resolution (~2x)

High change on Energy for different VGEM and z values

Middle z values seems to have better resolution



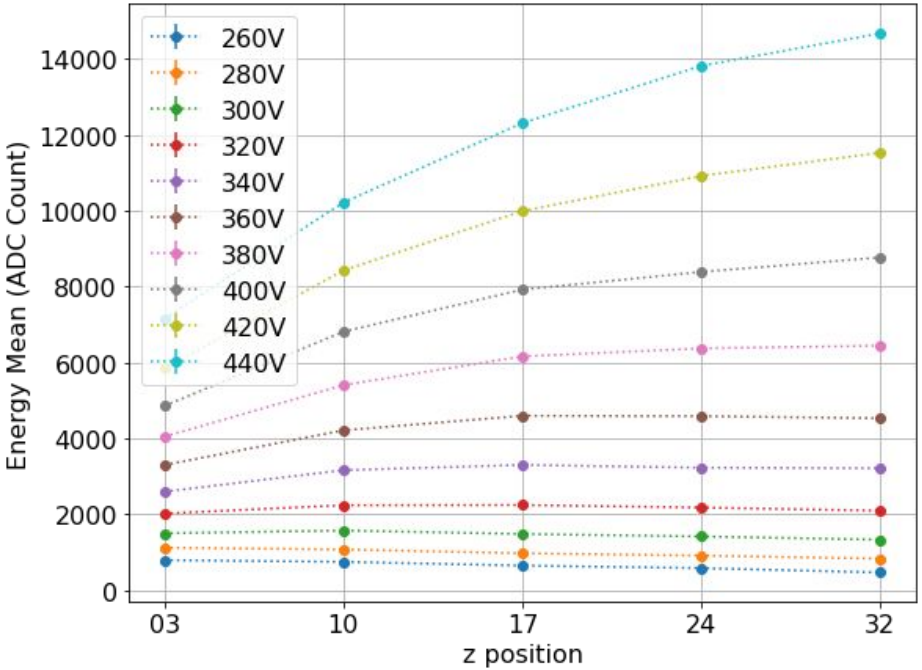



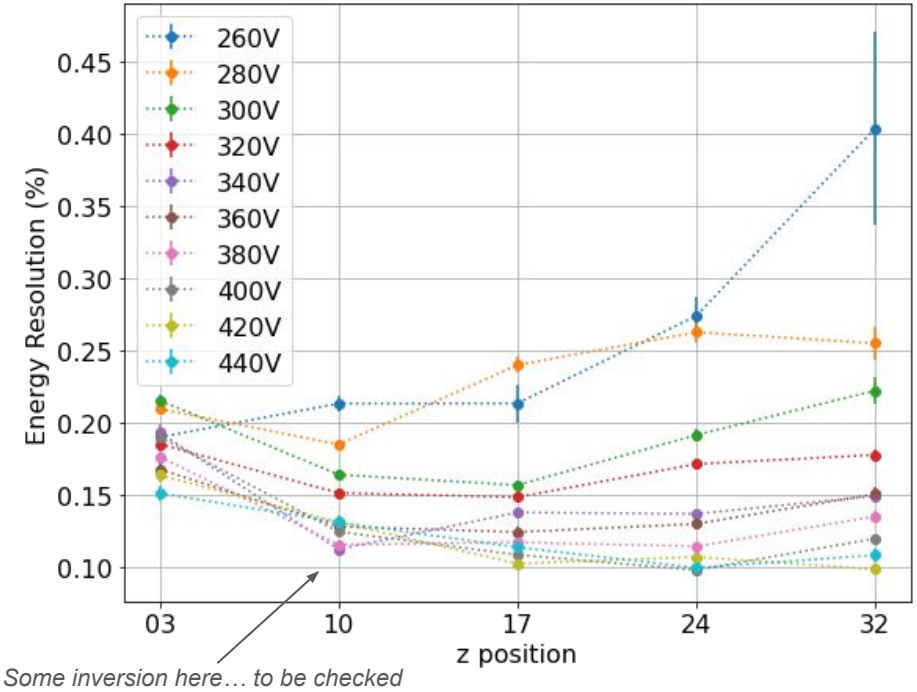
# Energy *vs* z

High VGEM → better resolution (~2x)

High change on Energy for different VGEM and z values

Middle z values seems to have better resolution



# Cluster rate map

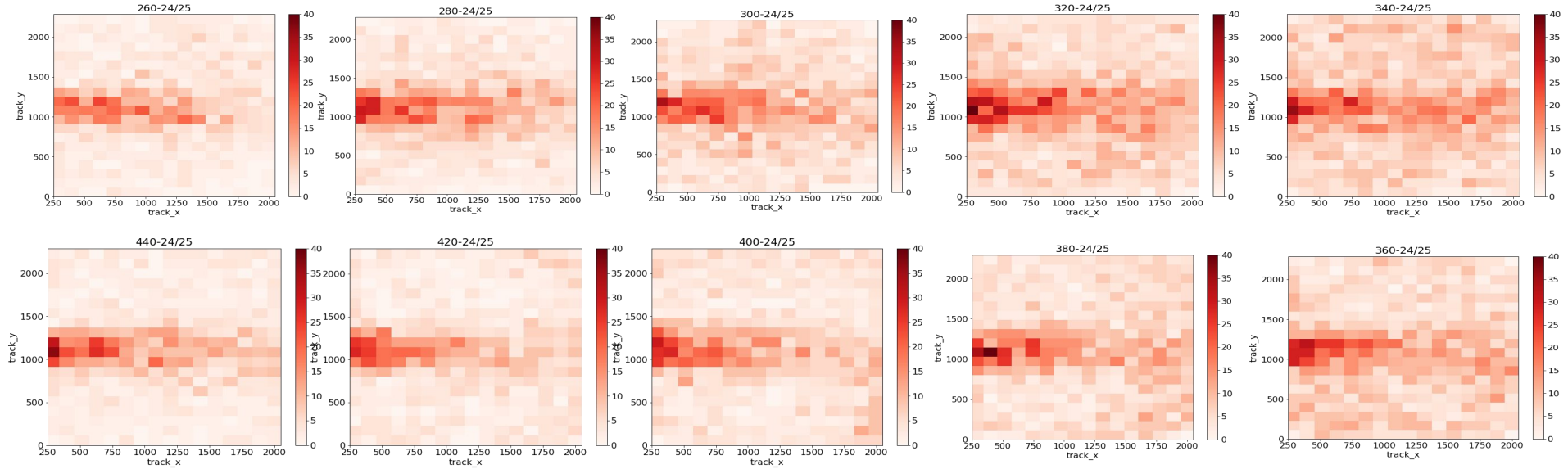
# Clusters rate map

- cut = (track_x[i]>250)&(track_x[i]<2050)

→Middle VGEM values → more clusters

260V

340V

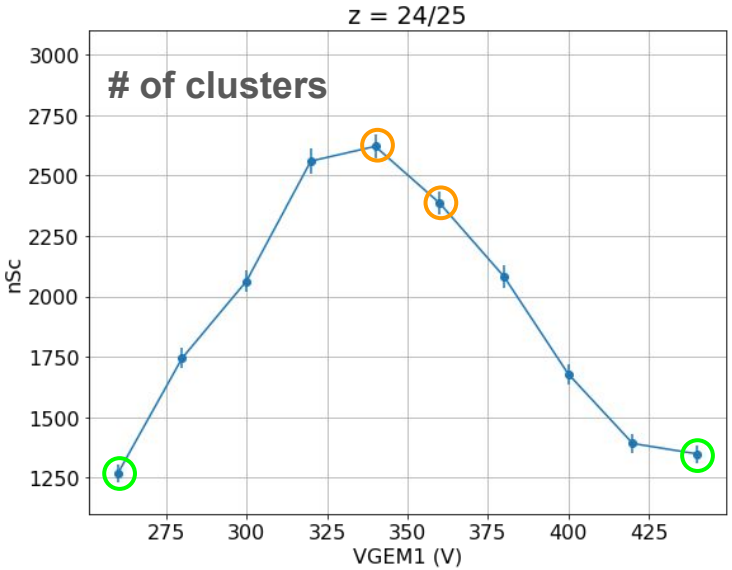



440V

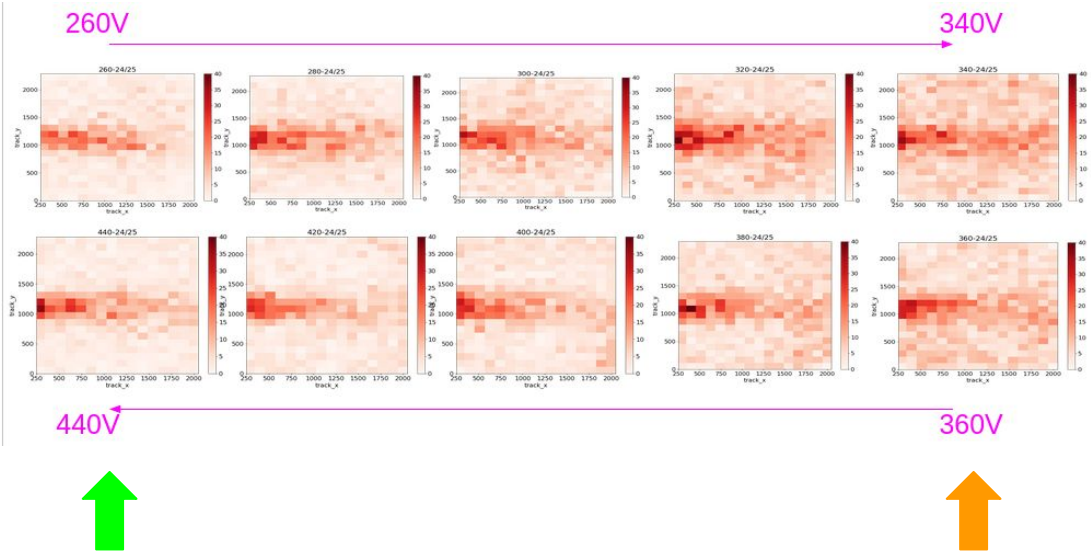
360V

# Clusters rate map

- cut = (track_x[i]>250)&(track_x[i]<2050)




→Middle VGEM values → more clusters

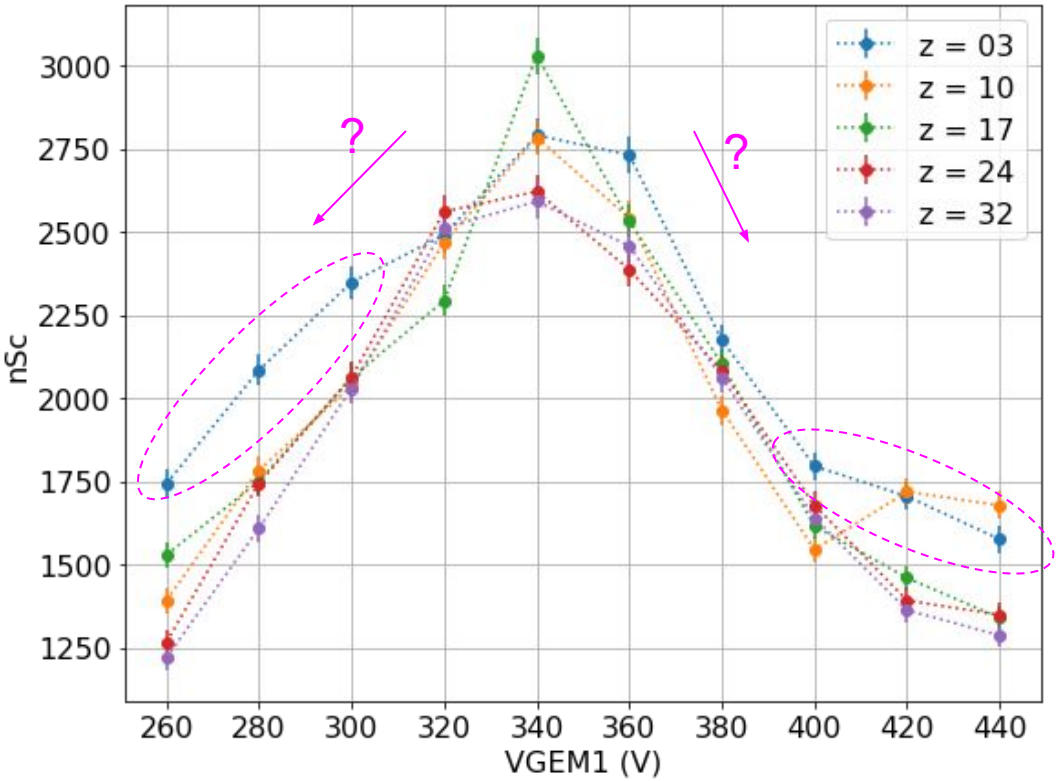


# nSc *vs* VGEM

→# of cluster taking out the noisy borders → cut = (track_x[i]>250)&(track_x[i]<2050)

→Middle VGEM values → more clusters

z= 3/4 seems to have a bit more events for low and high VGEM values

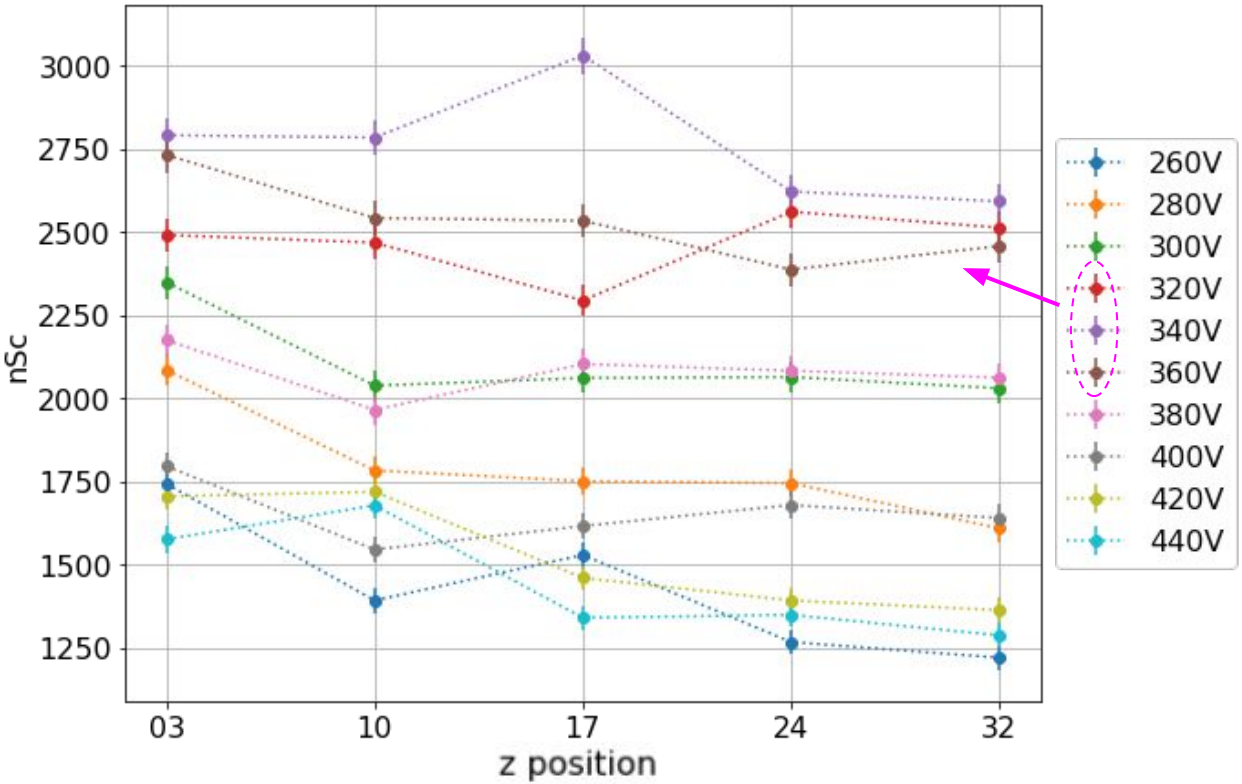


# nSc *vs* z

→# of cluster taking out the noisy borders → cut = (track_x[i]>250)&(track_x[i]<2050)

Not strong variation for the same VGEM

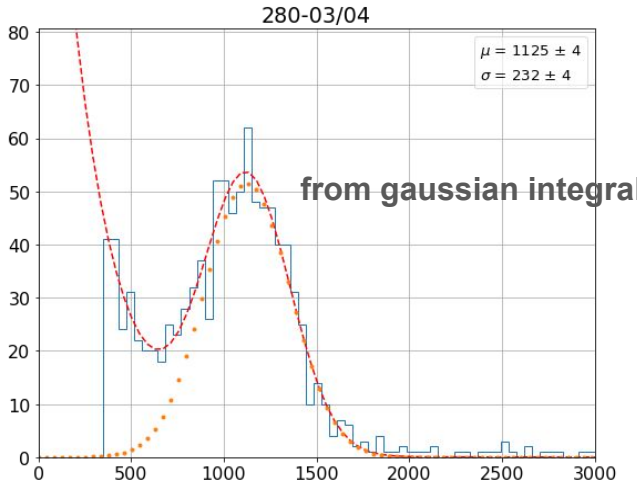
A tendency to increase nSC for z = 3/4



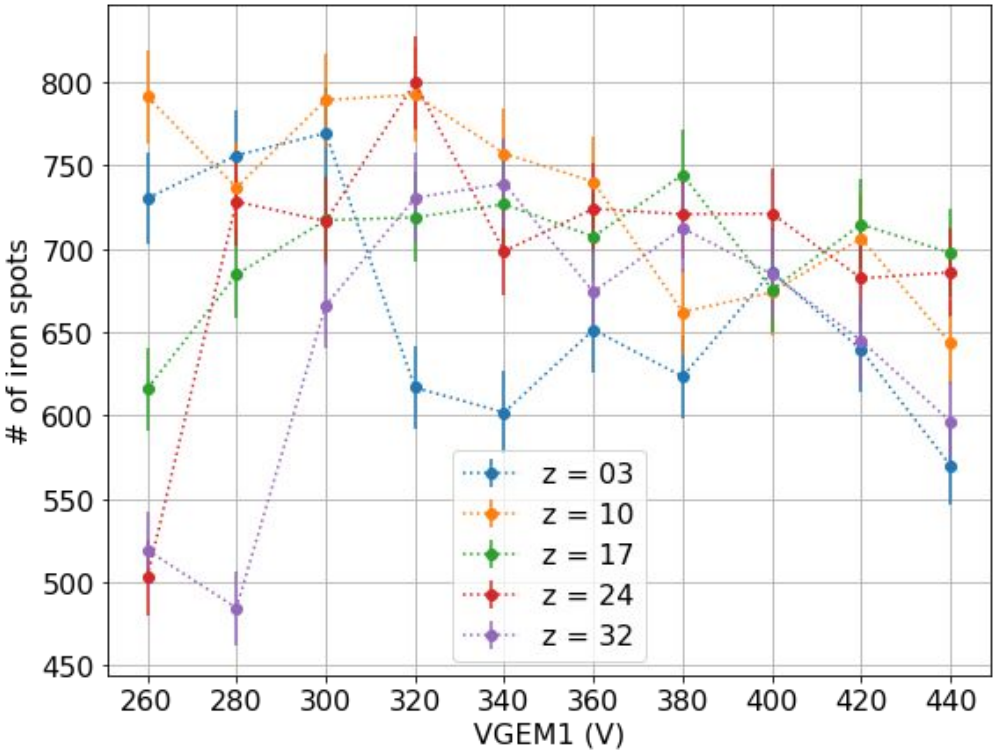
# of iron spots

# # of iron spots *vs* VGEM

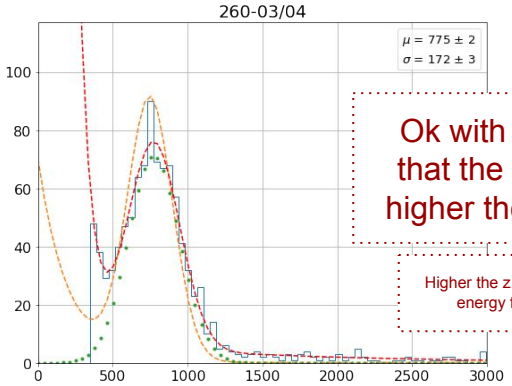
Seems that there is a loss in efficiency for low VGEM values for z > 10/11




from gaussian integral ⟶

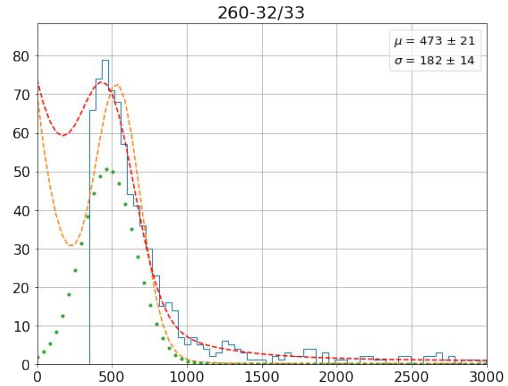


# # of iron spots *vs* VGEM

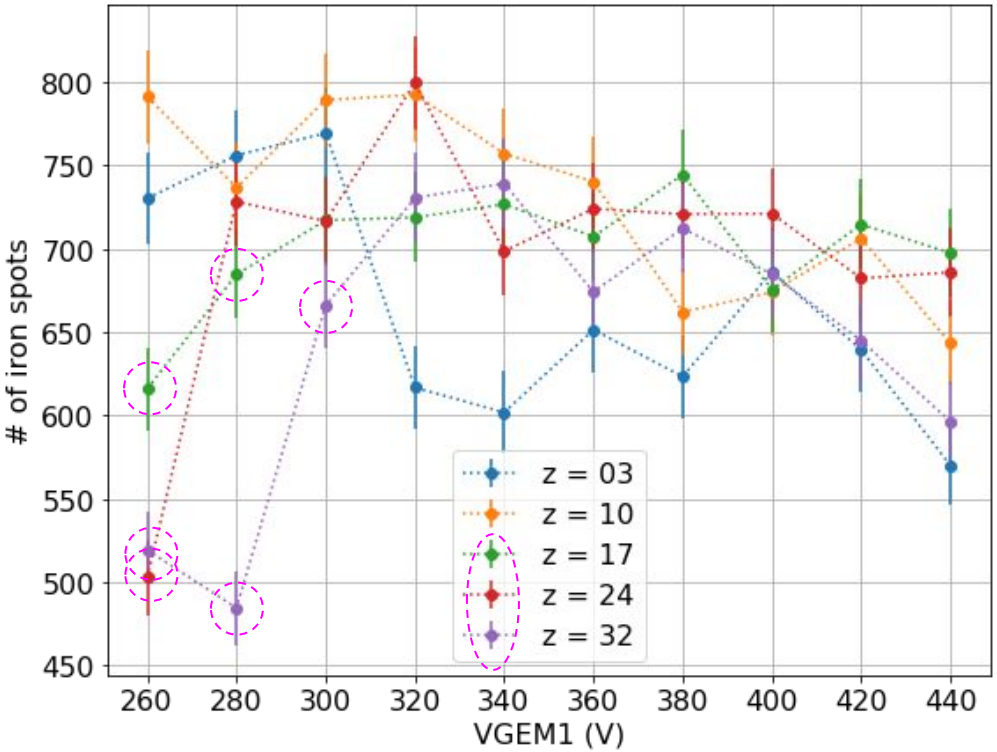



Ok with the fact that the lower z, higher the energy

Higher the z, higher the loss in energy for low VGEM

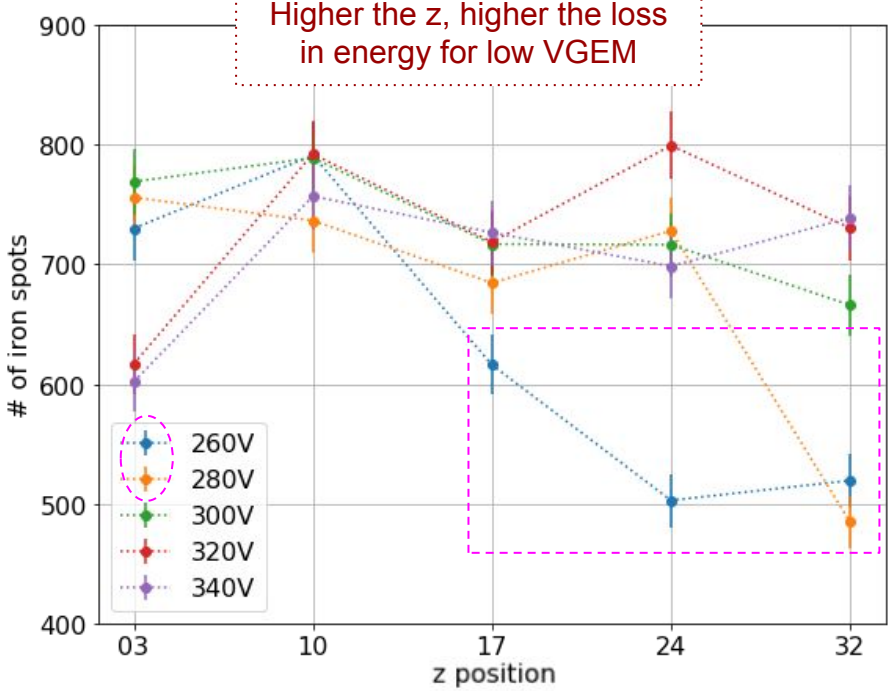


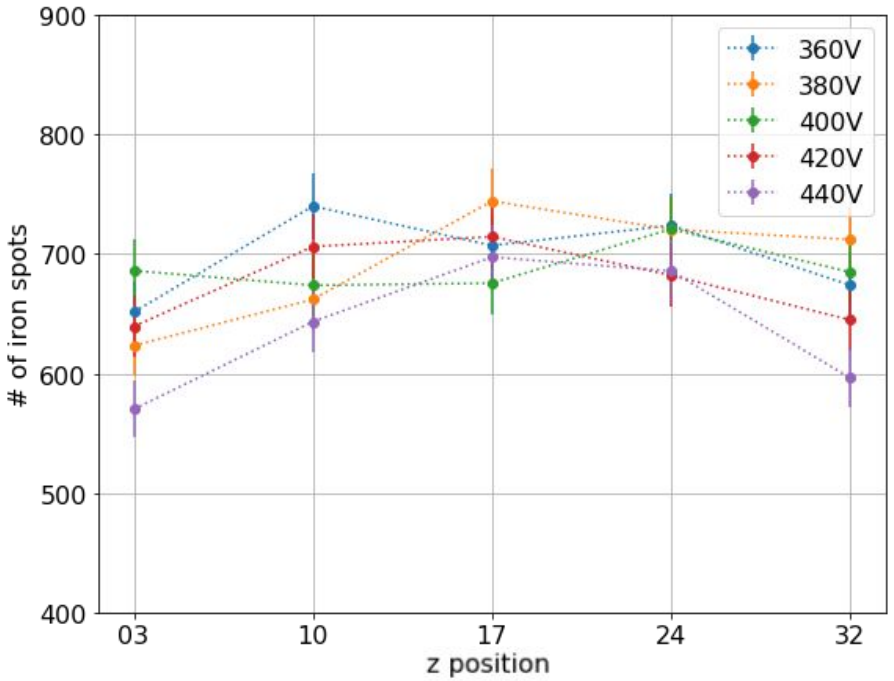

Seems that there is a loss in efficiency for low VGEM values for z > 10/11



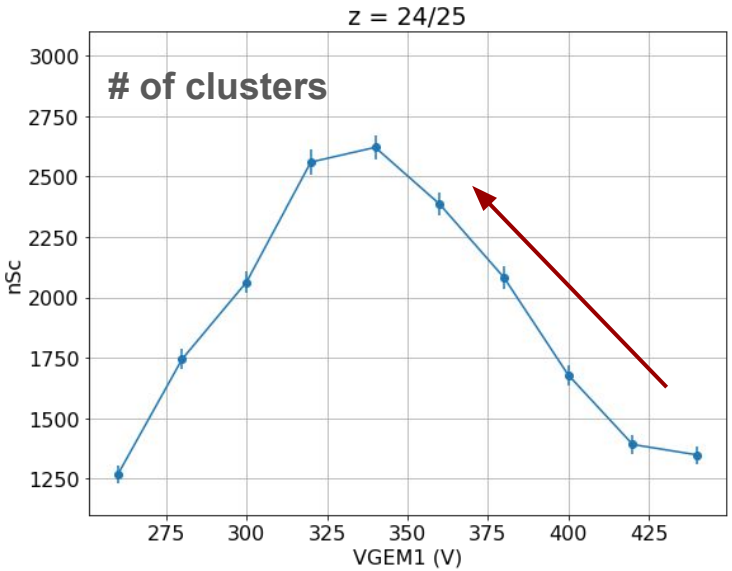
# # of iron spots *vs* z

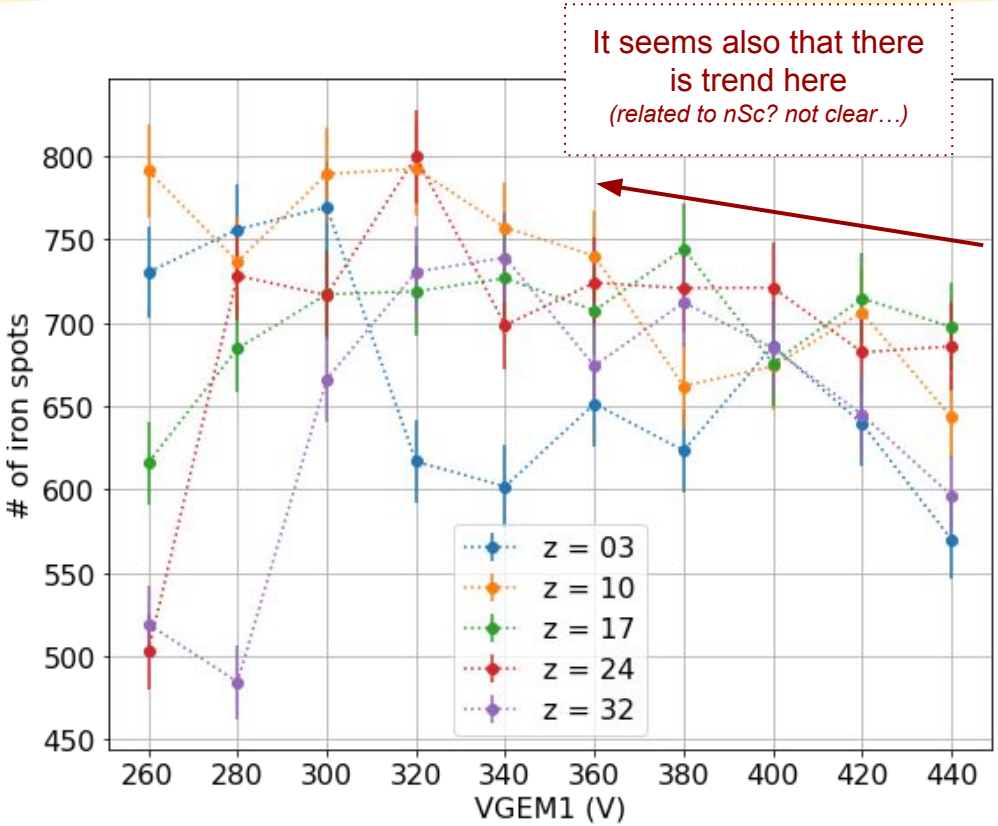
Higher the z, higher the loss in energy for low VGEM



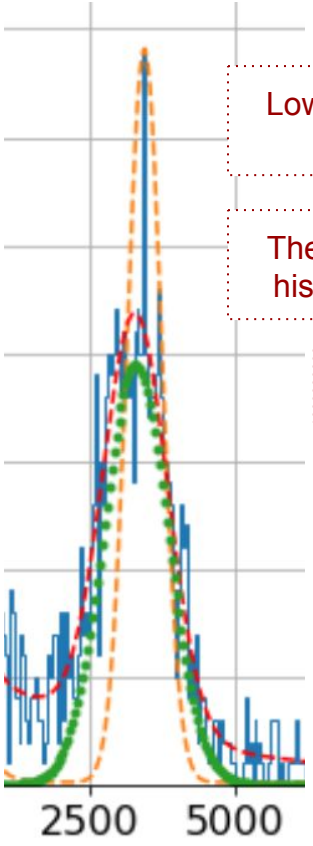



# # of iron spots *vs* VGEM



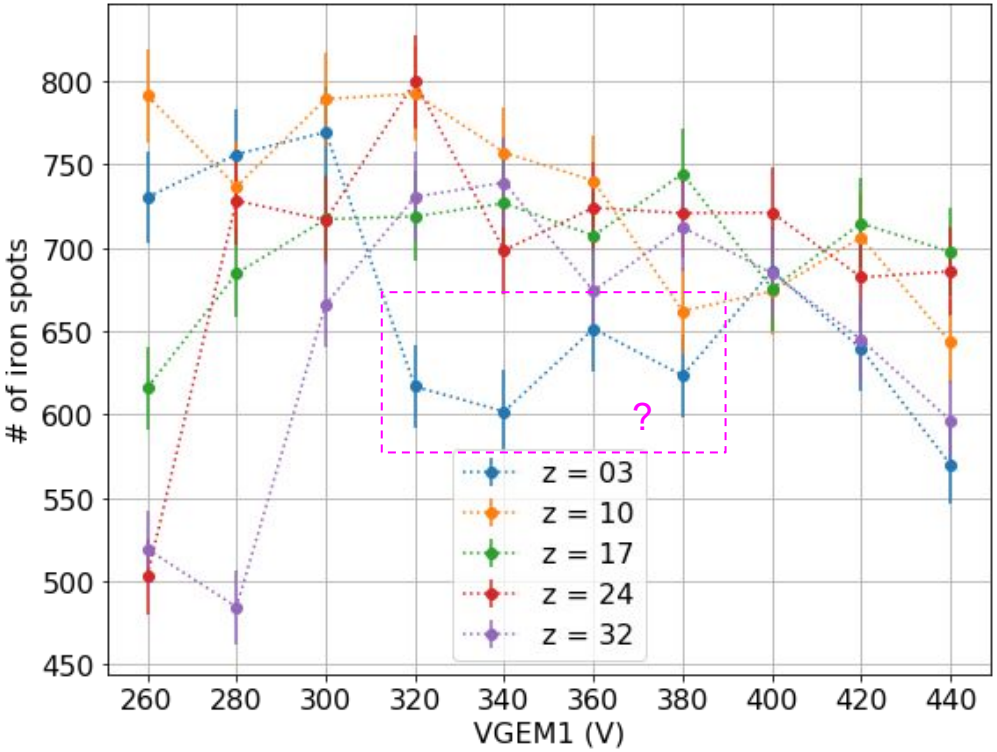
# # of iron spots *vs* VGEM




Low values for VGEM between 320 and 380 V

There are peaks on the energy histogram that might explain it

To be studied



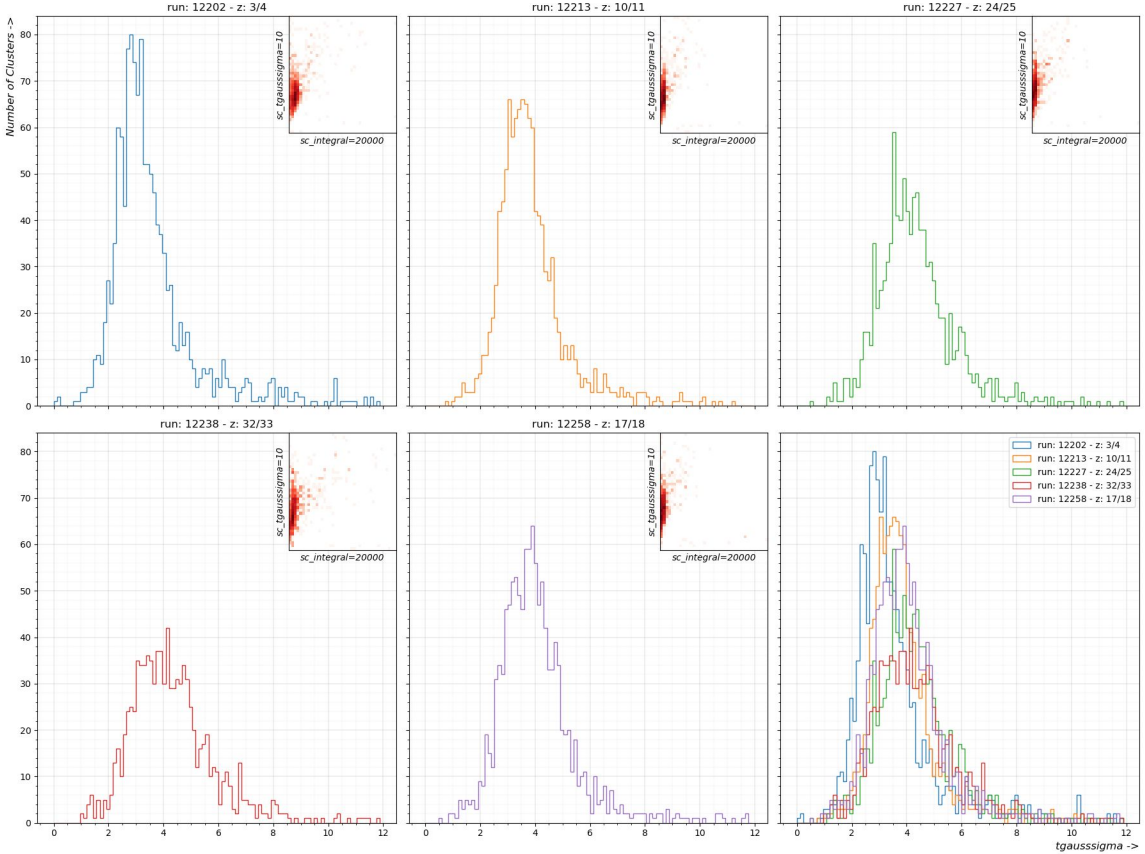
# tgausssigma distributions

Cut

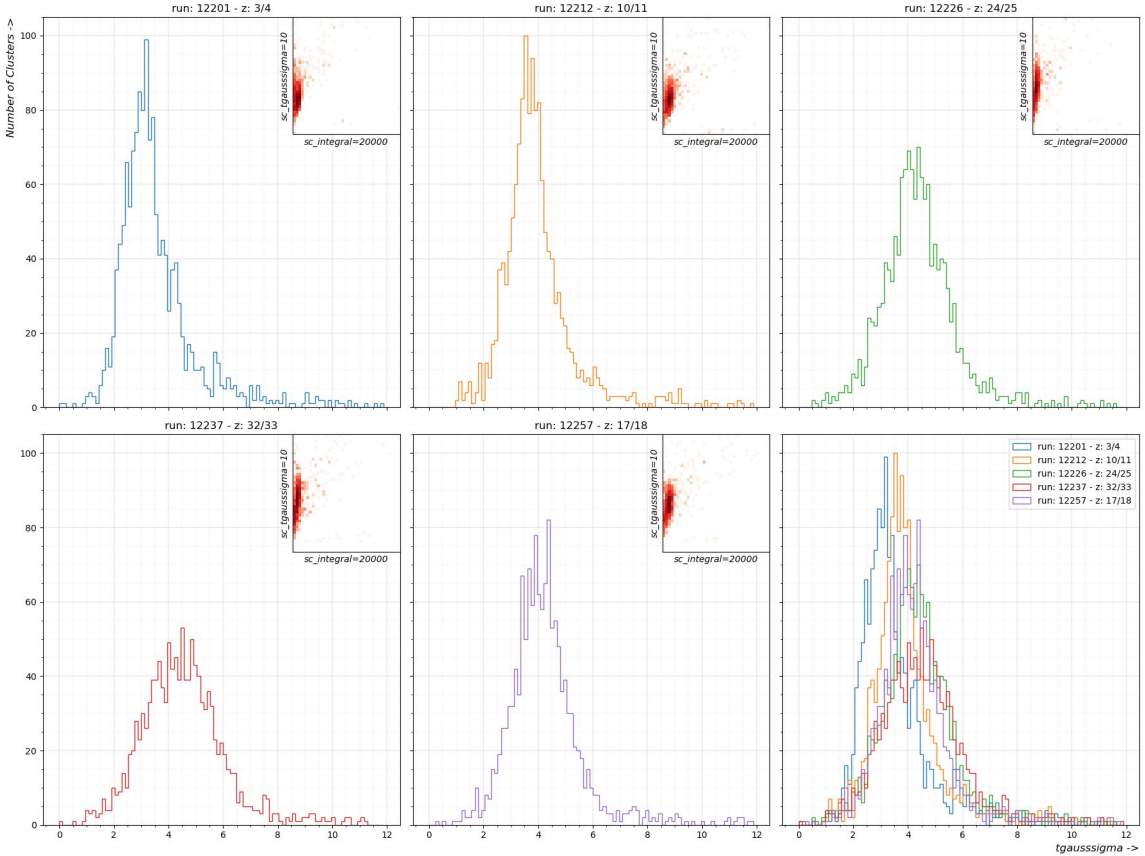
sc_ymin > 500 & sc_ymax < 1750

sc_xmin > 250 & sc_xmax < 2050

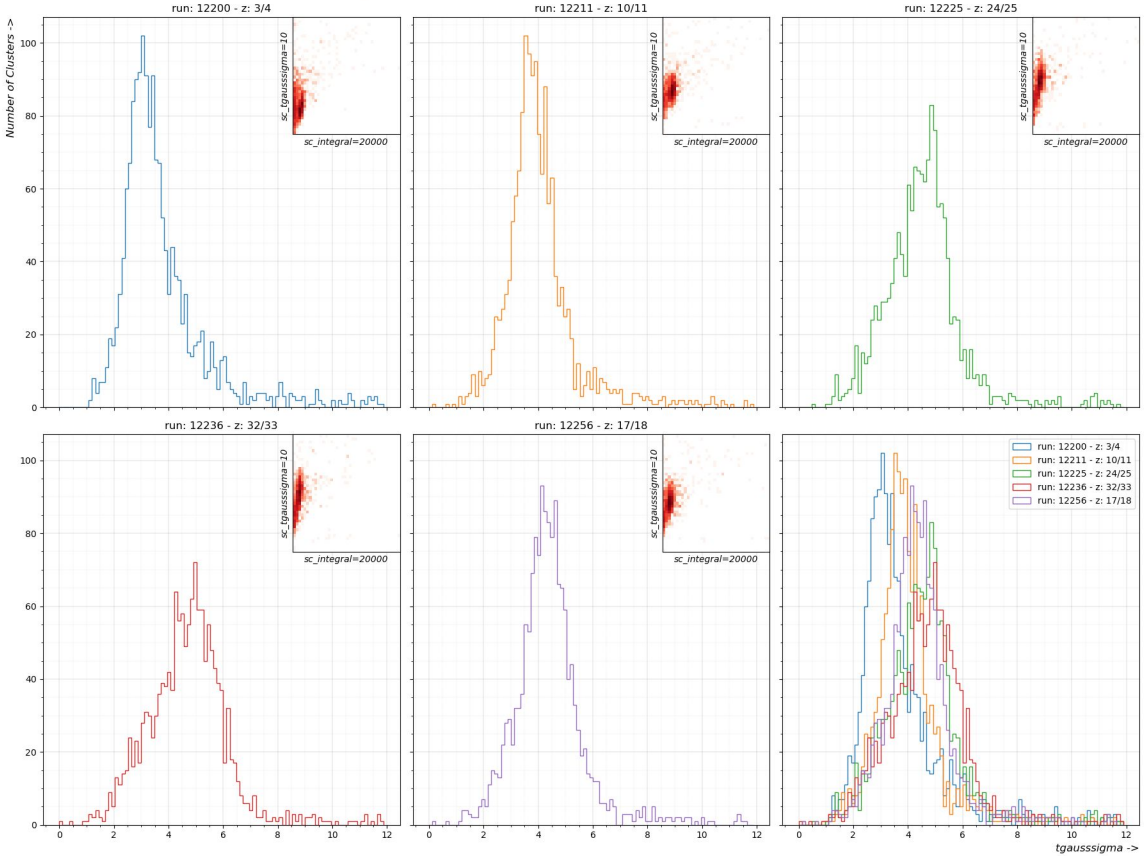
# VGEM Voltage: 260



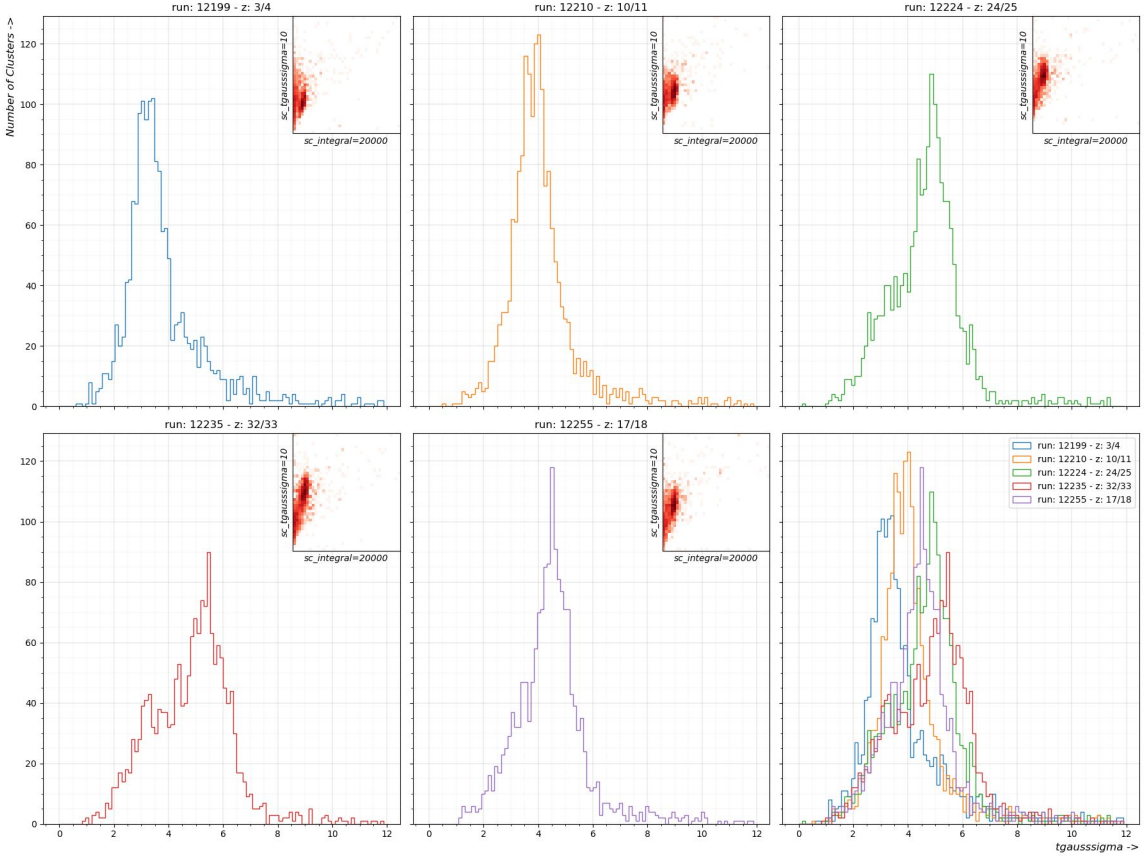
# VGEM Voltage: 280



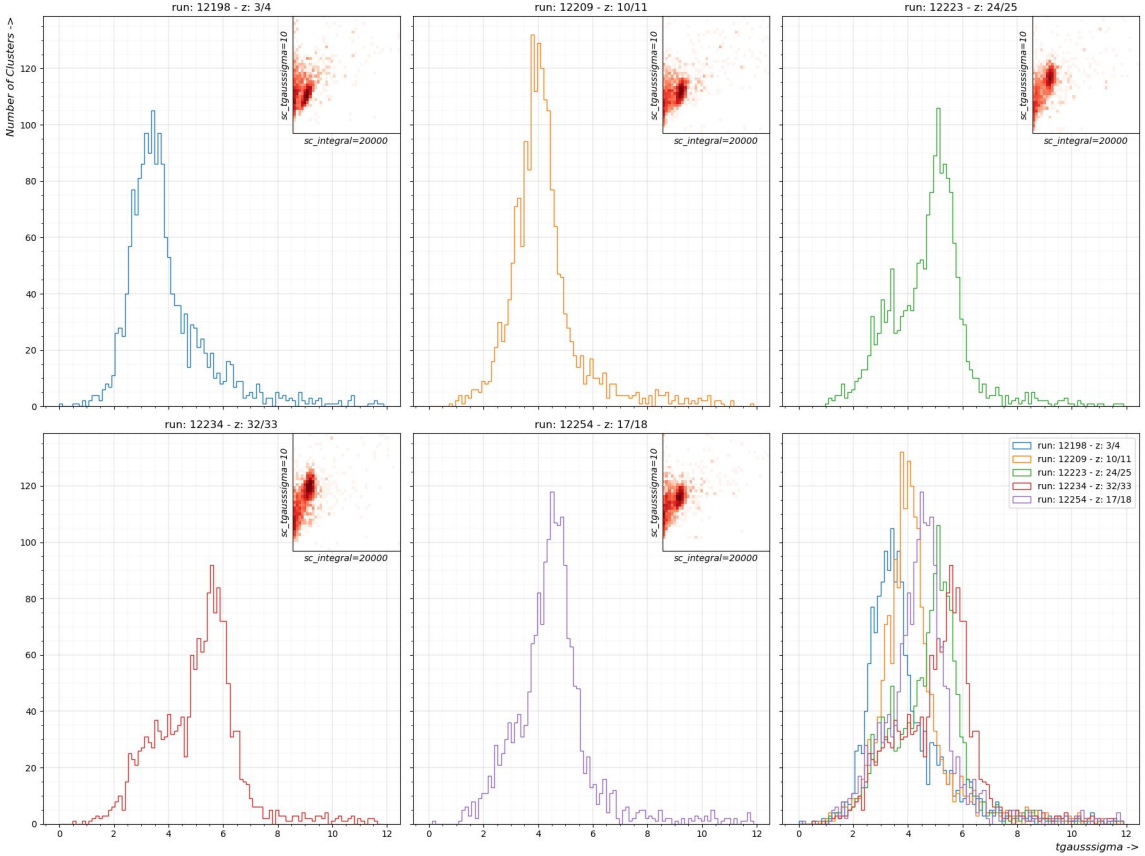
# VGEM Voltage: 300



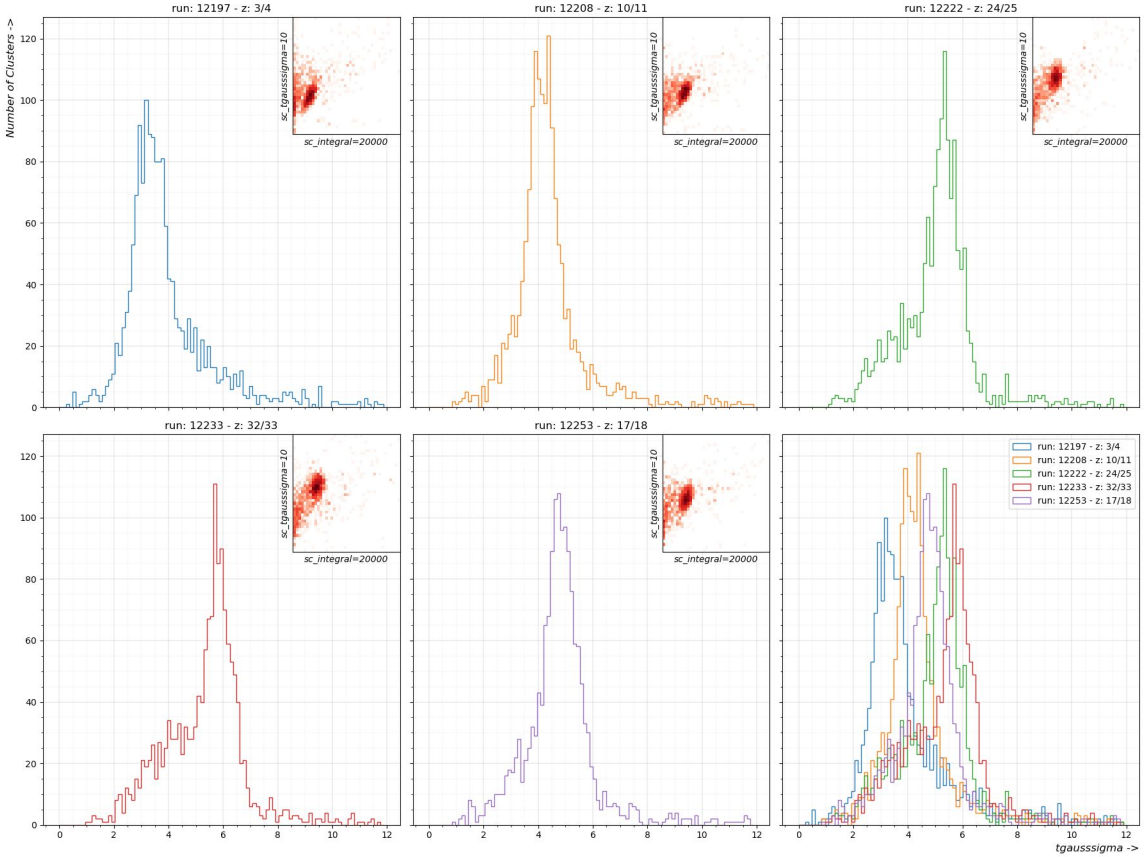
# VGEM Voltage: 320



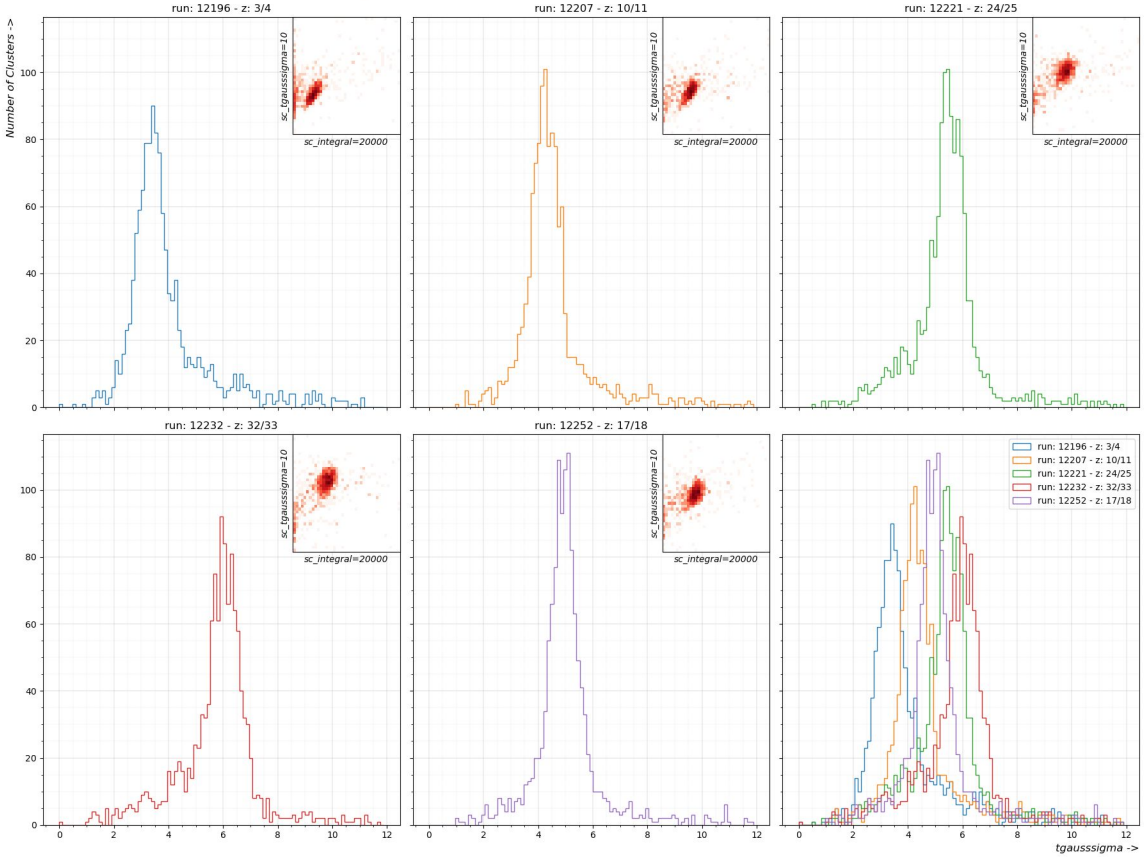
# VGEM Voltage: 340



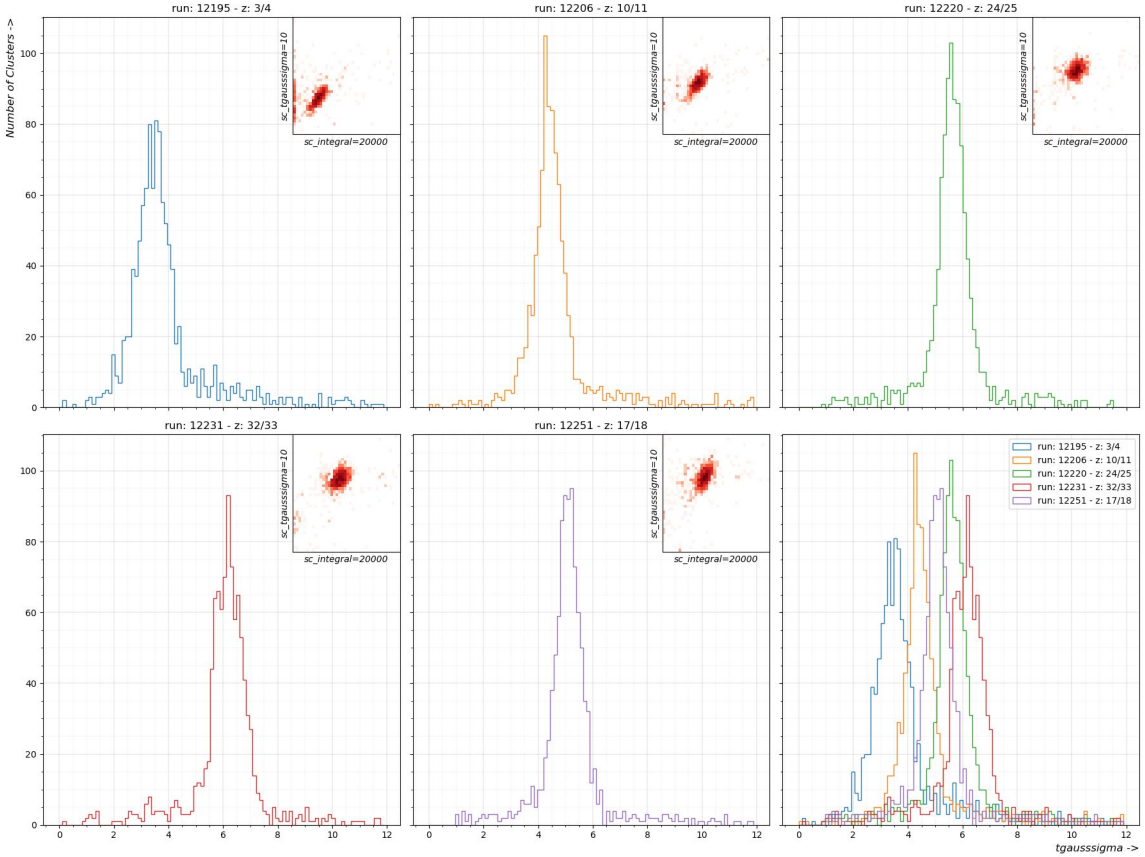
# VGEM Voltage: 360



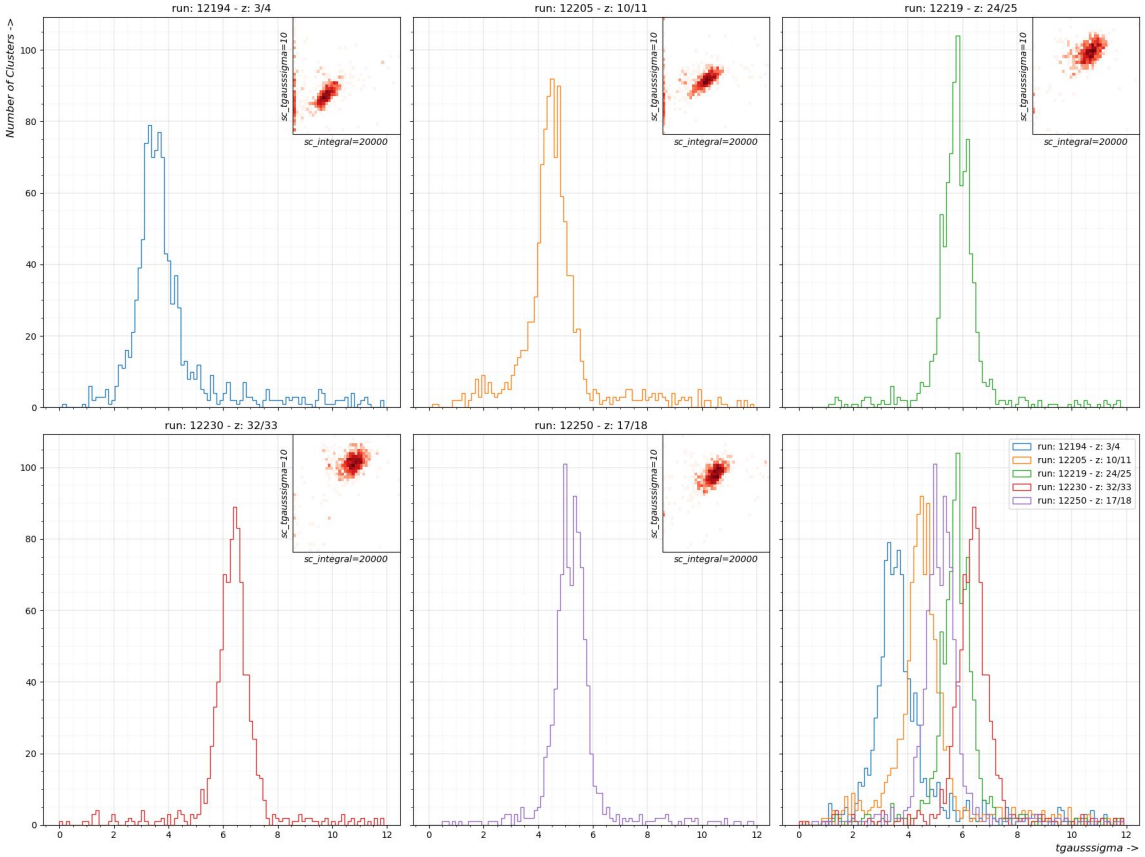
# VGEM Voltage: 380



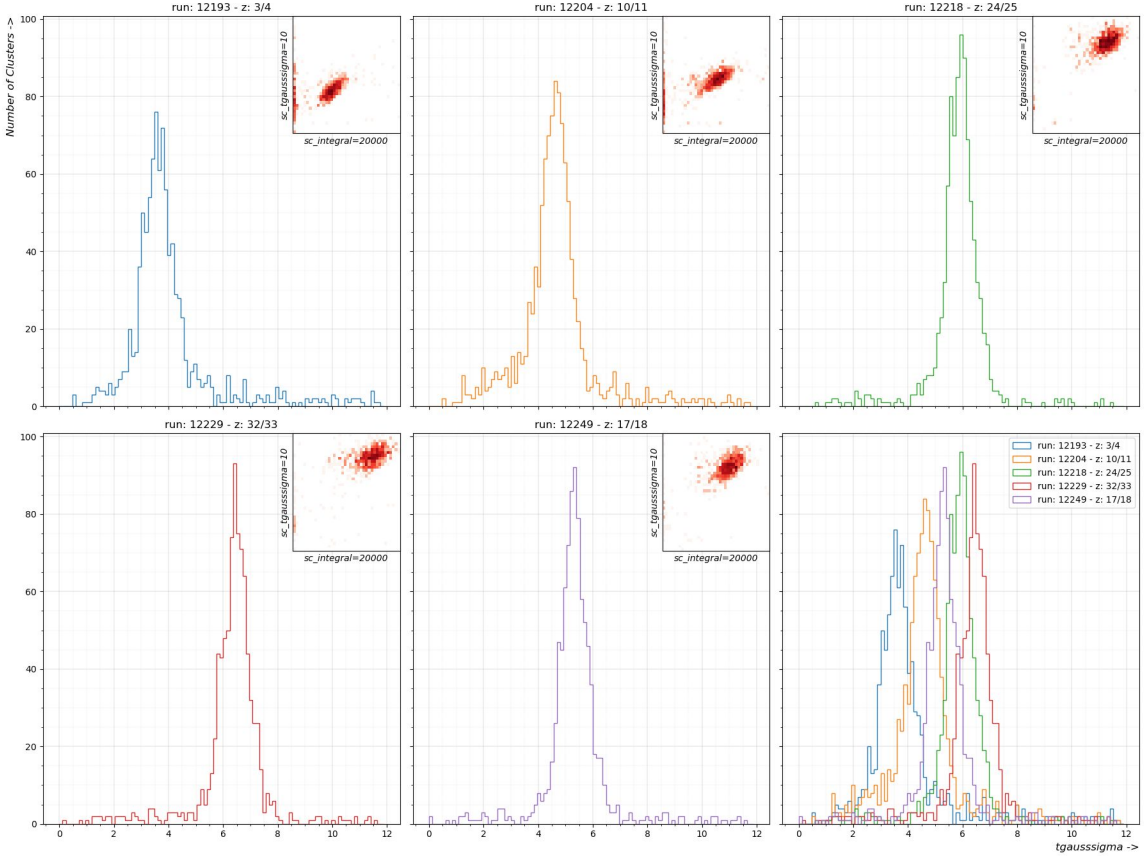
# VGEM Voltage: 400



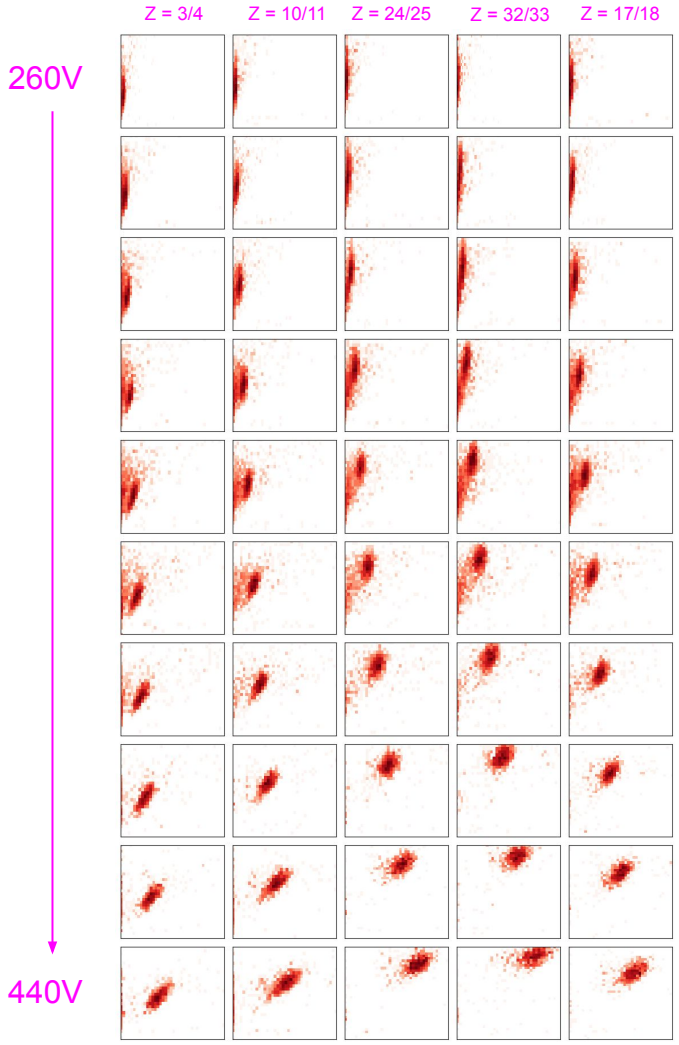
# VGEM Voltage: 420



# VGEM Voltage: 440



Aqui colocar os insights



# Next steps

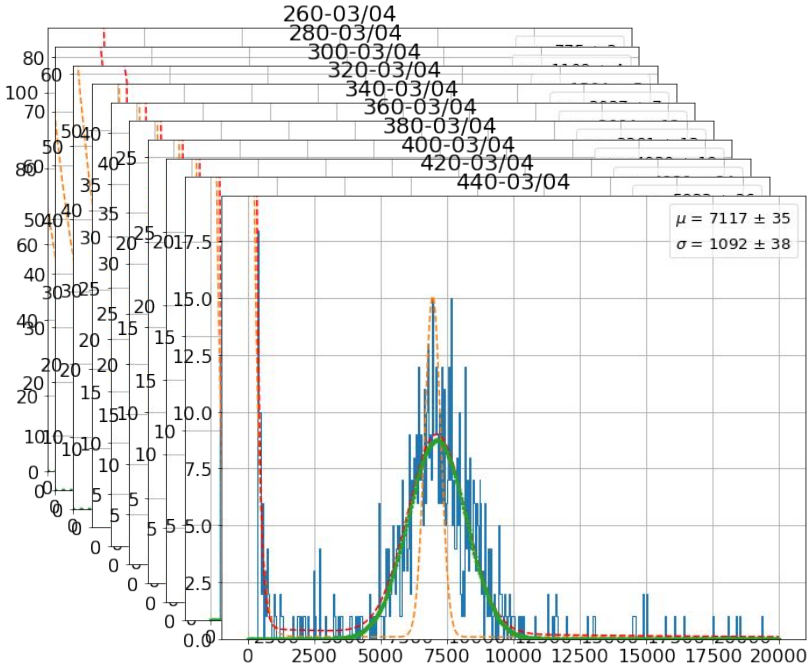
- ??

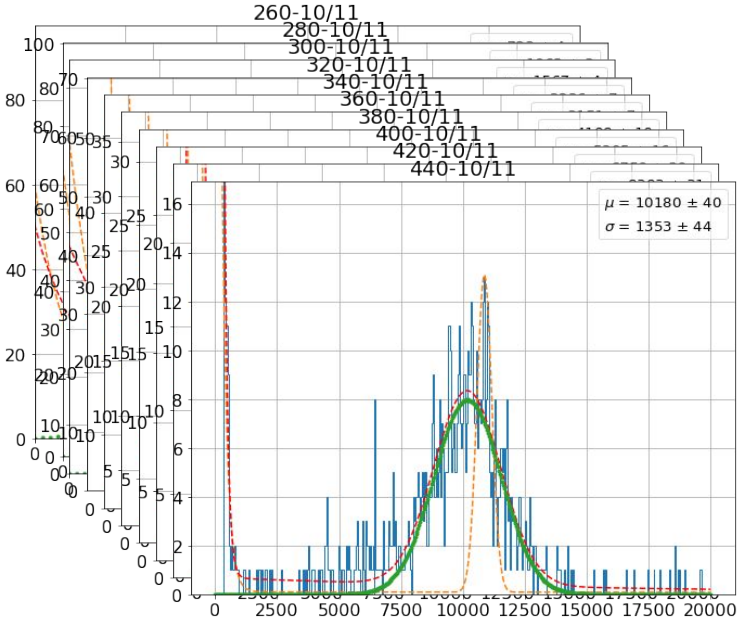
# Back-up

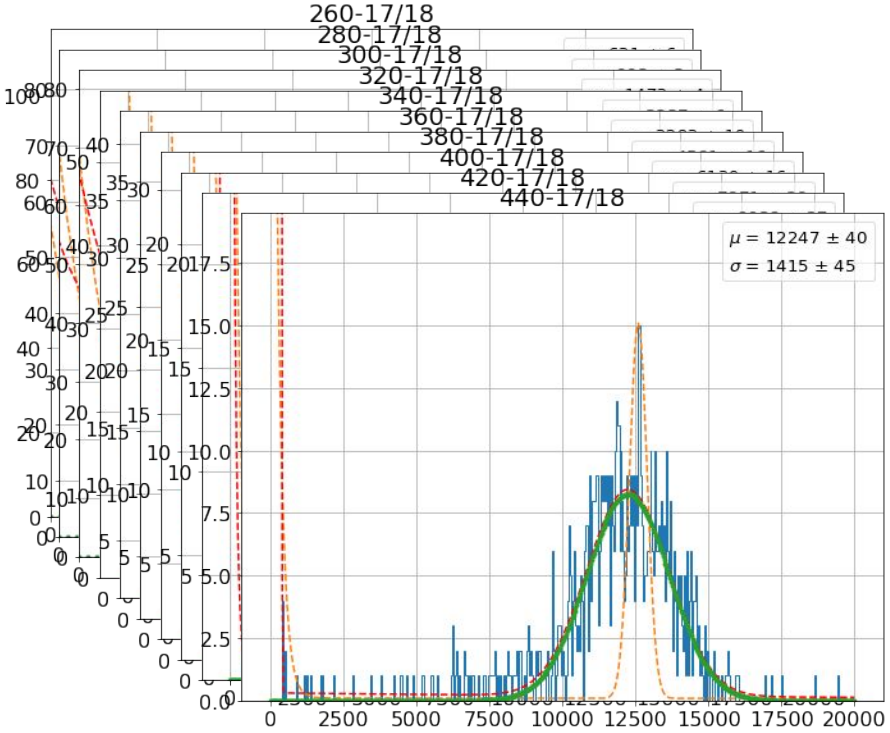
, vmin=0, vmax=40

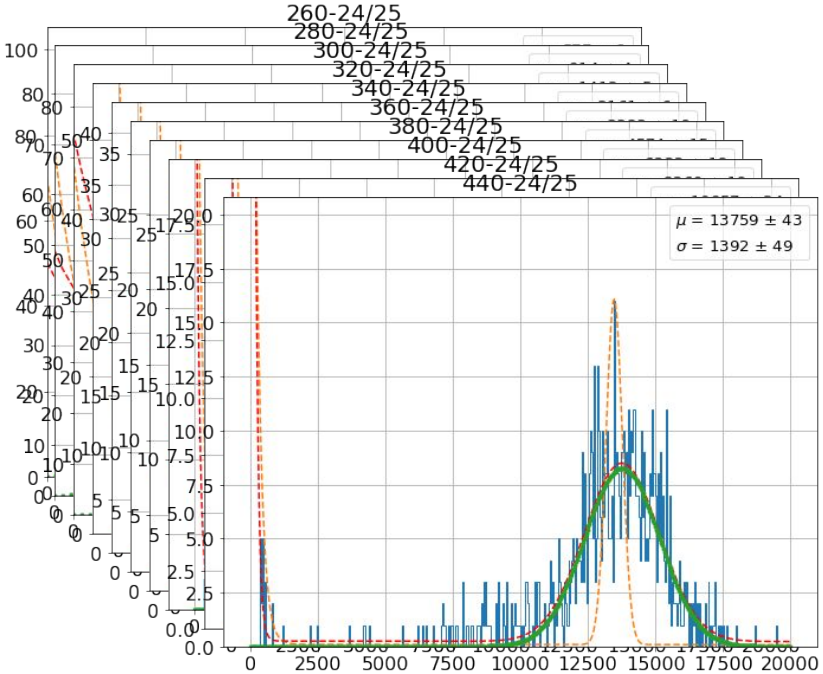
Posso usar o pedestal para tentar recuperar os dados de 260V…

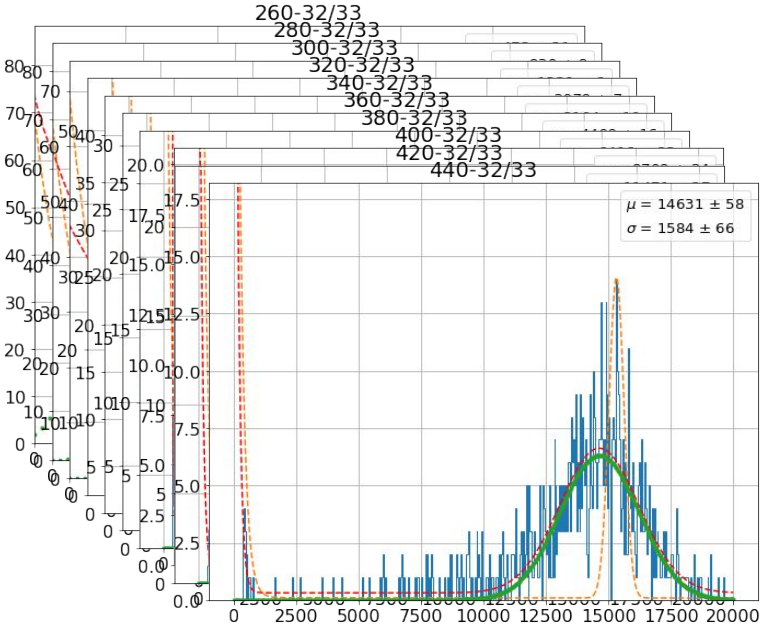
Posso fazer o fit de eficiência depois dos cortes…


260-03/04
280-03/04
300-03/04
320-03/04
340-03/04
360-03/04
380-03/04
400-03/04
420-03/04
440-03/04
$\mu$ = 7117 ± 35
$\sigma$ = 1092 ± 38
0
2500
5000
7500
10000
12500
15000
17500
20000


260-10/11
280-10/11
300-10/11
320-10/11
340-10/11
360-10/11
380-10/11
400-10/11
420-10/11
440-10/11
$\mu$ = 10180 ± 40
$\sigma$ = 1353 ± 44
0
2500
5000
7500
10000
12500
15000
17500
20000


260-17/18
280-17/18
300-17/18
320-17/18
340-17/18
360-17/18
380-17/18
400-17/18
420-17/18
440-17/18
$\mu$ = 12247 ± 40
$\sigma$ = 1415 ± 45
0
2500
5000
7500
10000
12500
15000
17500
20000


260-24/25
280-24/25
300-24/25
320-24/25
340-24/25
360-24/25
380-24/25
400-24/25
420-24/25
440-24/25
$\mu$ = 13759 ± 43
$\sigma$ = 1392 ± 49
0
2500
5000
7500
10000
12500
15000
17500
20000


260-32/33
280-32/33
300-32/33
320-32/33
340-32/33
360-32/33
380-32/33
400-32/33
420-32/33
440-32/33
$\mu$ = 14631 ± 58
$\sigma$ = 1584 ± 66
0
2500
5000
7500
10000
12500
15000
17500
20000