

Charge Probability with Vertex

Ch. Finck & D. Juliani

Vertex Cluster Size

Implementation

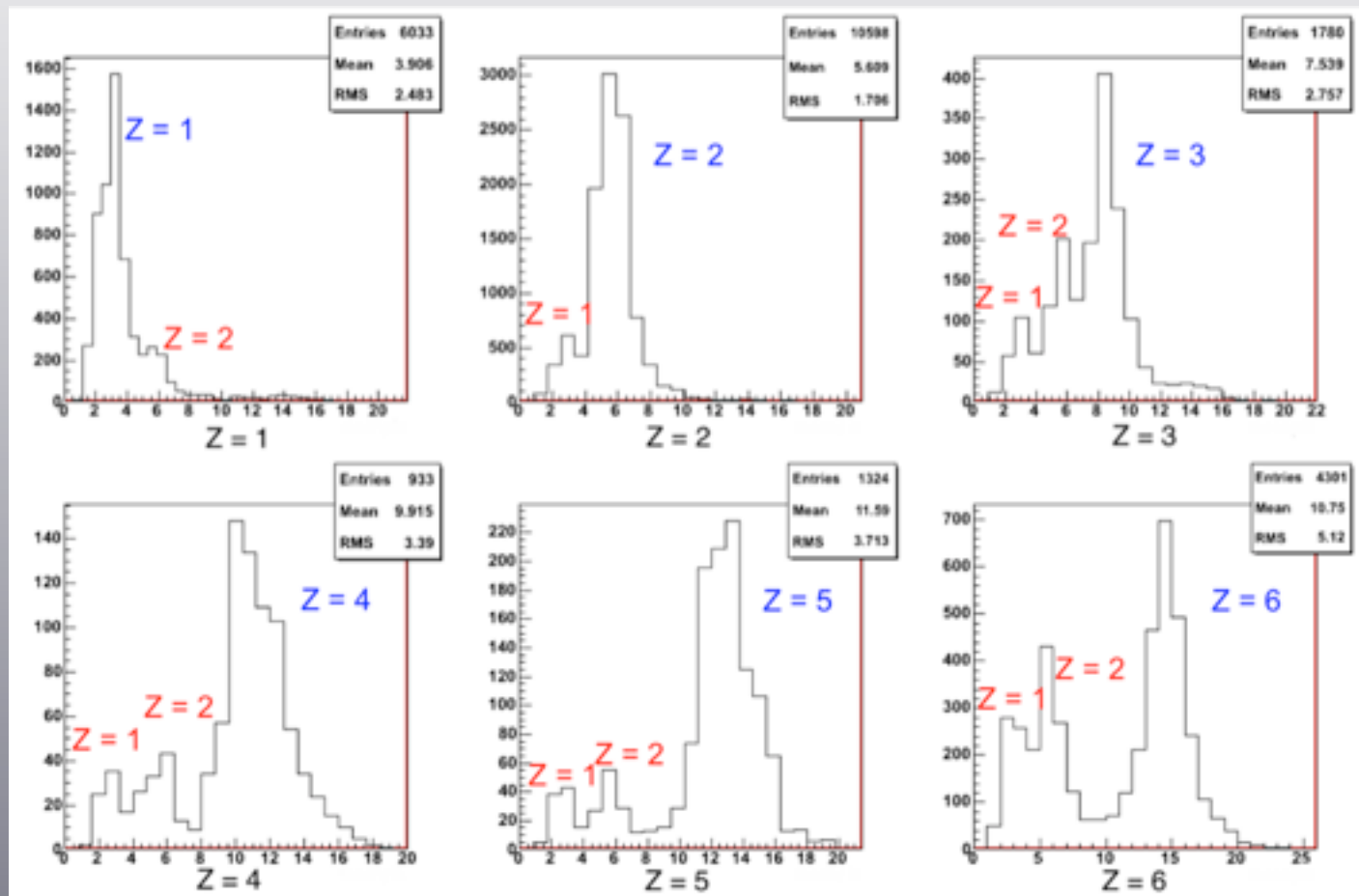
New Implementation

Conclusions

Vertex Cluster Size (i)

Clusters size vs charge (ToF)

- with cut $nTracks > 1$

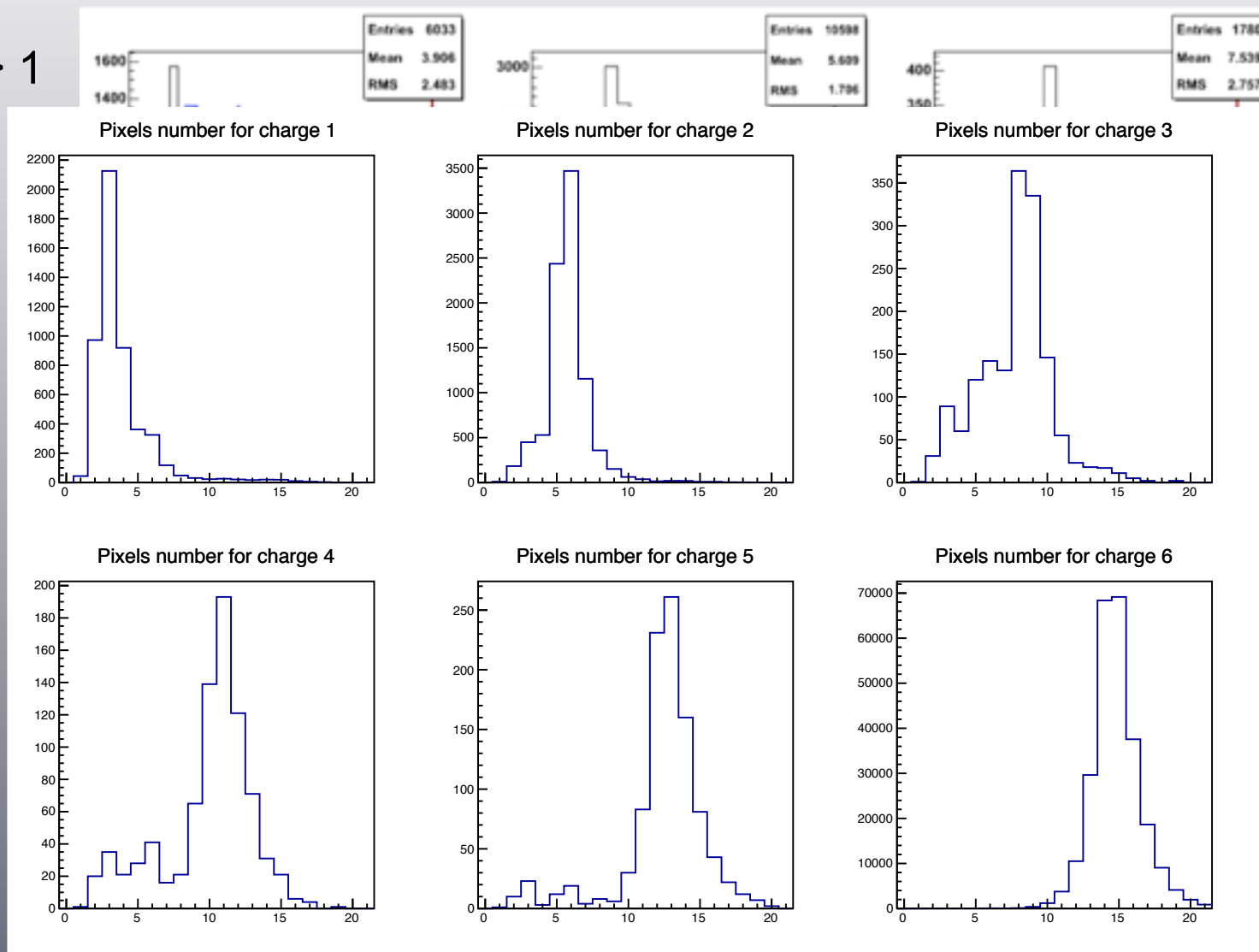


Vertex Cluster Size (i)

Clusters size vs charge (ToF)

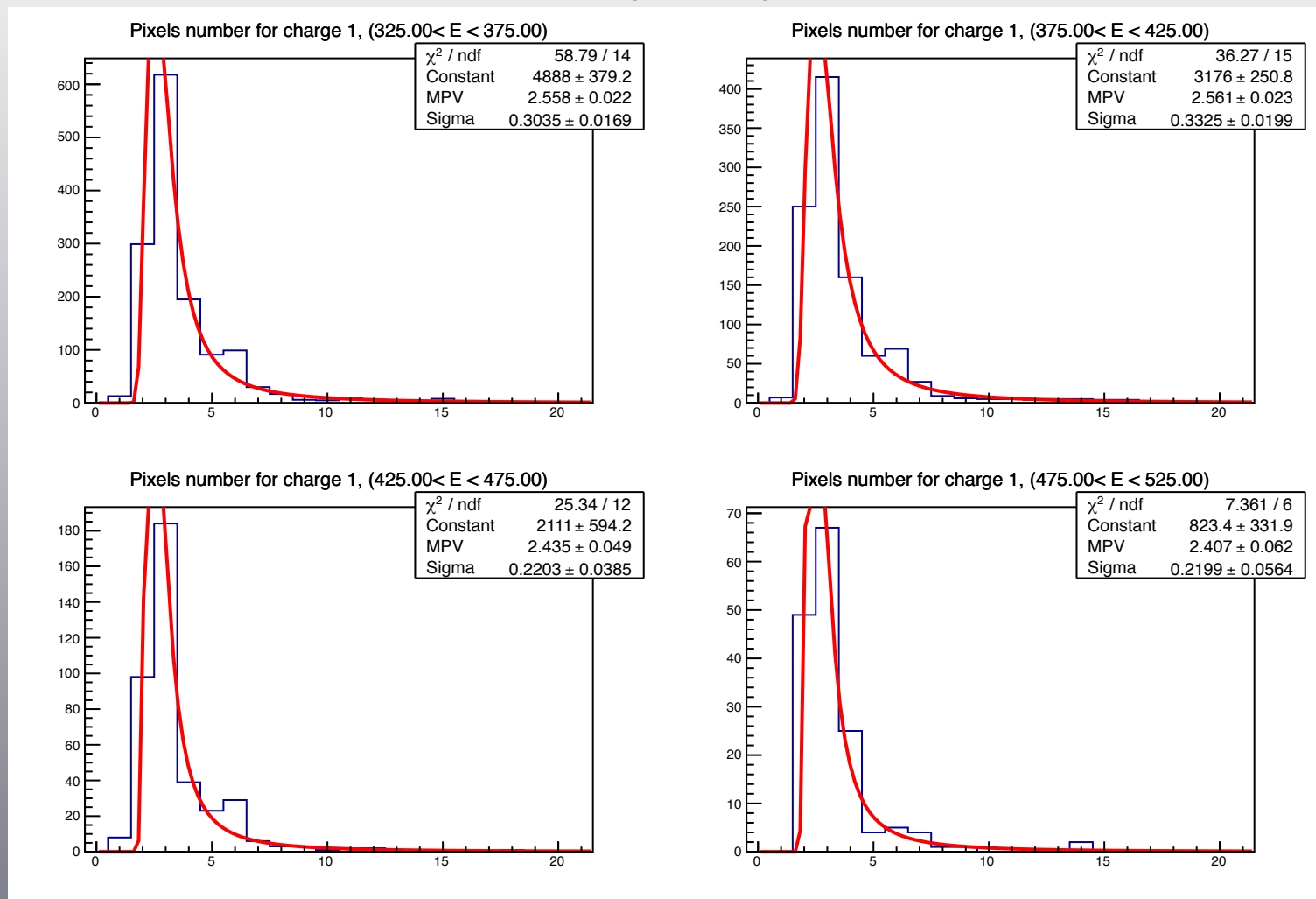
- with cut $nTracks > 1$

- BM Matched



Vertex Cluster Size (ii)

Cluster size with BM matched ($\theta < 5^\circ$)

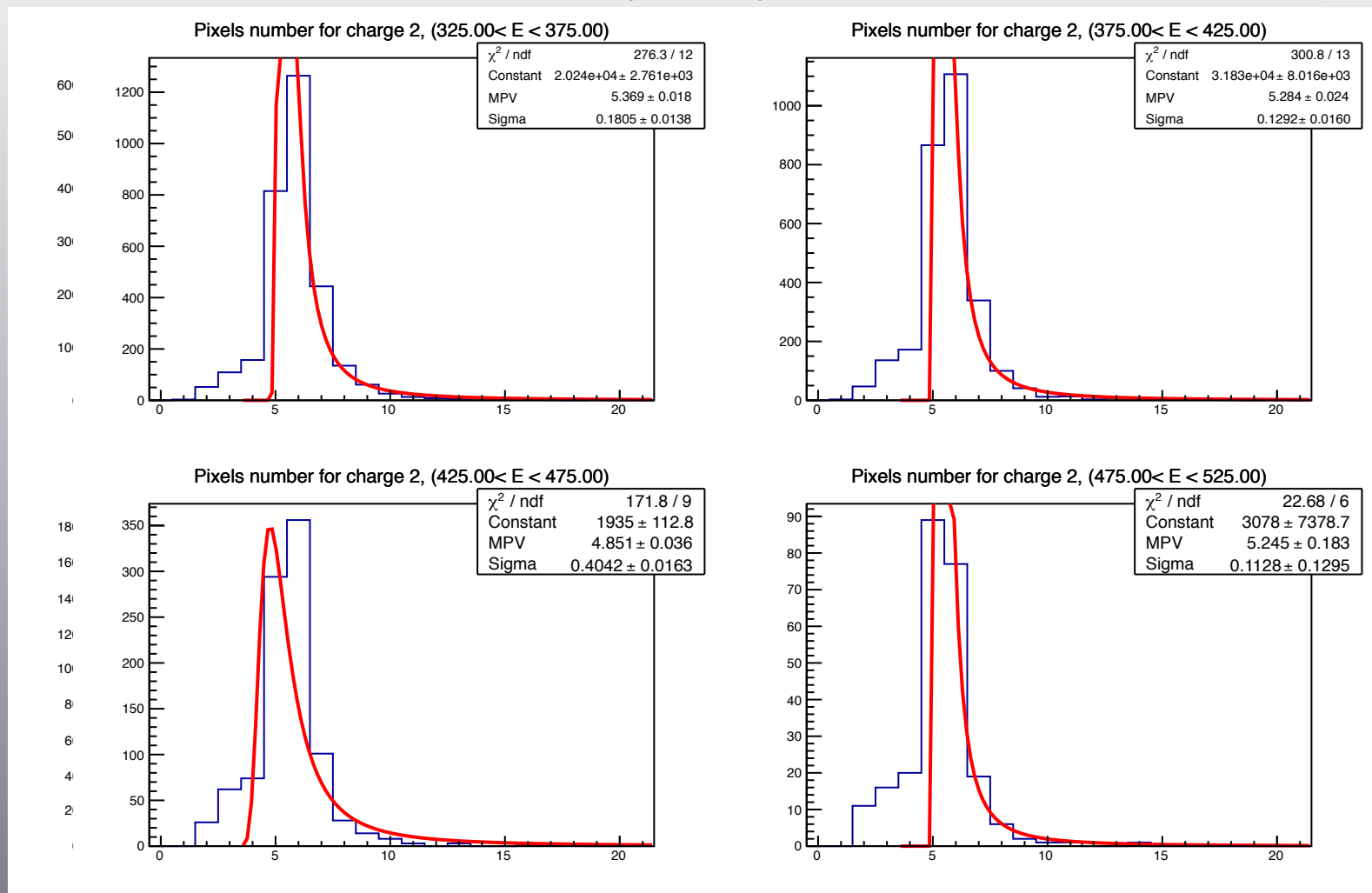


Fit with a Landau

Boron too high !

Vertex Cluster Size (ii)

Cluster size with BM matched ($\theta < 5^\circ$)

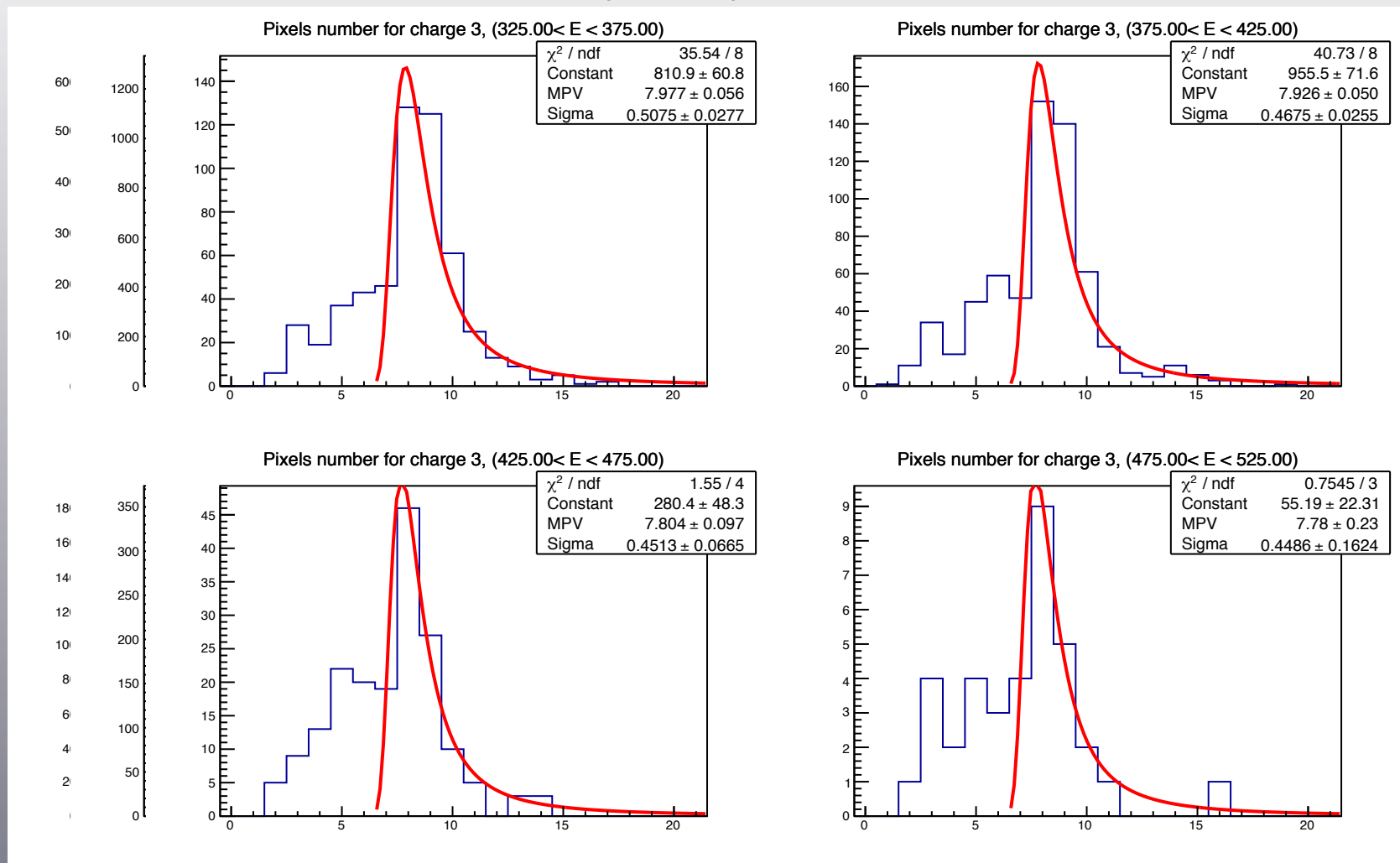


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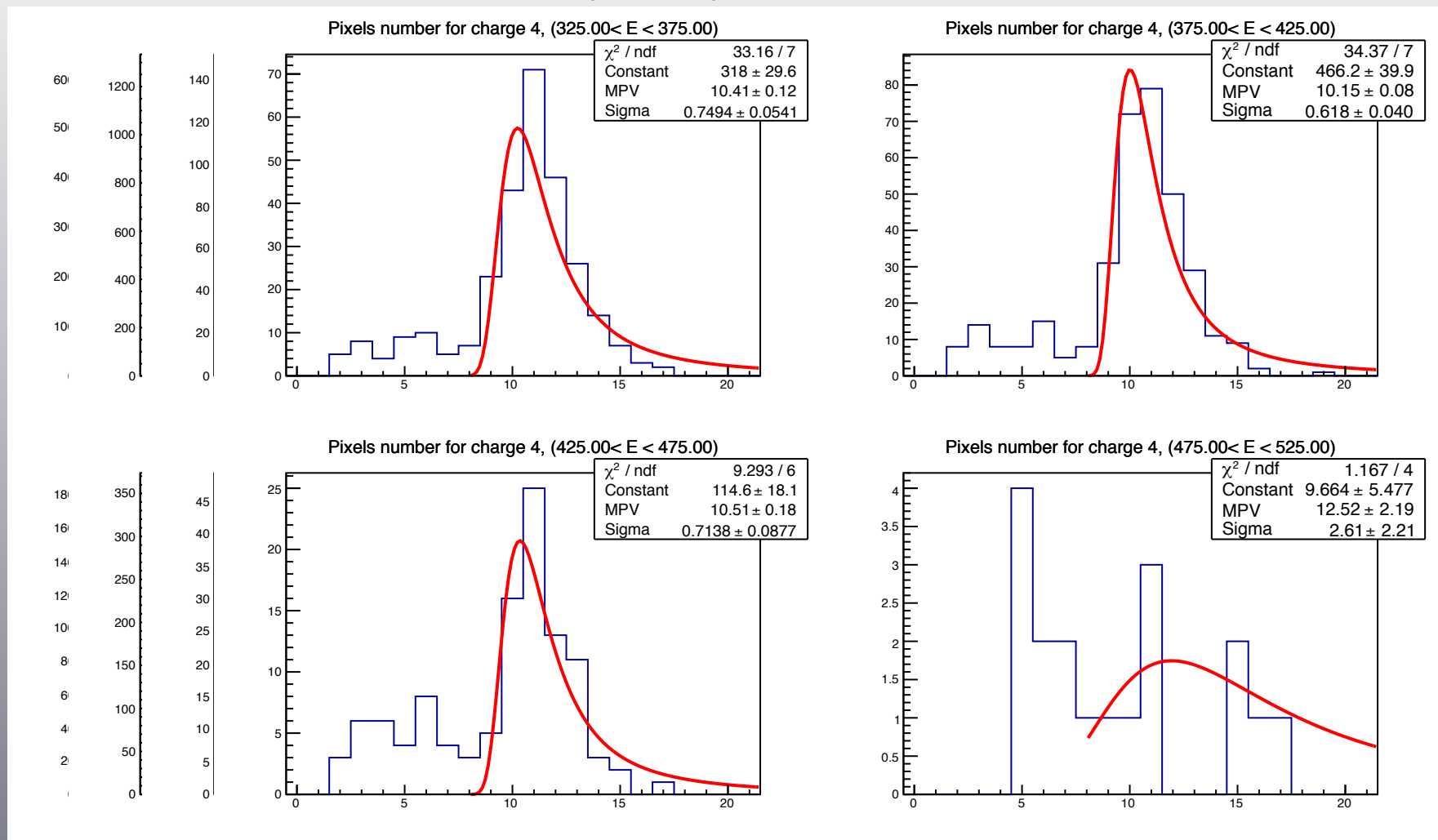


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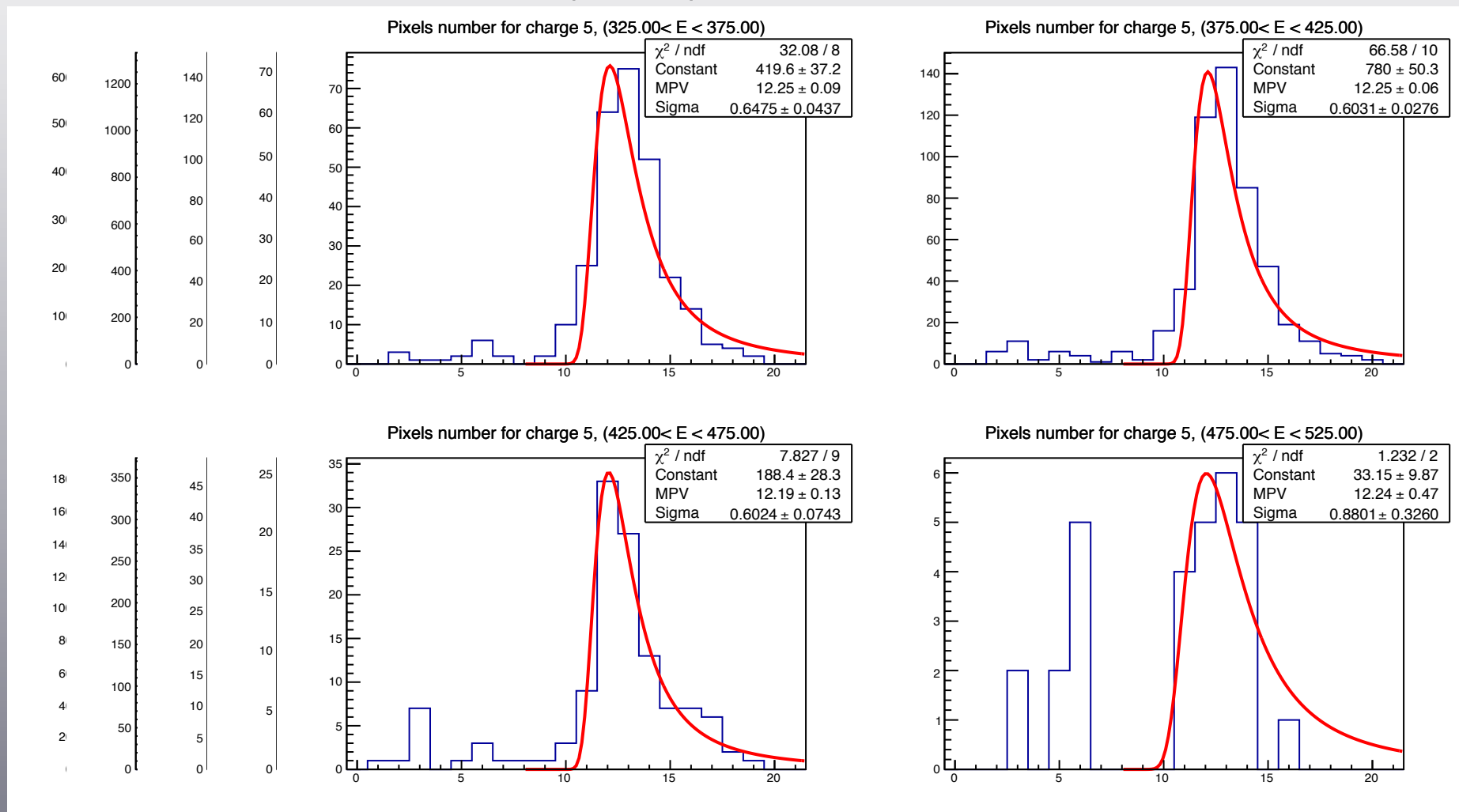


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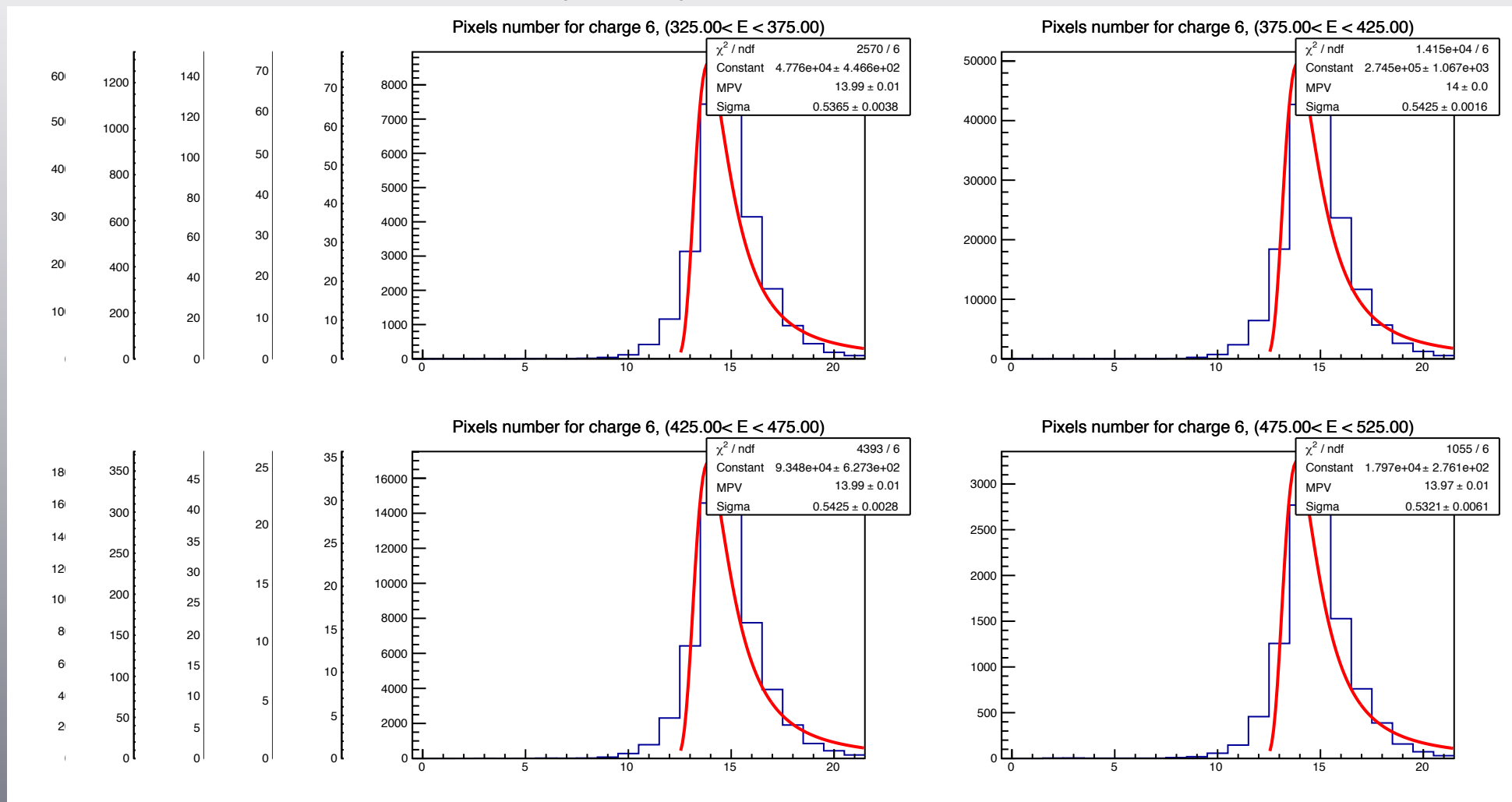


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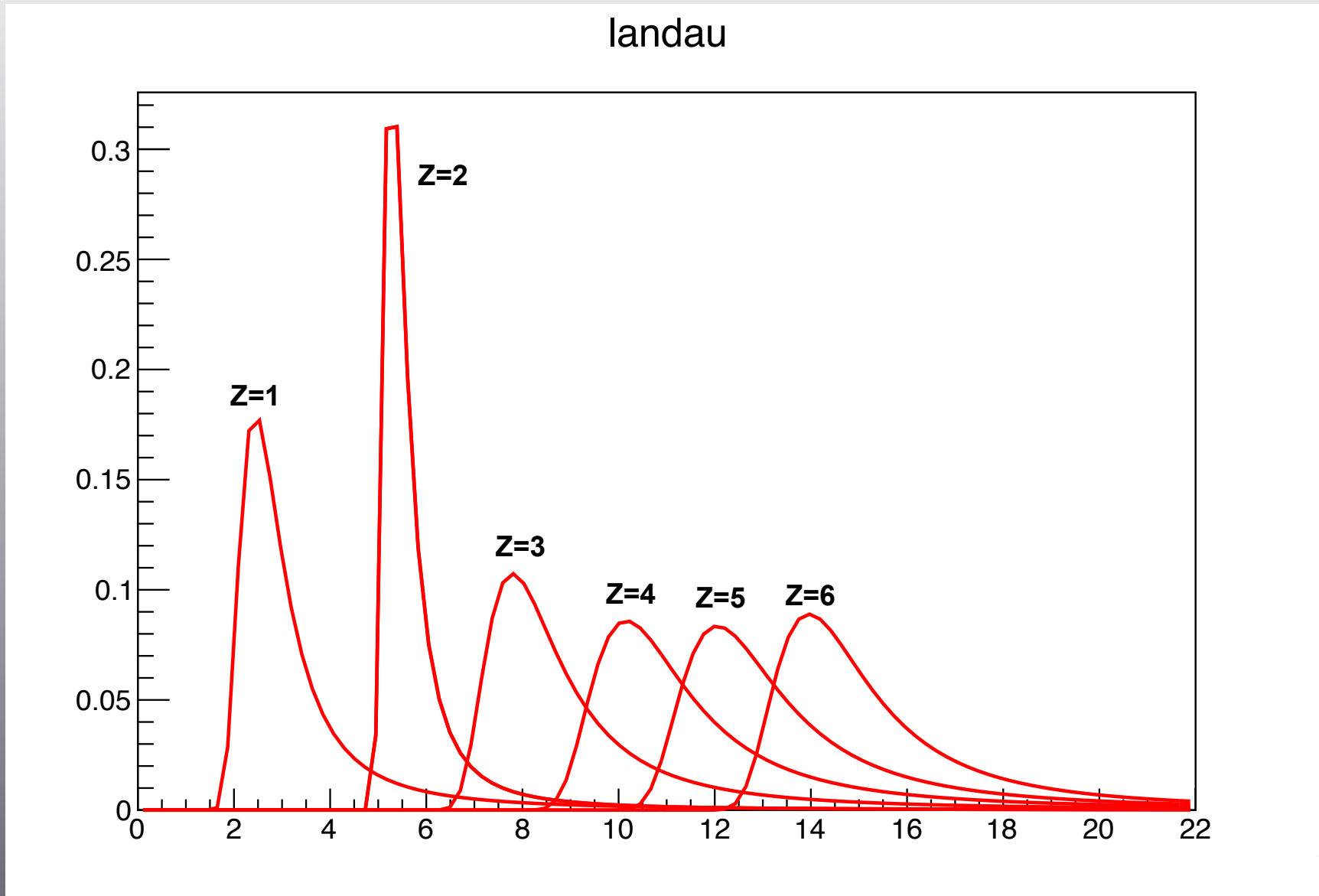


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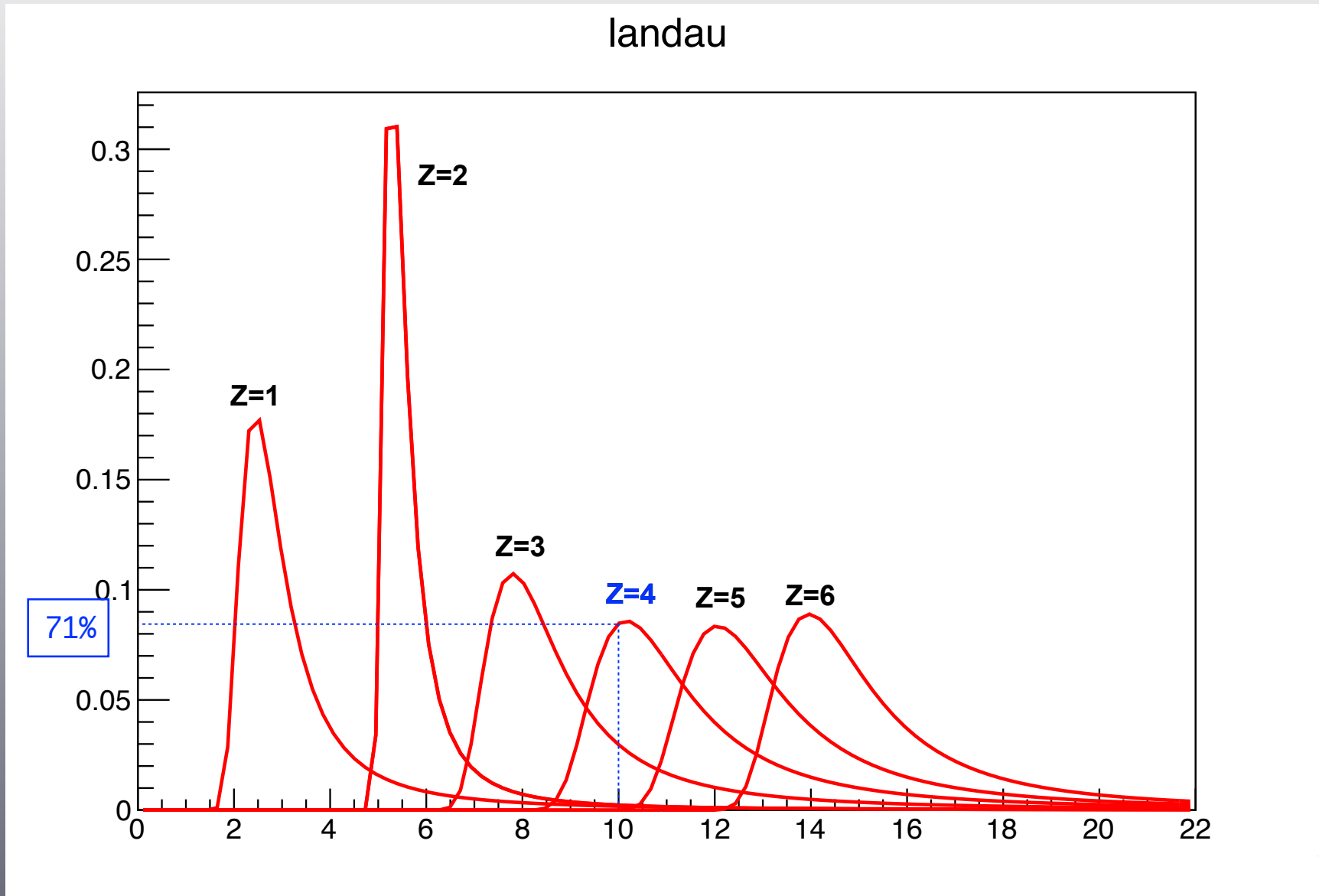
Implementation (ii)

• Landau Distributions (Normalized):



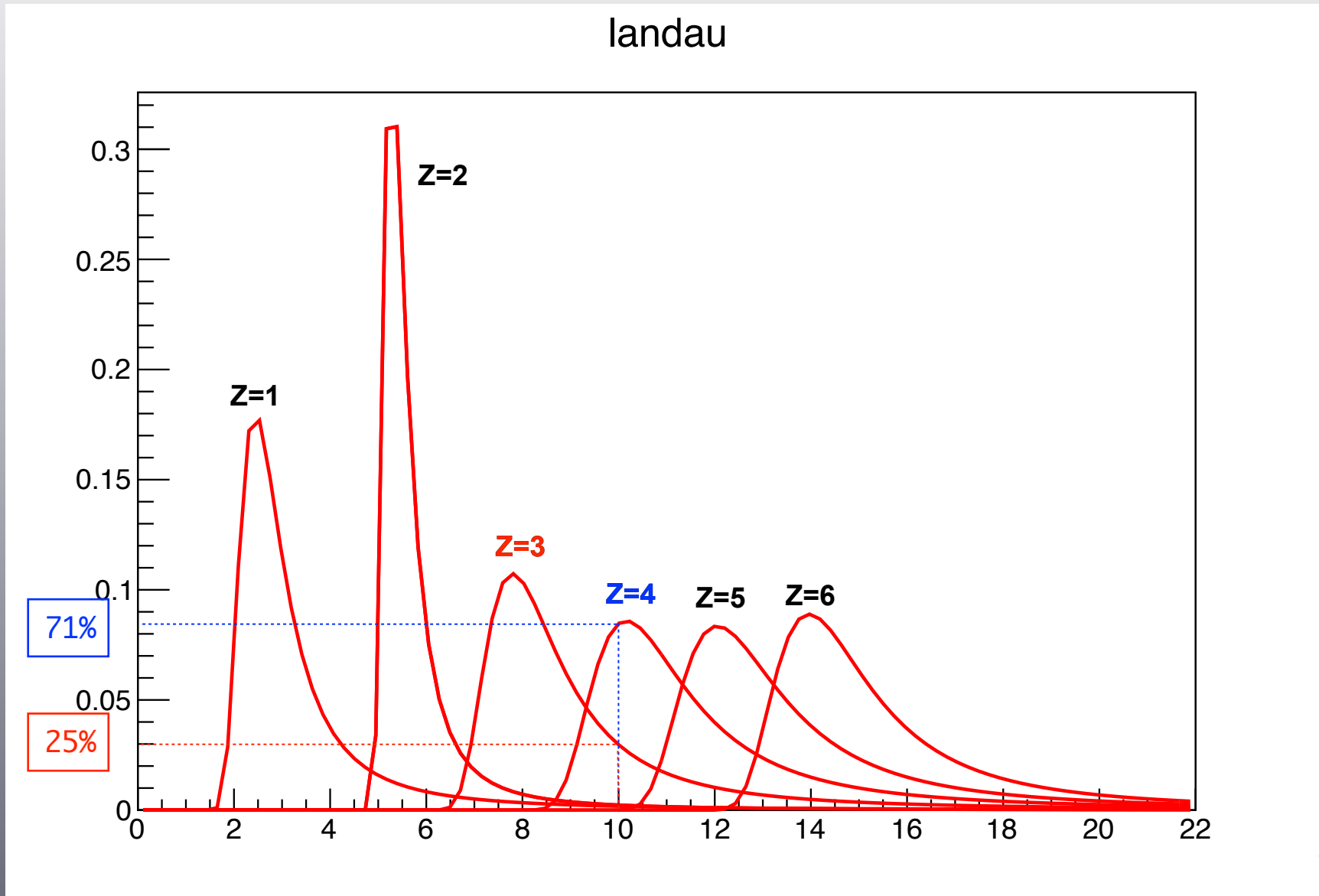
Implementation (ii)

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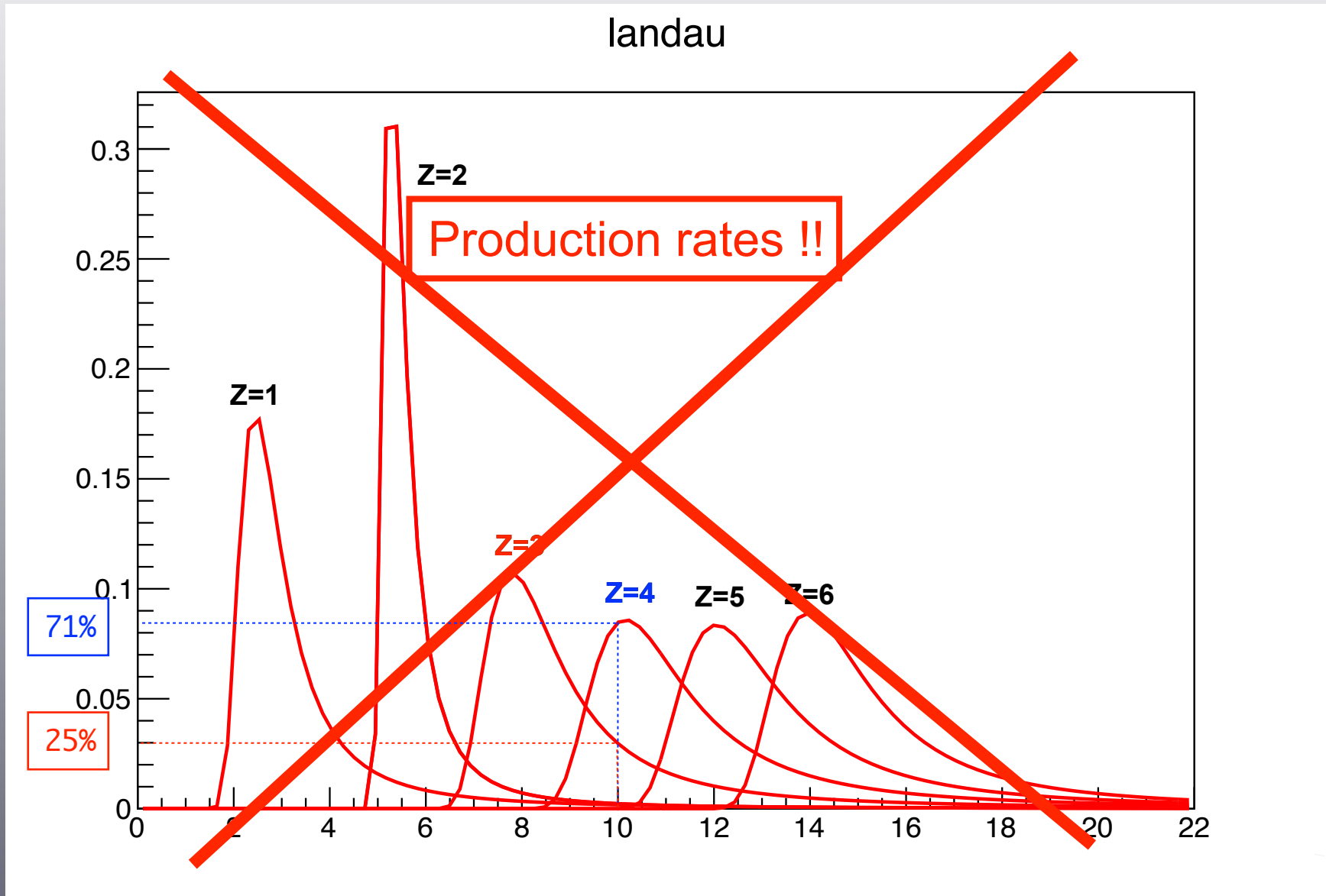
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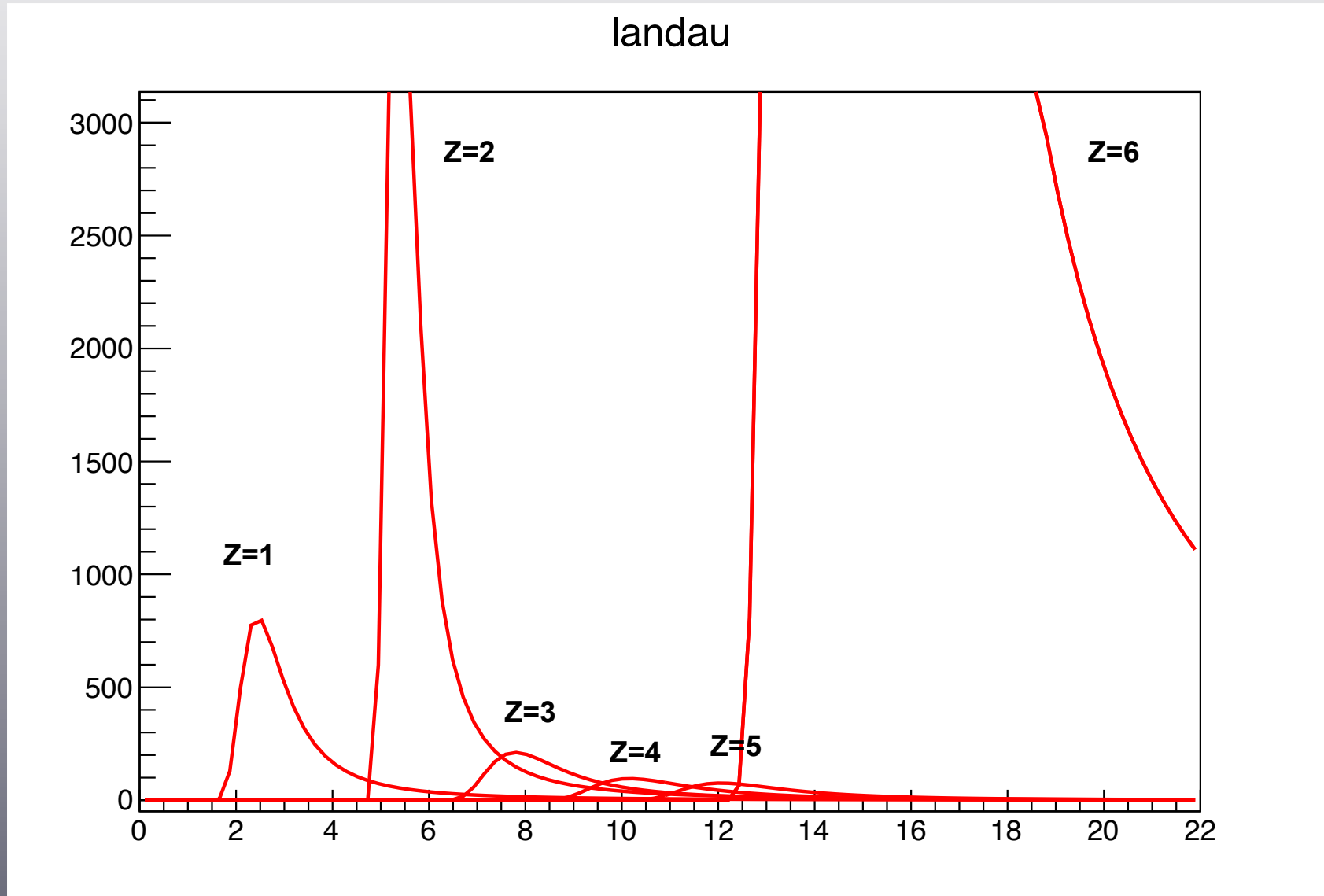
Implementation (ii)

• Landau Distributions (Normalized):



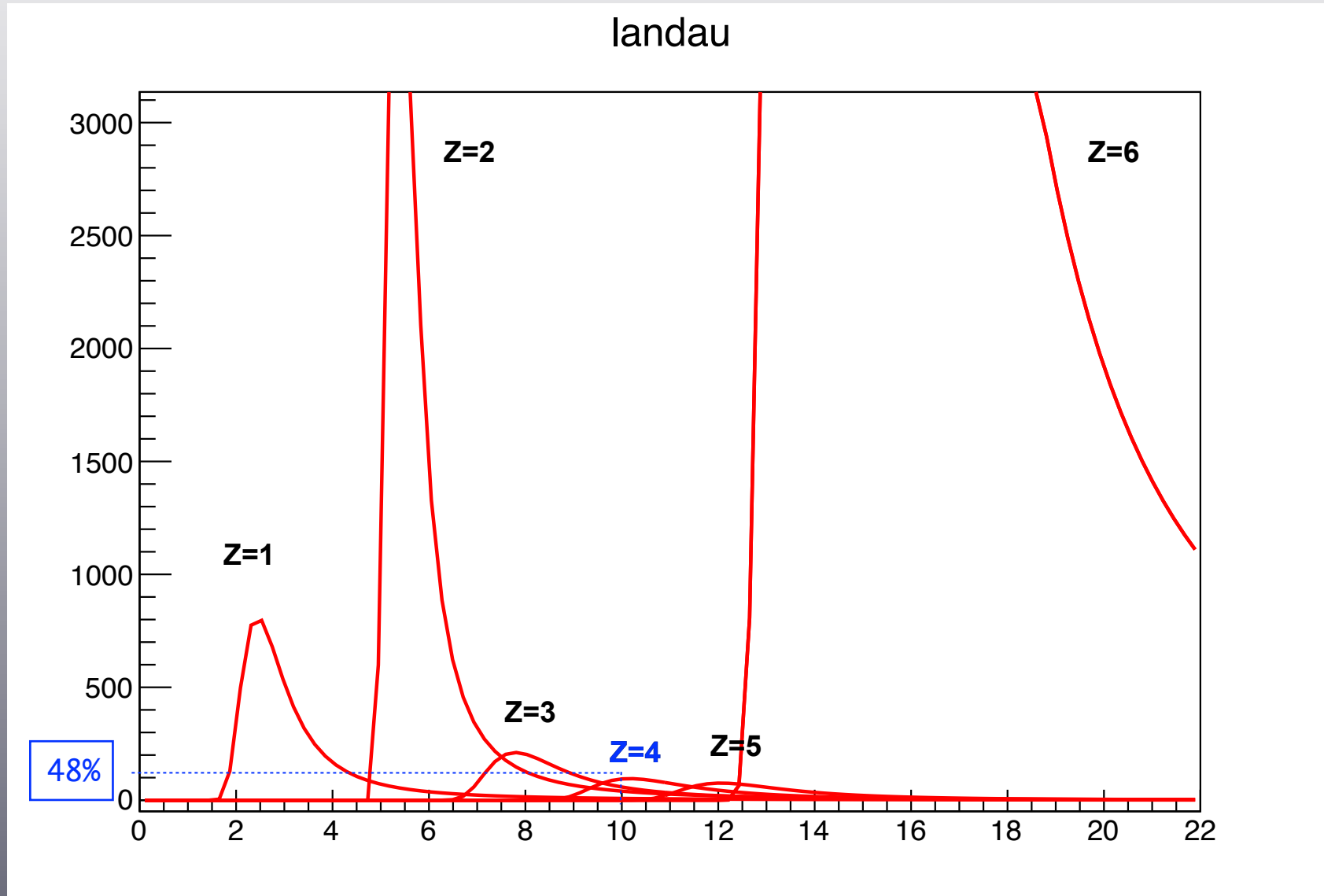
Implementation (ii)

• Landau Distributions (**Not Normalized**): ($375 < E < 425$)



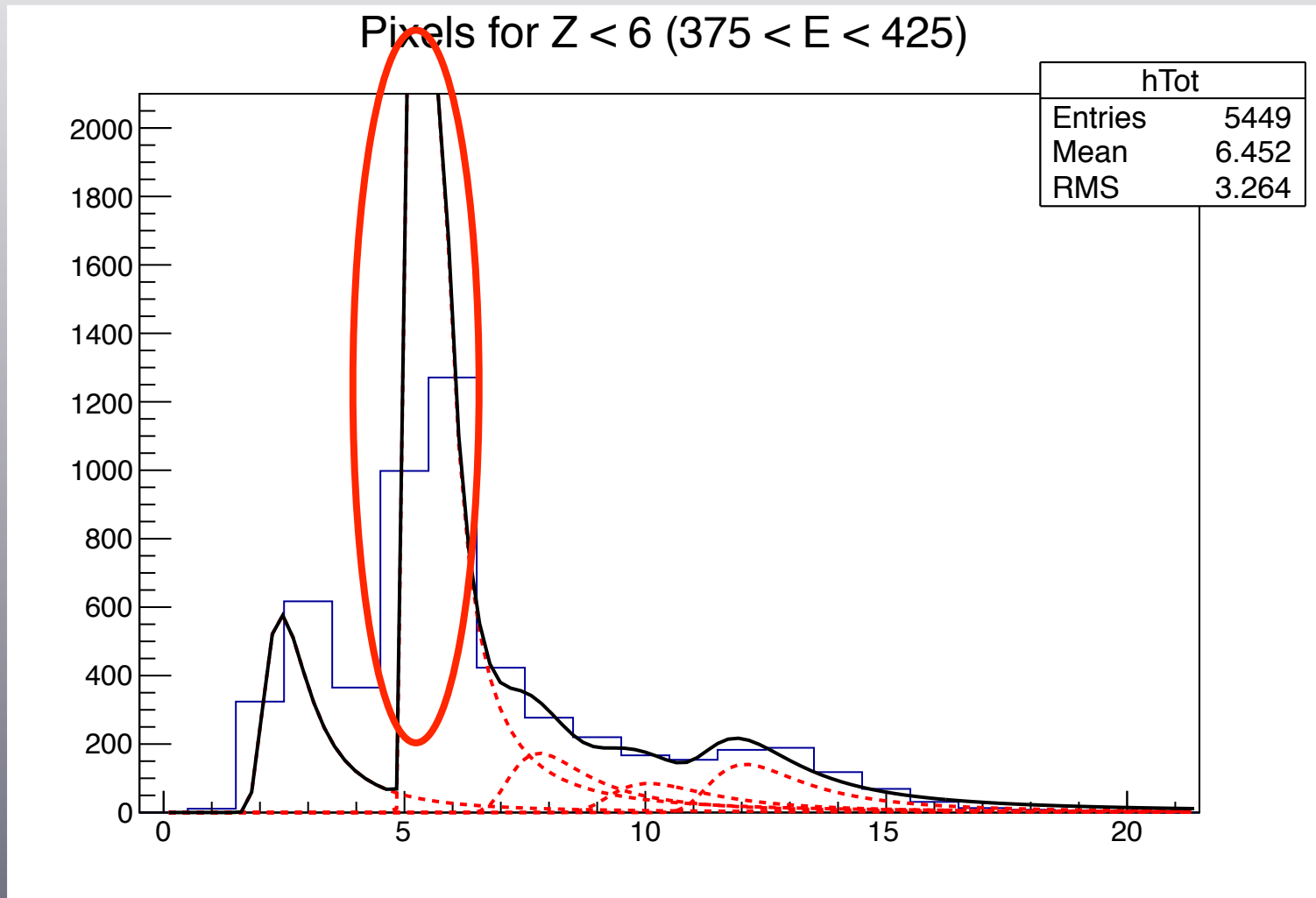
Implementation (ii)

Landau Distributions (**Not Normalized**): ($375 < E < 425$)



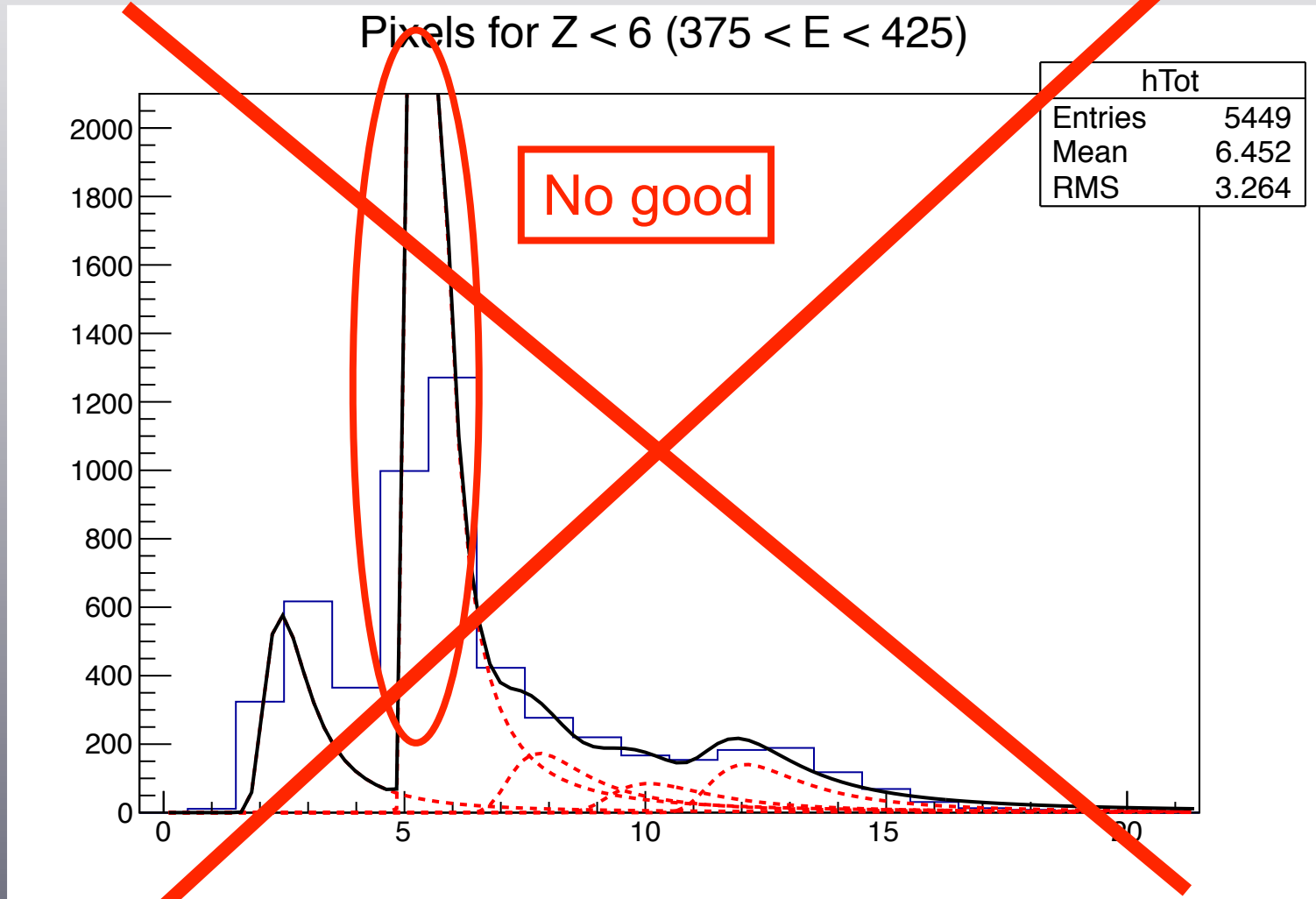
Implementation (ii)

• But pb with $Z = 2$ fit.



Implementation (ii)

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New Implementation (i)

• Normal Landau distribution

$$L(X) = \frac{A}{\sqrt{2\pi}} e^{-\frac{1}{2}(X + e^{-X})}$$

$$X = \frac{x - MPV}{\sigma}$$

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$$L(X) = \frac{A}{\sqrt{2\pi}} e^{-\frac{1}{2}(X + e^{-X})} \quad X = \frac{x - MPV}{\sigma}$$

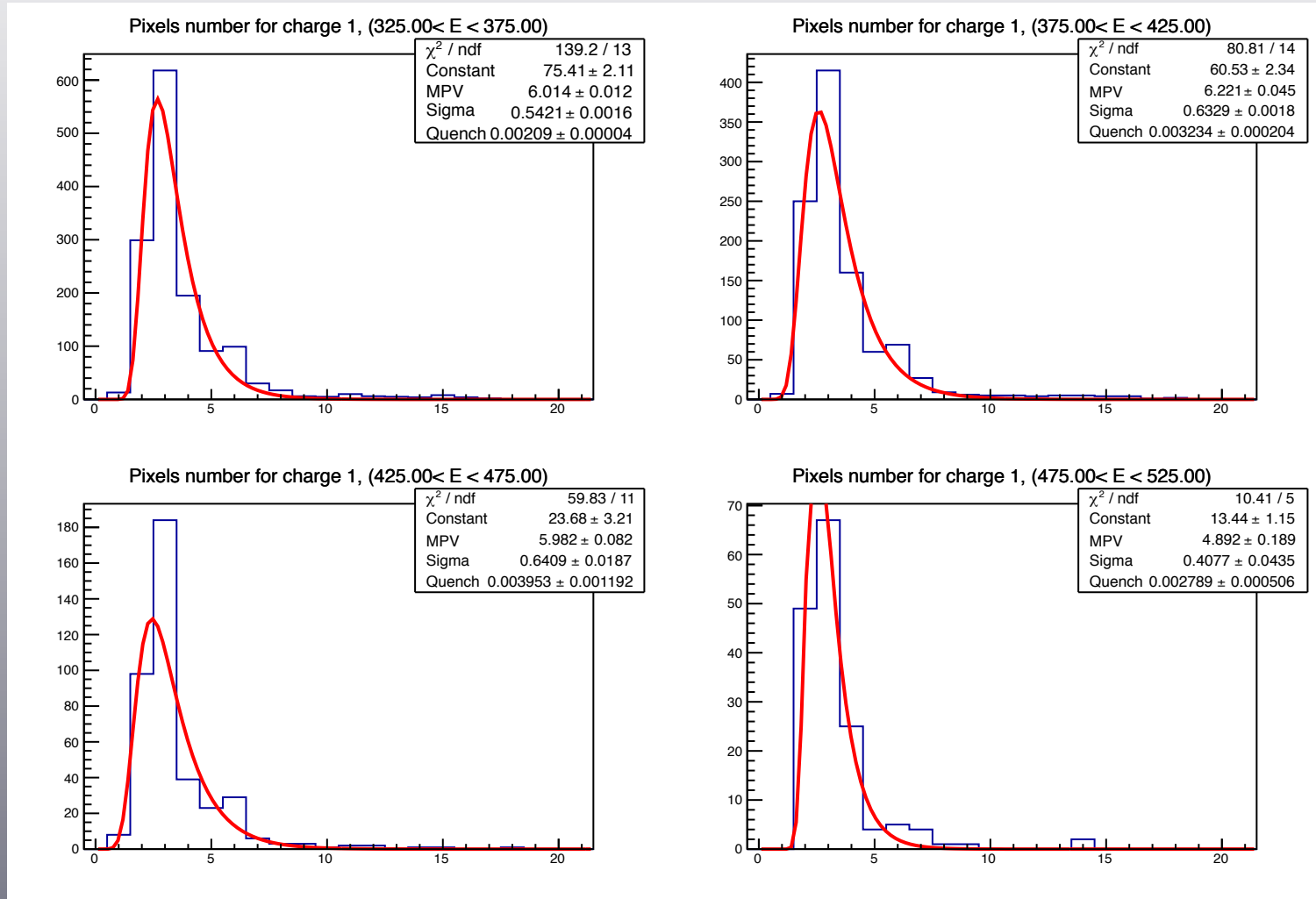
• Quenched Landau distribution

$$L(X) = \frac{A}{\sqrt{2\pi}} e^{-\frac{1}{2}(X + B e^{-X})}$$

- Adding parameter to quench the tail factor of Landau distribution ($B < 1$.)

New Implementation (ii)

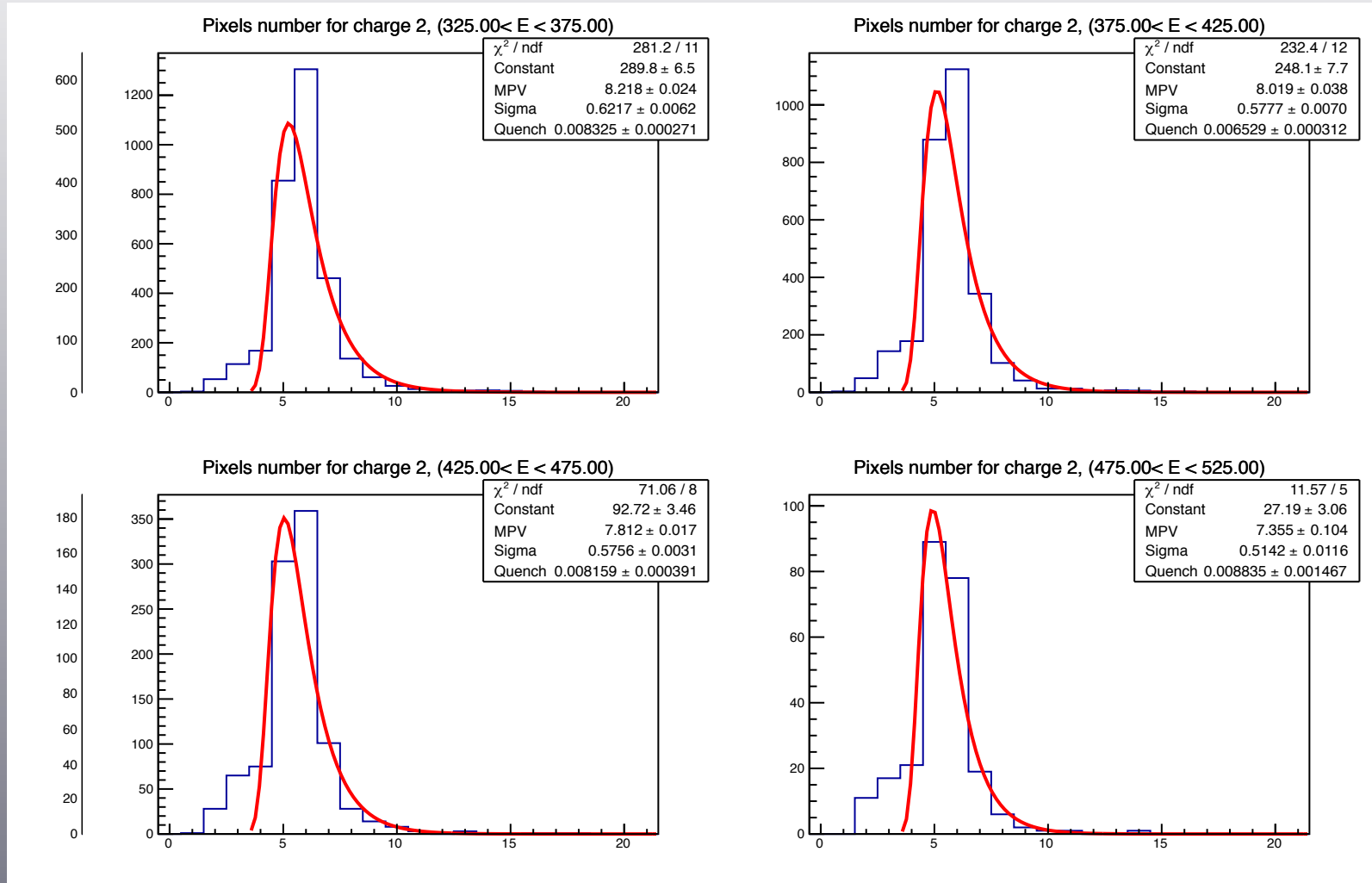
Cluster size with BM matched ($\theta < 5^\circ$)



Fit with a Quenched Landau

New Implementation (ii)

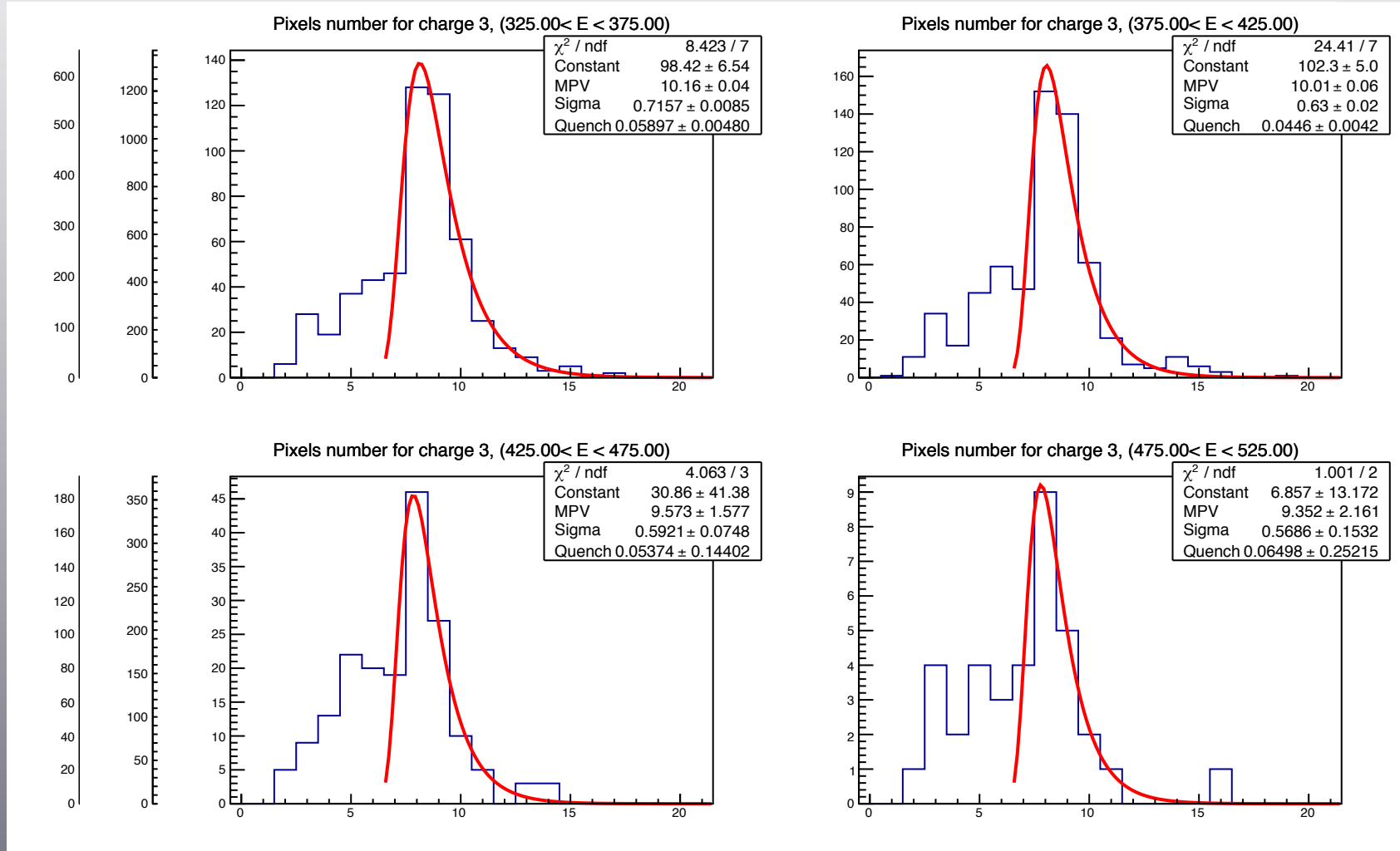
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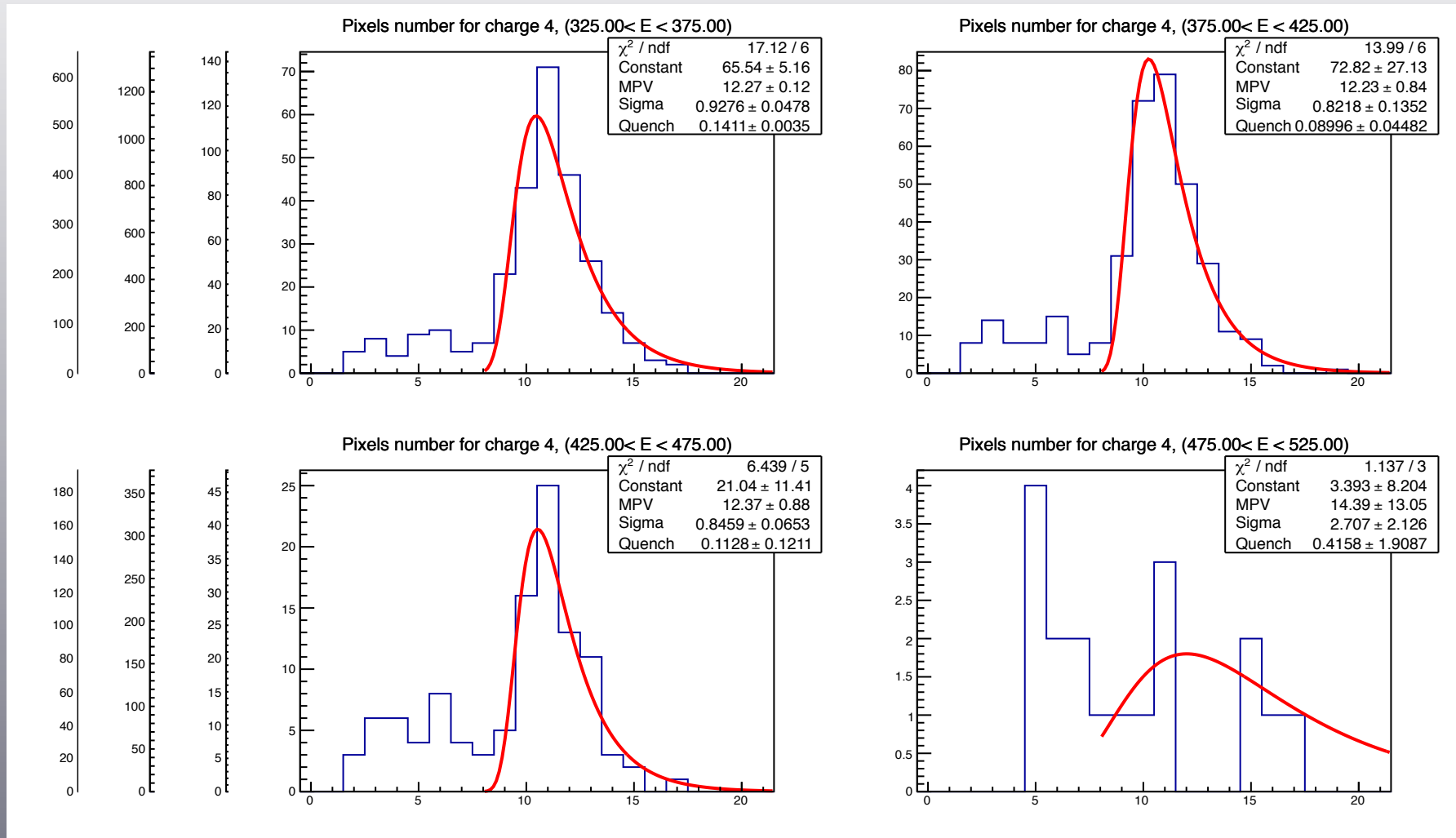
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Fit with a Quenched Landau

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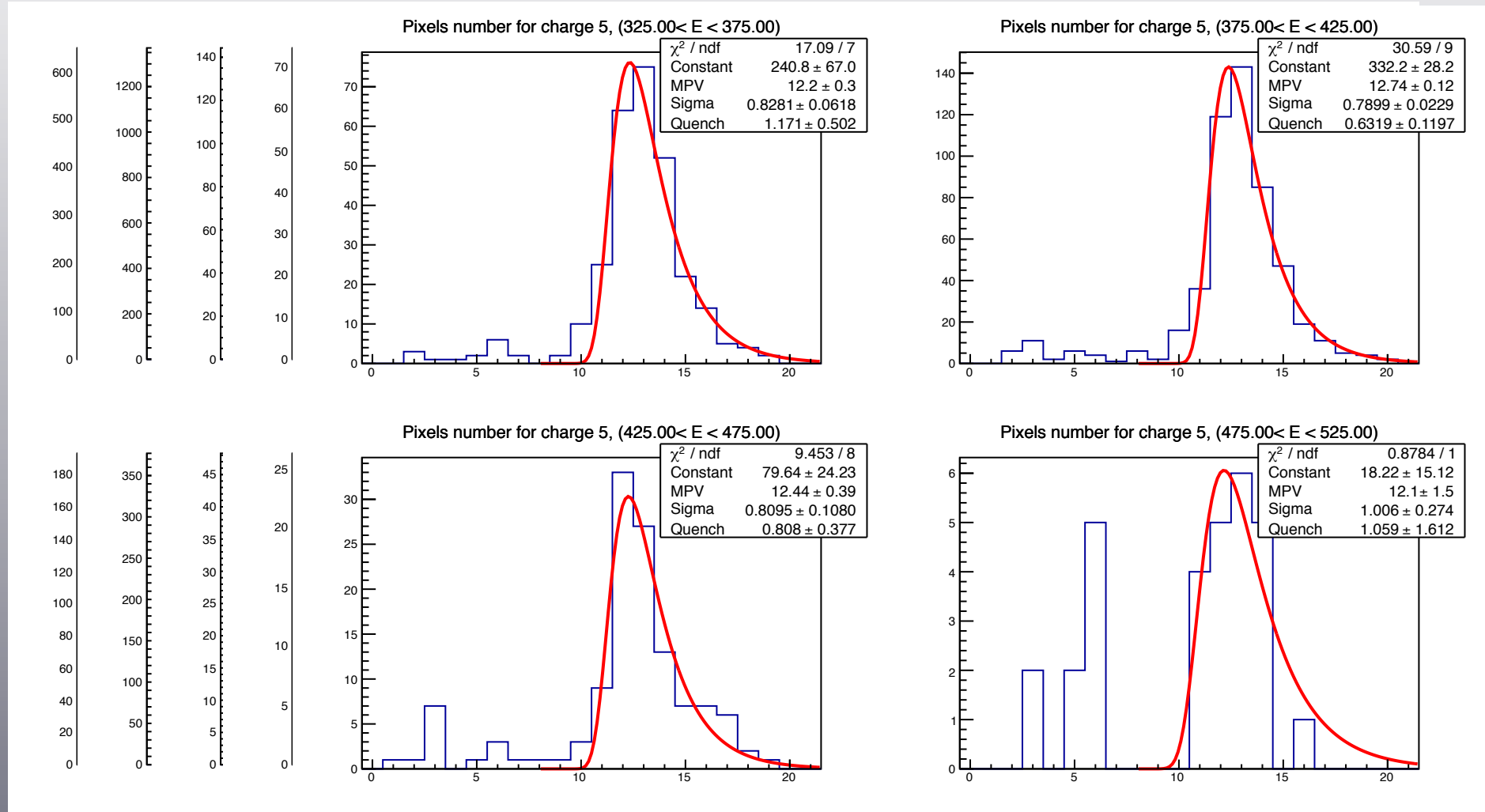
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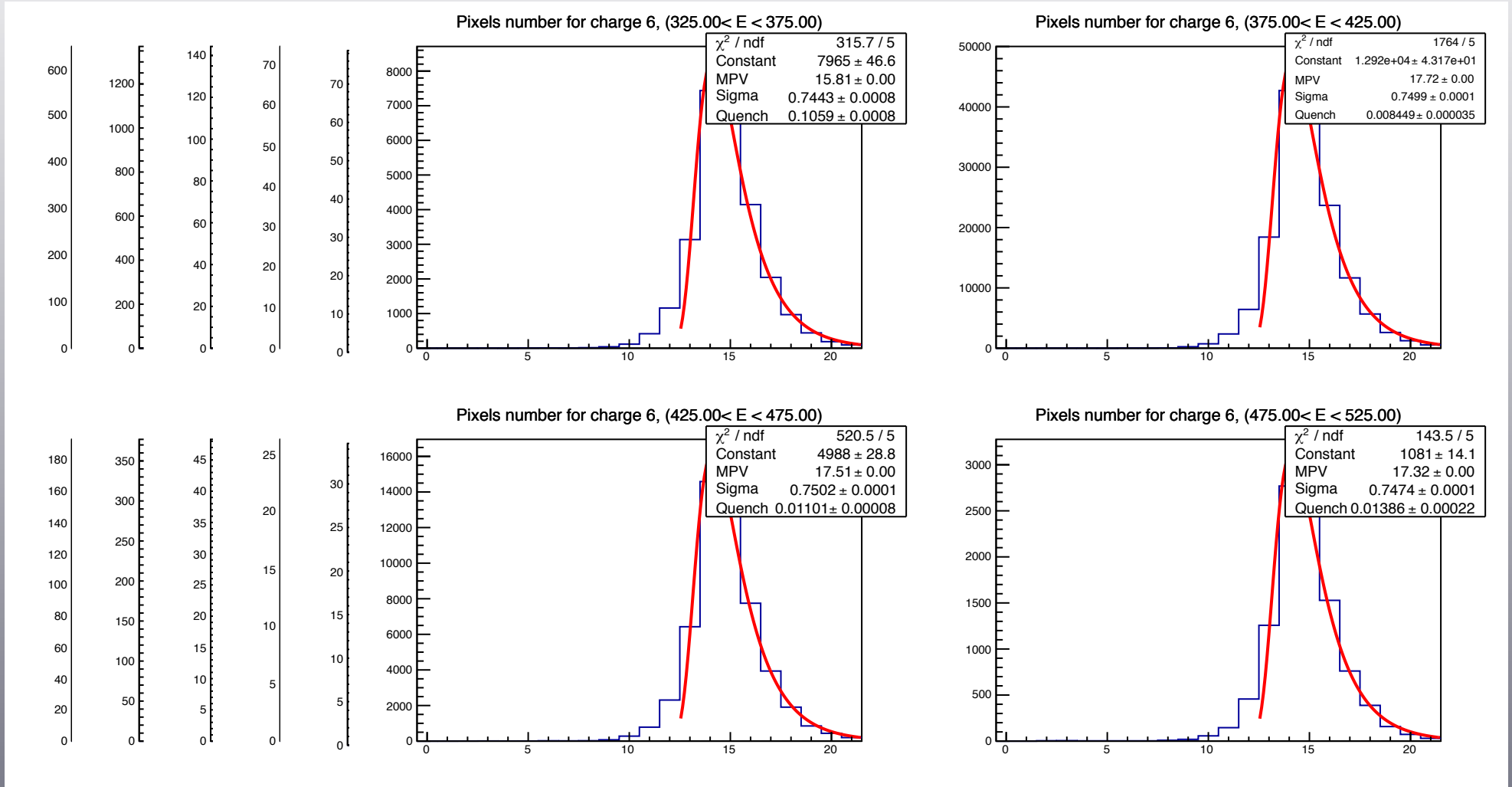
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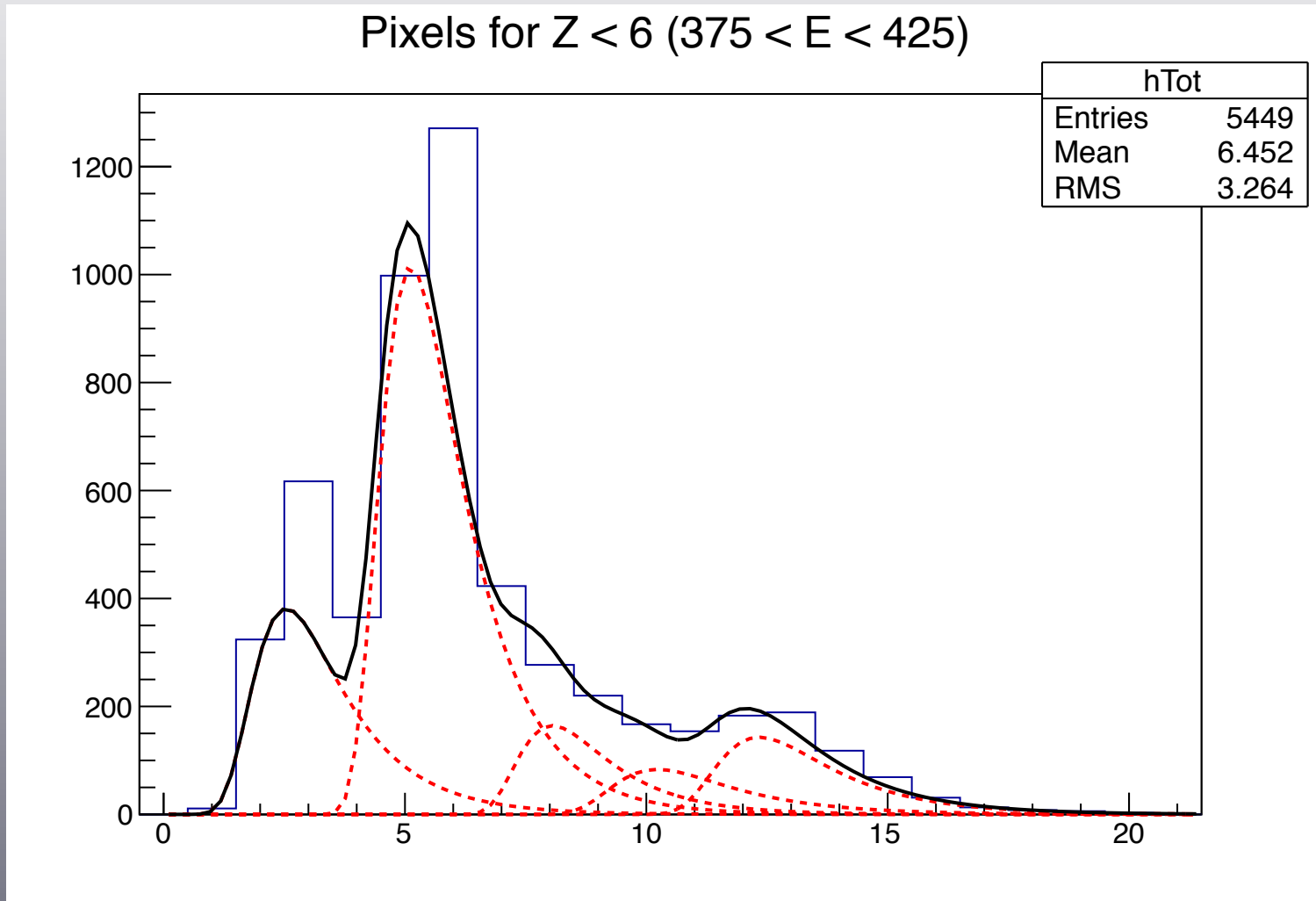
Cluster size with BM matched ($\theta < 5^\circ$)



Fit with a Quenched Landau

New Implementation (iii)

• Fit (looks better)



New Implementation (iv)

• Data file TAVTdetector.cal in config:

```
# Landau parameter for pixels number  
# per cluster for theta < 5 (Z = 1 to 6)  
# assuming a weak dependance on energy  
#      Cst      MPV      Sigma  Quench  
Charge 1: 74      6.4      0.63   0.002  
Charge 2: 304     8.2      0.58   0.005  
Charge 3: 139     10.1     0.63   0.041  
Charge 4: 103     12.2     0.82   0.090  
Charge 5: 455     12.8     0.79   0.592  
Charge 6: 16019  17.9     0.75   0.006
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• Class TAVTparCal:

```
//! Get charge probabilities for a given number of pixel
const TArrayF*      GetChargeProba(Float_t pixelsN);

//! Get charge with max probability
Int_t               GetChargeWithMaxProba() const;

//! Get charge max probability
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```
GetChargeProba(pixelsN = 10)
charge: 1  1.0
charge: 2 15.3
charge: 3 35.0
charge: 4 48.6
charge: 5  0.0
charge: 6  0.0
```

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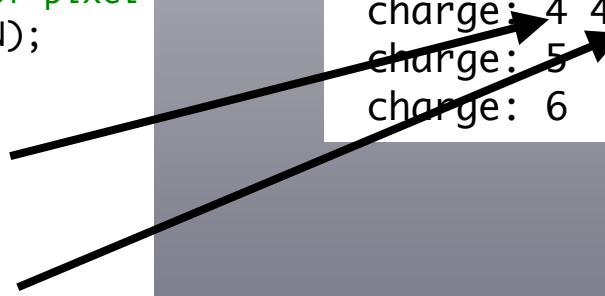
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```



Conclusions

- Cluster size vs charge from ToF with cuts

Assuming cut on track number does not affect the relative proportion ($Z = 1$ to 5)

Assuming that energy and angle dependence is weak

Assuming pixel distribution as quenched Landau

- Implementation of charge probabilities (based on Landau distributions)

Pb pollution (esp. Boron with carbon or protons)

- Could be used for global tracking ?