

Ncount and dE/dx Comparison in different Sampling rate and Angle

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Context

- Ncount and Comparison in different angle
- Ncount and Comparison in different sampling rate
- dE/dx Comparison in different sampling rate
- Dependency on t_F (First Cluster Time) and correction

Dataset List

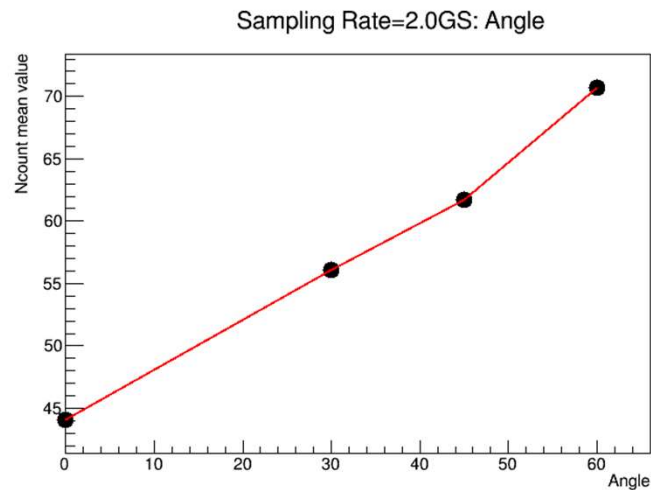
- 0°:
 - Sampling rate = 1G: Run 52, 10000Events
 - Sampling rate = 1.5G: Run12 + 13, 60000Events
 - Sampling rate = 2G: Run11, 10000Events
- 30°:
 - Sampling rate = 2G: Run49 +51, 10000Events

Dataset List

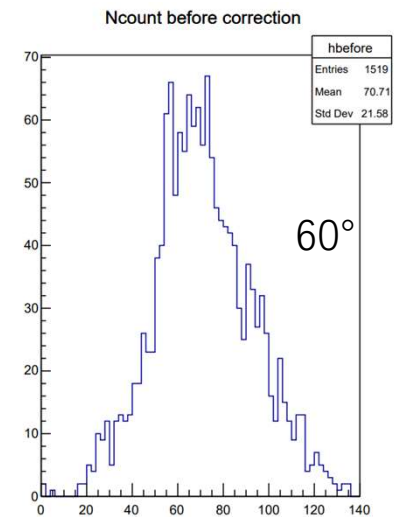
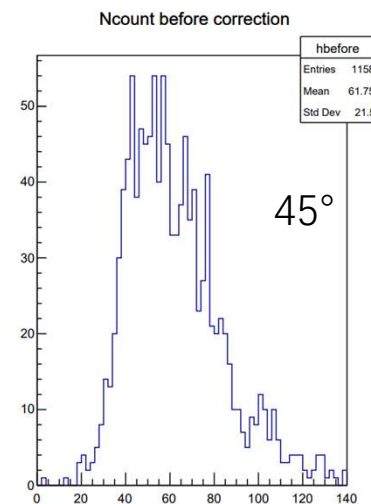
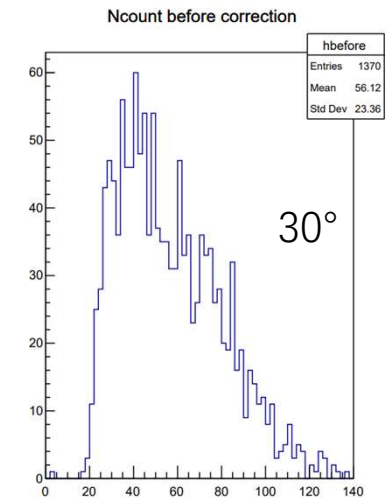
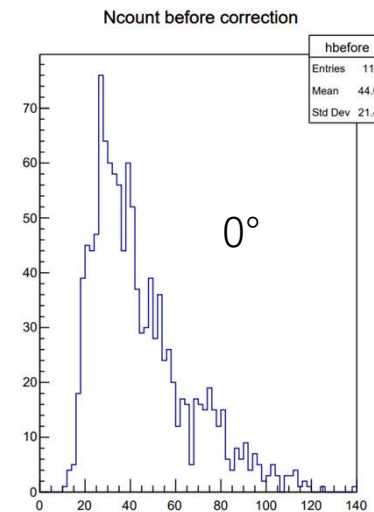
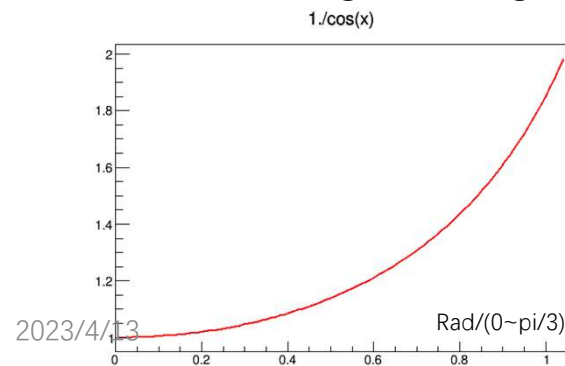
- 45°:
 - Sampling rate = 1G: Run7, 10000Events
 - Sampling rate = 1.5G: Run 16 + 17 + 18, 65000Events
 - Sampling rate = 2G: Run10, 10000Events
- 60°:
 - Sampling rate = 2G: Run47, 10000Events

Ncount Comparison in different angles

Sampling Rate = 2.0G

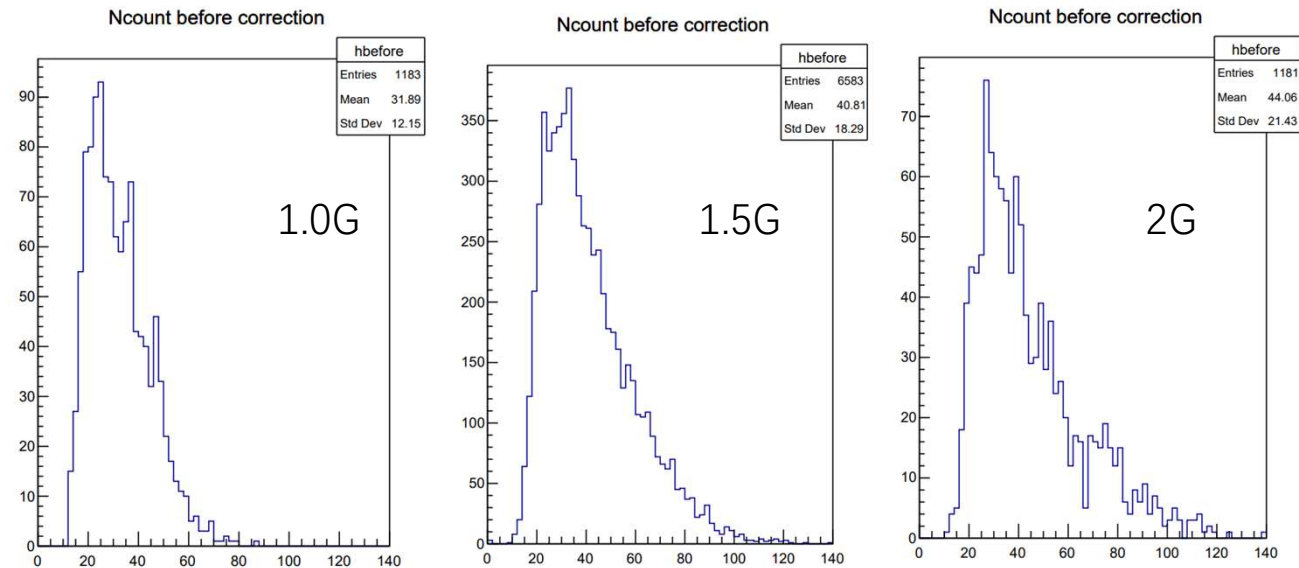
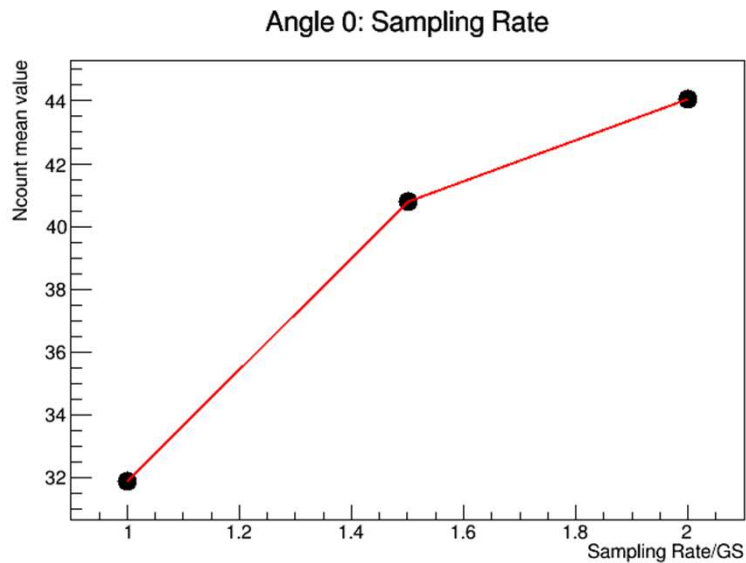


Ncount Increasing with Angle like $1/\cos(x)$



Ncount Comparison in Different Sampling Rates: 0°

Ncount distribution in different sampling rate

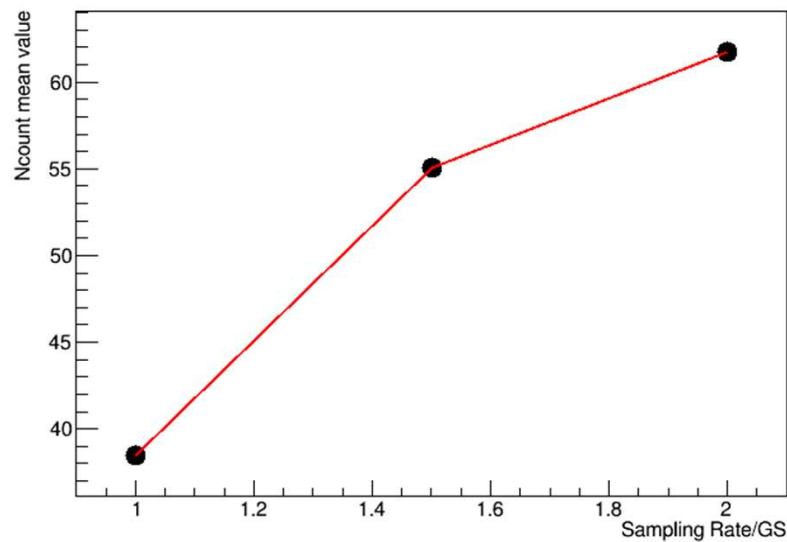


Ncount increasing with Sampling rate

Ncount Comparison in Different Sampling Rates: 45°

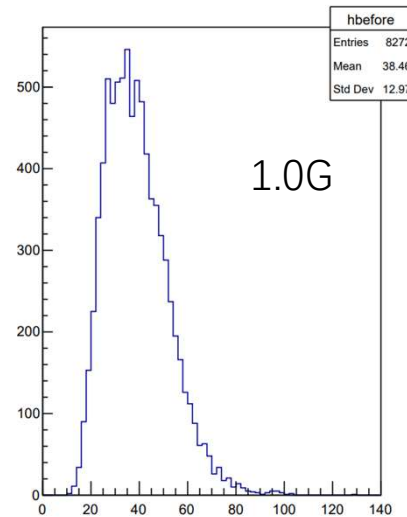
Ncount distribution in different sampling rate

Angle 45: Sampling Rate

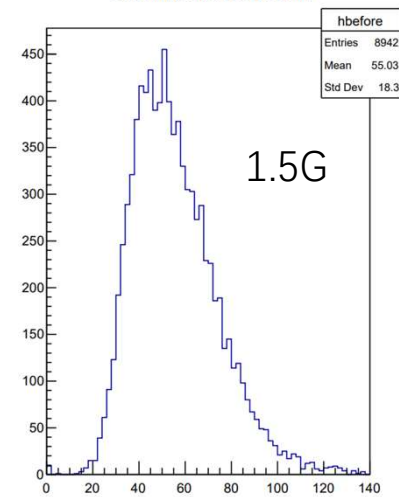


Ncount increasing with Sampling rate

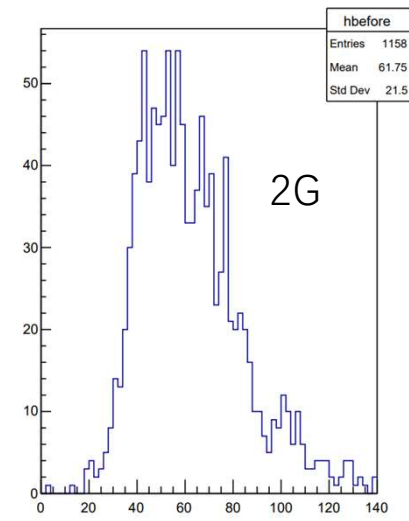
Ncount before correction



Ncount before correction



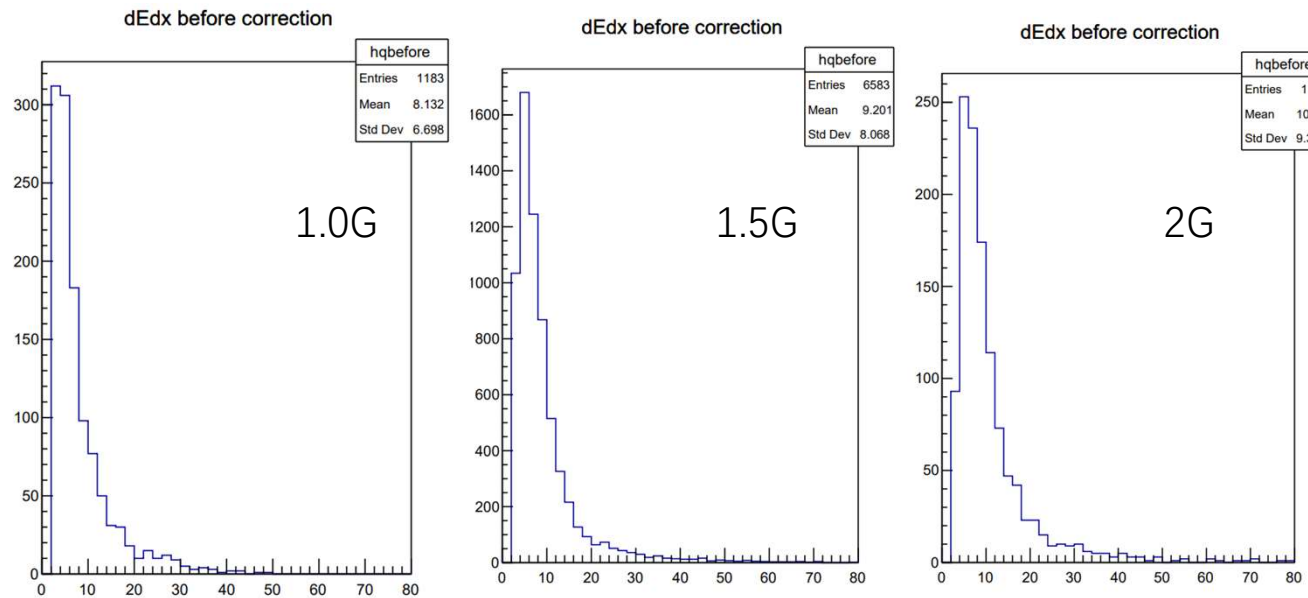
Ncount before correction



dE/dx Comparison in Different Sampling Rates: 0°

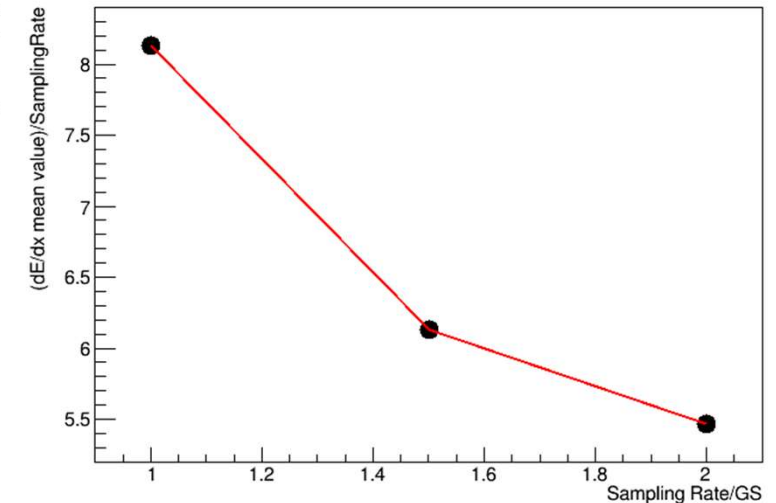
In the dE/dx distribution plots, dE/dx is caculated by:
 $dE/dx = \sum a[i]$, a means the amplitude of i-th bin

In the right plot, dE/dx is caculated by:
 $dE/dx = \sum (a[i] * tbin)$,
 (or $dE/dx = \frac{\sum a[i]}{Sampling\ rate}$)
 a means the amplitude of i-th bin,
 tbin means the time of one bin



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Angle 0: Sampling Rate



dE/dx decreasing with Sampling rate
 Unexpected decreasing, need to ask question⁸

dE/dx Comparison in Different Sampling Rates: 45°

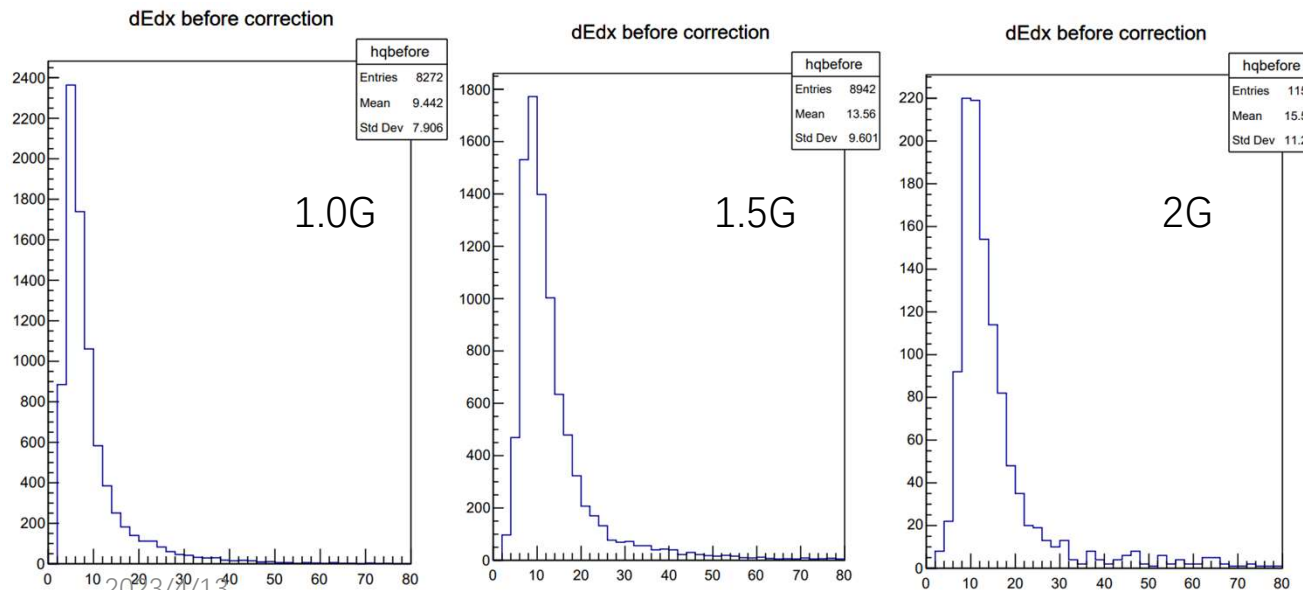
In the dE/dx distribution plots, dE/dx is caculated by:
 $dE/dx = \sum a[i]$, a means the amplitude of i-th bin

In the right plot, dE/dx is caculated by:

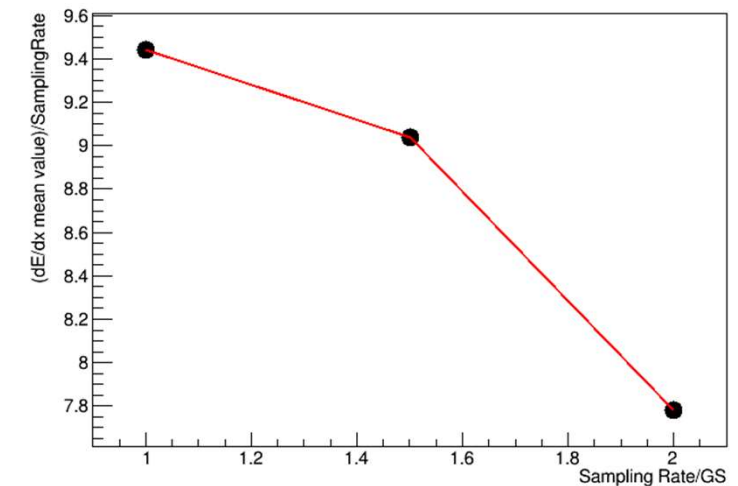
$$dE/dx = \sum (a[i] * tbin),$$

(or $dE/dx = \frac{\sum a[i]}{\text{Sampling rate}}$)

a means the amplitude of i-th bin,
 tbin means the time of one bin



Angle 45: Sampling Rate

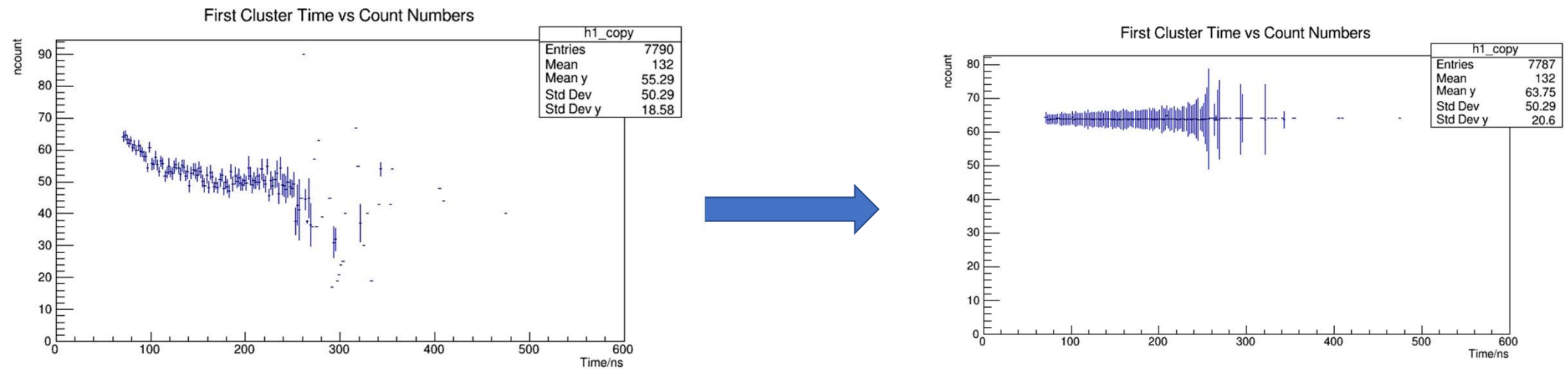


dE/dx decreasing with Sampling rate

Unexpected decreasing, need to ask question

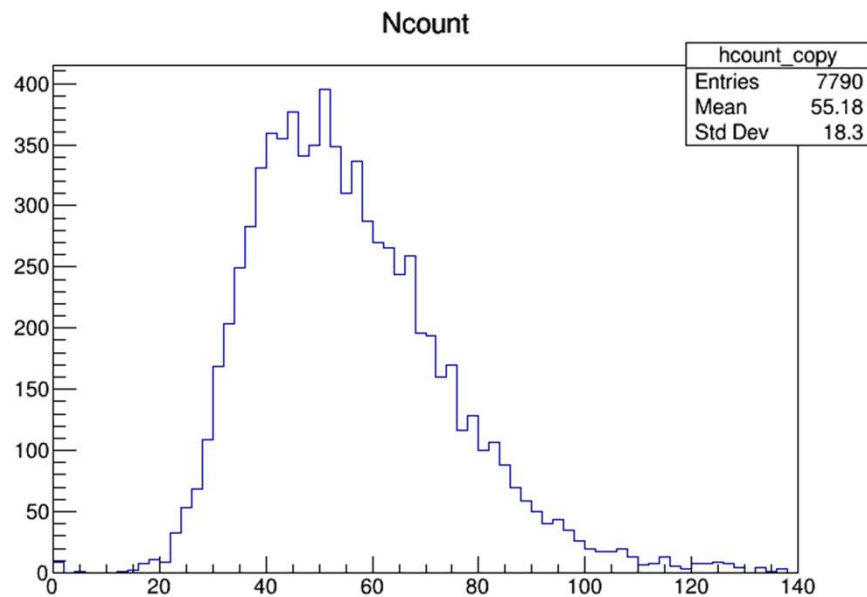
Dependency on t_F (First Cluster Time) and correction

- Run16+17+18, 65000 events, Sampling rate 1.5G, 45°

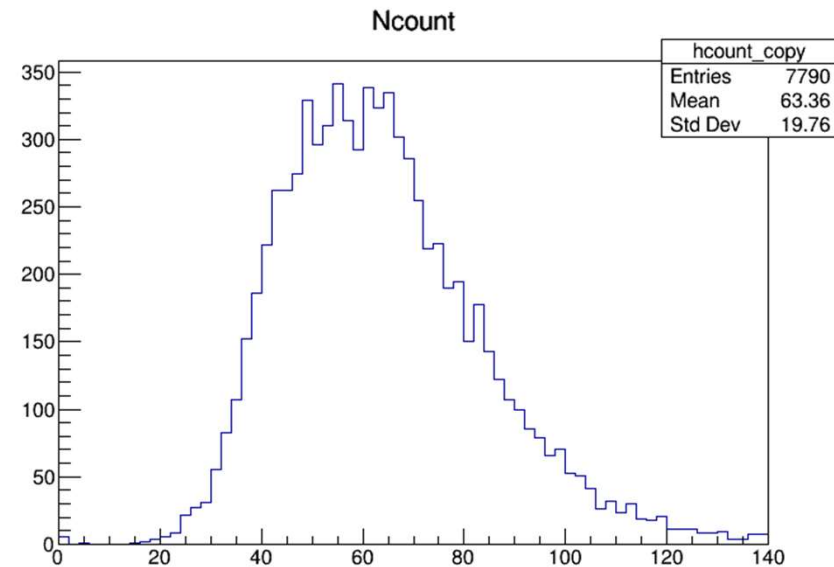


Correct ncount to $\text{ncount}(t_0)$

Ncount Comparison (t_F Correction)



Before correction
 $18.3/55.18=33.16\%$

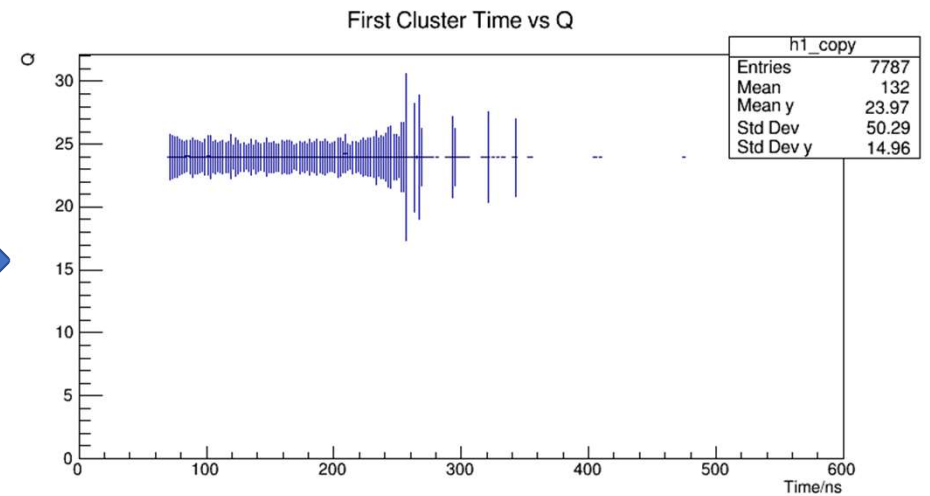
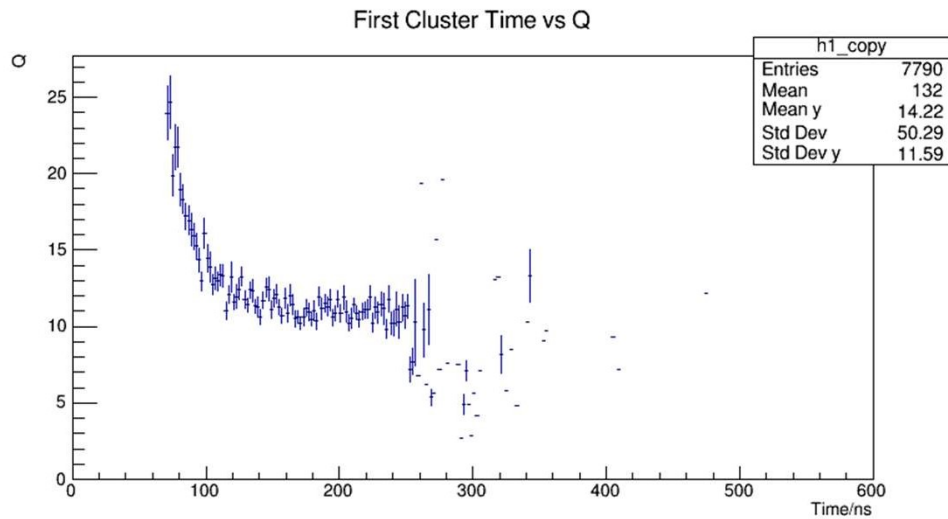


After correction
 $19.76/63.36=31.19\%$

dE/dx Correction Dependency on t_F

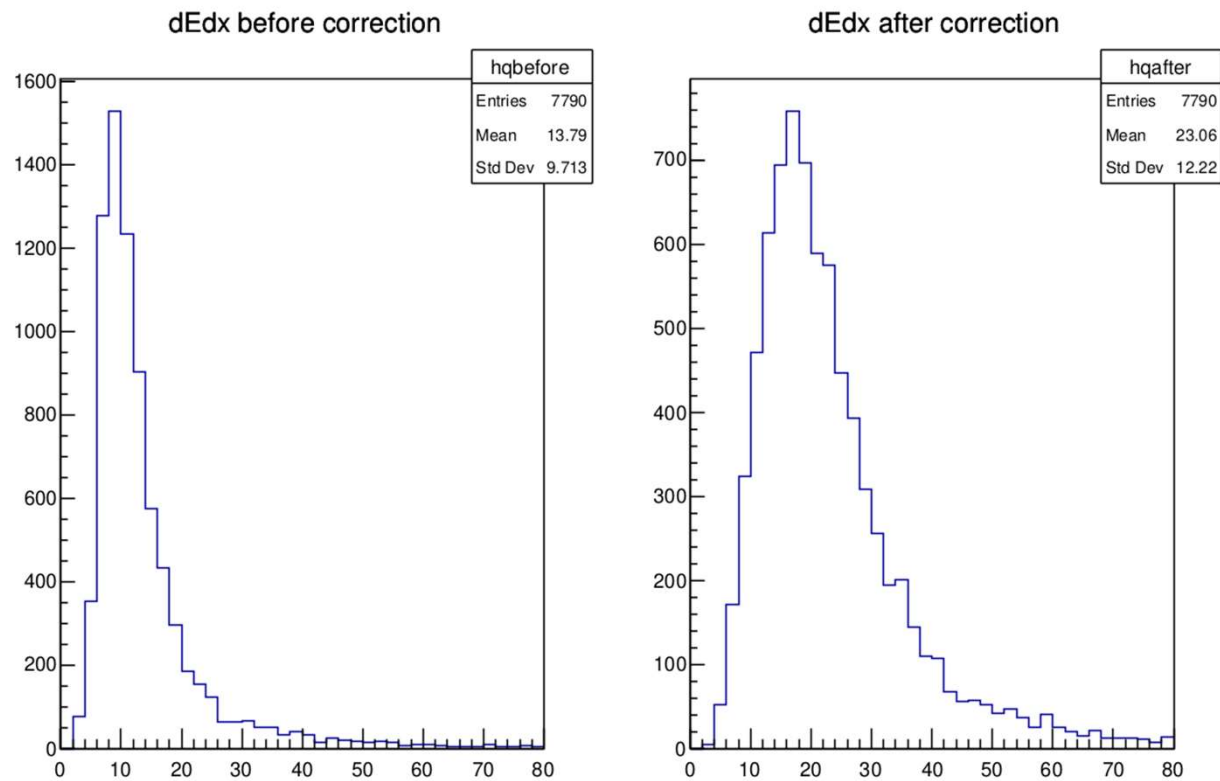
Q's unit is not converted

45° Run16+17+18



Correct dE/dx to dE/dx(t_0)

dE/dx Correction 45° Run16+17+18



$$9.713/13.79=70.44\%$$

$$12.22/23.06=52.99\%$$

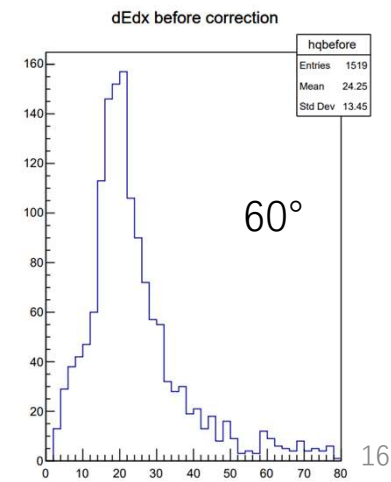
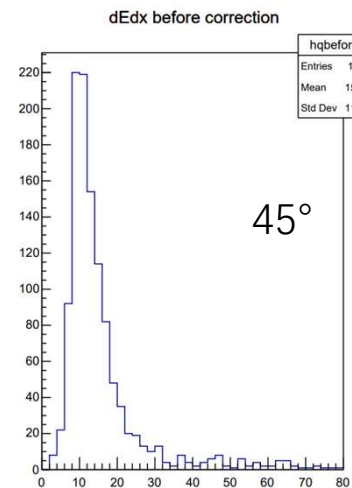
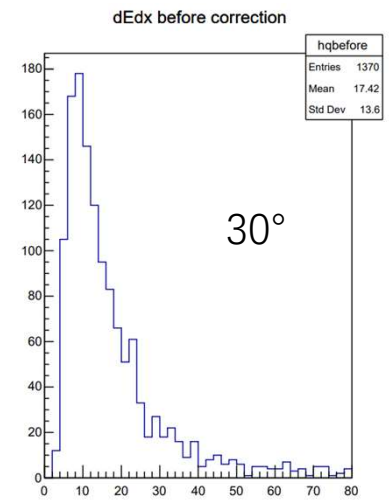
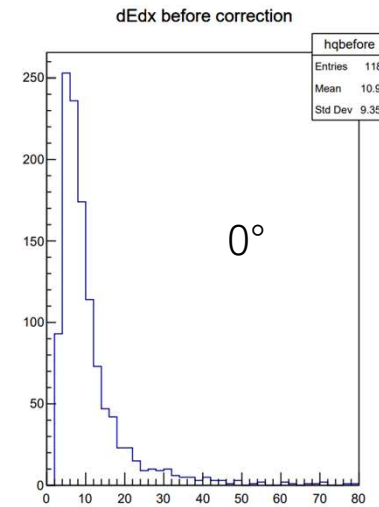
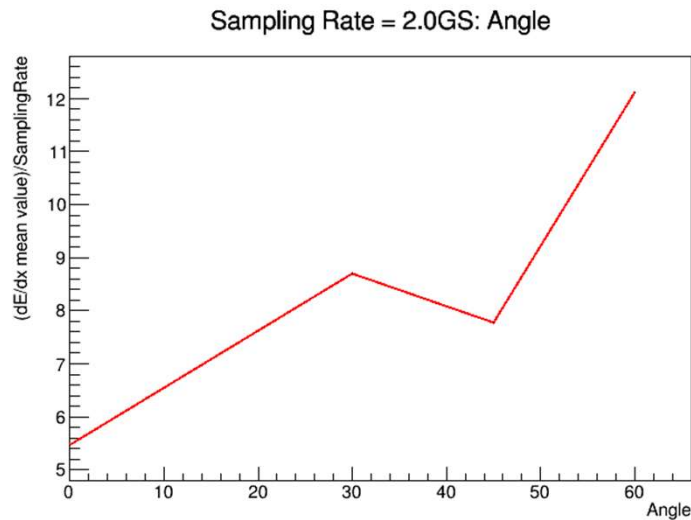
Summary

- Ncount and dE/dx Comparison in different situation:
 - Same angle, different sampling rates: Ncount increasing with sampling
 - Same sampling rate, different: Ncount increasing with angle
- Correction on the dependency of t_F to dN/dx and dE/dx
 - Angle = 45°, Sampling Rate=1.5GS, 65000Events
 - Resolution is improved
- Next
 - Clustering in dN/dx analysis

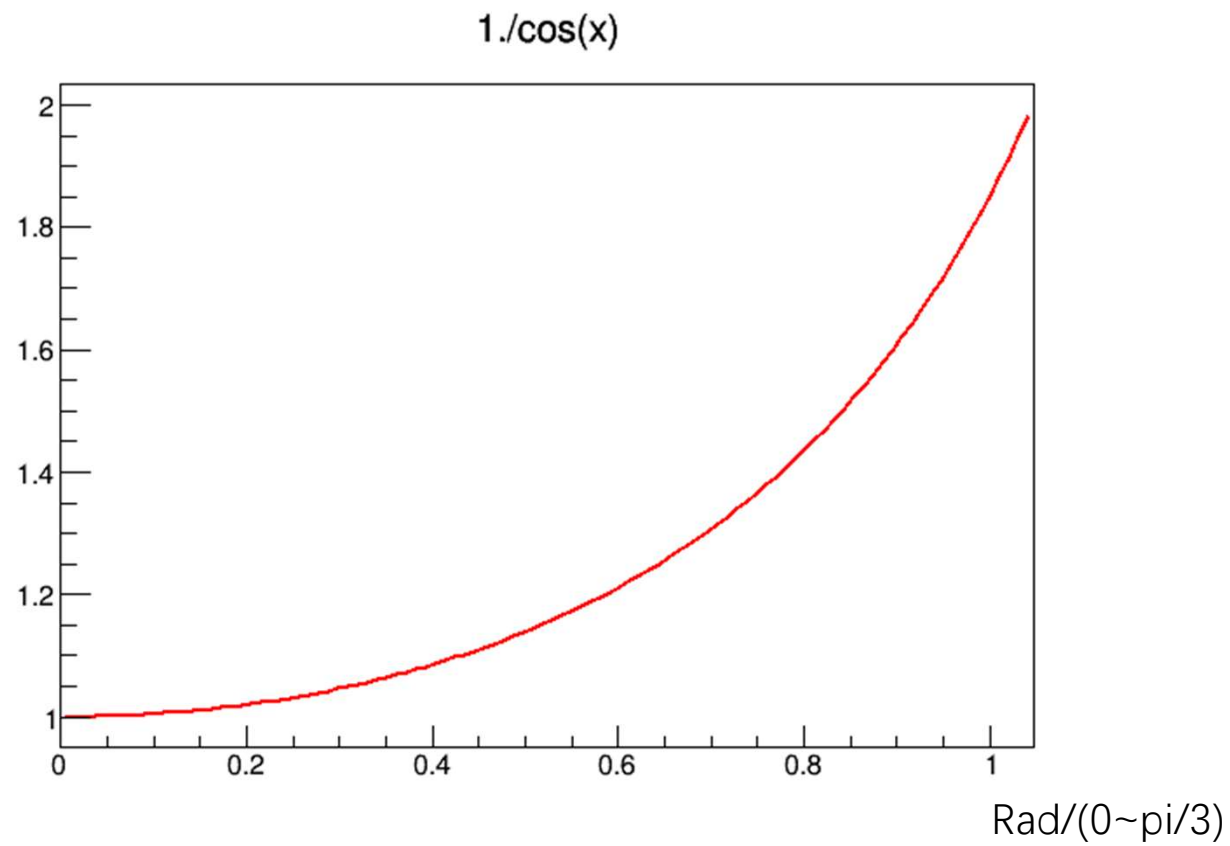
Backup

dE/dx Comparison in different angles

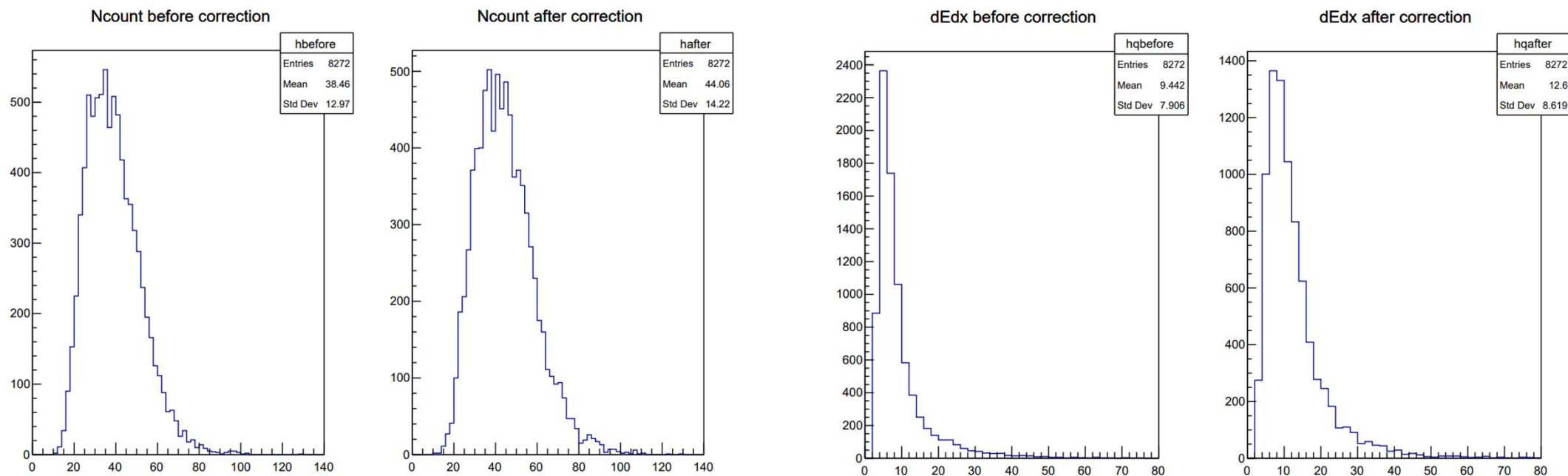
Sampling Rate = 2.0G



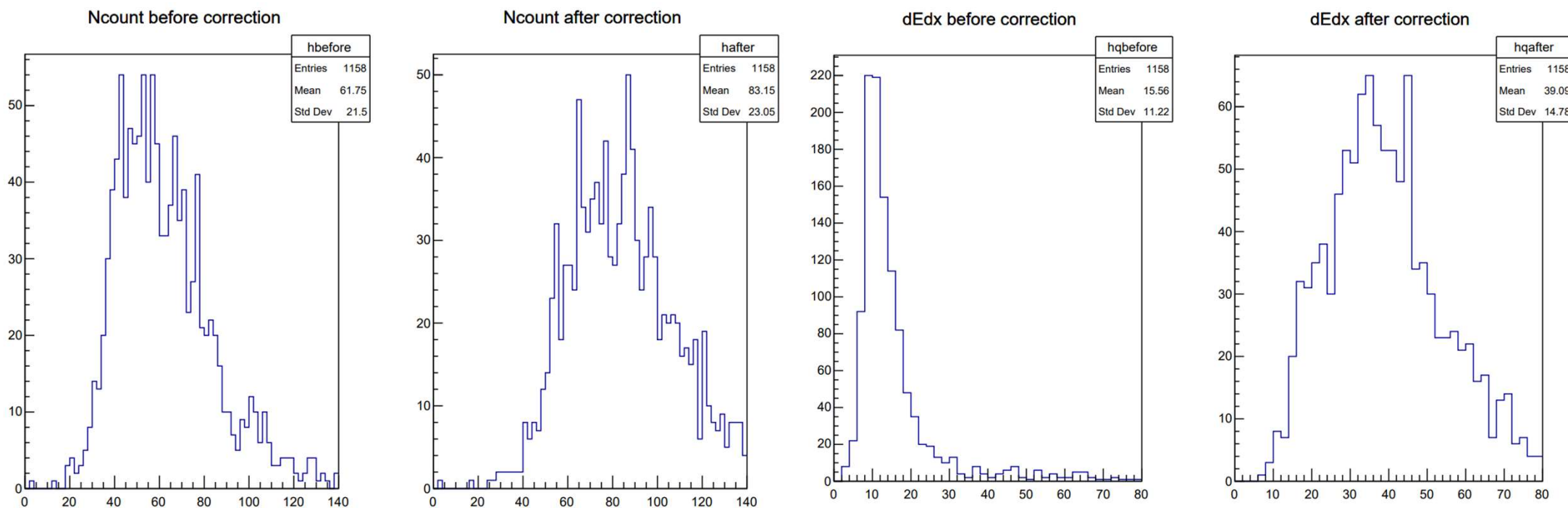
$$1/\cos(x) \ (0^\circ \sim 60^\circ)$$



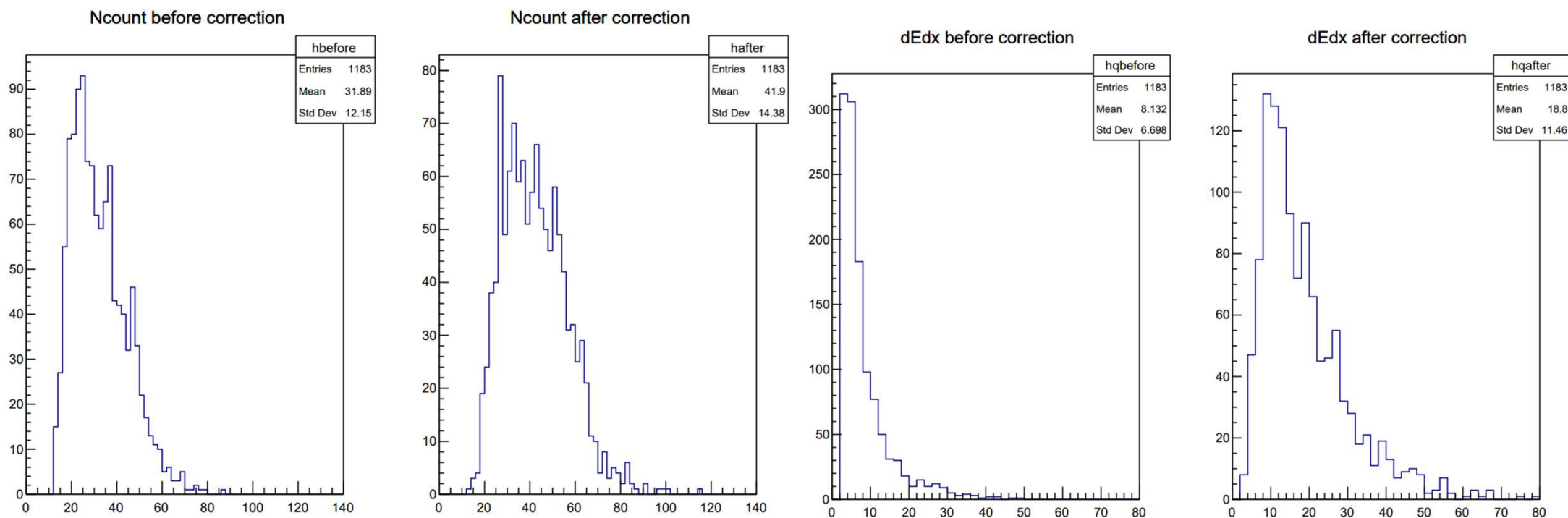
Correction Result: 45° Sampling rate =1G



Correction Result: 45° Sampling rate =2G

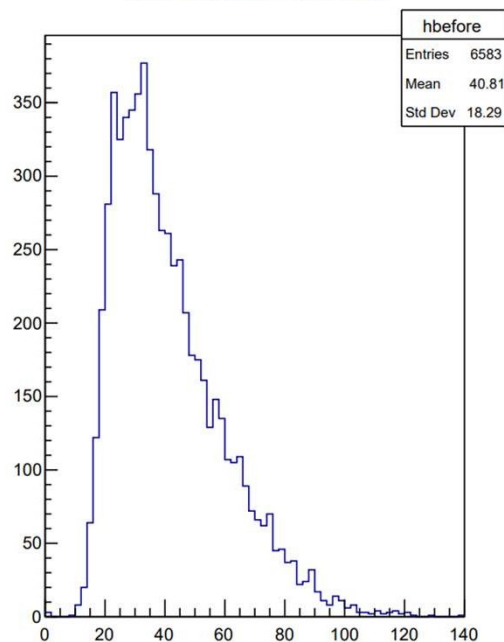


Correction Result: 0° Sampling rate =1G

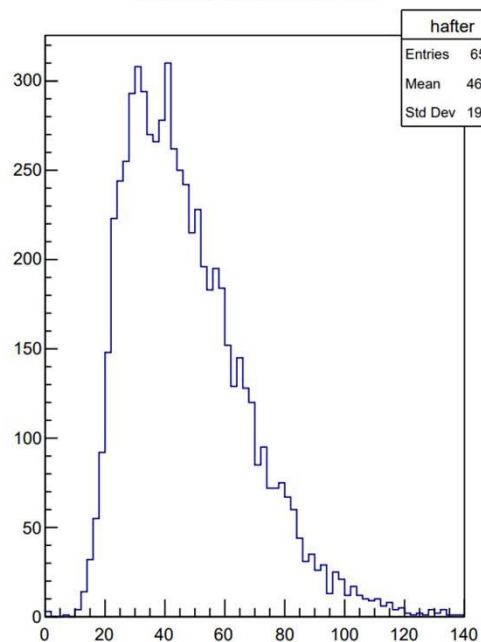


Correction Result: 0° Sampling rate =1.5G

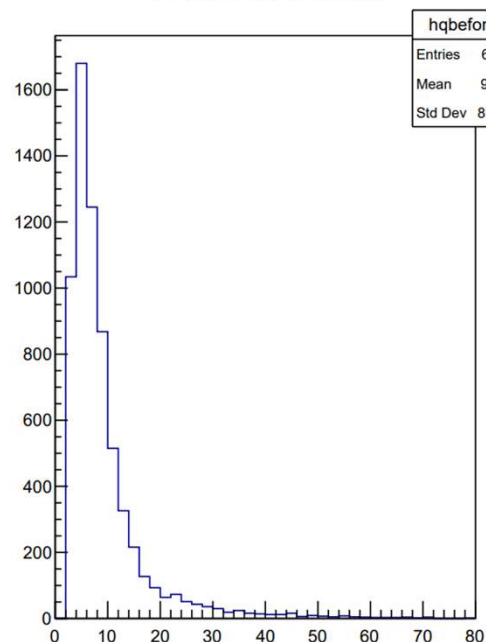
Ncount before correction



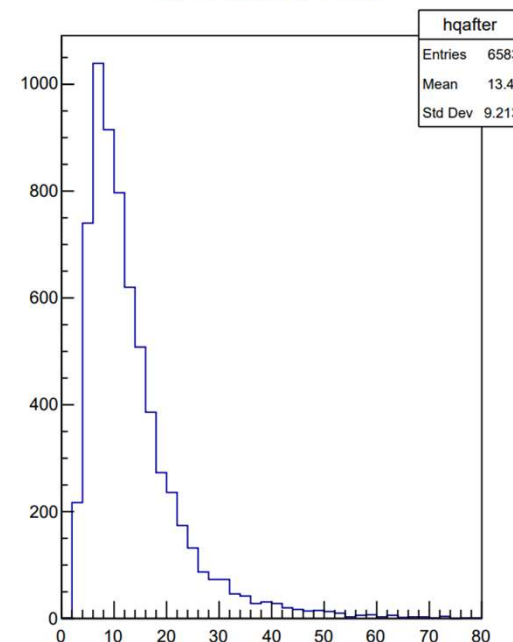
Ncount after correction



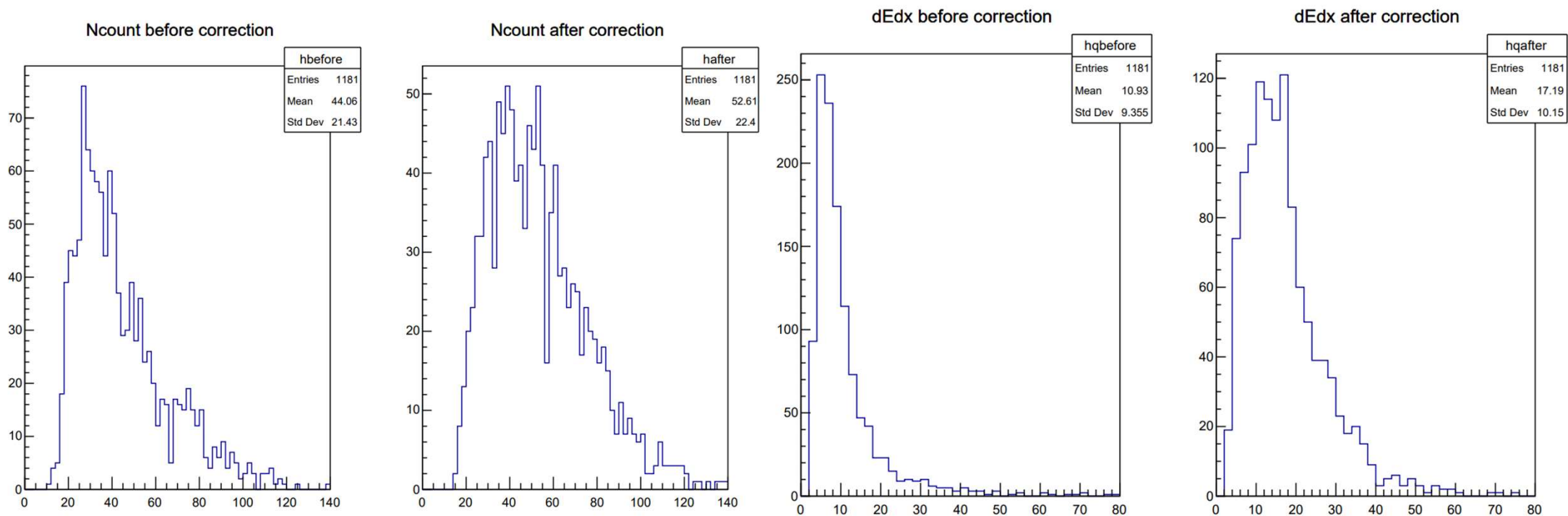
dEdx before correction



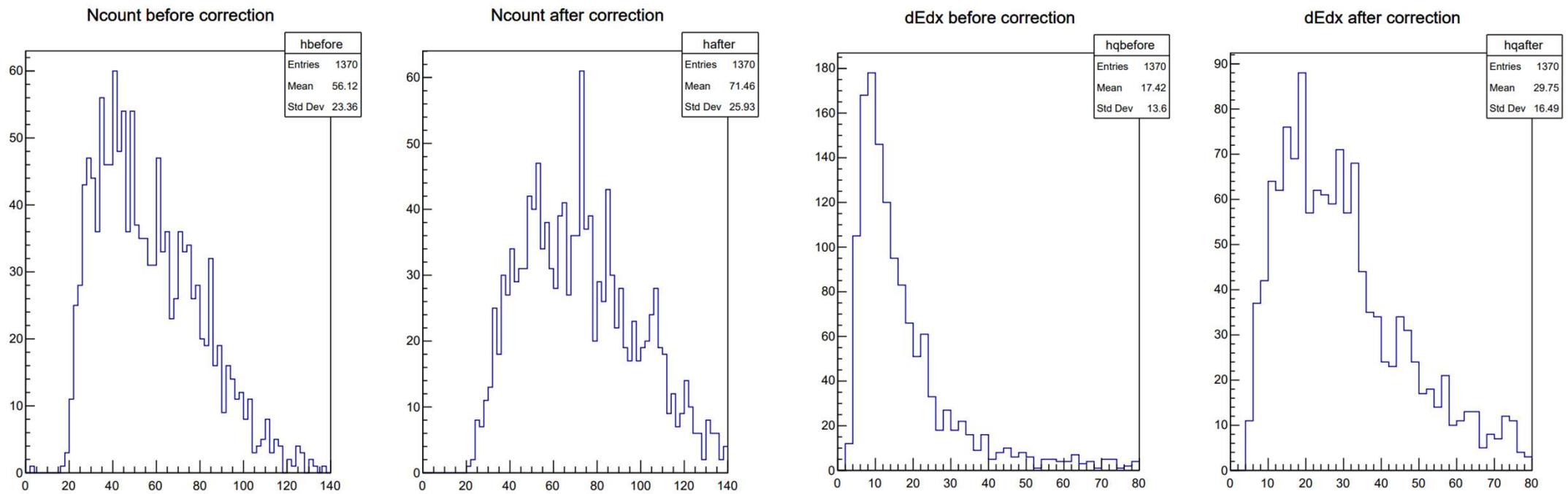
dEdx after correction



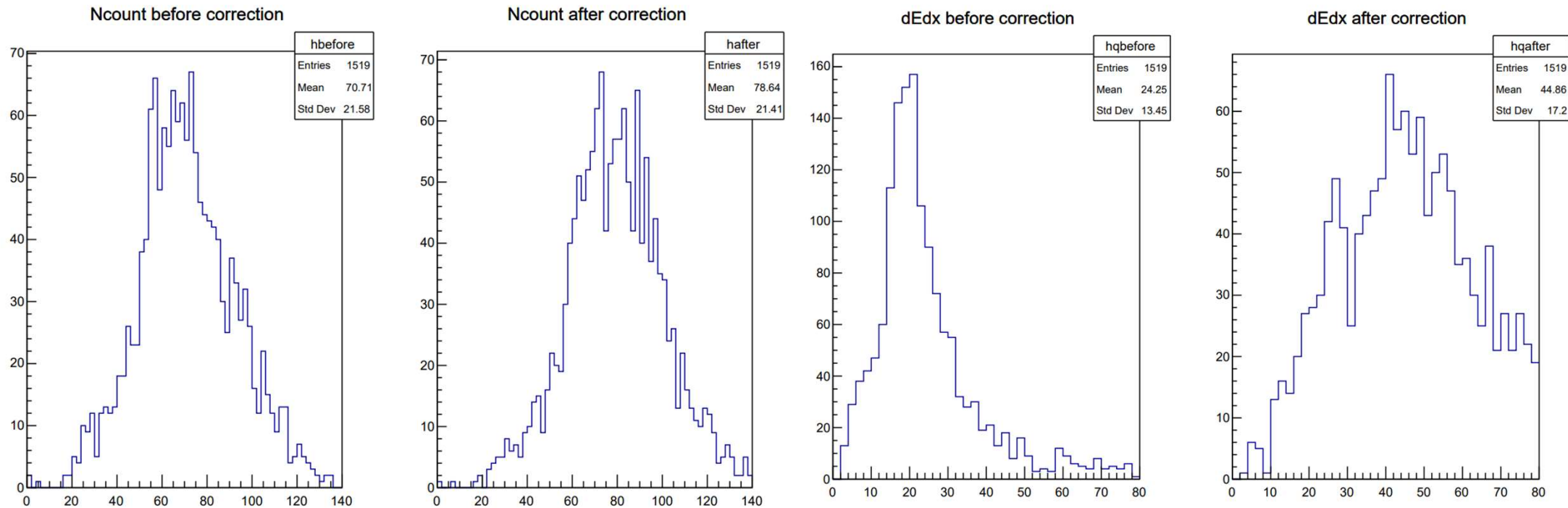
Correction Result: 0° Sampling rate =2G



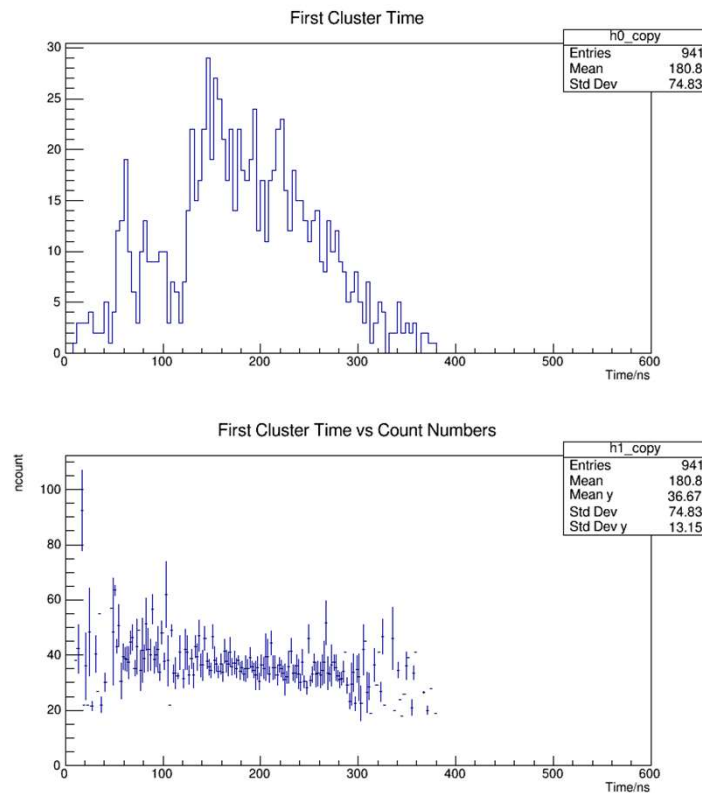
Correction Result: 30° Sampling rate =2G



Correction Result: 60° Sampling rate =2G

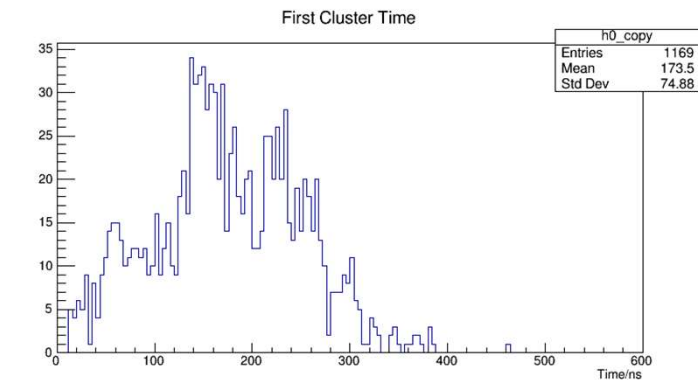


Correction Result: 30° Sampling rate =1G

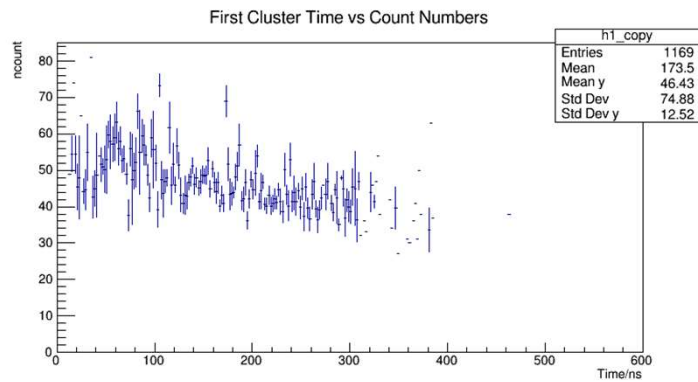


T0 is not obvious
Not Corrected

Correction Result: 60° Sampling rate =1G



T0 is not obvious
Not Corrected

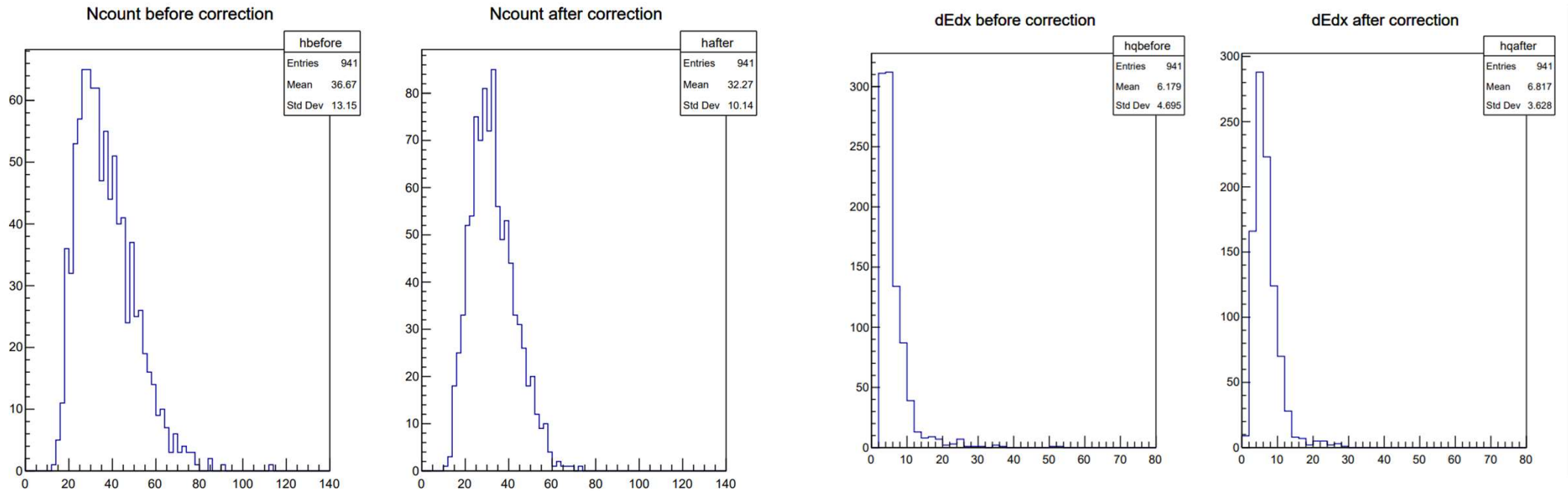


Backup Summary

- Correction on the dependency of t_F to dN/dx , and compared to same correction on dE/dx
 - Almost all 90/10 data is used
 - 4 different angles, 3 different sampling rate
 - Resolution is improved after correction
- Data of 30°/60°, sampling rate =1.0G have no obvious T0, not corrected now

Force Correction of Data of 30° , sampling rate = 1.0G

- Set $T_0=128.0$



Force Correction of Data of 60° , sampling rate = 1.0G

- Set $T_0=128.0$

