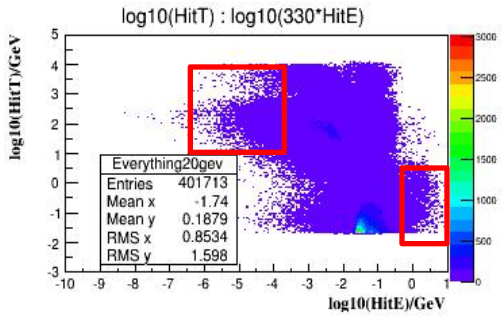
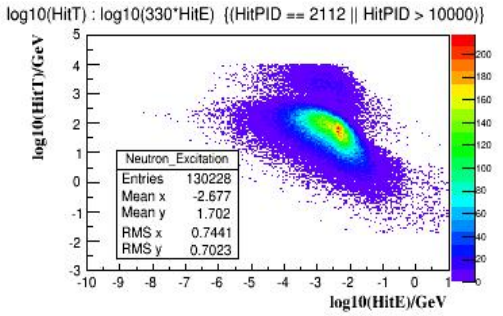
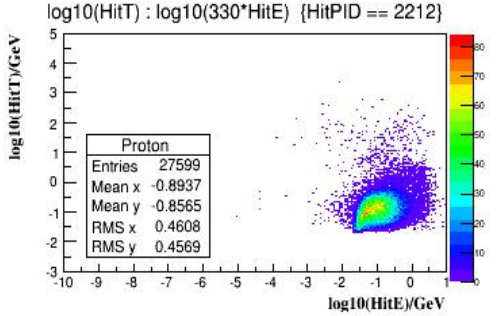
CEPC强子能量测量优化

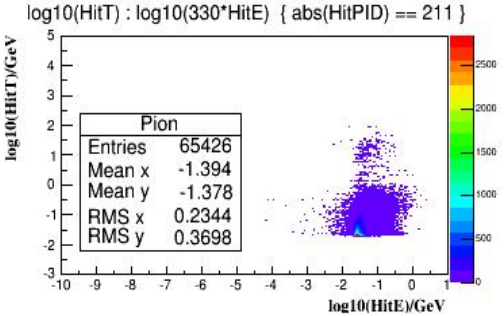
朱学正

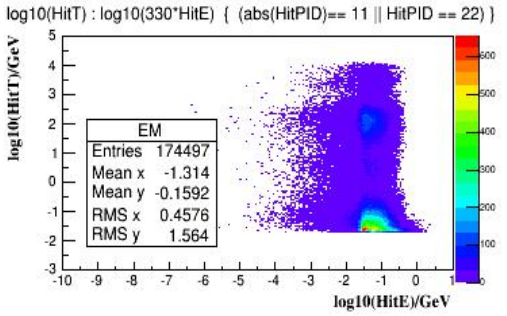
Pion打入硅钨量能器

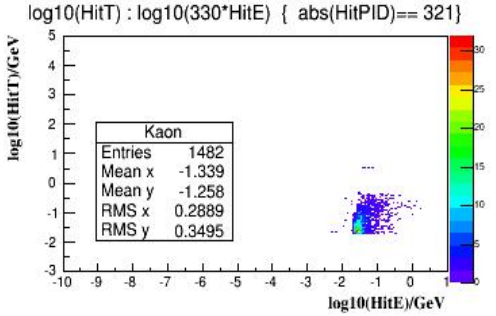


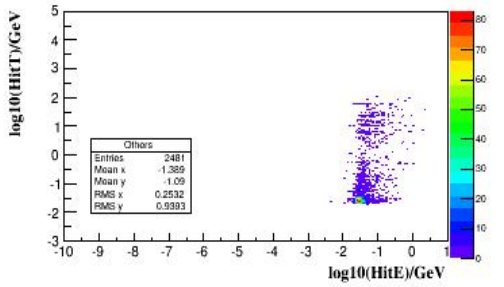




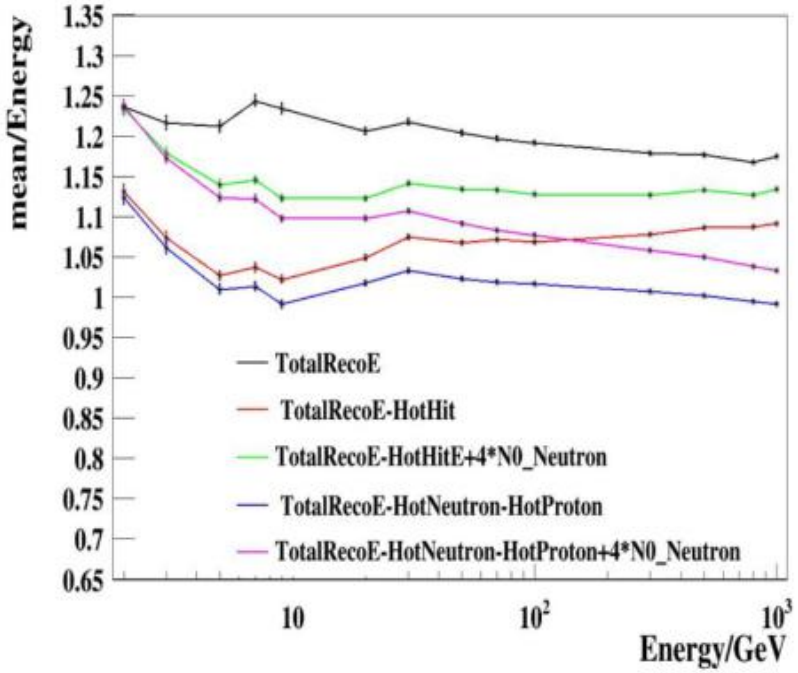


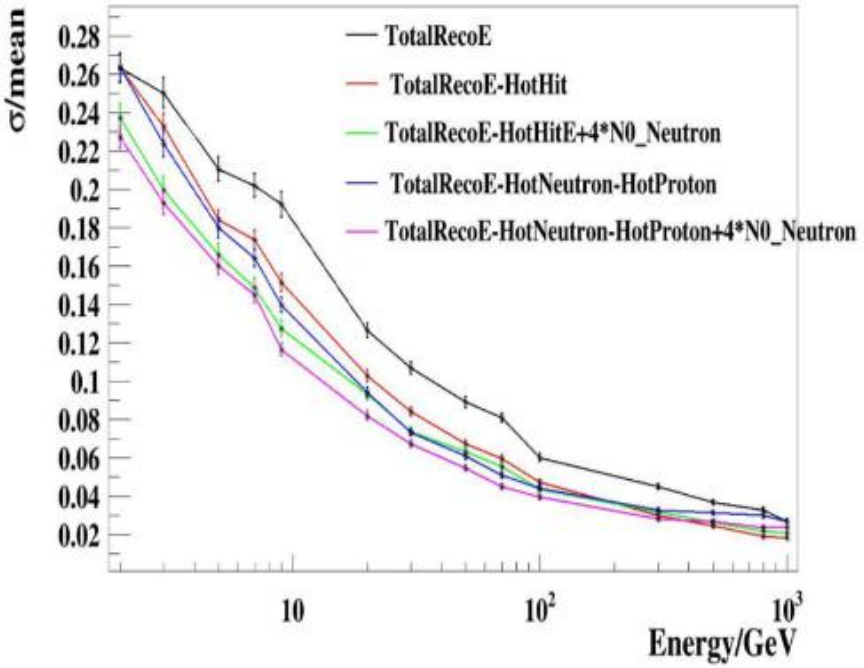






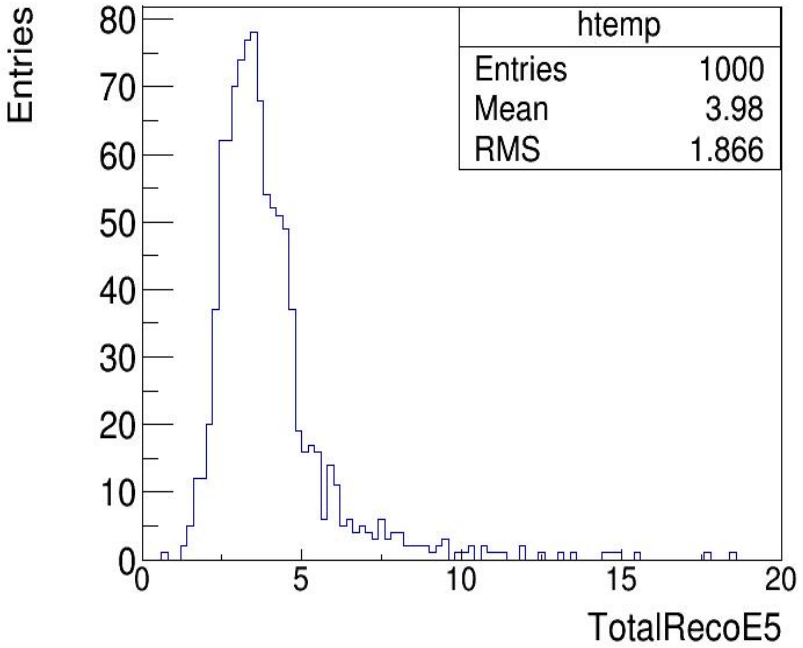
不同选择条件下能量测量



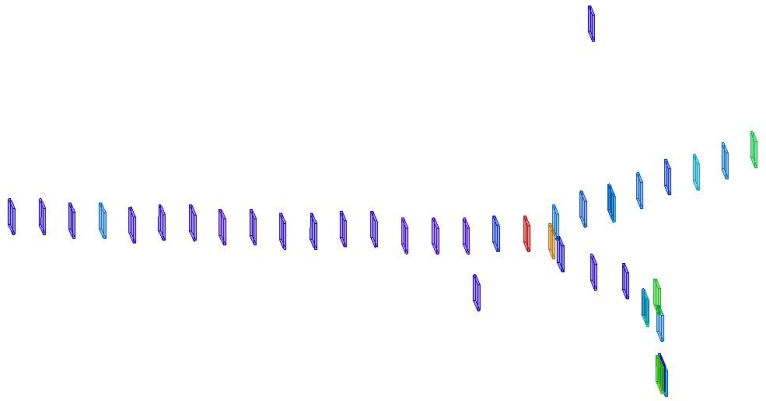


N0_Netron选择条件log10（HitE/330)<-4.2,HiT>1,Neighbor==0
HotHitE:HitE>0.45,Neighbor<2
HotProton:HitE>0.45,PID=2212
HotNeutron:HitE>0.45,PID=2122||PID>10000

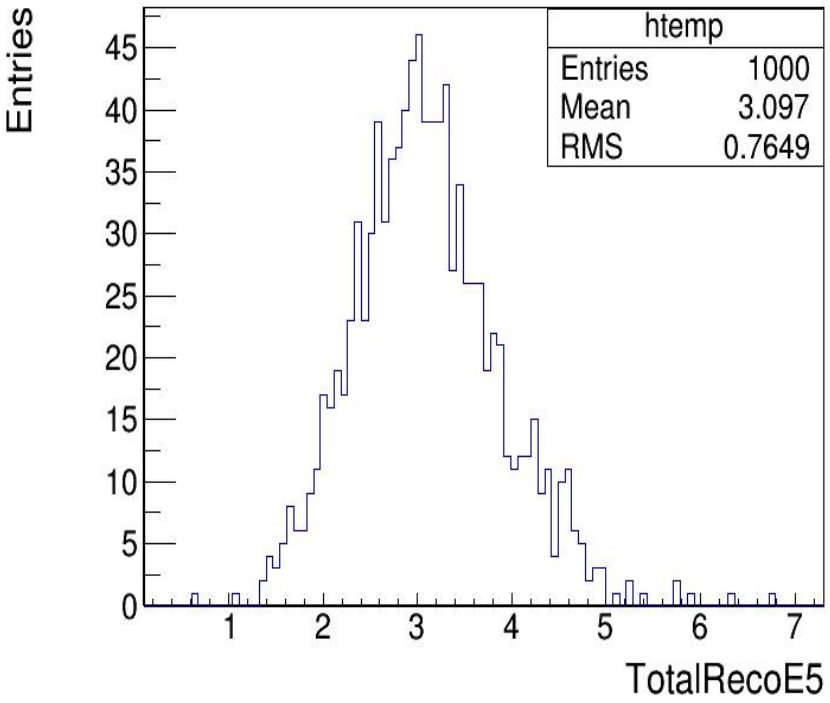
高能Hit

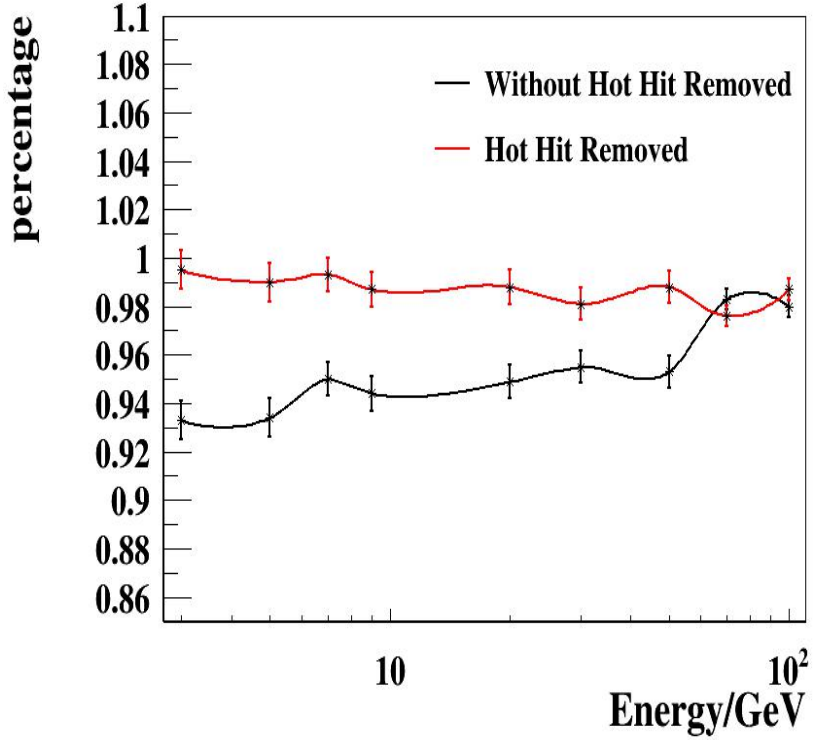


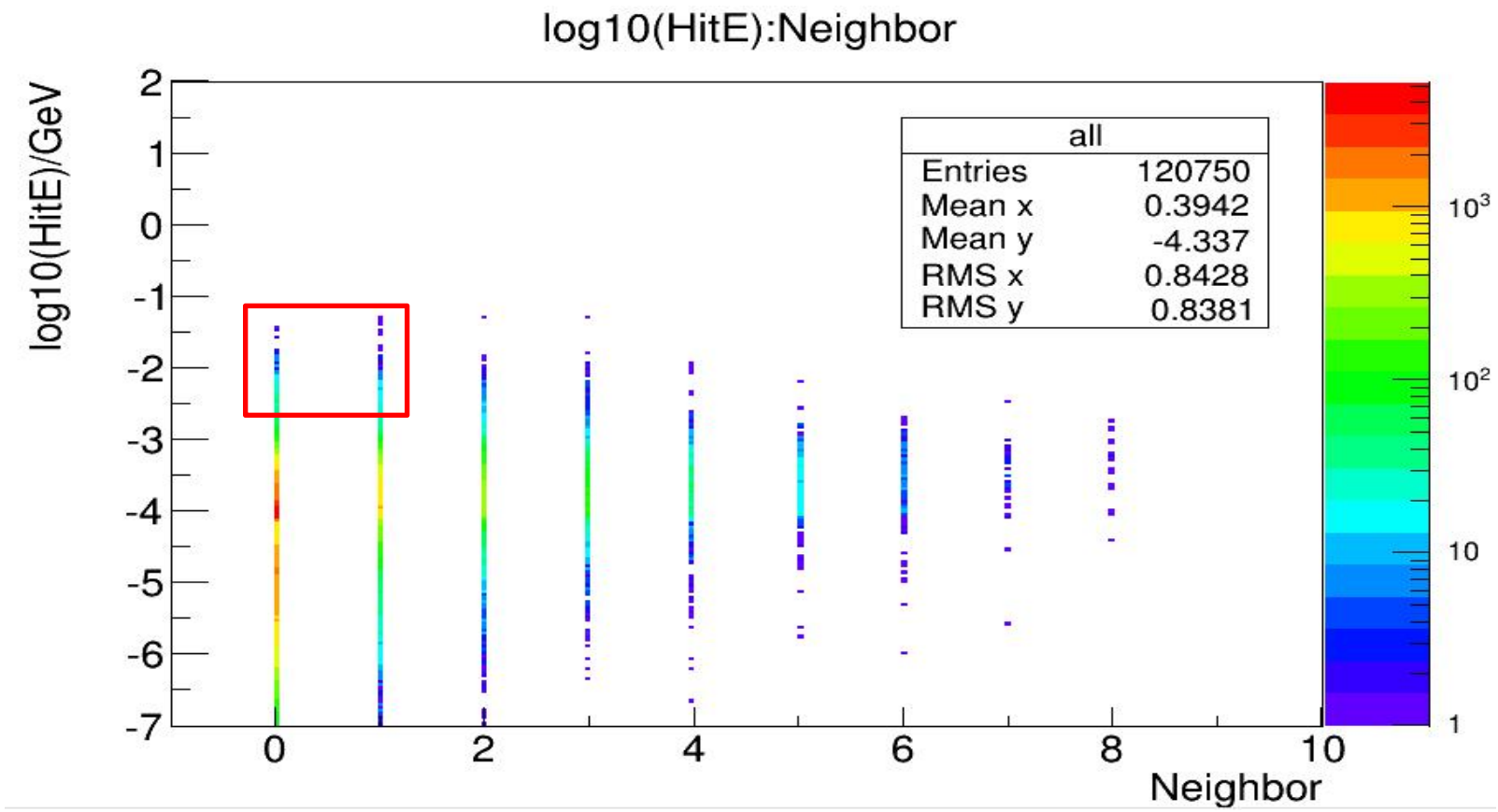
高能长尾



3GeVPion事例，红色Hit为1GeV

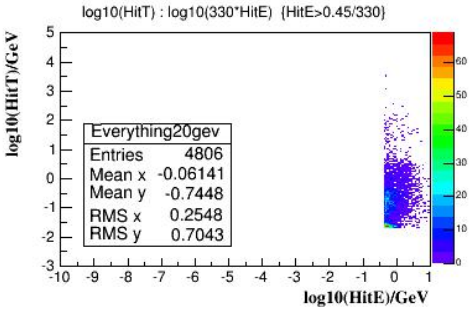

Entries
htemp
Entries 1000
Mean 3.097
RMS 0.7649
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
TotalRecoE5

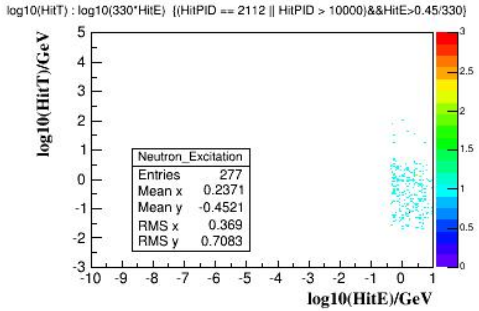

percentage
1.1
1.08
1.06
1.04
1.02
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
Without Hot Hit Removed
Hot Hit Removed
10
10^2
Energy/GeV

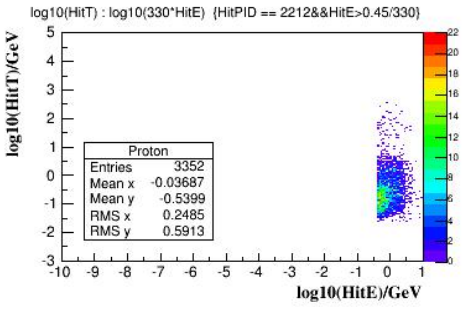

log10(HitE):Neighbor
log10(HitE)/GeV
Neighbor
all
Entries 120750
Mean x 0.3942
Mean y -4.337
RMS x 0.8428
RMS y 0.8381
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
10^3
10^2
10
1

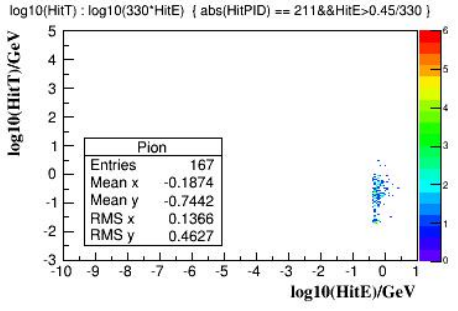
高能Hit

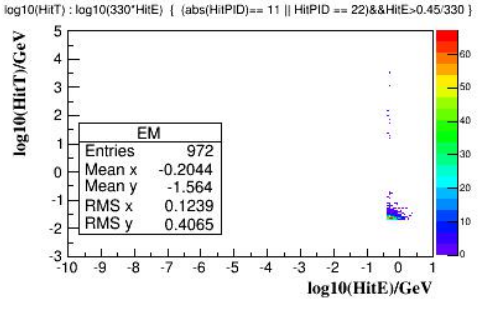
主要是其中的中子和质子部分使能量测量变差

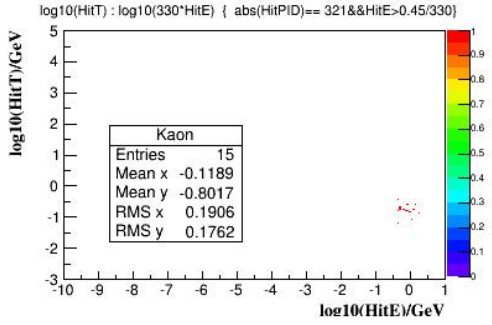


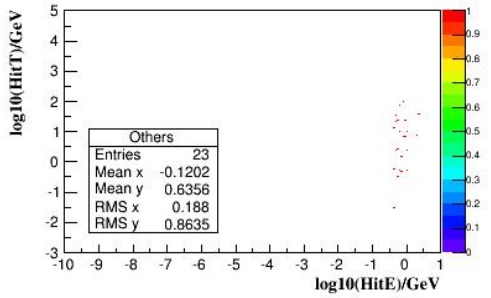


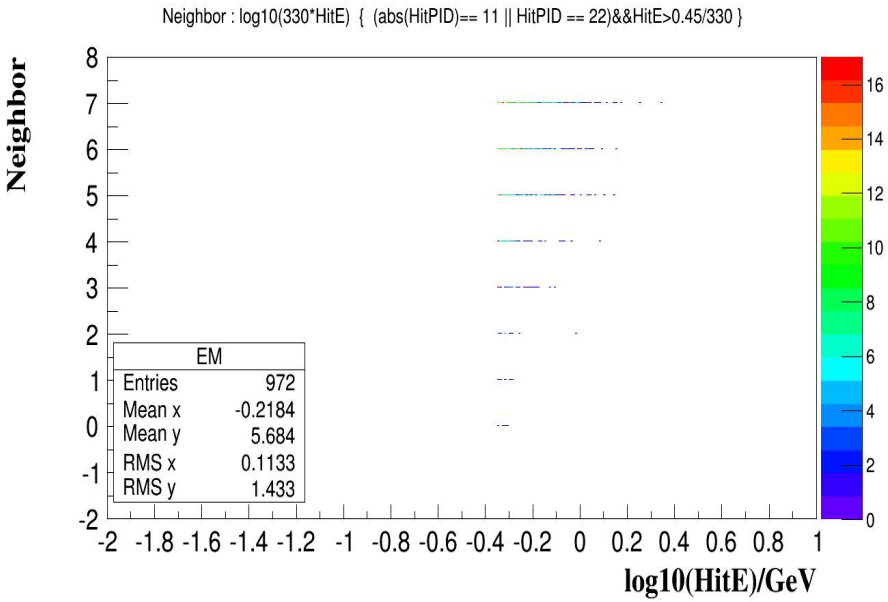


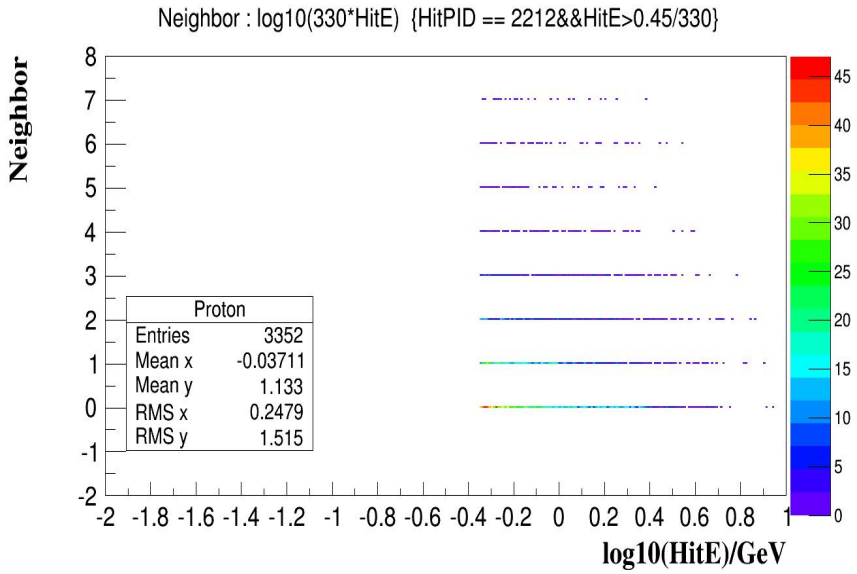









Neighbor : log10(330*HitE) { (abs(HitPID)== 11 || HitPID == 22)&&HitE>0.45/330 }
Neighbor
log10(HitE)/GeV
EM
Entries 972
Mean x -0.2184
Mean y 5.684
RMS x 0.1133
RMS y 1.433

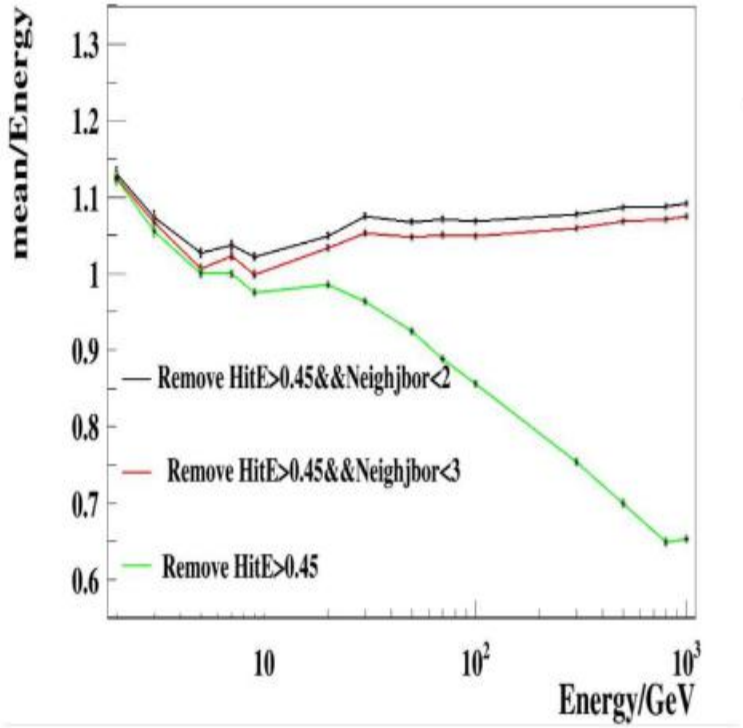

Neighbor : log10(330*HitE) {HitPID == 2212&&HitE>0.45/330}
Neighbor
log10(HitE)/GeV
Proton
Entries 3352
Mean x -0.03711
Mean y 1.133
RMS x 0.2479
RMS y 1.515

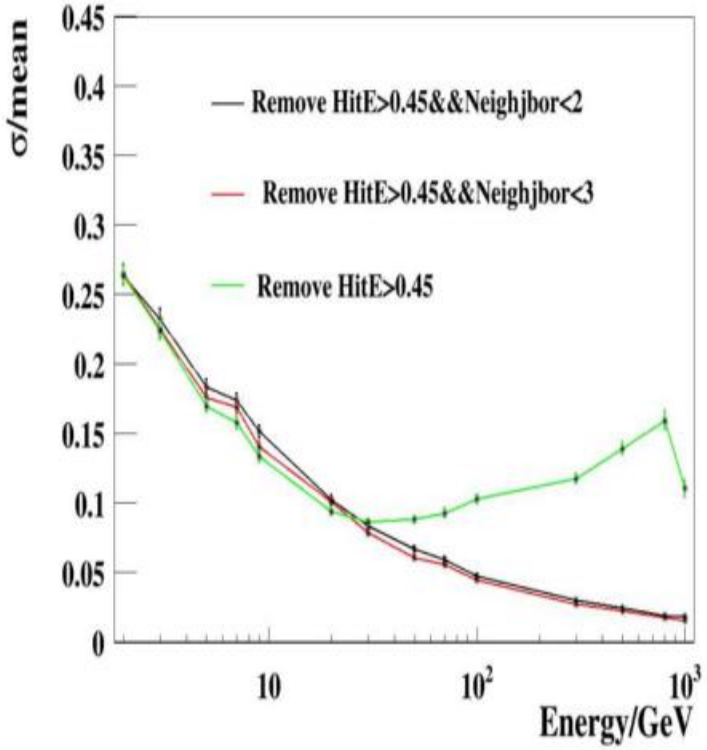
不同选择条件下粒子数

	Neutron_Excitation	Proton	Pion	EM	Kaon	others
HitE>0	130228	27599	65426	174497	1482	2481
HitE>0.45	277	3352	167	972	15	23
HitE>0.45&& Neighbor<2	227	2408	85	12	11	16
HitE>0.45&& Neighbor<1	165	1556	33	5	5	9

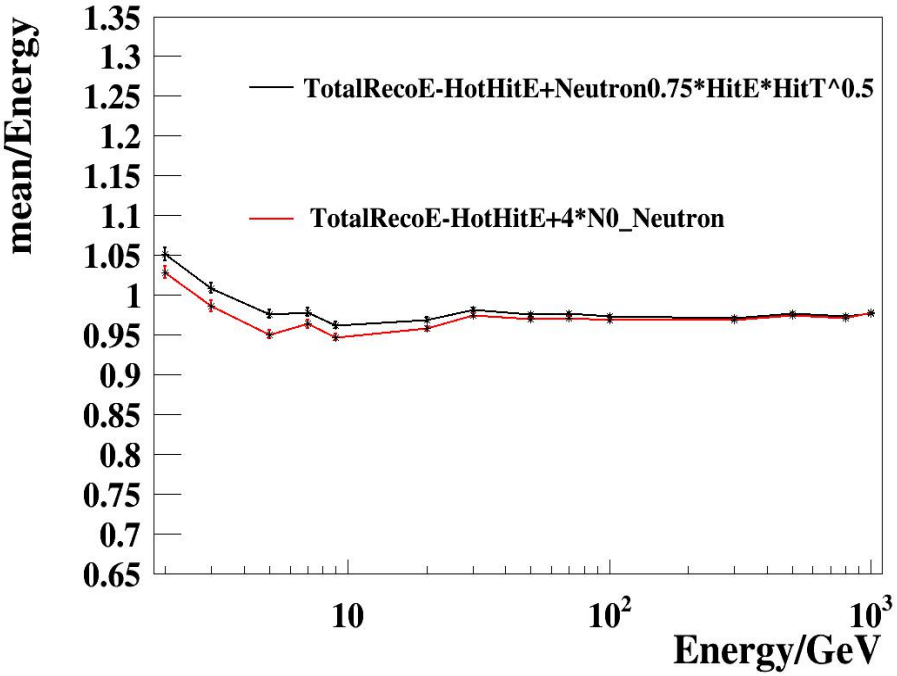
Neighbor和能量测量

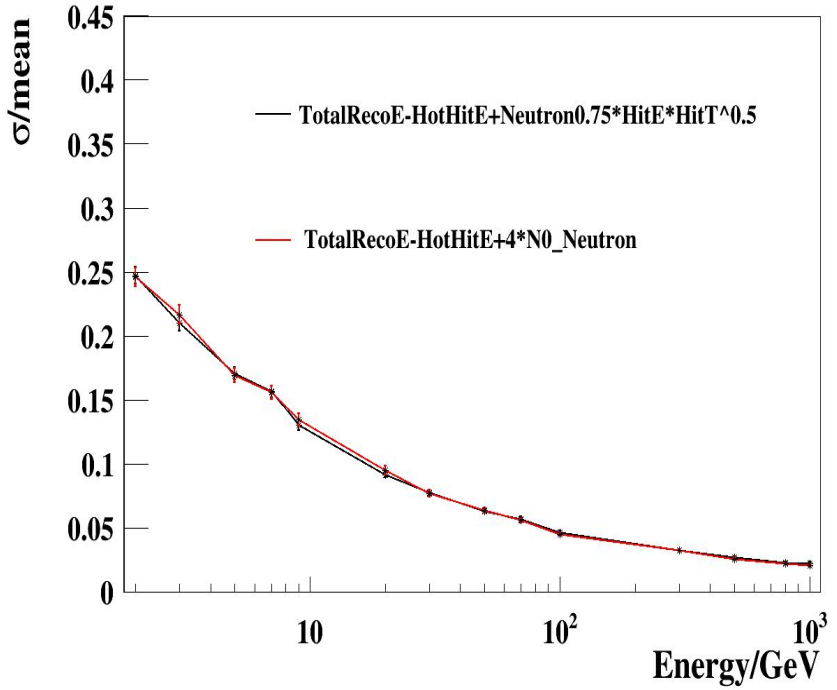
当直接去除高能Hit时能量测量很差



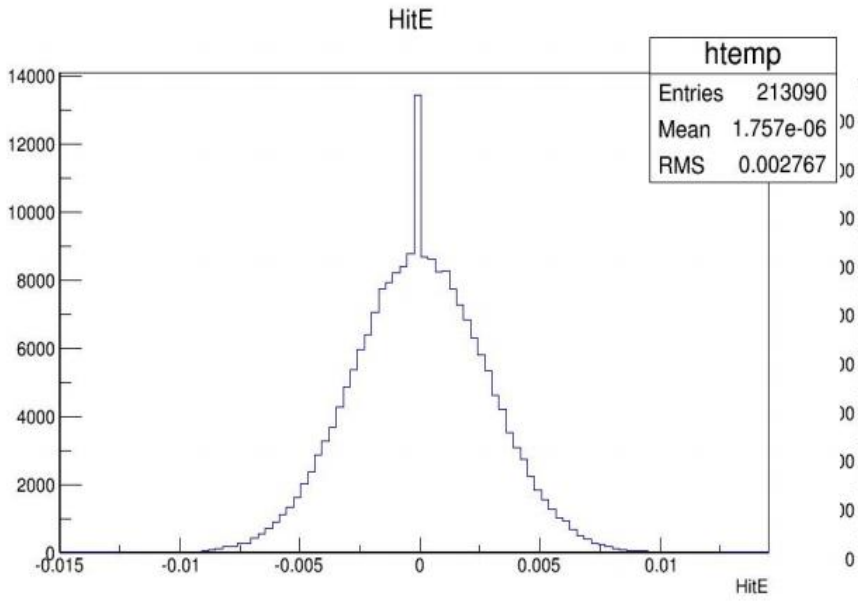


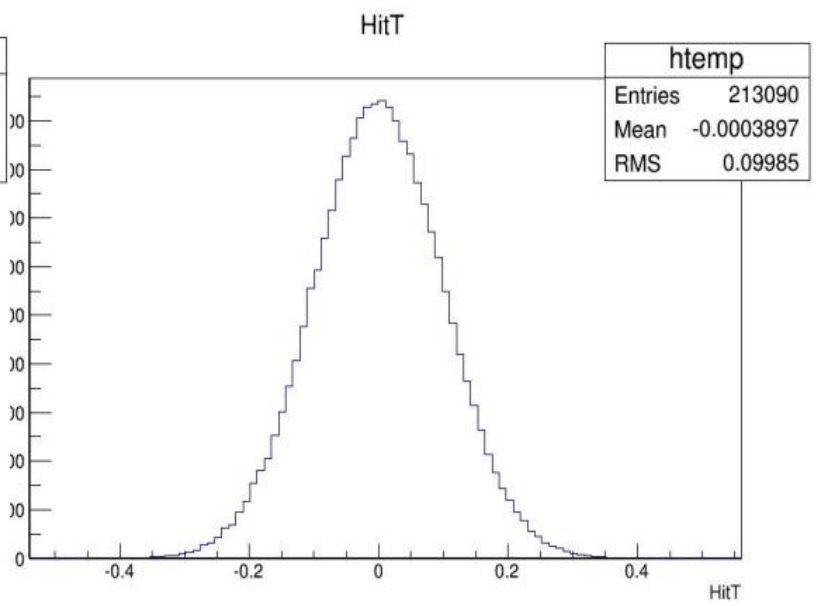
二种低能中子处理方法

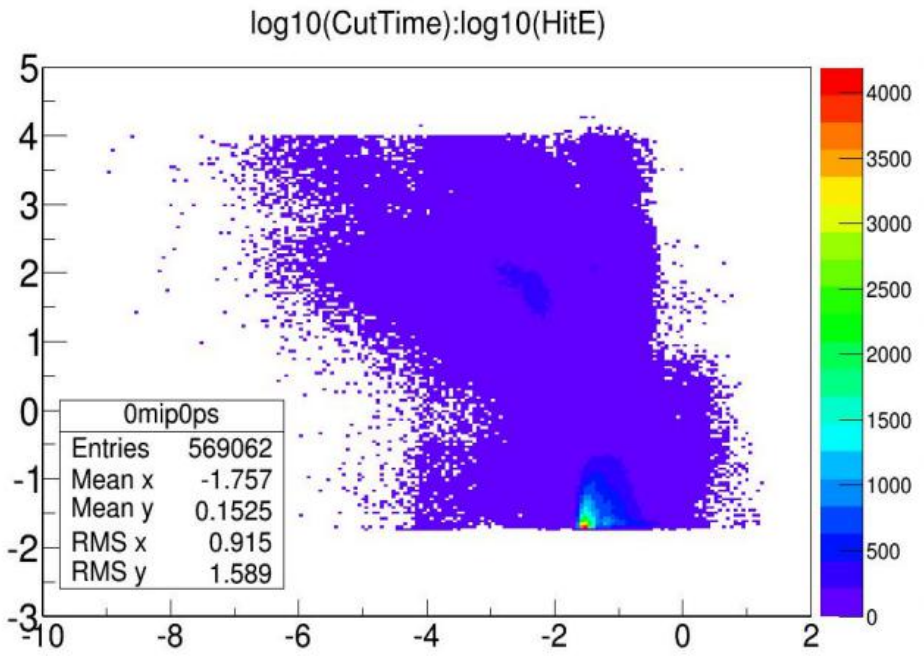

mean/Energy
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
TotalRecoE-HotHitE+Neutron0.75*HitE*HitT^0.5
TotalRecoE-HotHitE+4*N0_Neutron
10
10^2
10^3
Energy/GeV

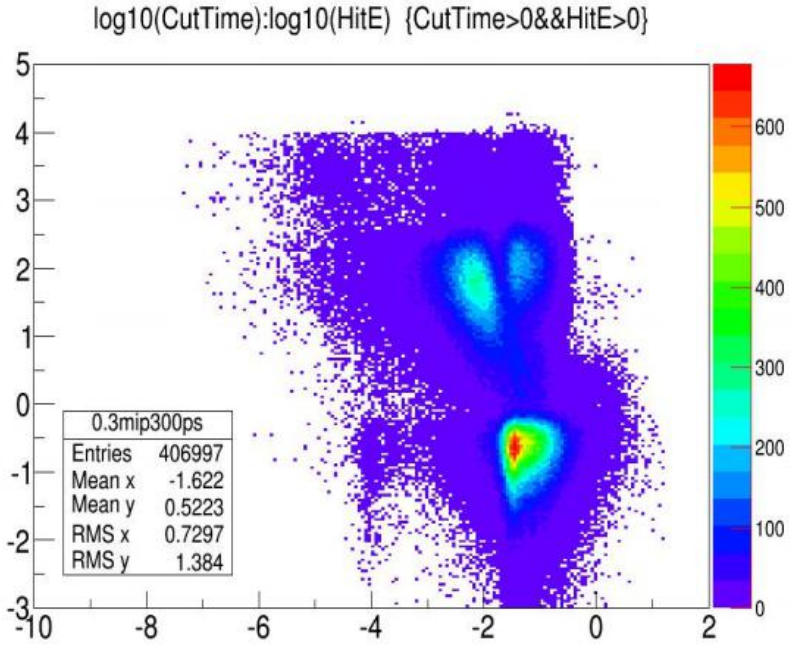

σ/mean
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
TotalRecoE-HotHitE+Neutron0.75*HitE*HitT^0.5
TotalRecoE-HotHitE+4*N0_Neutron
10
10^2
10^3
Energy/GeV

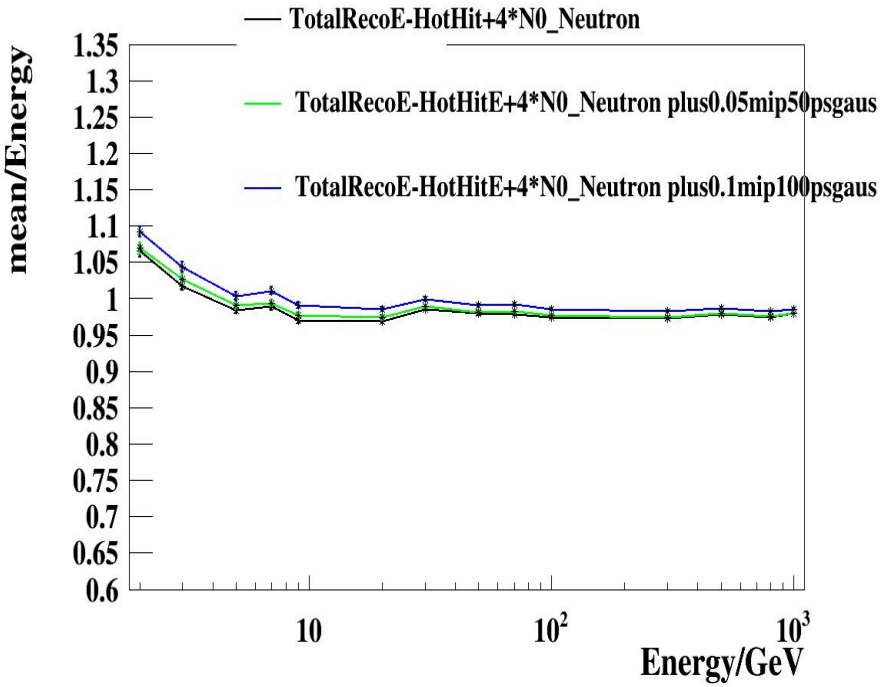
考虑HitE,HitT误差

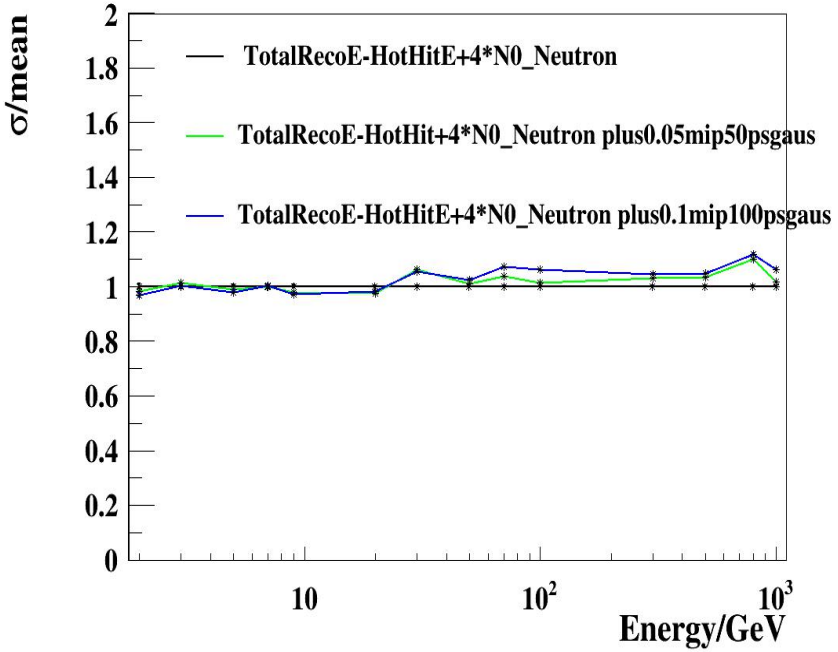





log10(CutTime):log10(HitE)
0mip0ps
Entries 569062
Mean x -1.757
Mean y 0.1525
RMS x 0.915
RMS y 1.589
5
4
3
2
1
0
-1
-2
-3
-10
-8
-6
-4
-2
0
2
4000
3500
3000
2500
2000
1500
1000
500
0

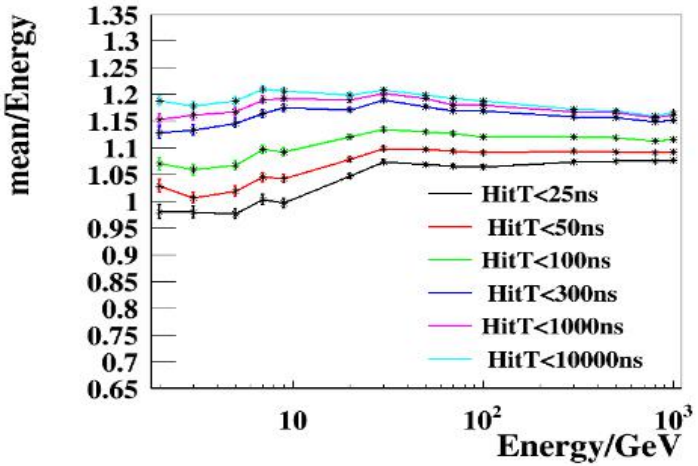

log10(CutTime):log10(HitE) {CutTime>0&&HitE>0}
0.3mip300ps
Entries 406997
Mean x -1.622
Mean y 0.5223
RMS x 0.7297
RMS y 1.384
5
4
3
2
1
0
-1
-2
-3
-10
-8
-6
-4
-2
0
2
600
500
400
300
200
100
0

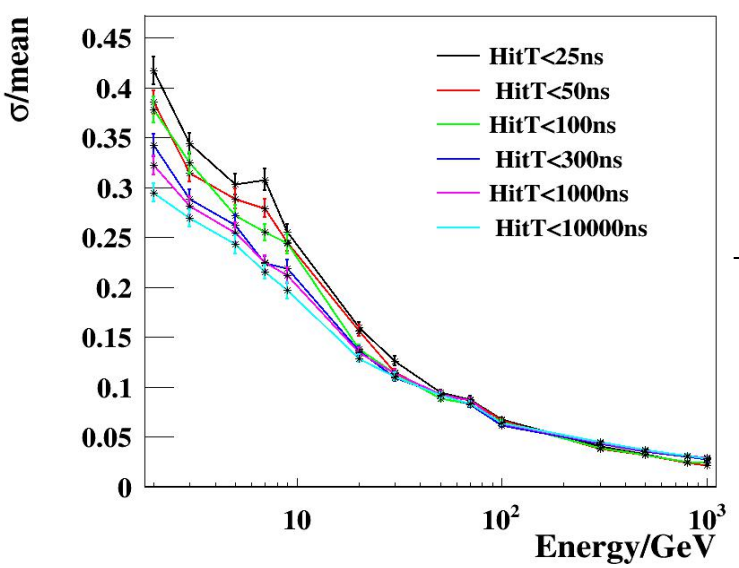

TotalRecoE-HotHit+4*N0_Neutron
TotalRecoE-HotHitE+4*N0_Neutron plus0.05mip50psgaus
TotalRecoE-HotHitE+4*N0_Neutron plus0.1mip100psgaus
mean/Energy
Energy/GeV

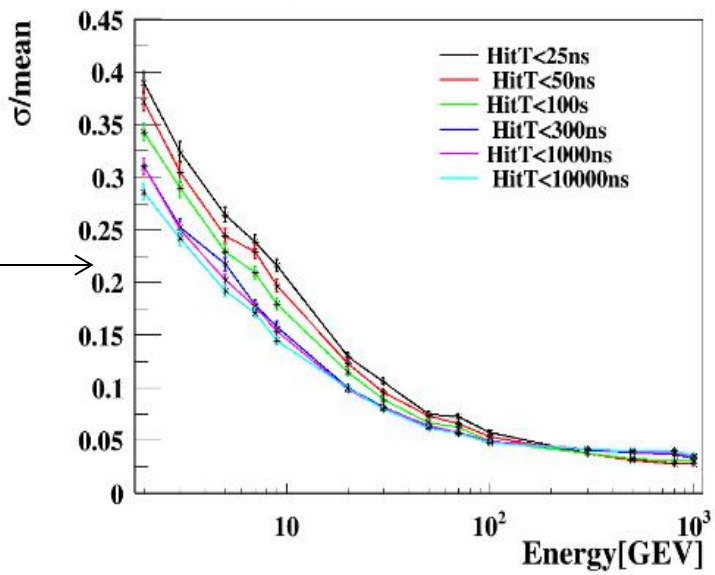

TotalRecoE-HotHitE+4*N0_Neutron
TotalRecoE-HotHit+4*N0_Neutron plus0.05mip50psgaus
TotalRecoE-HotHitE+4*N0_Neutron plus0.1mip100psgaus
σ/mean
Energy/GeV

不同时间cut下能量测量

在小于100GeV时，选取Hit越多，能量测量越好







不同Hit能量cut下能量测量

选择的Hit越多能量测量趋于变好，但并不明显