
CERN

Weekly Progress

Jesus A. Galarza

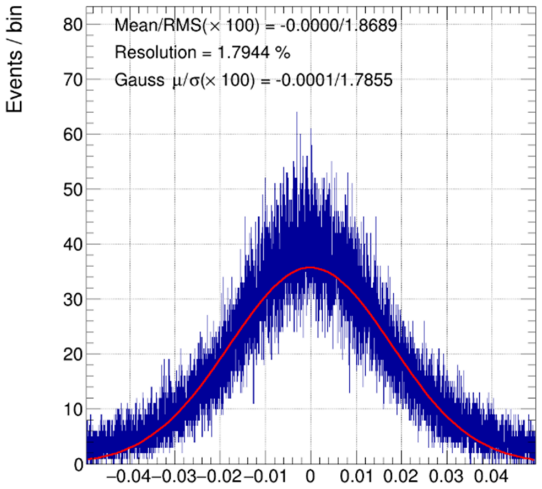
Introduction

Z$\rightarrow \mu\mu$ at 240GeV

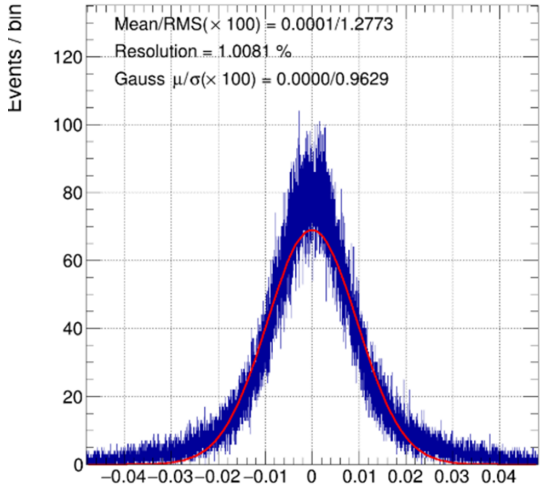
Z$\rightarrow$ uu at 91.2GeV

$Z \rightarrow \mu\mu$ at 240GeV

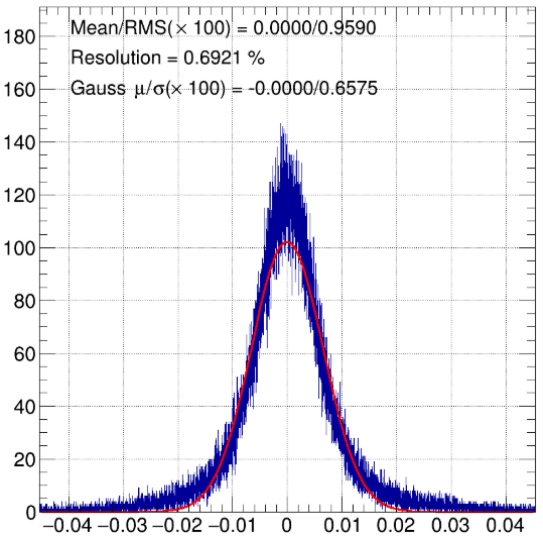
p resolution in CLD



0.5 Tesla

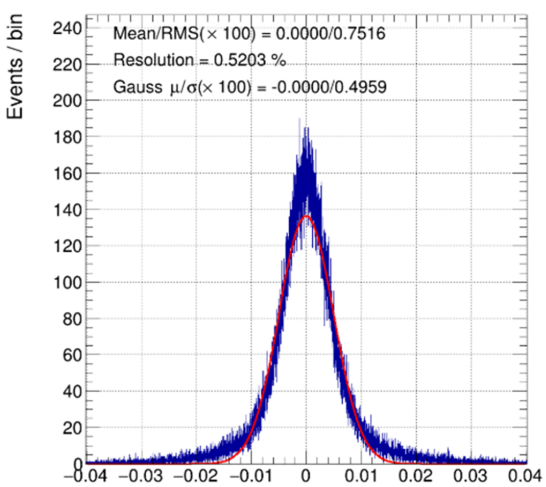


1 Tesla

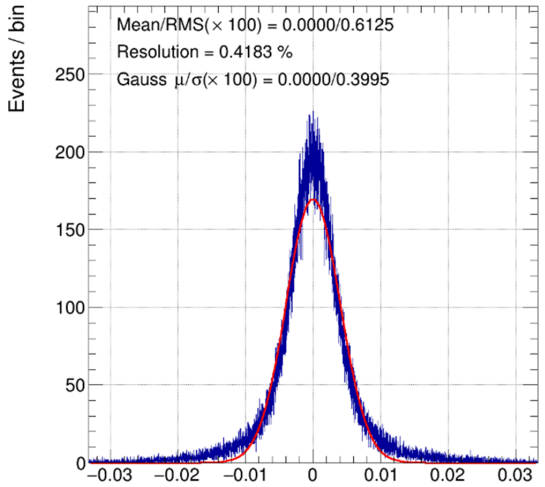


1.5 Tesla

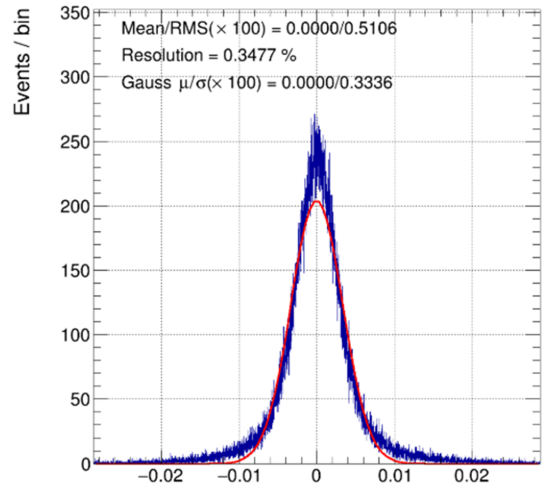
p resolution in CLD



2 Tesla

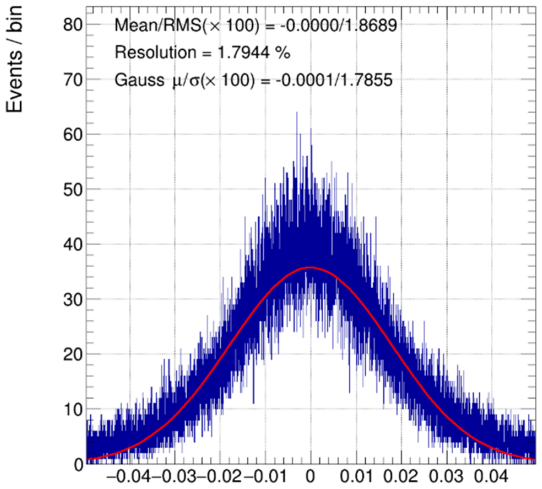


2.5 Tesla

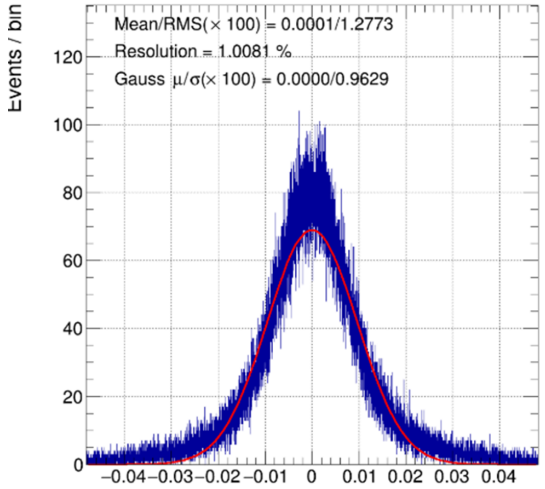


3 Tesla

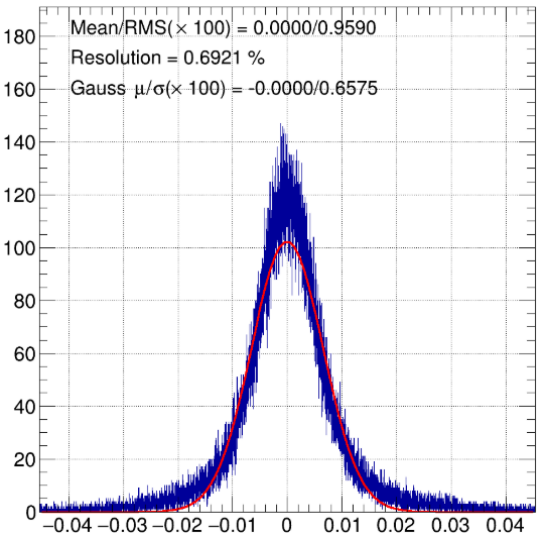
pT resolution in CLD



0.5 Tesla

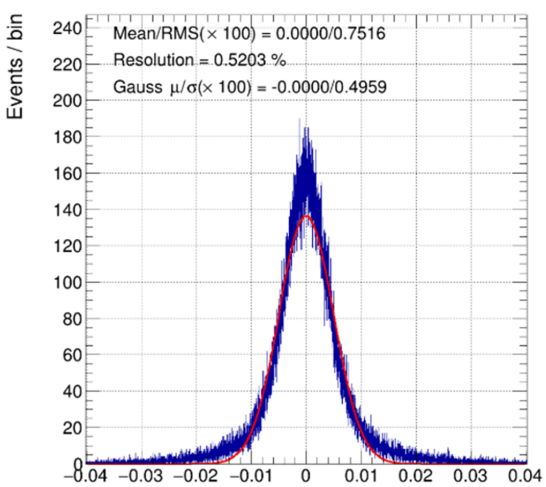


1 Tesla

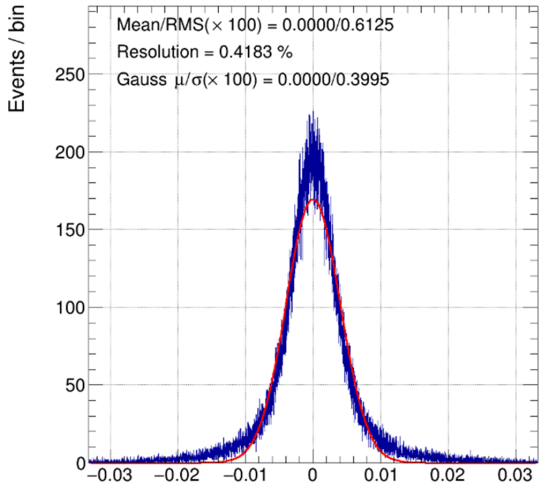


1.5 Tesla

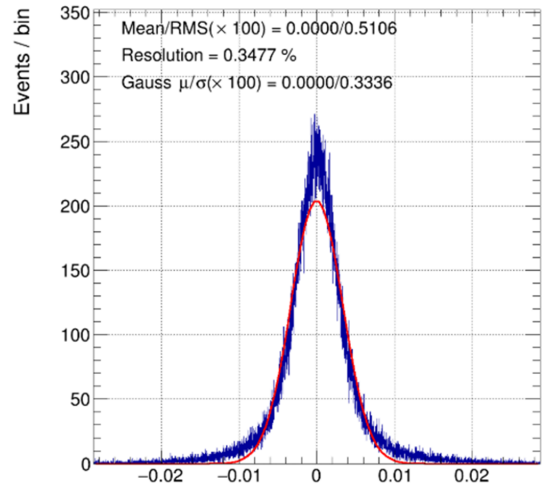
pT resolution in CLD



2 Tesla

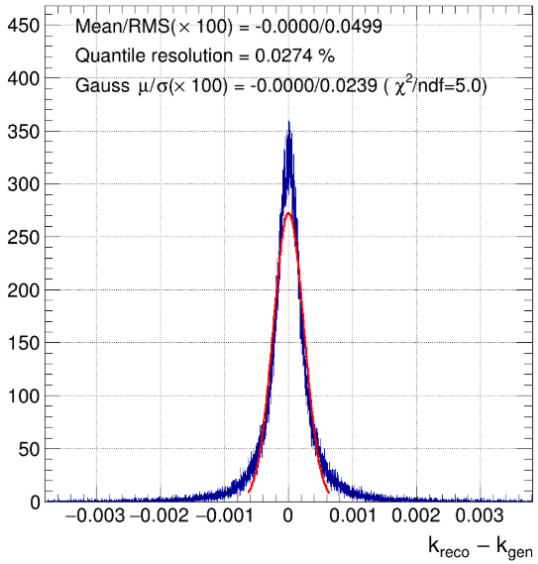


2.5 Tesla

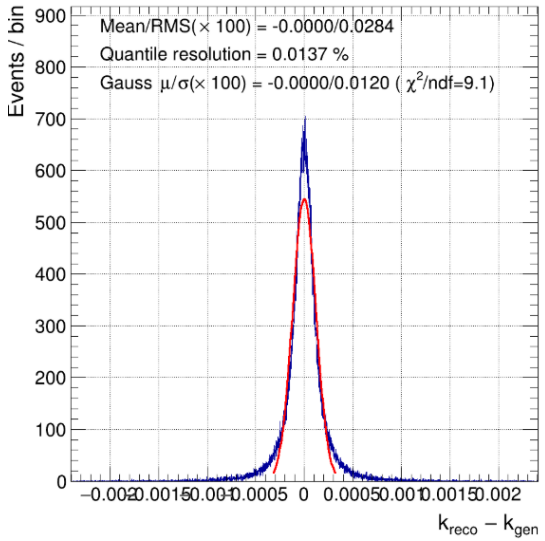


3 Tesla

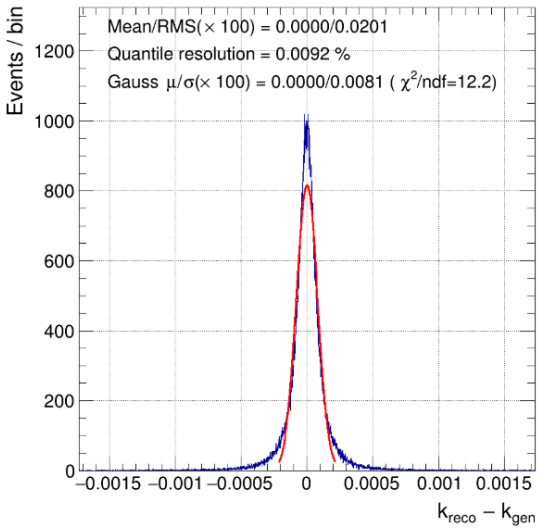
k resolution in CLD



0.5 Tesla

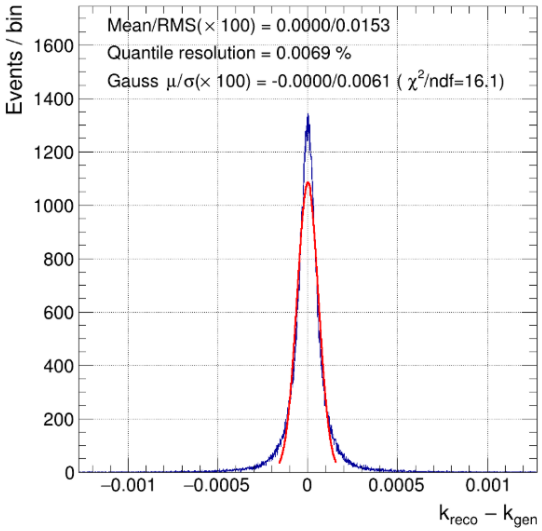


1 Tesla

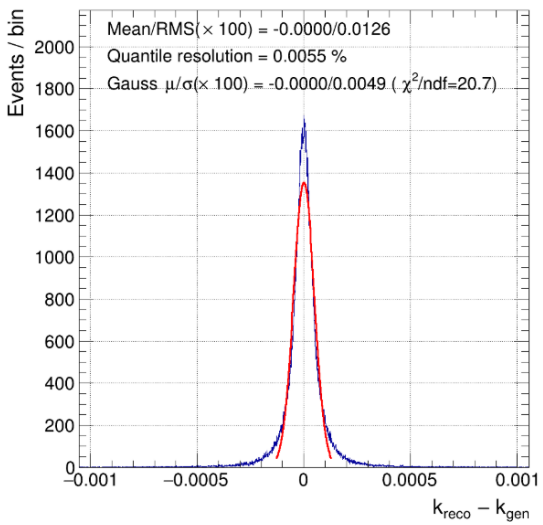


1.5 Tesla

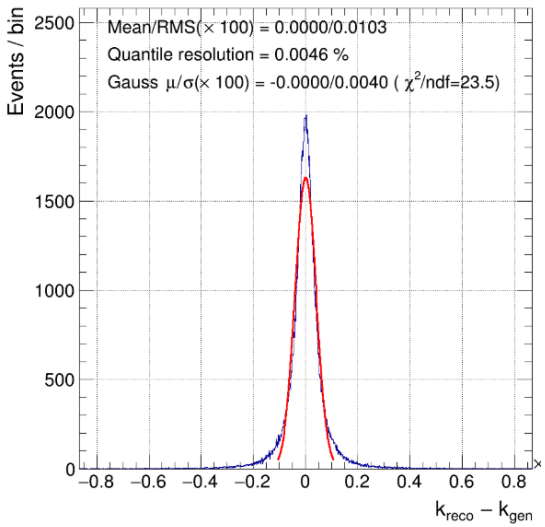
k resolution in CLD



2 Tesla

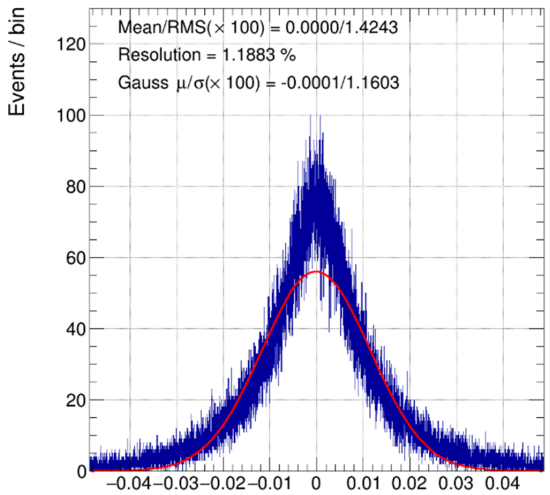


2.5 Tesla

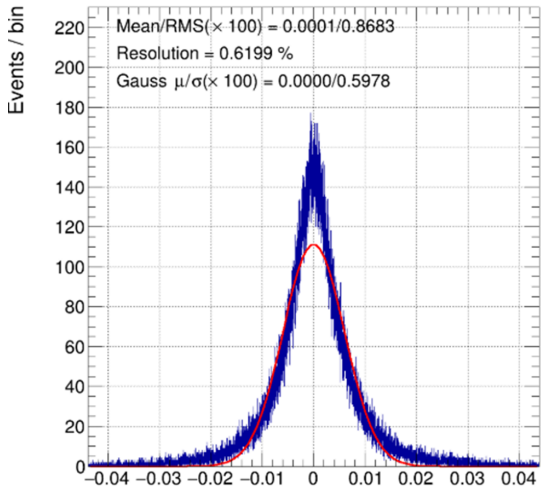


3 Tesla

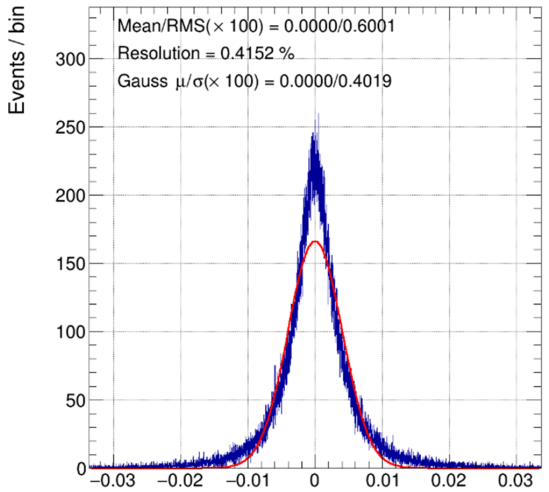
p resolution in IDEA



0.5 Tesla

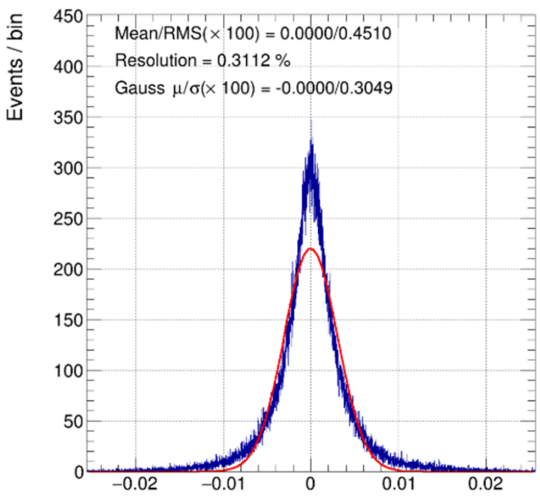


1 Tesla

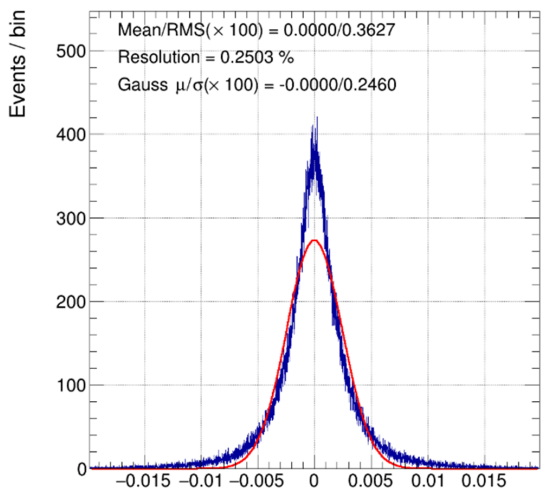


1.5 Tesla

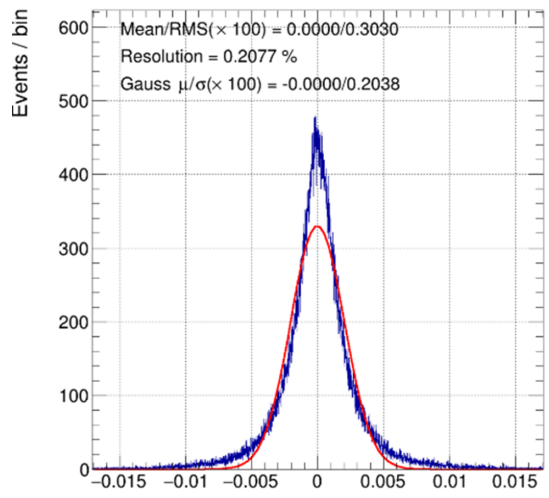
p resolution in IDEA



2 Tesla

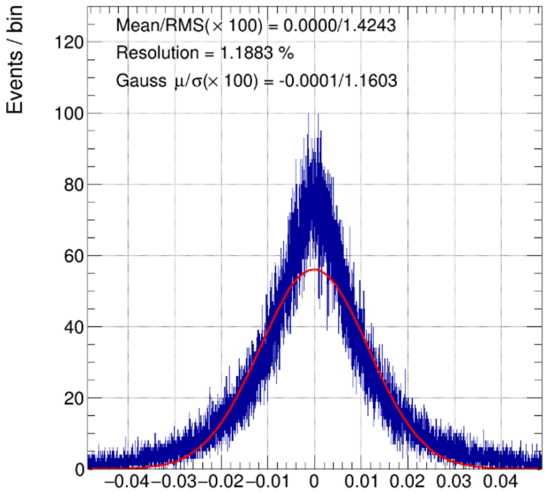


2.5 Tesla

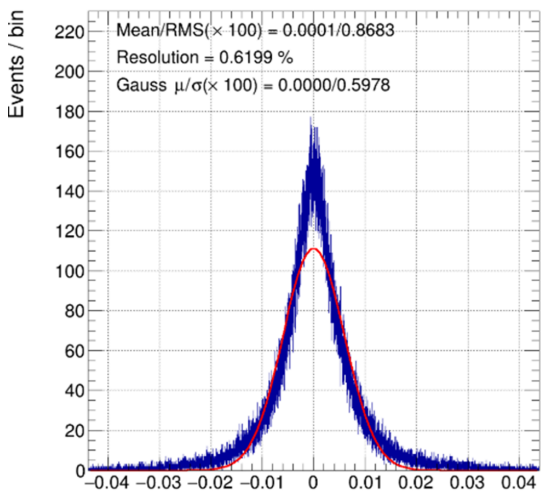


3 Tesla

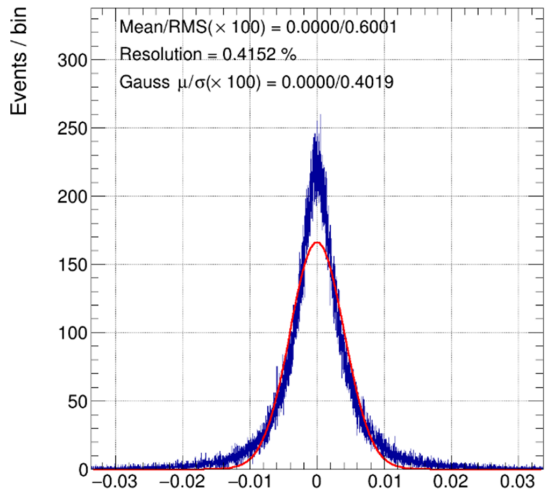
pT resolution in IDEA



0.5 Tesla

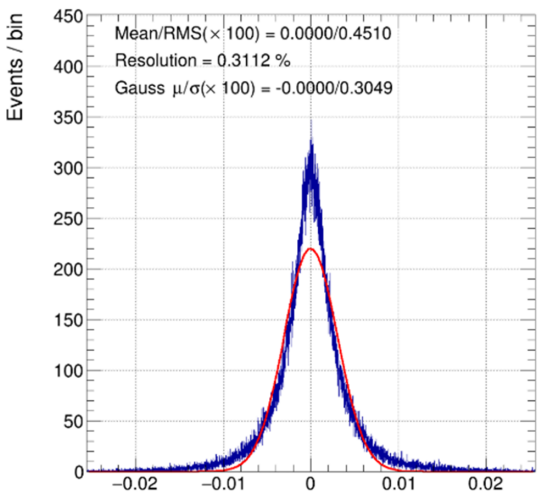


1 Tesla

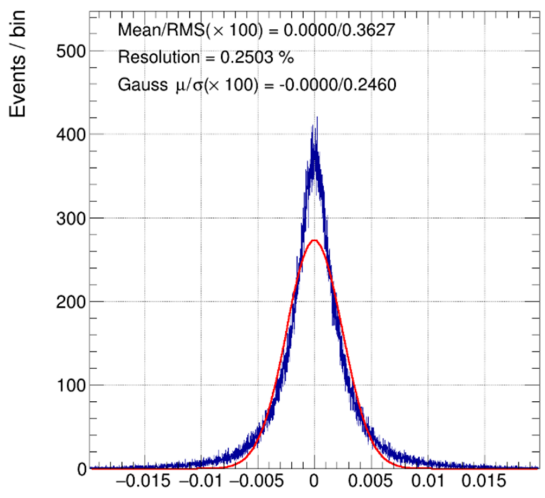


1.5 Tesla

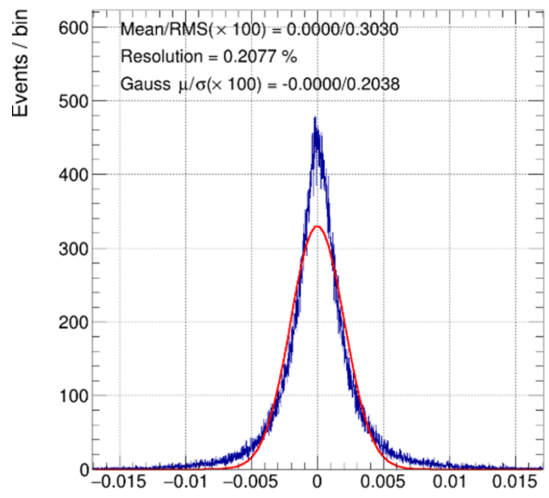
pT resolution in IDEA



2 Tesla

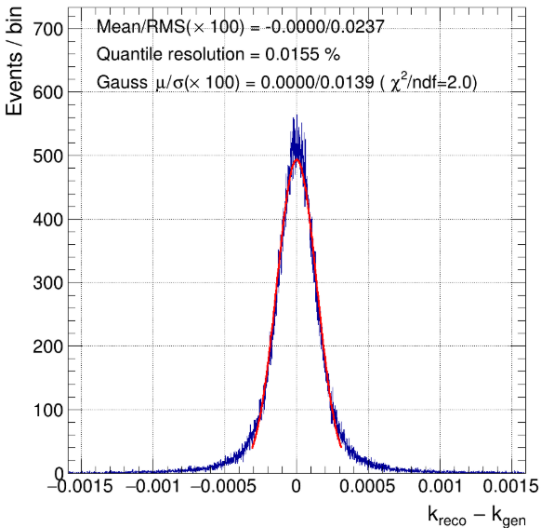


2.5 Tesla

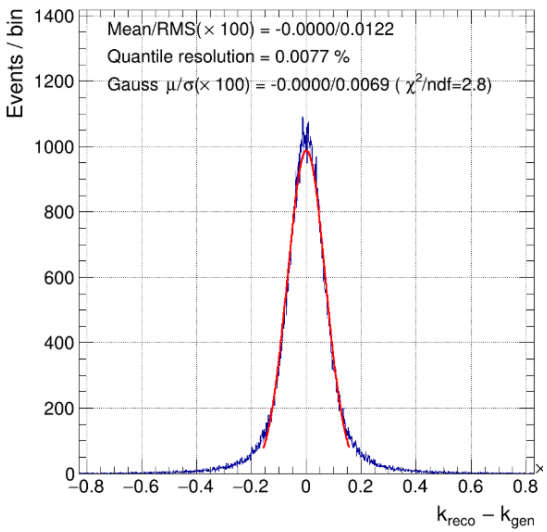


3 Tesla

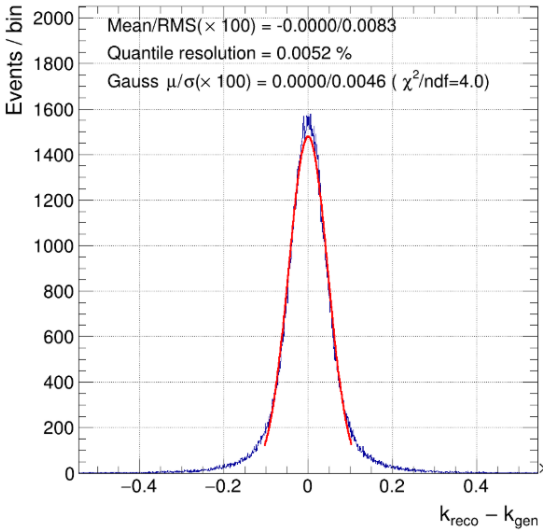
k resolution in IDEA



0.5 Tesla

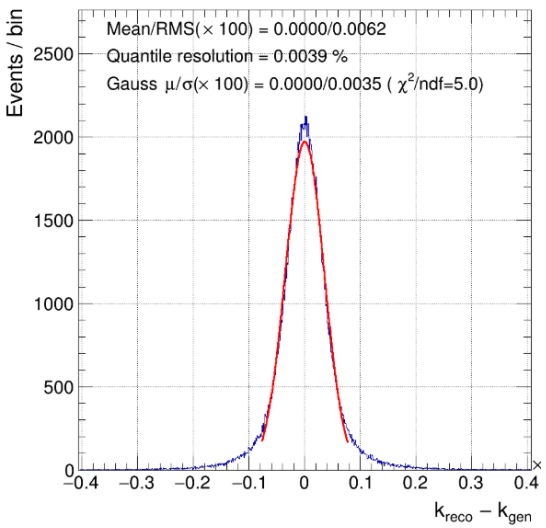


1 Tesla

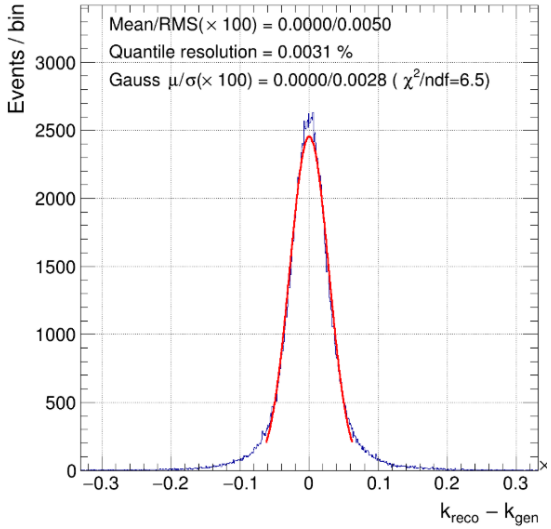


1.5 Tesla

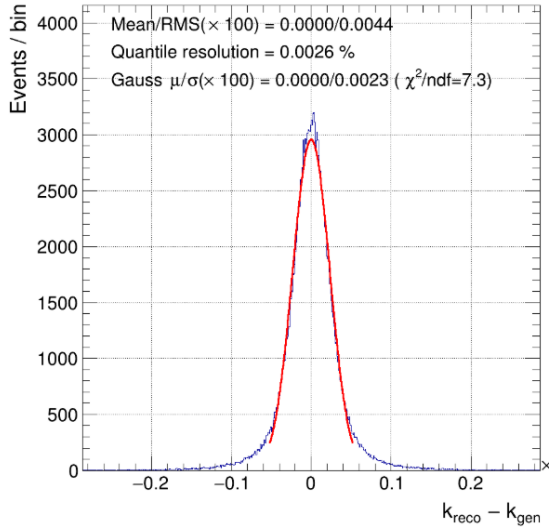
k resolution in IDEA



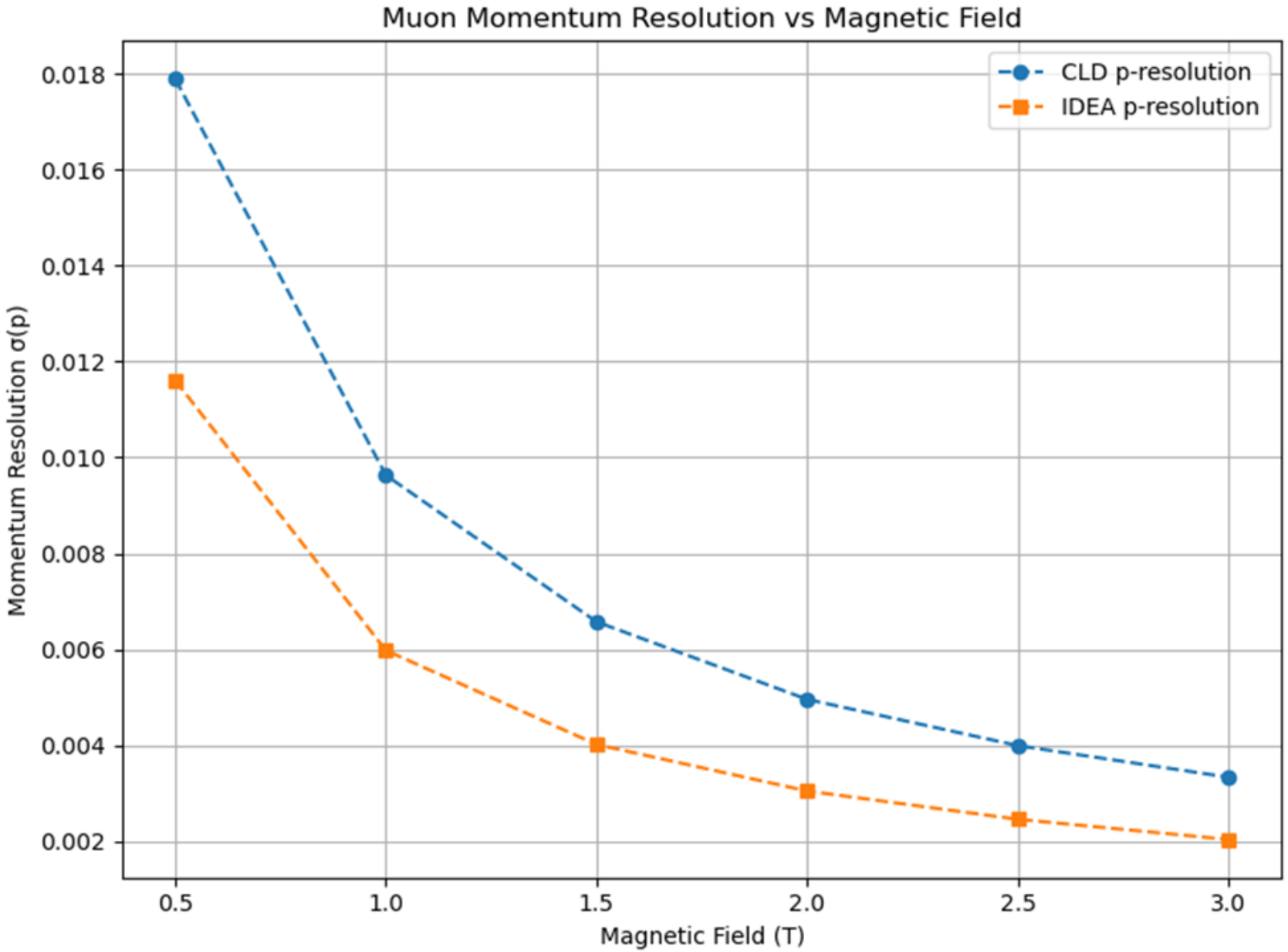
2 Tesla

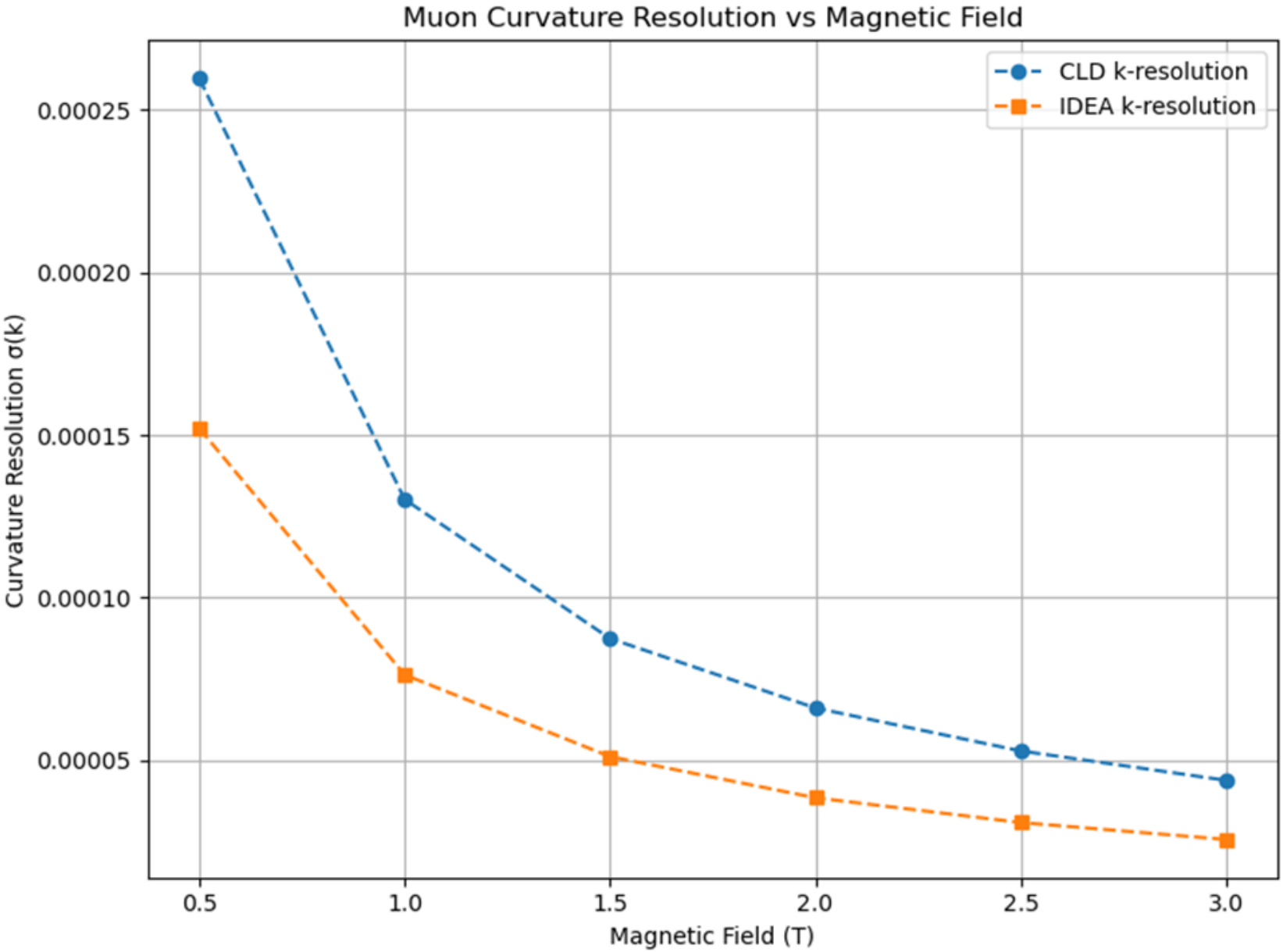


2.5 Tesla



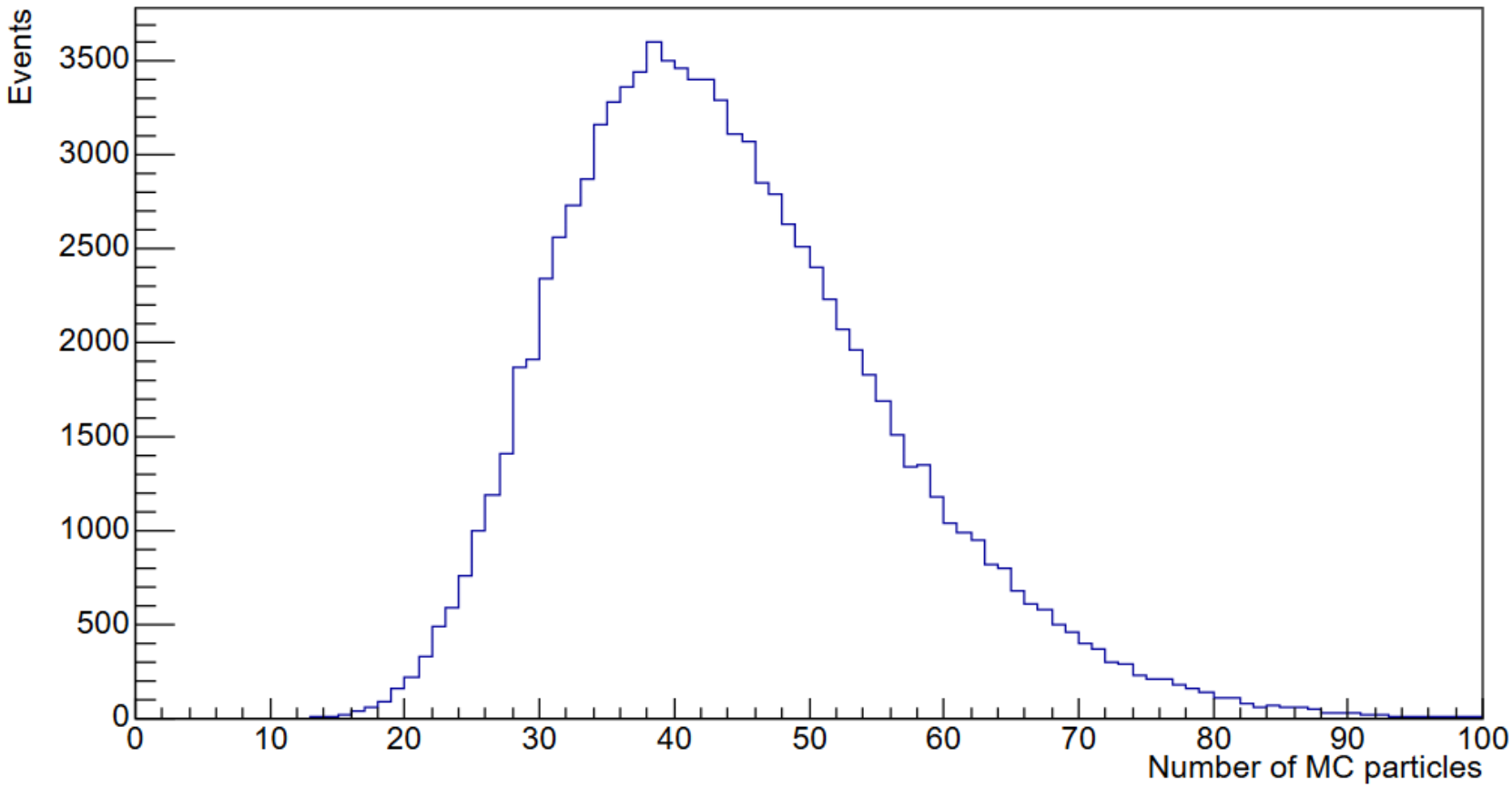
3 Tesla


Muon Momentum Resolution vs Magnetic Field
CLD p-resolution
IDEA p-resolution
Momentum Resolution σ(p)
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.5
1.0
1.5
2.0
2.5
3.0
Magnetic Field (T)

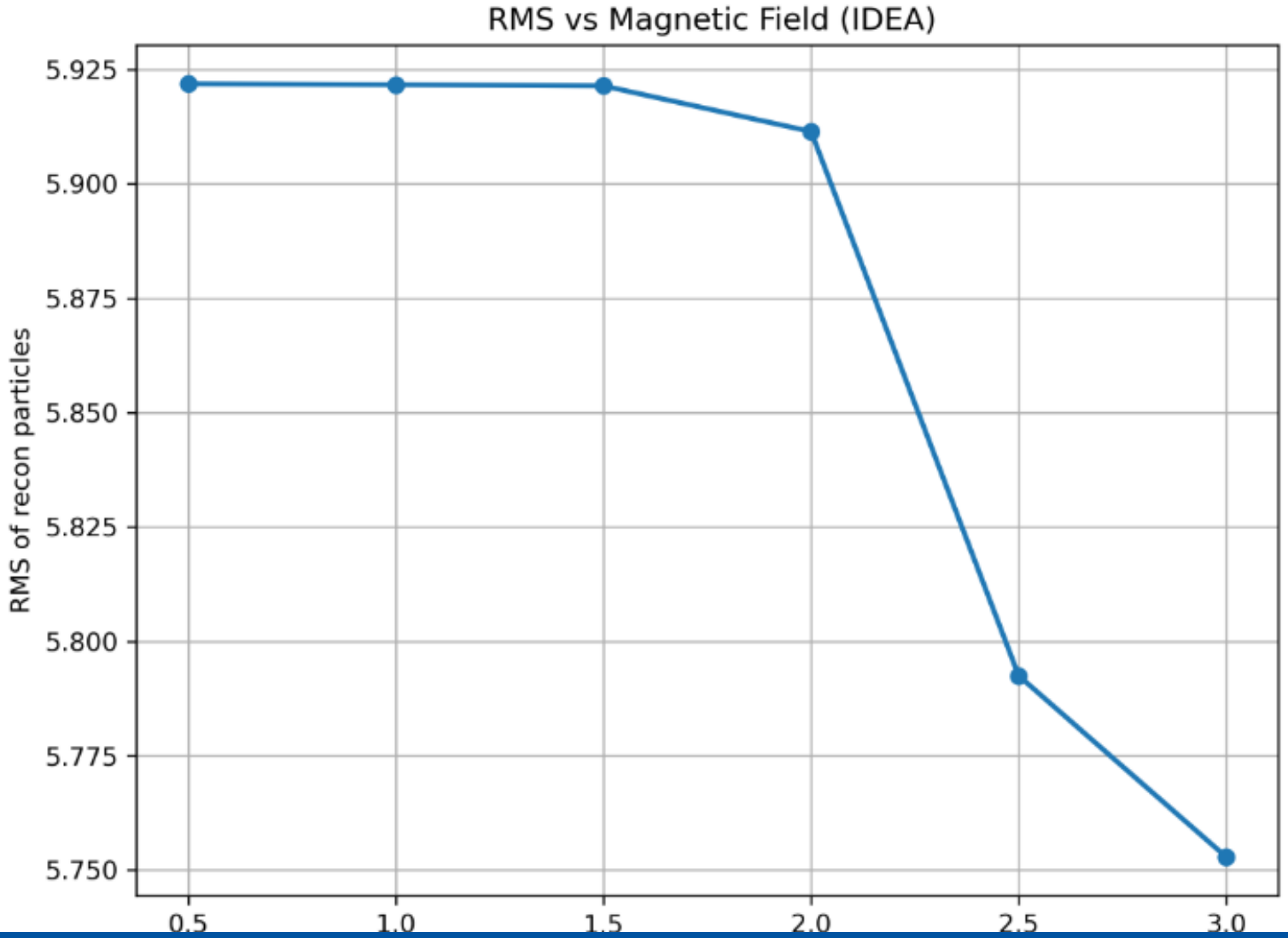

Muon Curvature Resolution vs Magnetic Field
CLD k-resolution
IDEA k-resolution
Curvature Resolution σ(k)
0.00025
0.00020
0.00015
0.00010
0.00005
0.5
1.0
1.5
2.0
2.5
3.0
Magnetic Field (T)

Z$\rightarrow$ uu at 91.2GeV

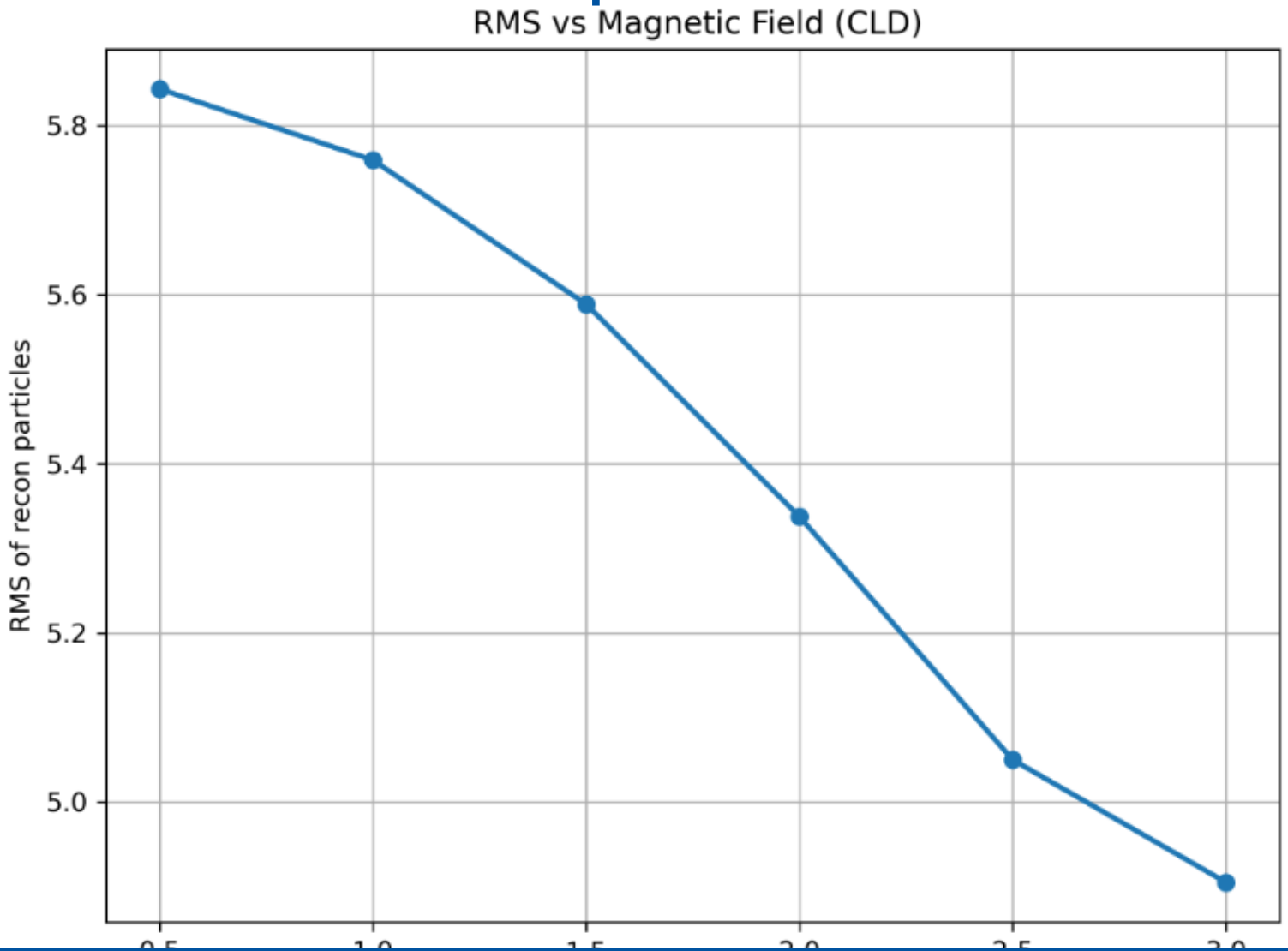
Number of MC particles in CLD and IDEA



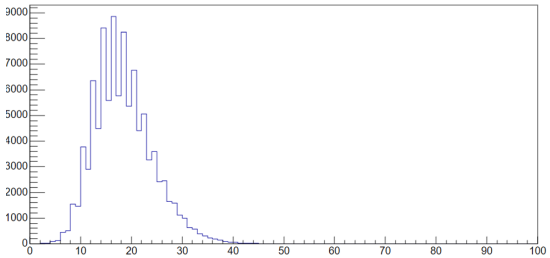
Number of Recon particles



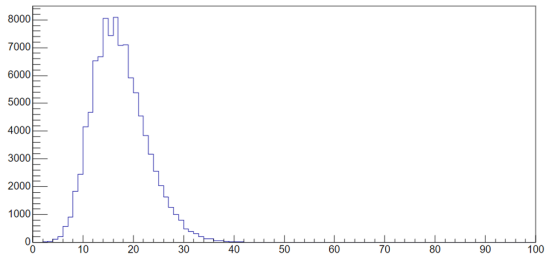
Number of Recon particles



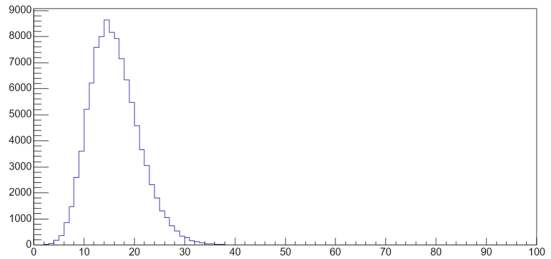
Number of Recon particles



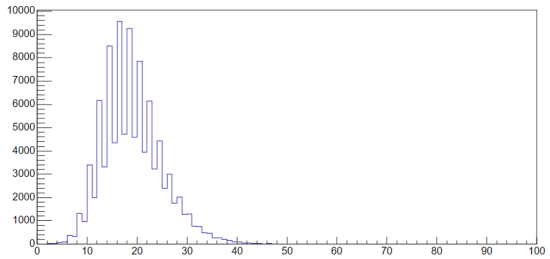
1T in CLD



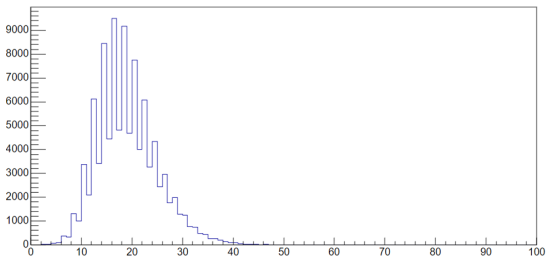
2T in CLD



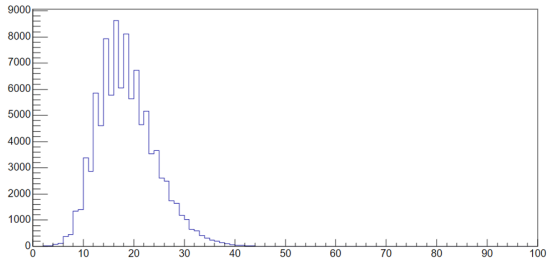
3T in CLD



1T in IDEA

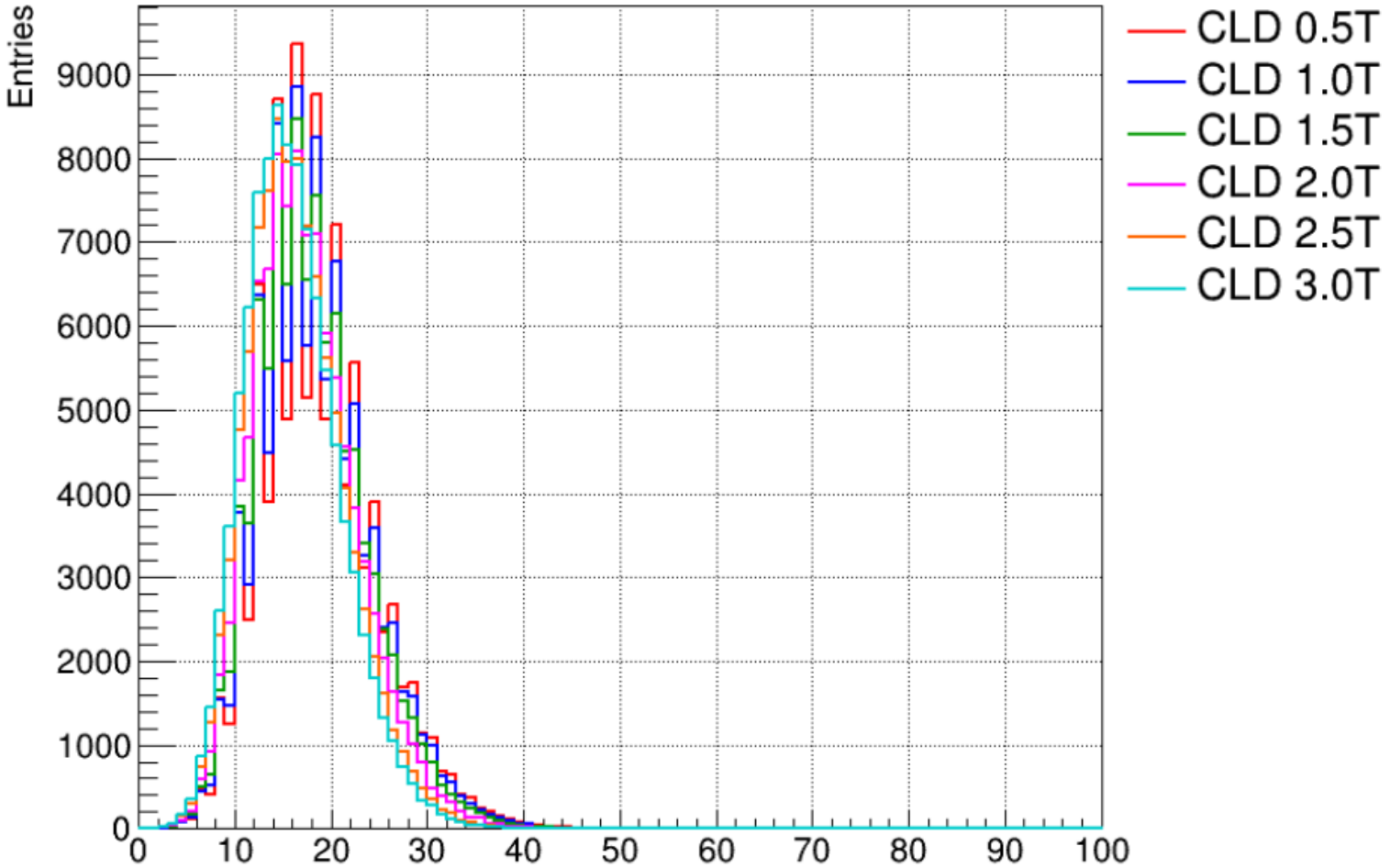


2T in IDEA

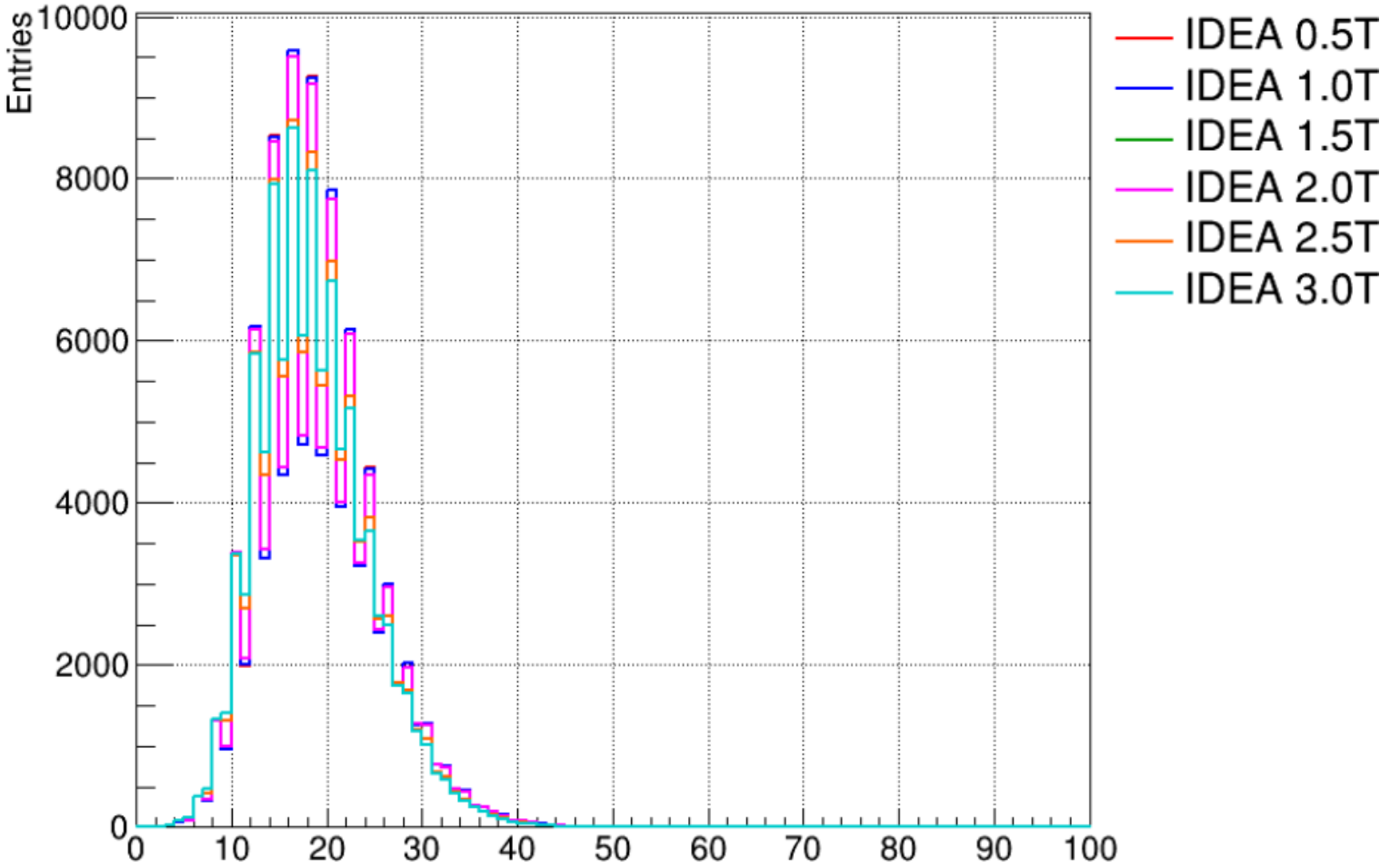


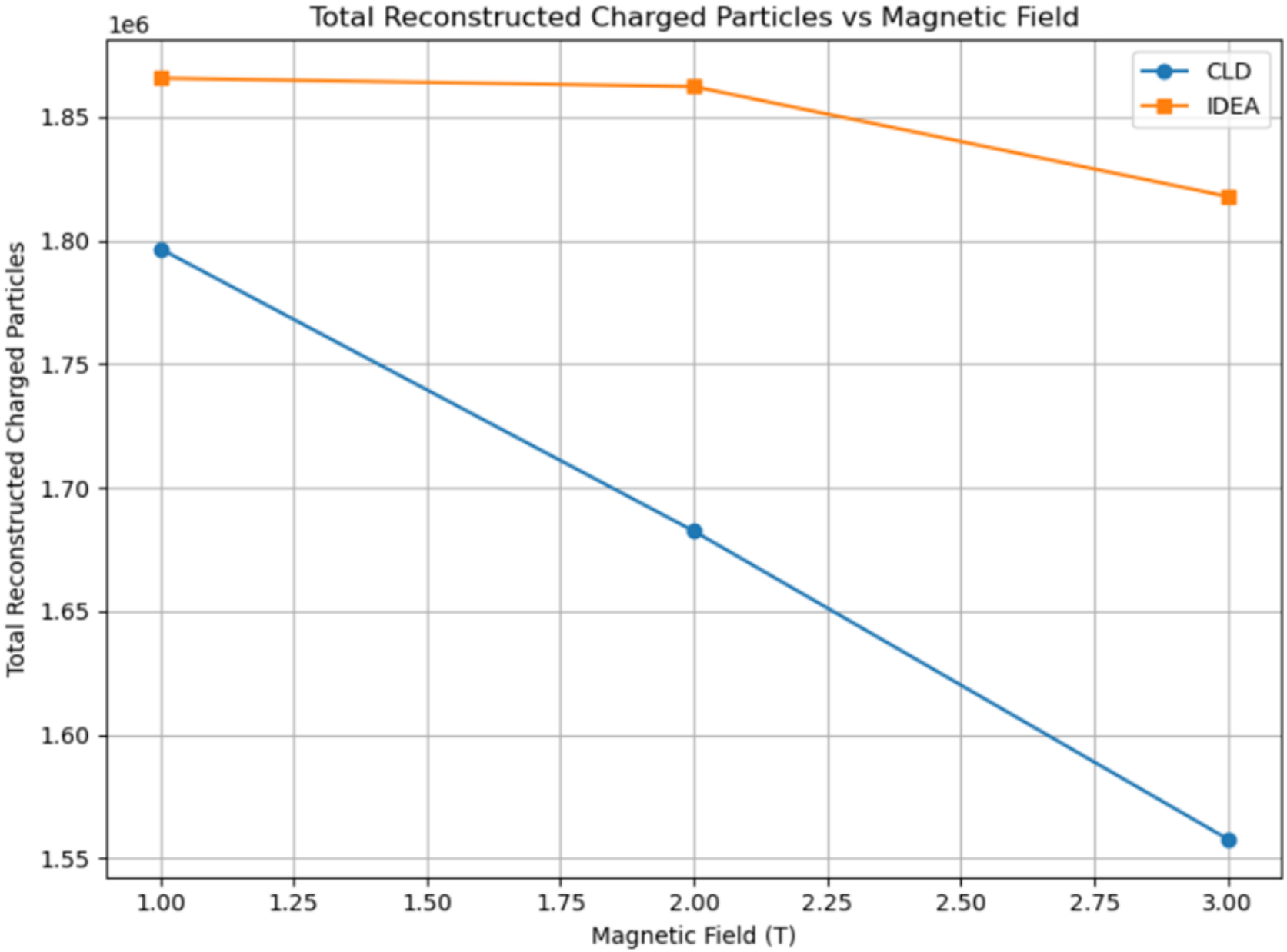
3T in IDEA

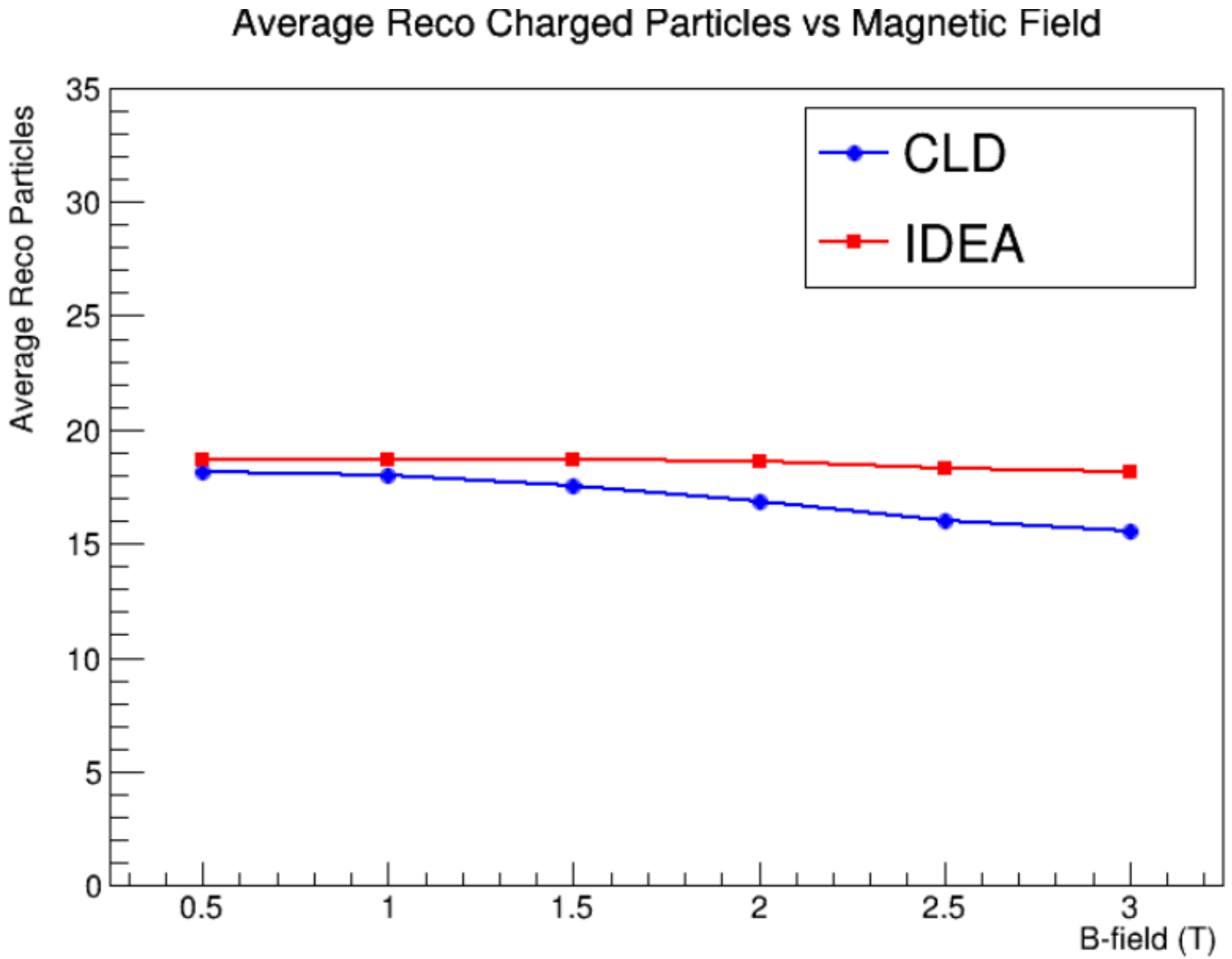
Number of Recon particles



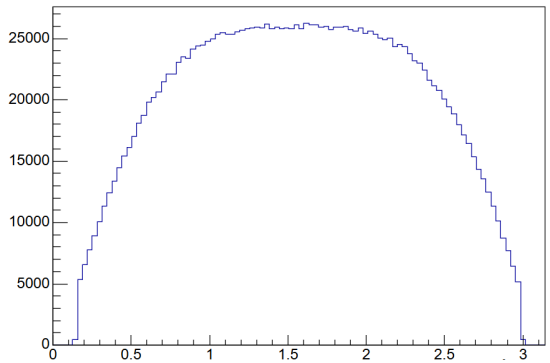
Number of Recon particles



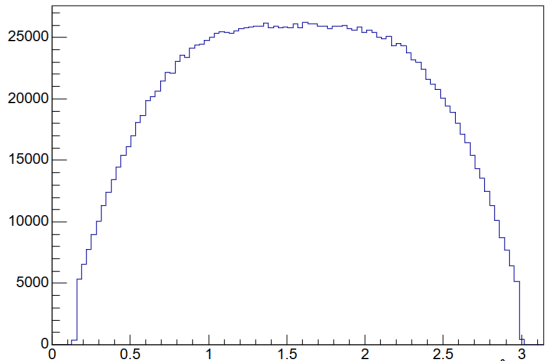

Total Reconstructed Charged Particles vs Magnetic Field
1e6
1.85
1.80
1.75
1.70
1.65
1.60
1.55
Total Reconstructed Charged Particles
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
Magnetic Field (T)
CLD
IDEA


Average Reco Charged Particles vs Magnetic Field
Average Reco Particles
B-field (T)
CLD
IDEA
0
5
10
15
20
25
30
35
0.5
1
1.5
2
2.5
3

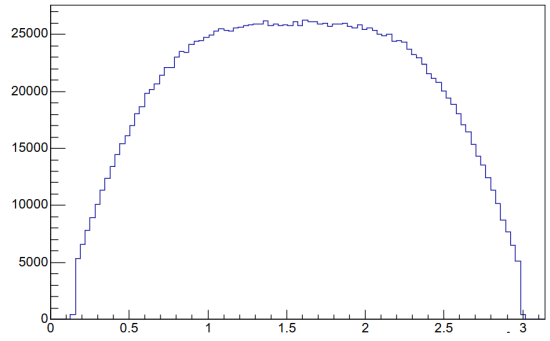
θ resolution in IDEA



0.5 Tesla

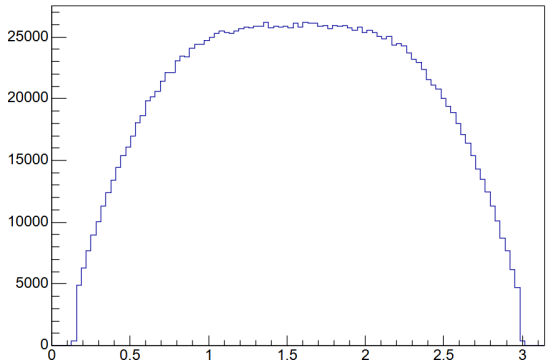


1.0 Tesla

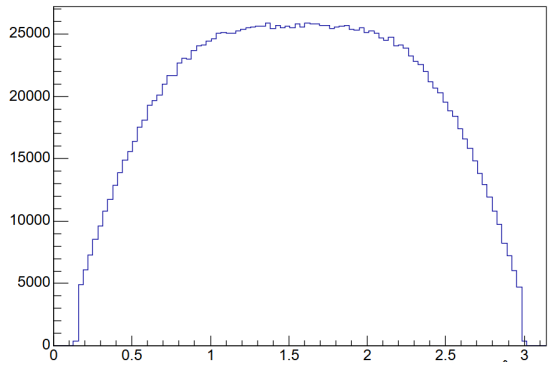


1.5 Tesla

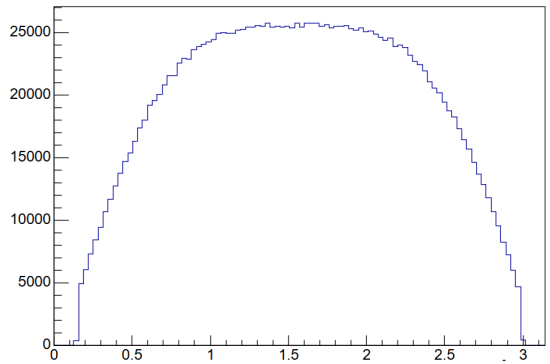
θ resolution in IDEA



2.0 Tesla

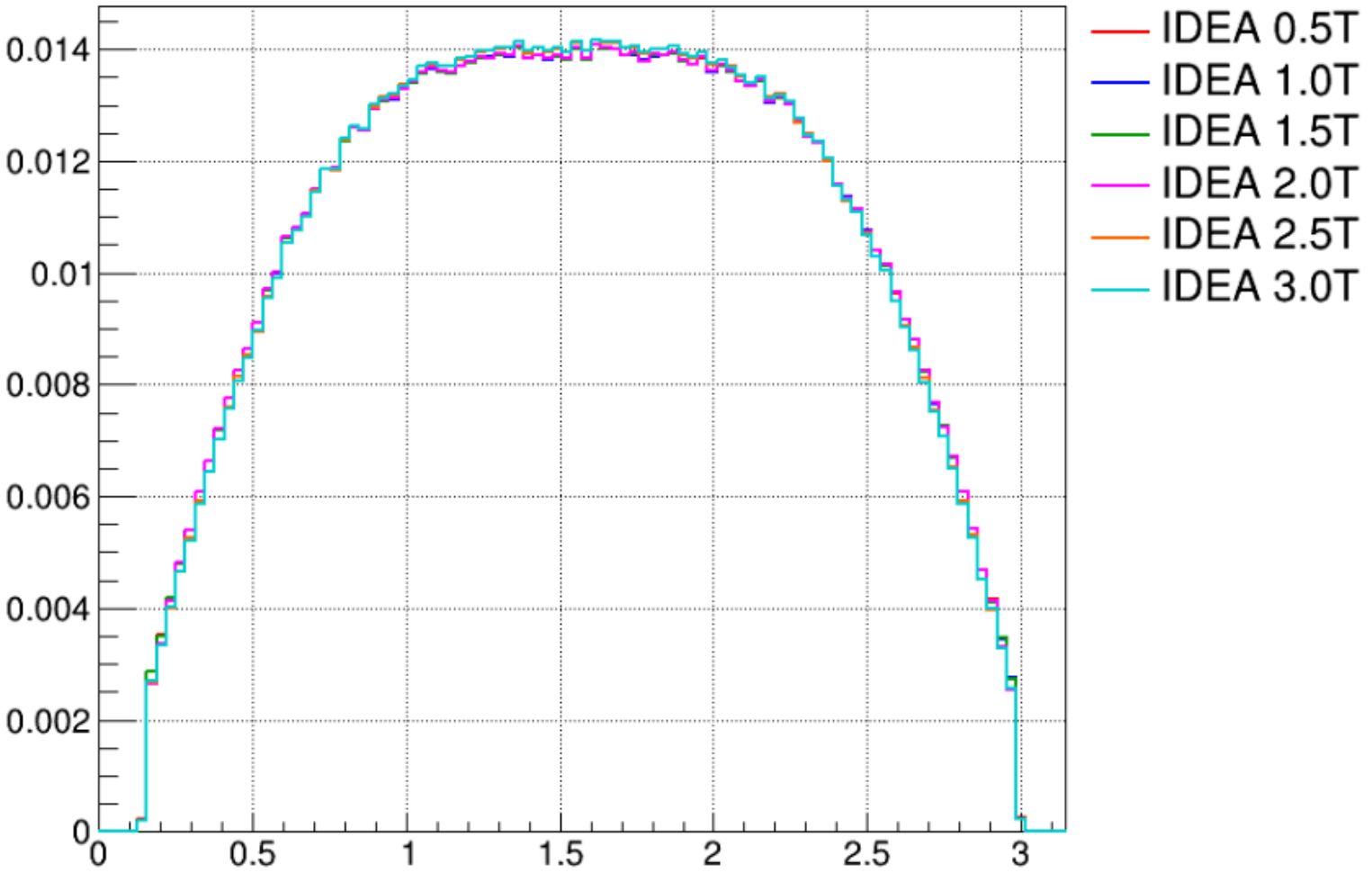


2.5 Tesla

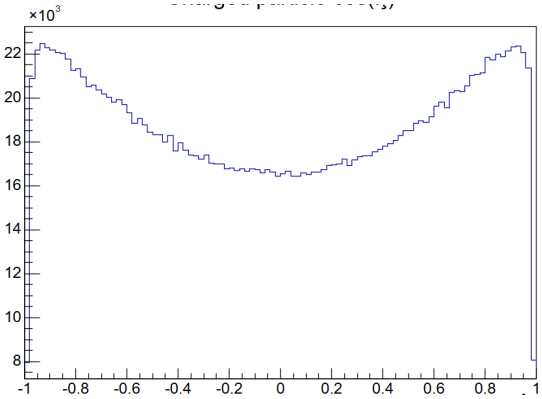


3.0 Tesla

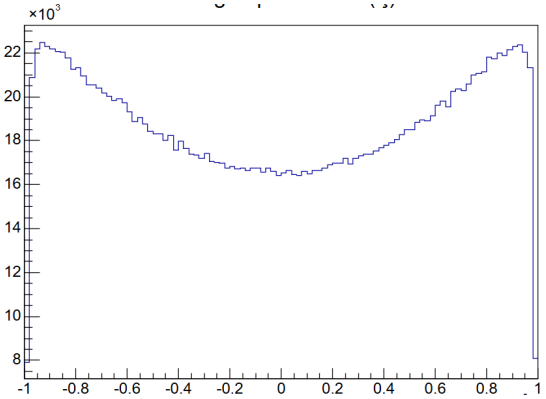
θ resolution in IDEA



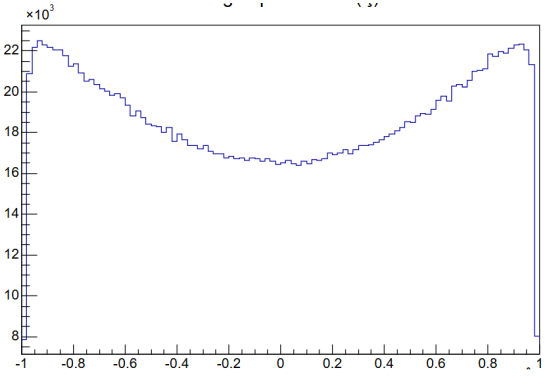
$\cos(\theta)$ resolution in IDEA



0.5 Tesla

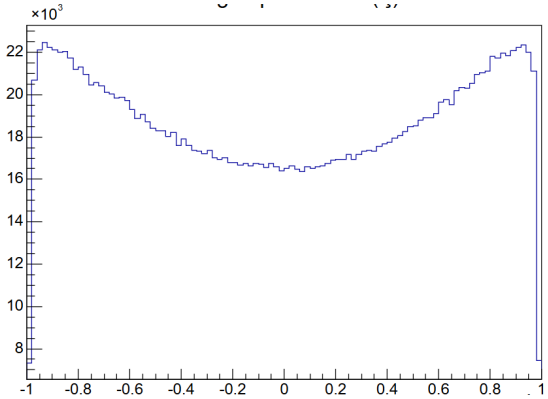


1.0 Tesla

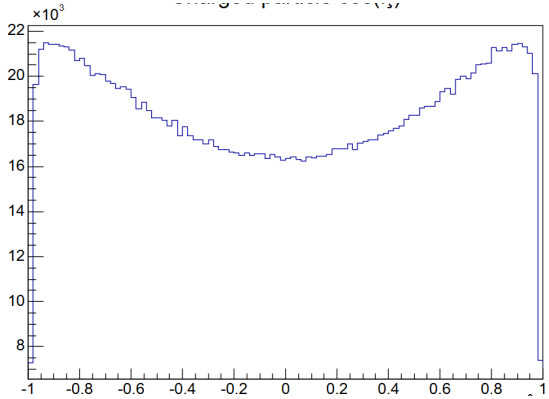


1.5 Tesla

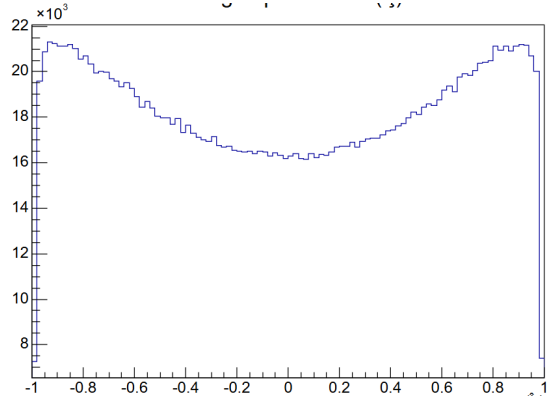
$\cos(\theta)$ resolution in IDEA



2.0 Tesla

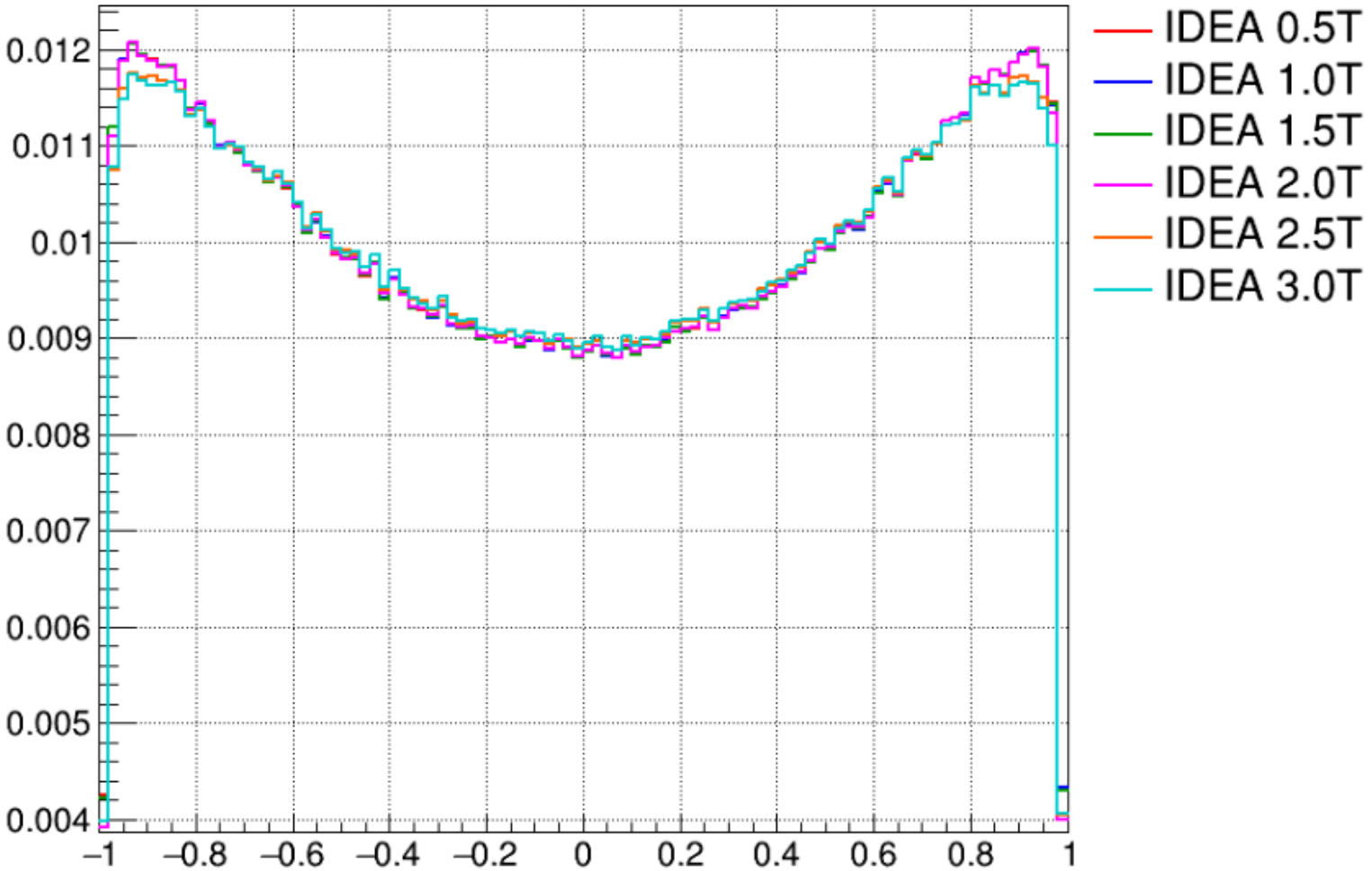


2.5 Tesla

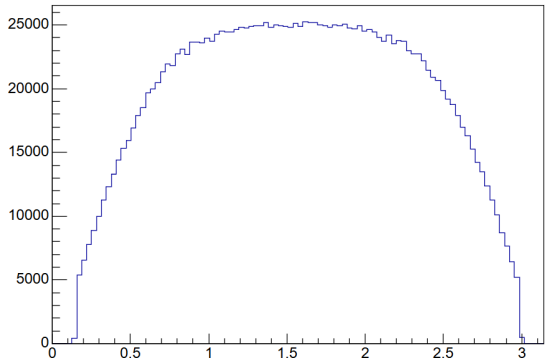


3.0 Tesla

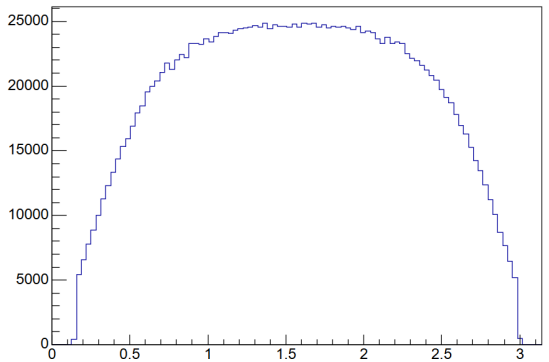
$\cos(\theta)$ resolution in IDEA



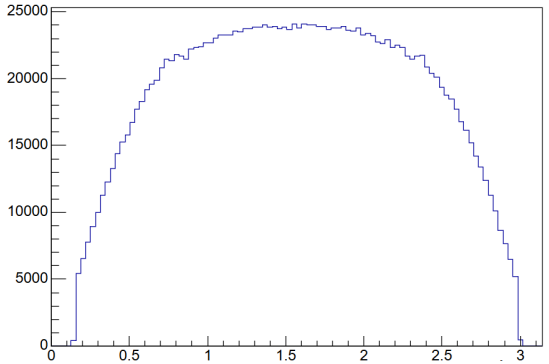
θ resolution in CLD



0.5 Tesla

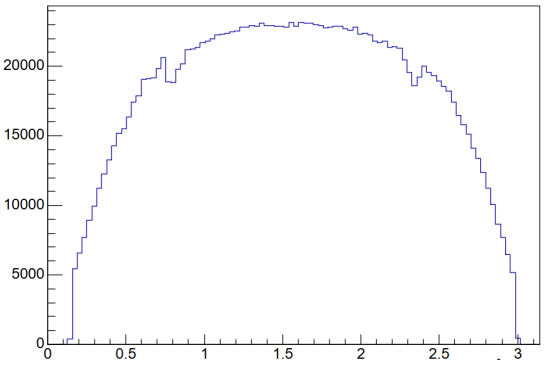


1.0 Tesla

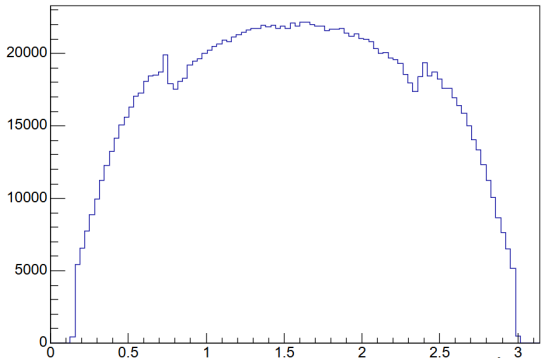


1.5 Tesla

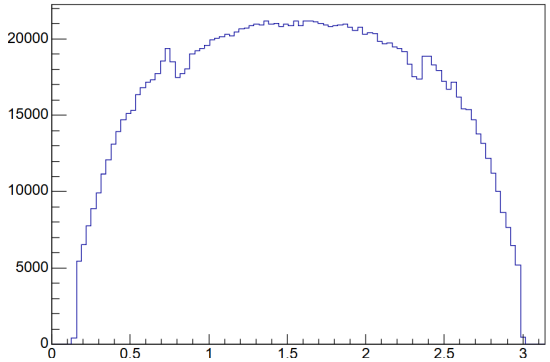
θ resolution in CLD



2.0 Tesla

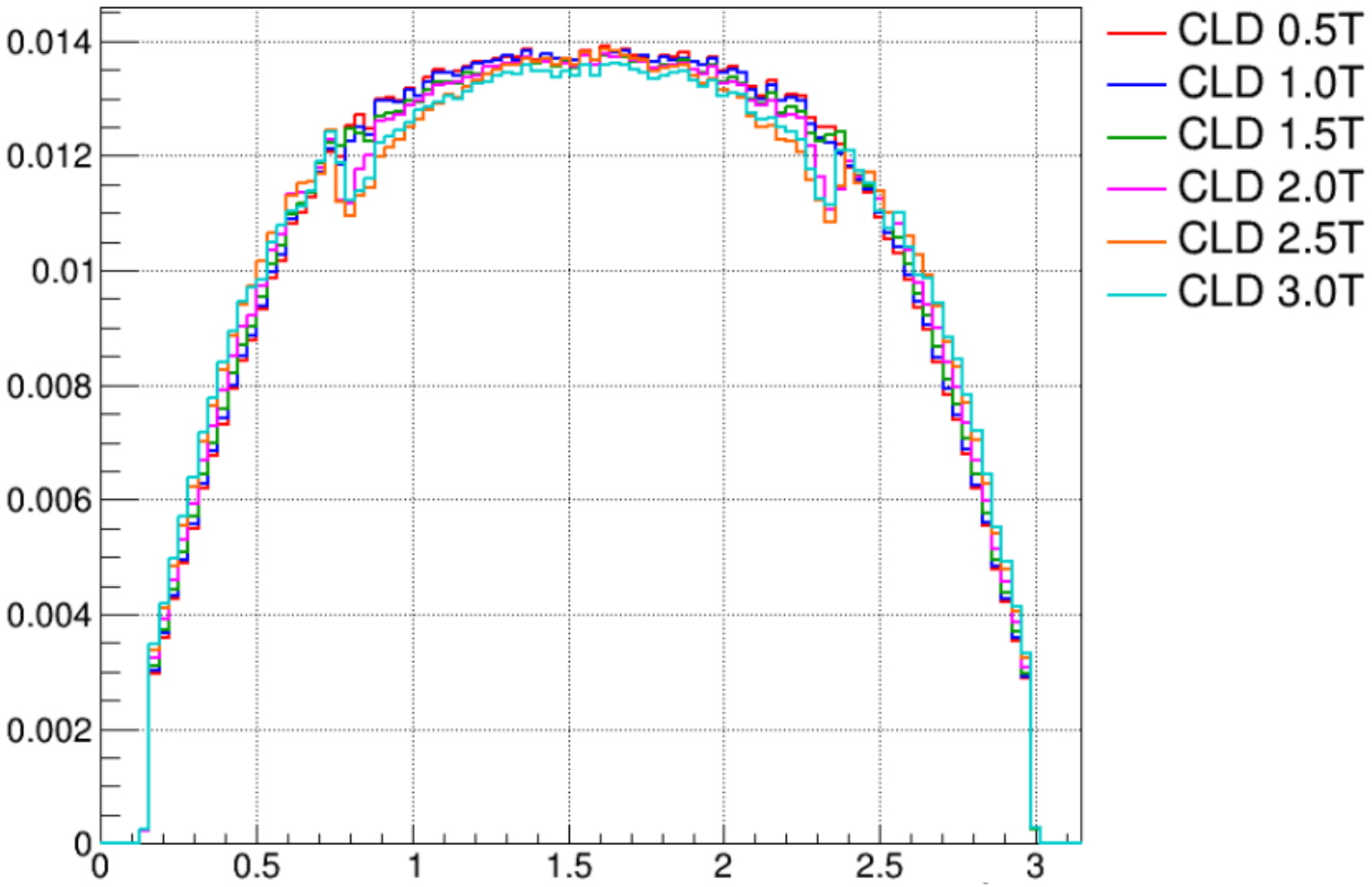


2.5 Tesla

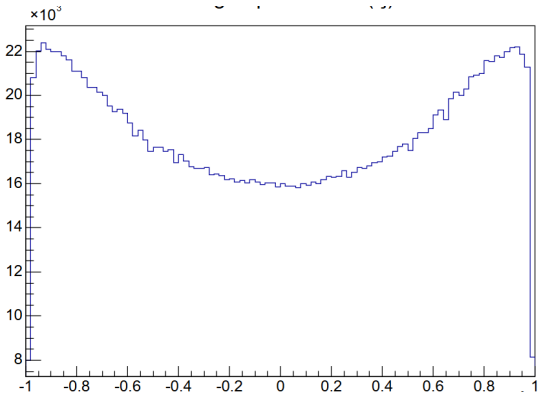


3.0 Tesla

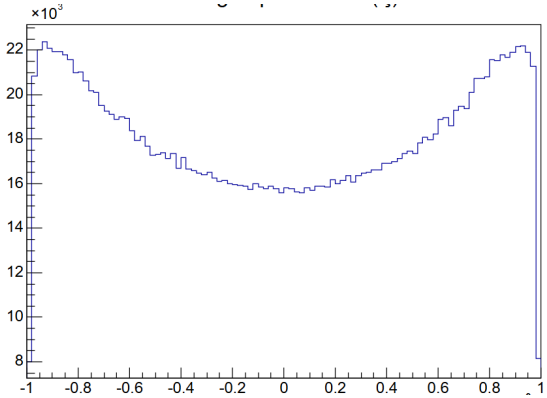
θ resolution in CLD



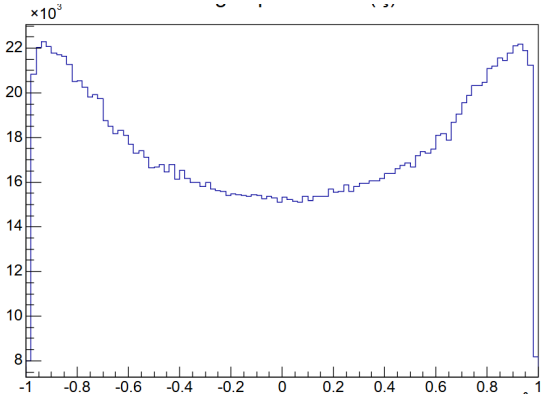
$\cos(\theta)$ resolution in CLD



0.5 Tesla

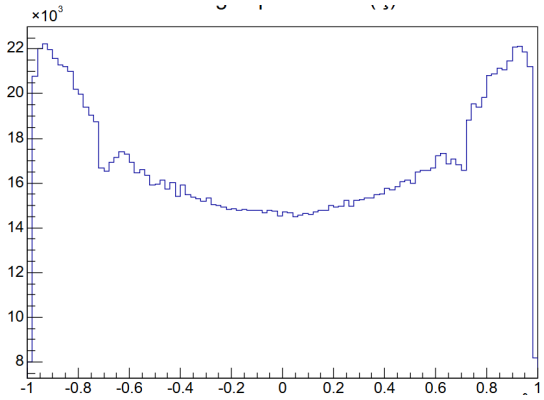


1.0 Tesla

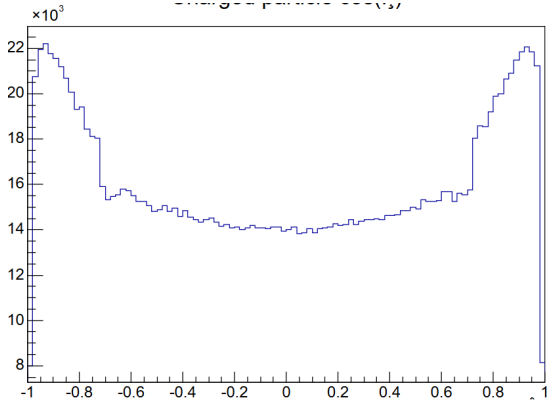


1.5 Tesla

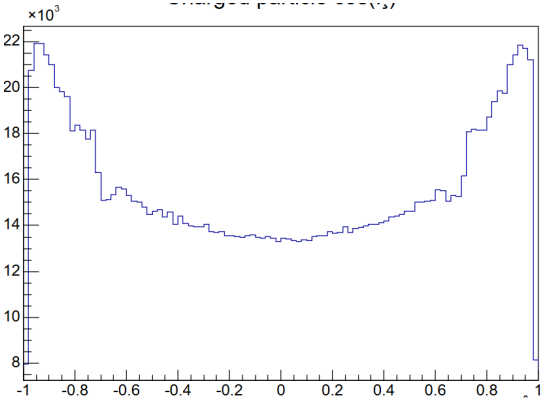
$\cos(\theta)$ resolution in CLD



2.0 Tesla

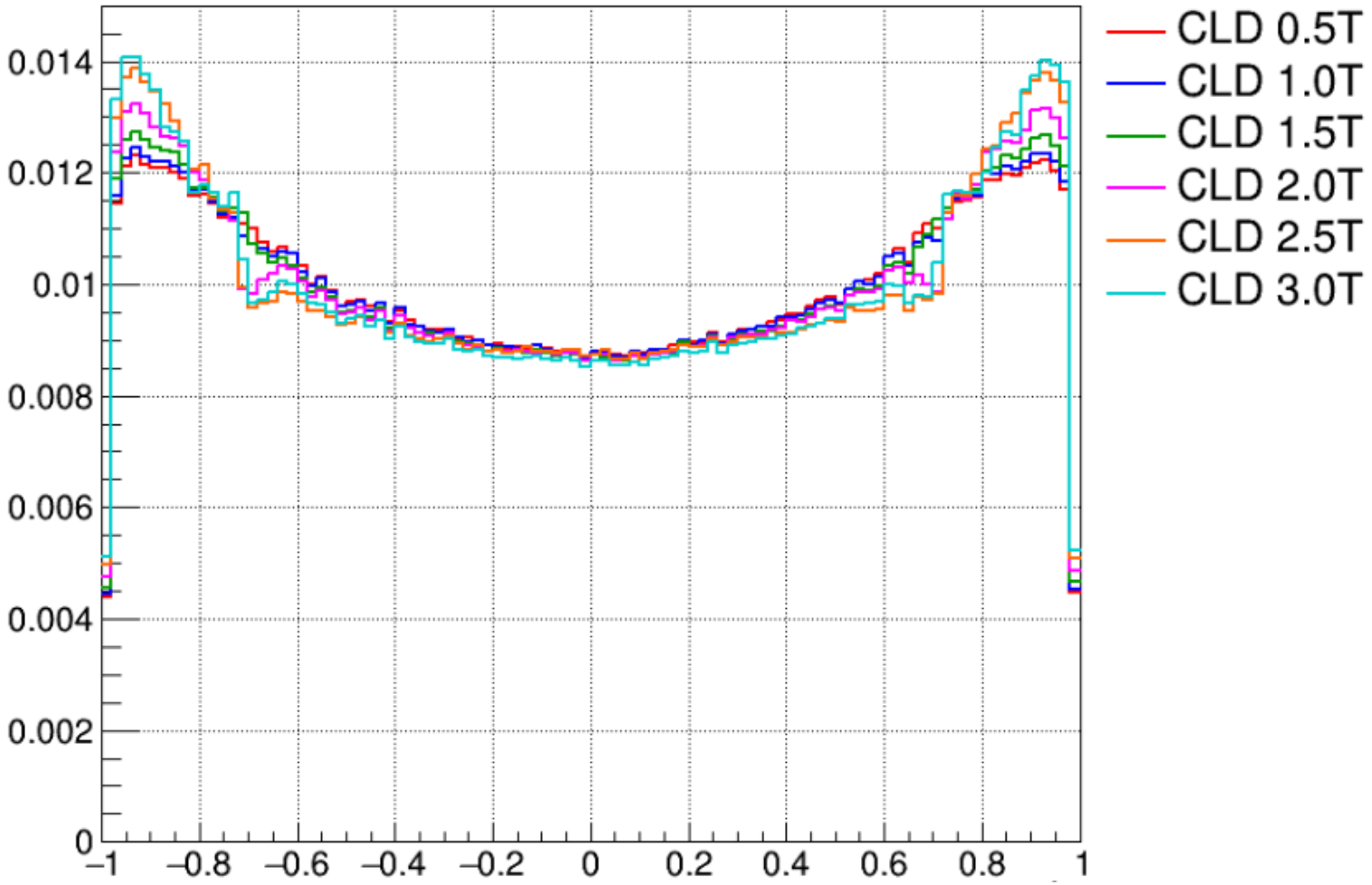


2.5 Tesla

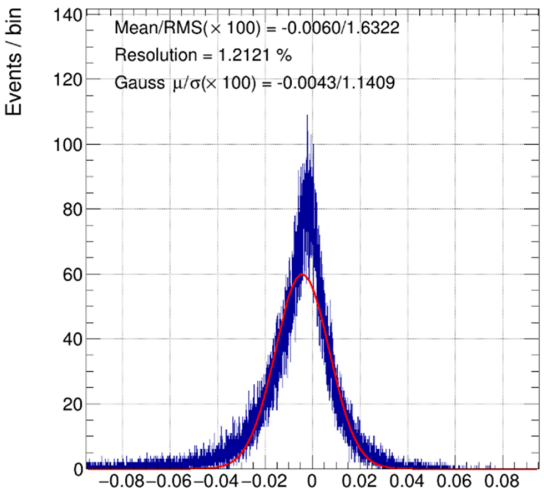


3.0 Tesla

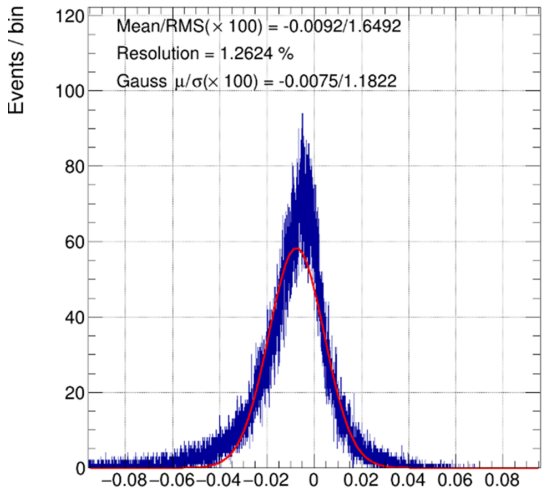
$\cos(\theta)$ resolution in CLD



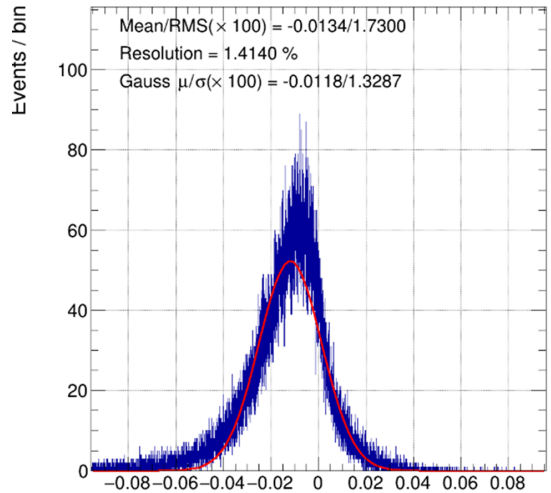
Momentum Resolution in CLD



1 Tesla

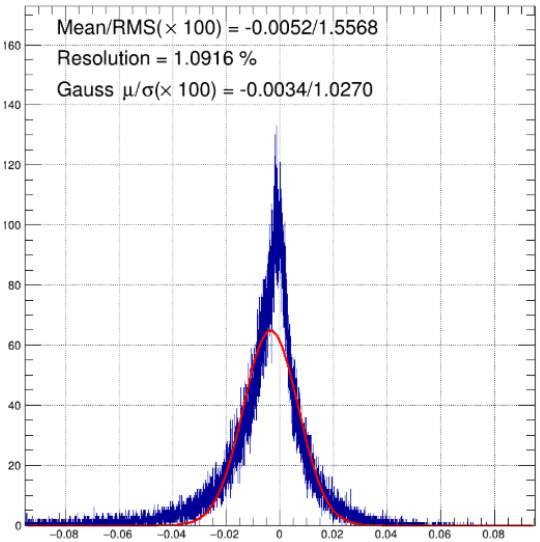


2 Tesla

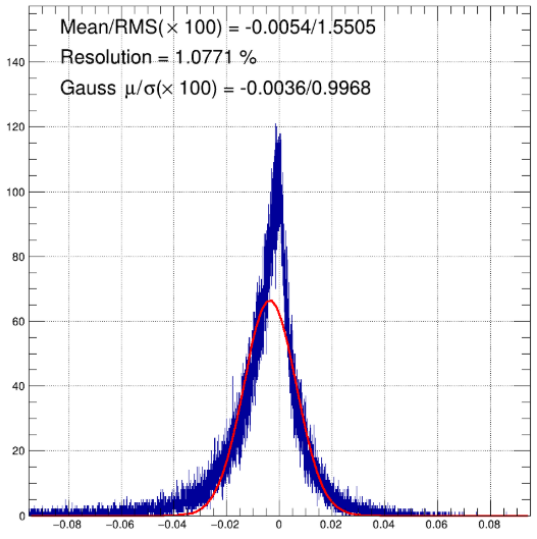


3 Tesla

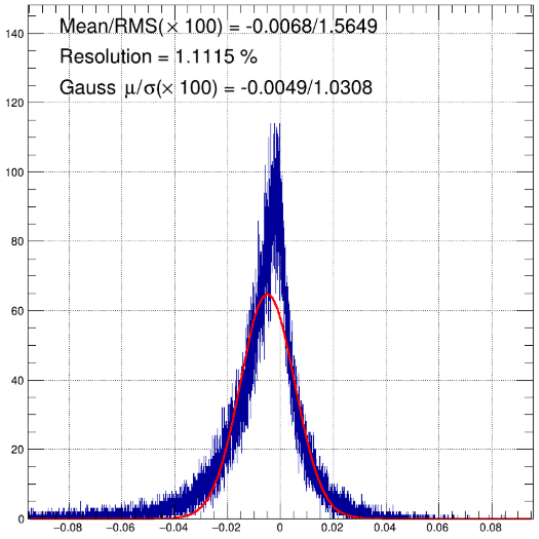
Momentum Resolution in IDEA



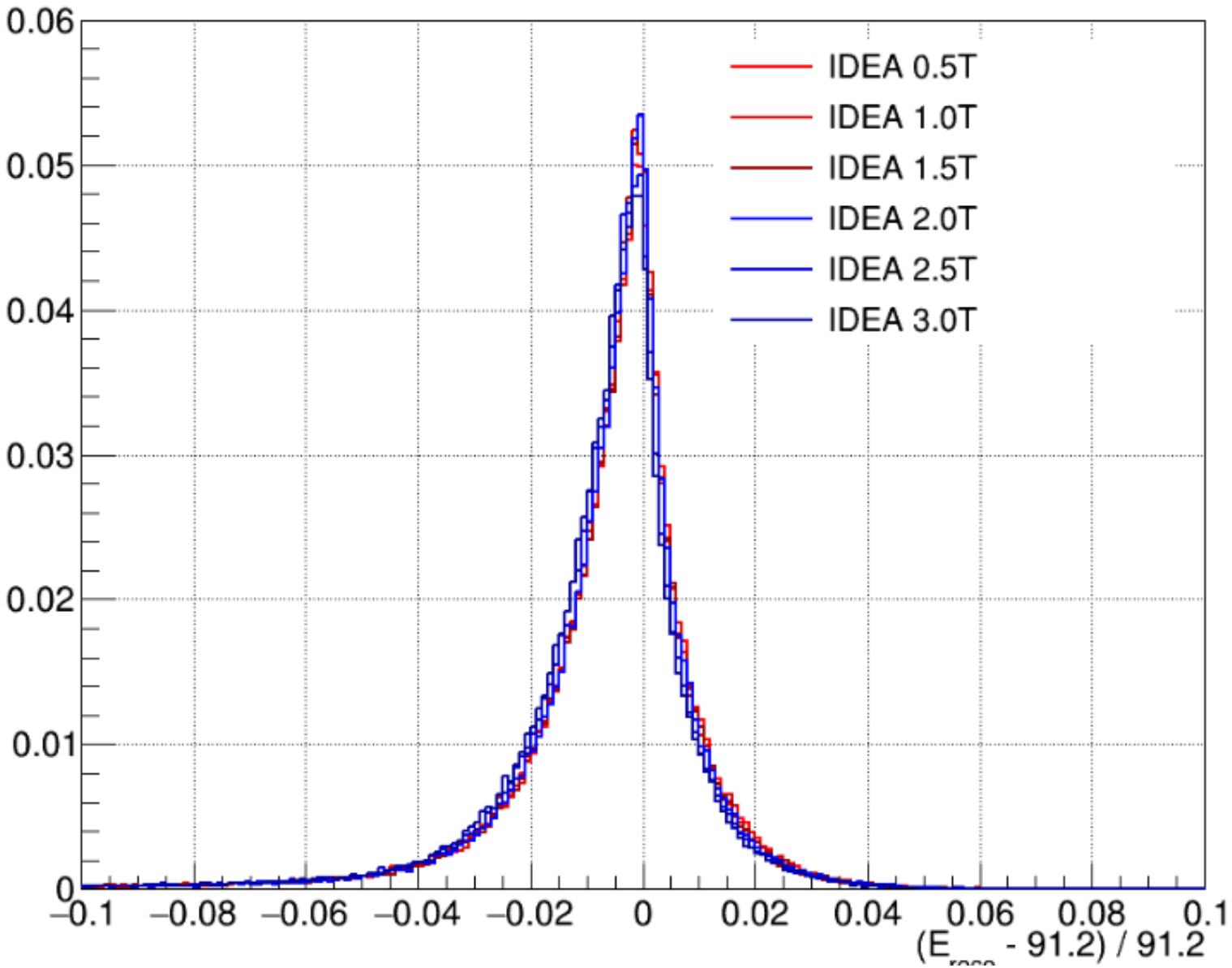
1 Tesla

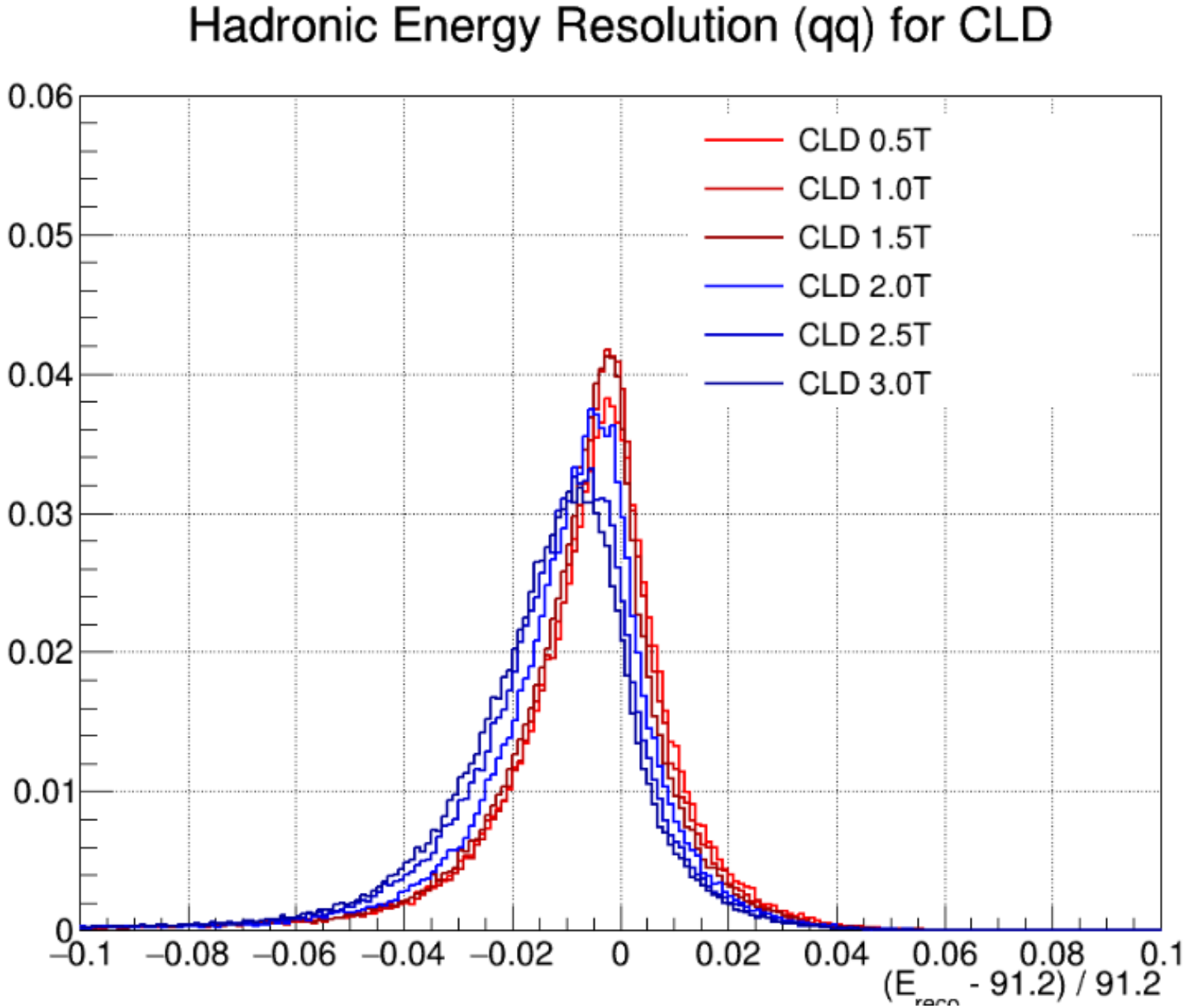


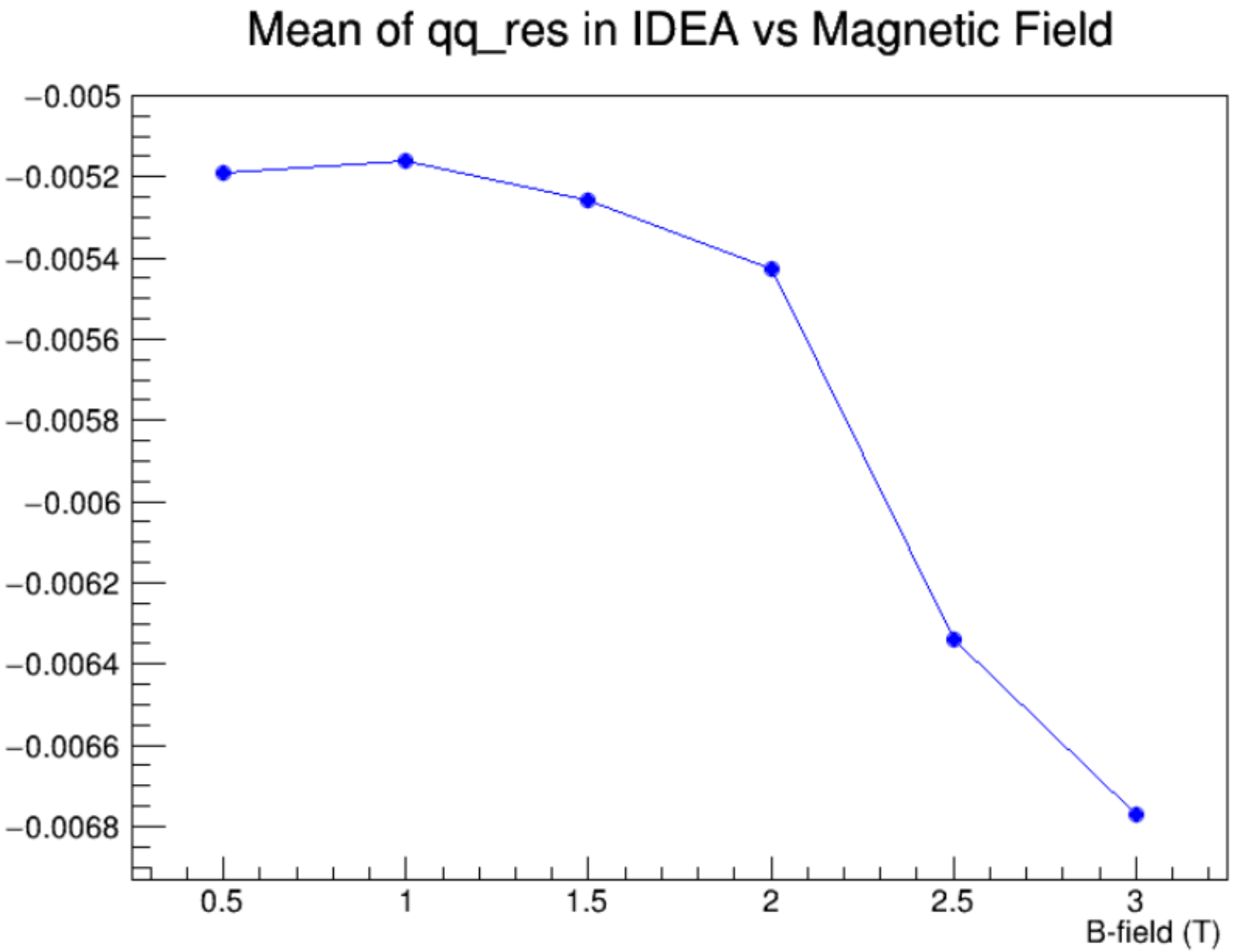
2 Tesla

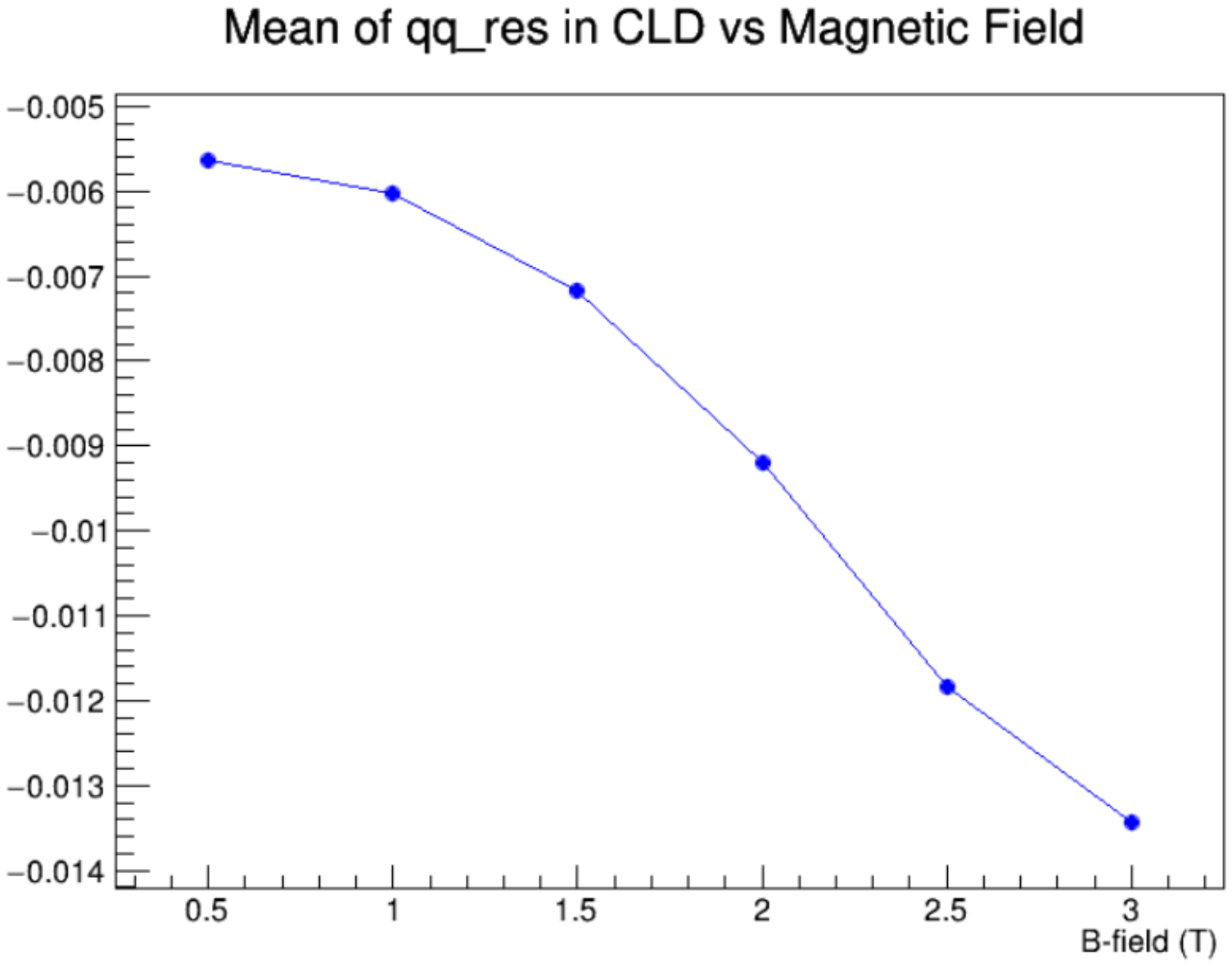


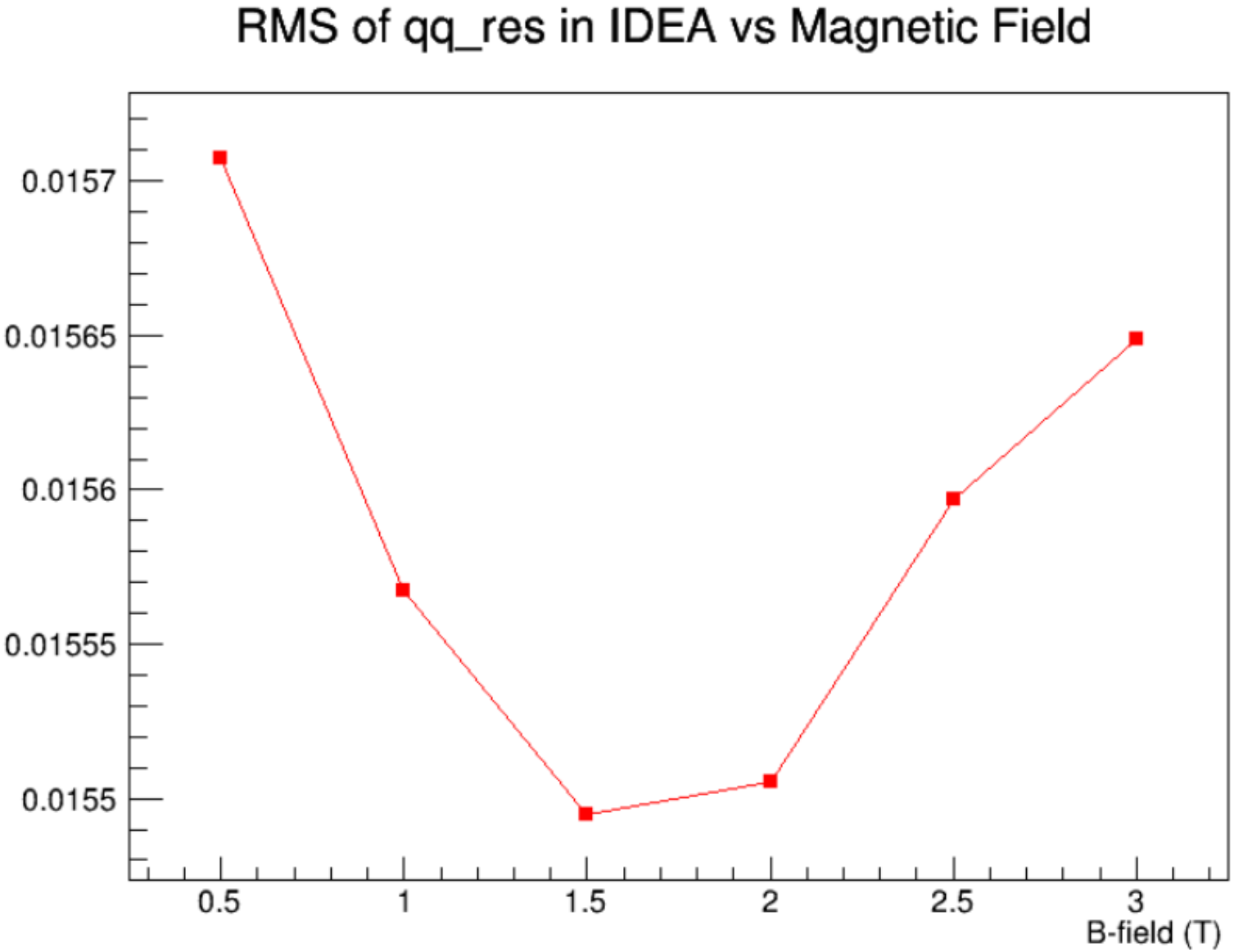
3 Tesla

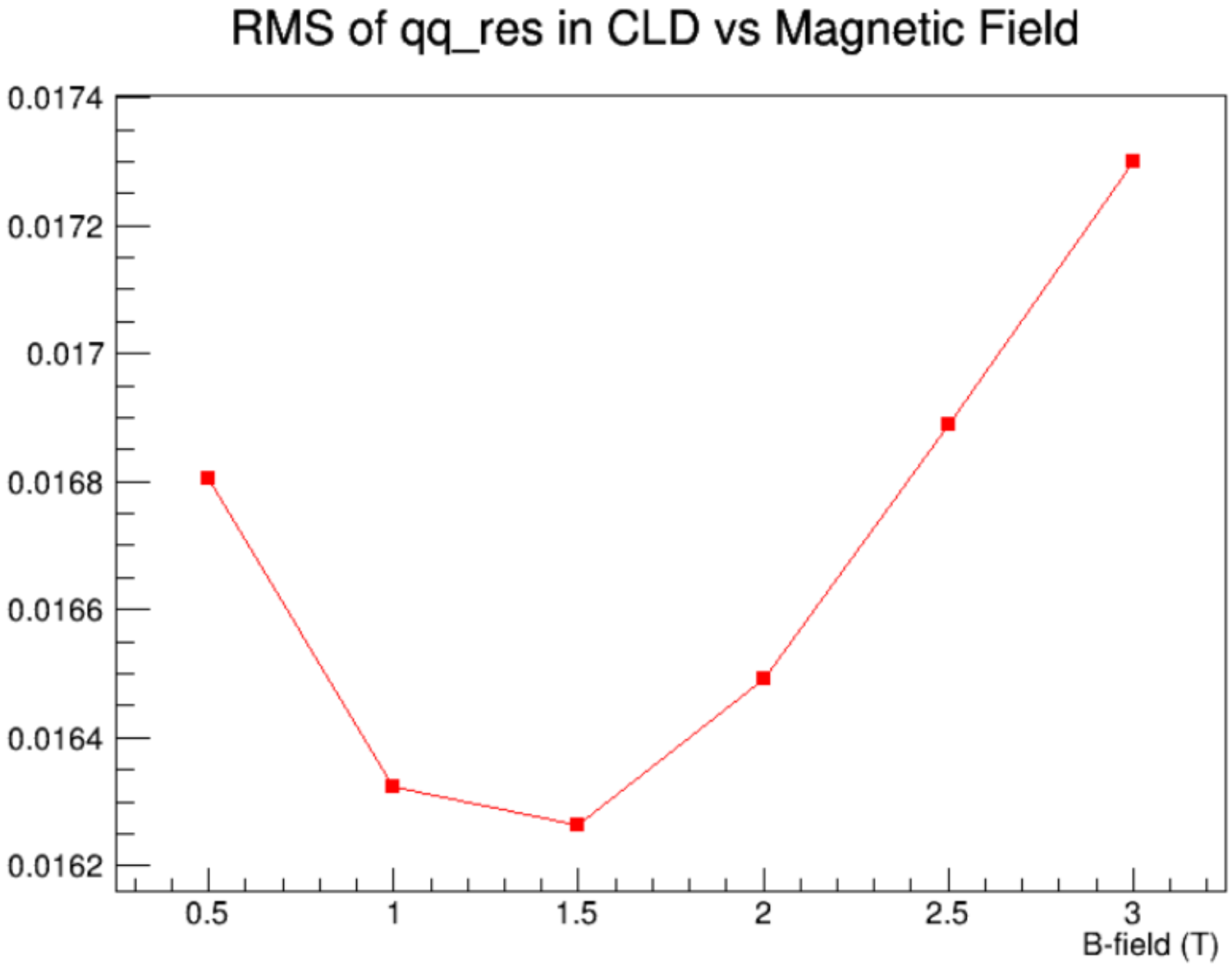

Hadronic Energy Resolution (qq) for IDEA
IDEA 0.5T
IDEA 1.0T
IDEA 1.5T
IDEA 2.0T
IDEA 2.5T
IDEA 3.0T
0.06
0.05
0.04
0.03
0.02
0.01
0
−0.1
−0.08
−0.06
−0.04
−0.02
0
0.02
0.04
0.06
0.08
0.1
(E_reco - 91.2) / 91.2


Hadronic Energy Resolution (qq) for CLD
CLD 0.5T
CLD 1.0T
CLD 1.5T
CLD 2.0T
CLD 2.5T
CLD 3.0T
0.06
0.05
0.04
0.03
0.02
0.01
0
−0.1
−0.08
−0.06
−0.04
−0.02
0
0.02
0.04
0.06
0.08
0.1
(E_reco - 91.2) / 91.2

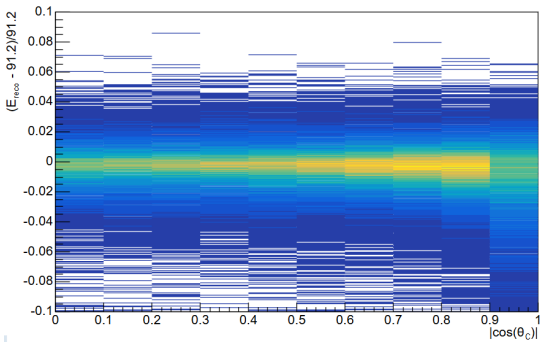

Mean of qq_res in IDEA vs Magnetic Field
−0.005
−0.0052
−0.0054
−0.0056
−0.0058
−0.006
−0.0062
−0.0064
−0.0066
−0.0068
0.5
1
1.5
2
2.5
3
B-field (T)


Mean of qq_res in CLD vs Magnetic Field
−0.005
−0.006
−0.007
−0.008
−0.009
−0.01
−0.011
−0.012
−0.013
−0.014
0.5
1
1.5
2
2.5
3
B-field (T)

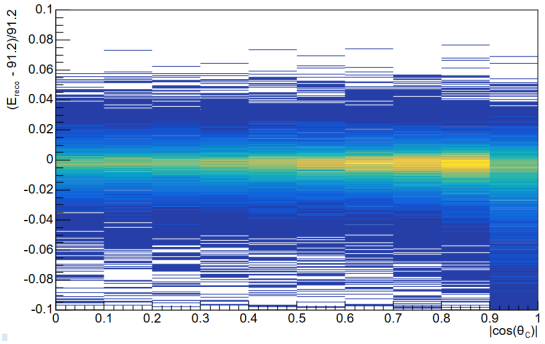

RMS of qq_res in IDEA vs Magnetic Field
0.0157
0.01565
0.0156
0.01555
0.0155
0.5
1
1.5
2
2.5
3
B-field (T)


RMS of qq_res in CLD vs Magnetic Field
0.0174
0.0172
0.017
0.0168
0.0166
0.0164
0.0162
0.5
1
1.5
2
2.5
3
B-field (T)

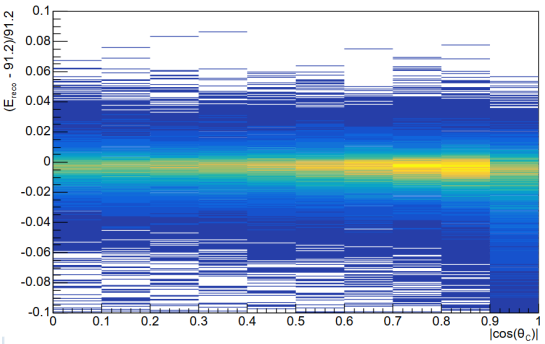
particles per $abs(cos(\theta_C))$ and resolution in CLD



0.5 Tesla

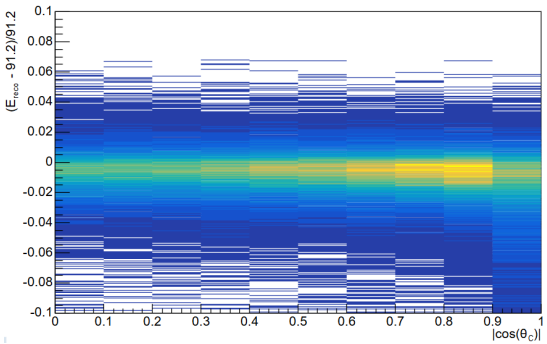


1.0 Tesla

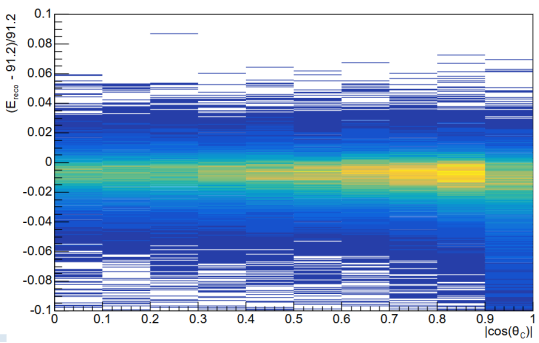


1.5 Tesla

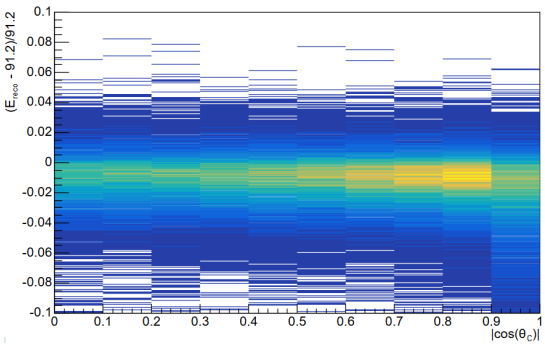
particles per $abs(cos(\theta_C))$ and resolution in CLD



2.0 Tesla

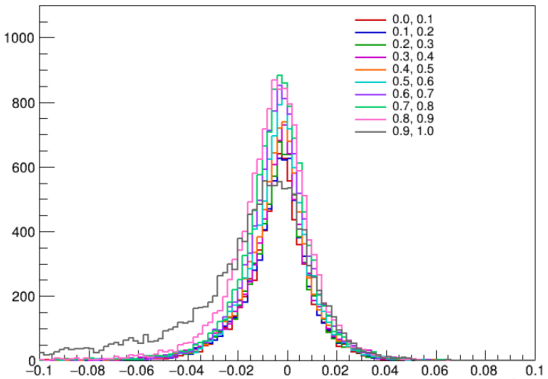


2.5 Tesla

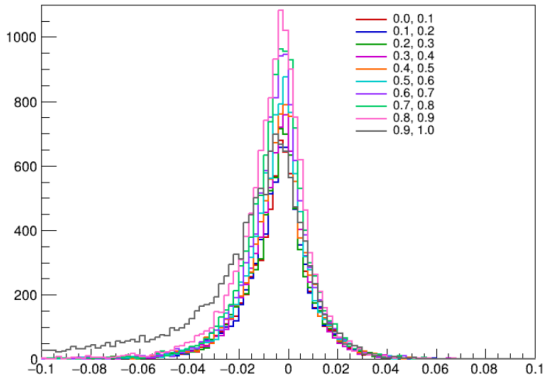


3.0 Tesla

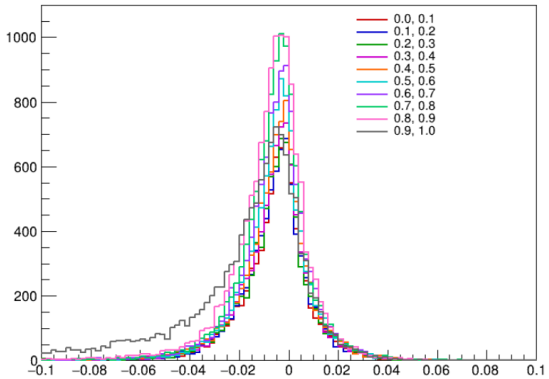
Resolution per $abs(cos(\theta_C))$ in CLD



0.5 Tesla

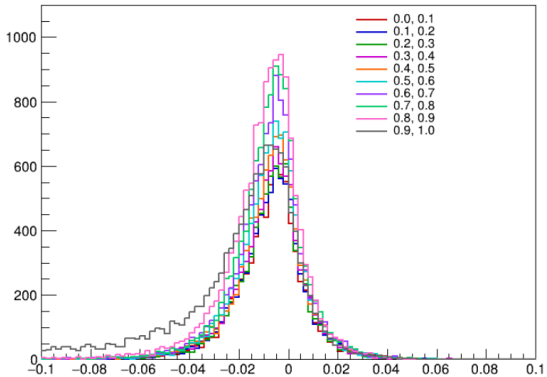


1.0 Tesla

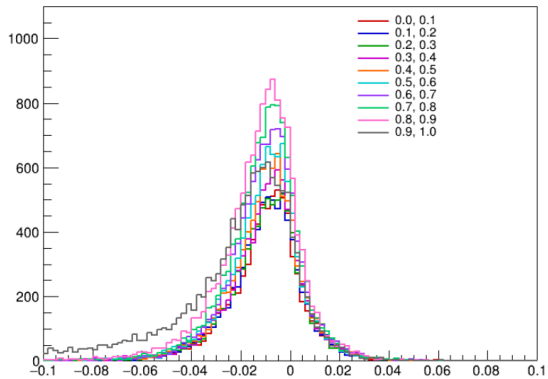


1.5 Tesla

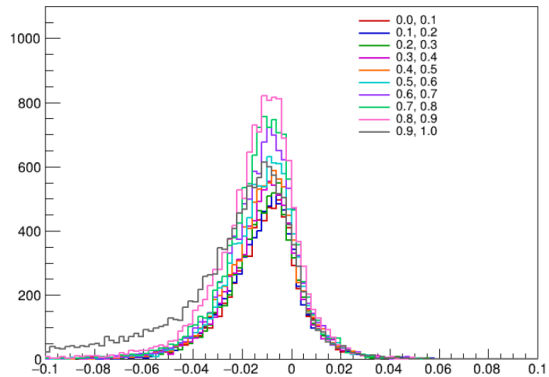
Resolution per $abs(cos(\theta_C))$ in CLD



2.0 Tesla



2.5 Tesla

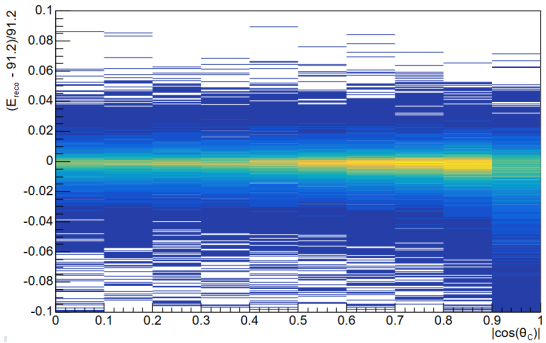


3.0 Tesla

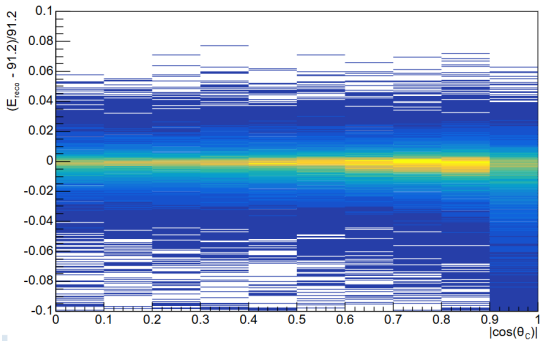
Conclusions

- Worse resolution at high $abs(cos(\theta_C))$
  - Worst zone
- Narrower at low $abs(cos(\theta_C))$.
  - Best zones for detectors
- Packed in underestimated resolution at $0.7 < abs(cos(\theta_C)) < 0.9$
- Best resolution at 1.0 T.
  - Consistent with hadronic resolution for CLD.

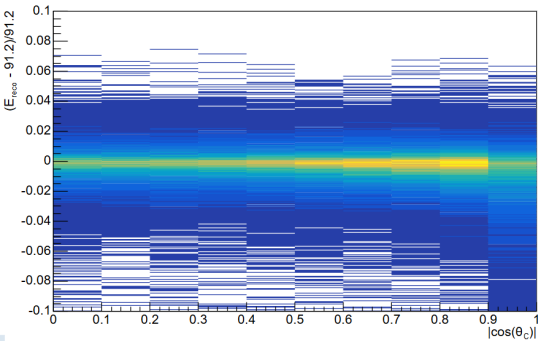
particles per $abs(cos(\theta_C))$ and resolution in IDEA



0.5 Tesla

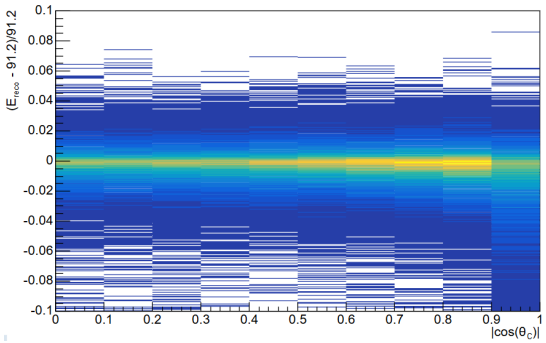


1.0 Tesla

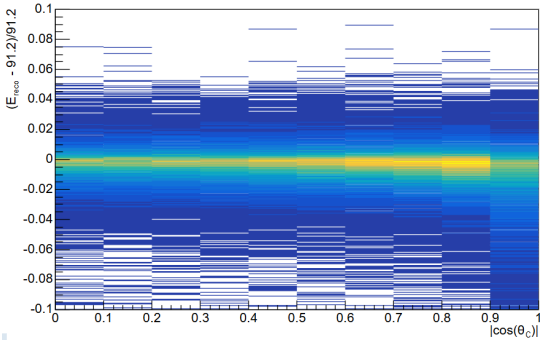


1.5 Tesla

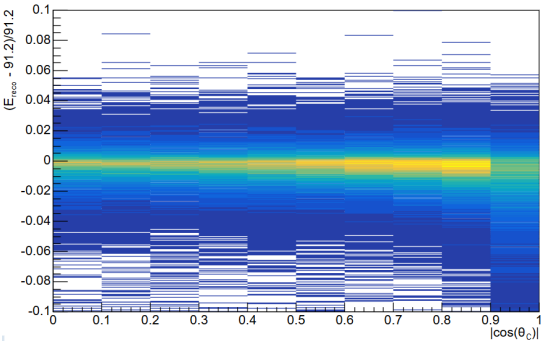
particles per $abs(cos(\theta_C))$ and resolution in IDEA



2.0 Tesla

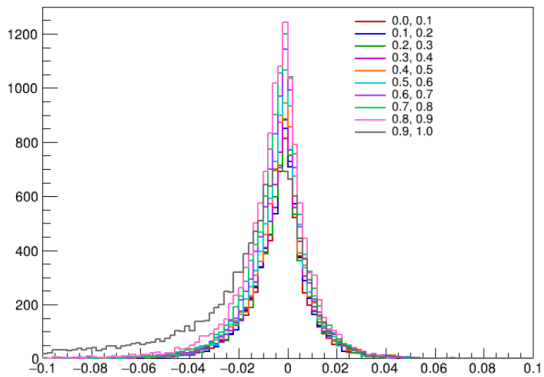


2.5 Tesla

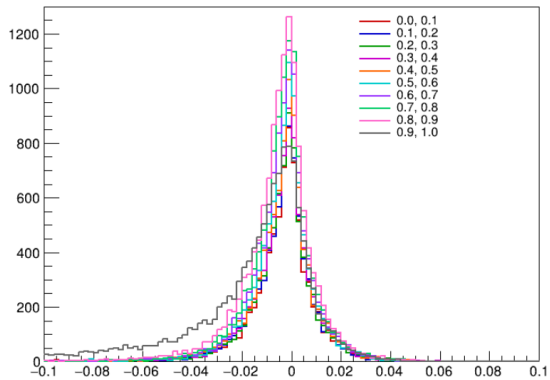


3.0 Tesla

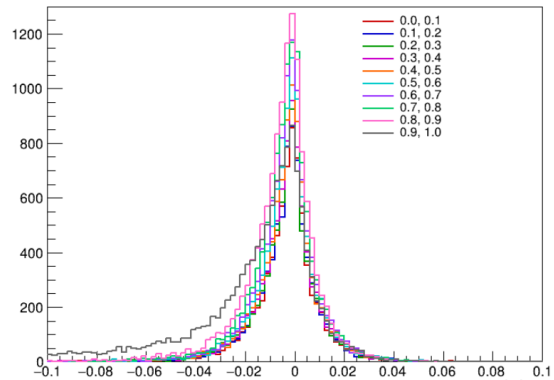
Resolution per $abs(cos(\theta_C))$ in IDEA



0.5 Tesla

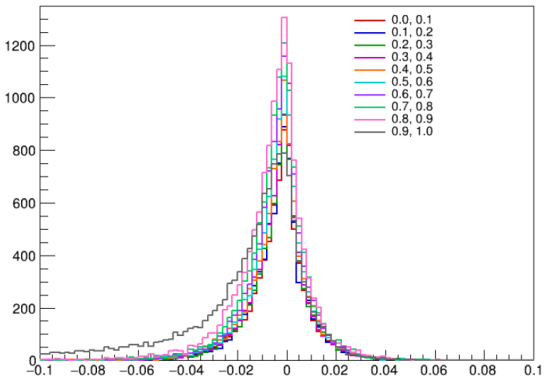


1.0 Tesla

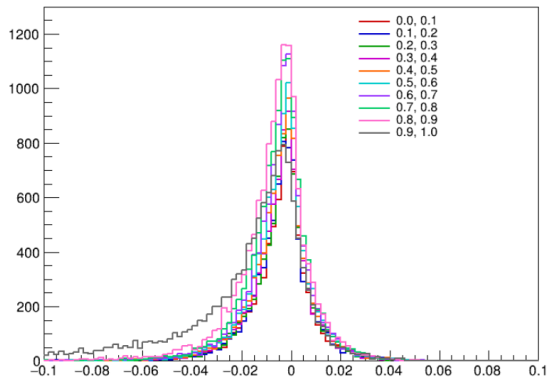


1.5 Tesla

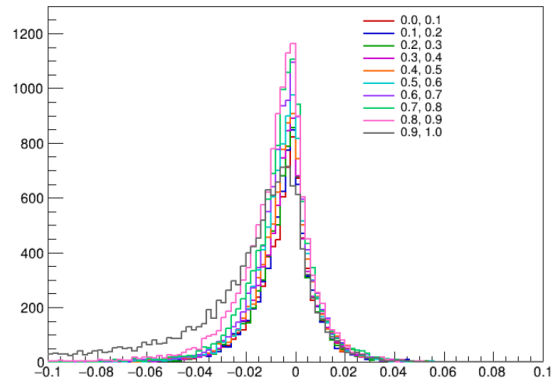
Resolution per $abs(cos(\theta_C))$ in IDEA



2.0 Tesla



2.5 Tesla



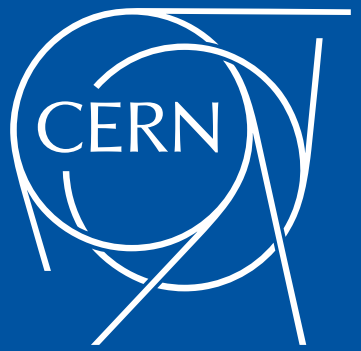
3.0 Tesla

Conclusions

- No strongly visible enhancement in resolution from 0.5 to 2.0 Teslas but noticeable concentration of better resolutions at 2.5.
  - Similar to hadronic resolution obtained by IDEA.

Next steps

- # of particles per $abs(cos(\theta_C))$ bin.
  - Explore the distribution by angles.
  - Compare with resolutions.
- RMS distribution per $abs(cos(\theta_C))$ for each B-field.


CERN