

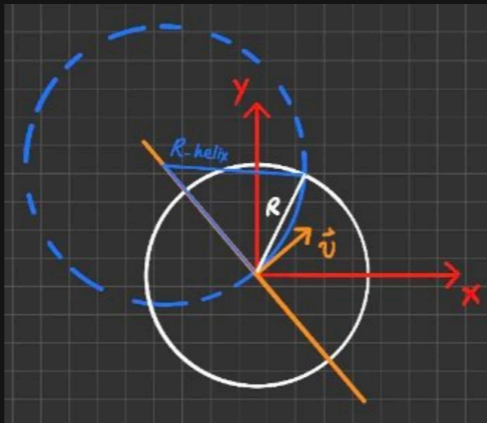
ImpactPoint

Not found in current released Druid v2.2 & v2.4 at <http://cepcsoft.ihep.ac.cn/package/cepcsoft/Druid/>
Maybe used in old version Druid (in BuildMCParticles.cc)

```

65 TVector3 ImpactPoint_Old( MCParticle *aMCP, double Track_Half_Z, double Track_Radius, double B_Field )
66 //B_Field always along Z+ direction
67 {
68     TVector3 MCP_Mom = aMCP->getMomentum();
69     int MCP_Charge = aMCP->getCharge();
70
71     TVector3 ImpactP(0, 0, 0);
72     double impact_En = MCP_Mom.Mag();
73     double impact_Pt = MCP_Mom.Perp();
74     double impact_Phi = MCP_Mom.Phi();
75     double ScaleFactor = 1.0;
76     double Tau = 0;
77     double R_helix = 1000*impact_Pt/(0.3*B_Field);
78     double Ratio_Z_Pz = 1000/(0.3*B_Field);
79
80     if(MCP_Charge == 0)
81     {
82         if( fabs(MCP_Mom[2]/impact_En) > Track_Half_Z/sqrt(Track_Half_Z*Track_Half_Z +
83             Track_Radius*Track_Radius) ) // Endcap
84         {
85             ScaleFactor = fabs(Track_Half_Z/MCP_Mom[2]);
86         }
87         else
88         {
89             ScaleFactor = Track_Radius/impact_Pt;
90         }
91         ImpactP.SetXYZ( ScaleFactor*MCP_Mom.X(), ScaleFactor*MCP_Mom.Y(), ScaleFactor*MCP_Mom.Z() );
92     }
93     else{
94         Tau = std::min( fabs(1.0/Ratio_Z_Pz*Track_Half_Z/MCP_Mom.Z()), fabs(Track_Radius/R_helix));
95         ImpactP.SetXYZ( R_helix*(MCP_Charge*sin(MCP_Charge*Tau - impact_Phi) +
96             MCP_Charge*sin(impact_Phi)), R_helix*(MCP_Charge*cos(MCP_Charge*Tau - impact_Phi) -
97             MCP_Charge*cos(impact_Phi)), Ratio_Z_Pz*MCP_Mom.Z()*Tau);
98     }
99
100     return ImpactP;
101 }

```



如下是R_helix < R/2打在端盖上的

```

Charge = -1, Px = -0.0996212, Py = -0.425107, Pt = 0.436624, Pz = 0.374203, Phi = -1.80099
R_helix = 485.138 vs R/2 = 900
nT_Endcap = 0.899545
Beta_Endcap = 5.65201
R_helix < R/2 ----->
Beta = 5.65201
Beta_z = 5.65201
L = 301.15
IPx = -25.6865
IPy = 300.053
IPt = 301.15
IPz = 2350
New: Particle 84, PDG = -211, Charge = -1, Pt = 0.436624, Pz = 0.374203, IPt = 301.15, IPz = 2350
Old: Particle 84, PDG = -211, Charge = -1, Pt = 0.436624, Pz = 0.374203, IPt = 931.315, IPz = 1542.67

```

如下这种情况是对sin(beta/2)做了近似~R/R_helix所导致的精度不够

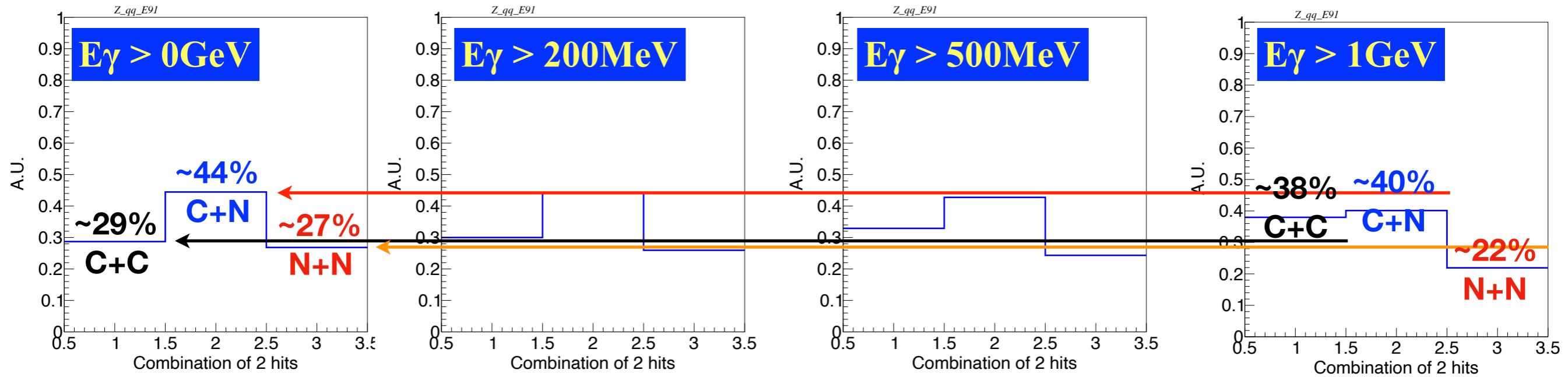
```

Charge = 1, Px = -7.24169, Py = 3.901, Pt = 8.22556, Pz = 3.16863, Phi = 2.64748
R_helix = 9139.51 vs R/2 = 900
nT_Endcap = 0.106233
Beta_Endcap = 0.66748
R_helix >= R/2 ----->
Beta_Barrel = 0.197267
nT_Barrel = 0.031396
Beta = 0.197267
Beta_z = 0.197267
L = 1800
IPx = -1661.06
IPy = 693.455
IPt = 1800
IPz = 694.517
New: Particle 74, PDG = 211, Charge = 1, Pt = 8.22556, Pz = 3.16863, IPt = 1800, IPz = 694.517
Old: Particle 74, PDG = 211, Charge = 1, Pt = 8.22556, Pz = 3.16863, IPt = 1797.09, IPz = 693.392

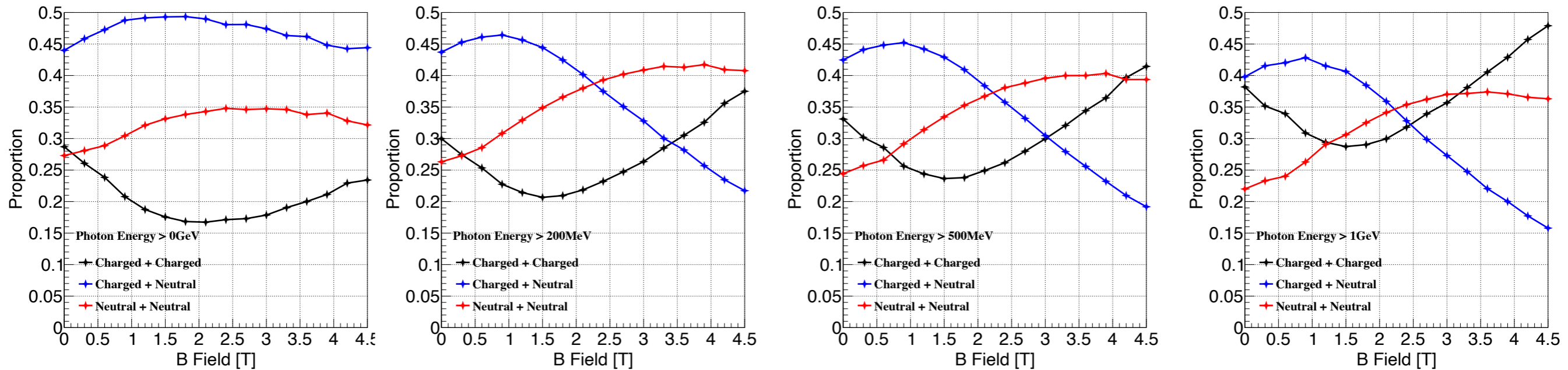
```

Combination of nearest 2 particles in a event

Minimum Angle



Minimum Distance



Diagnosis: Cluster Hit Time = 0

4 CalorimeterHit Collections without Time:

BCAL -> Simu/BeamCalCollection

LCAL -> Simu/LumiCalCollection

LHCAL -> Simu/LHcalCollection

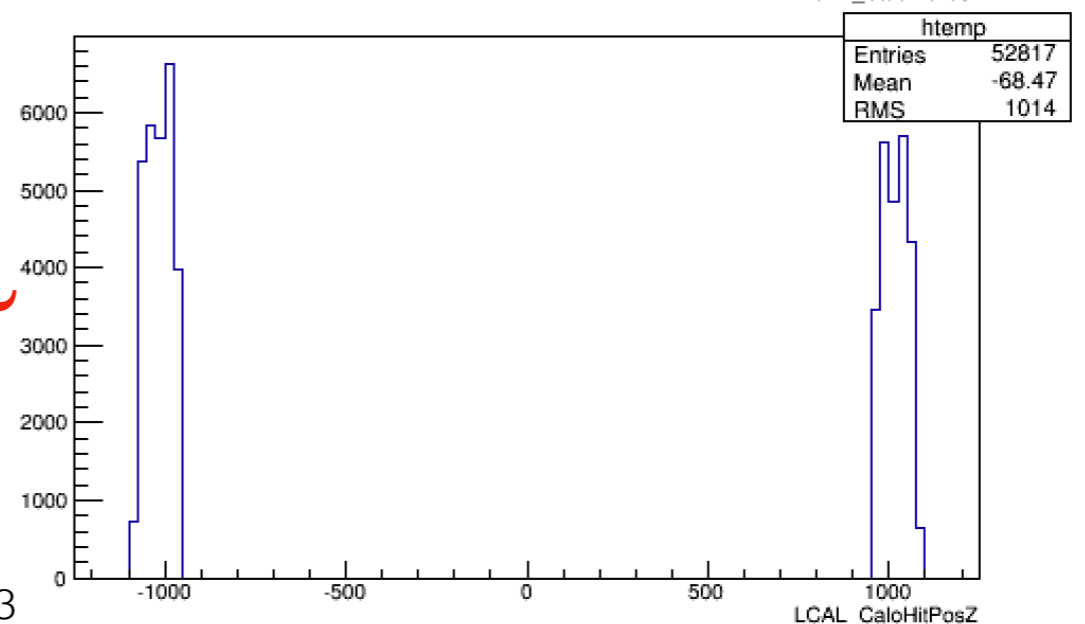
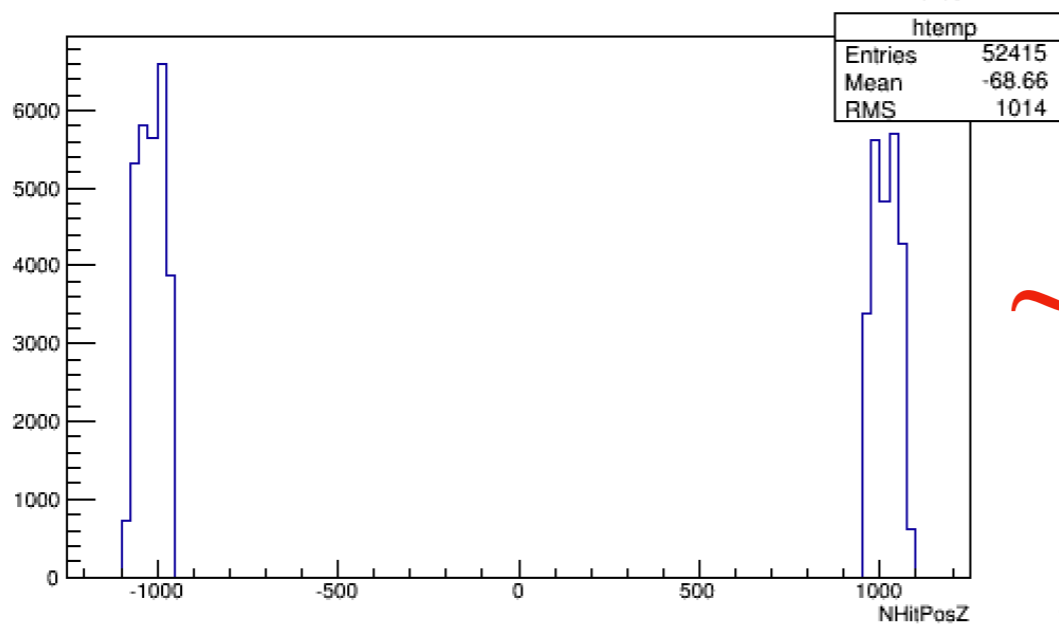
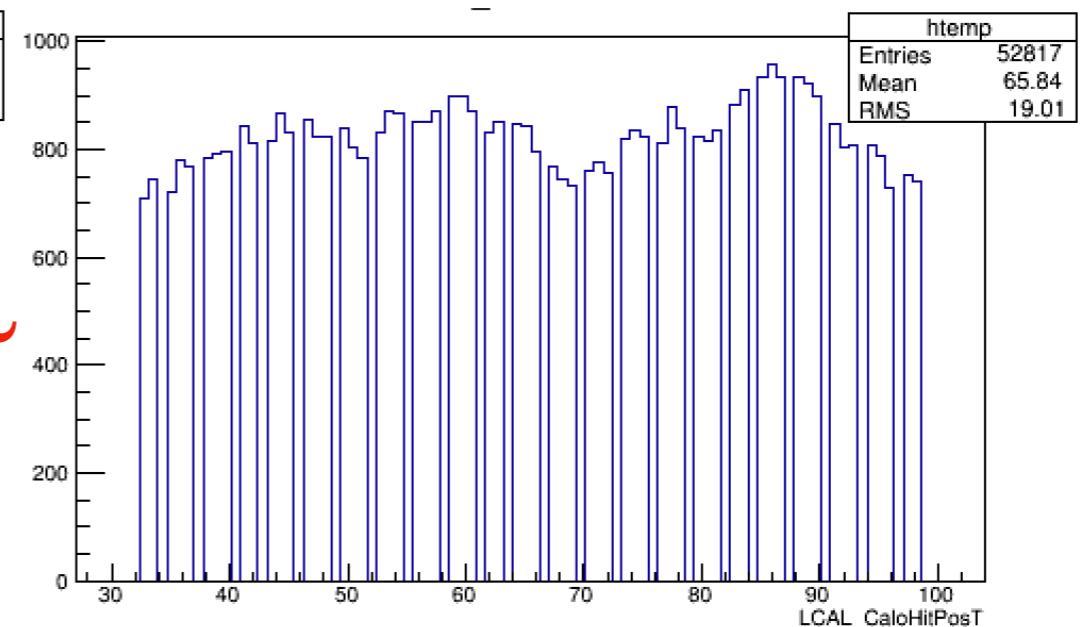
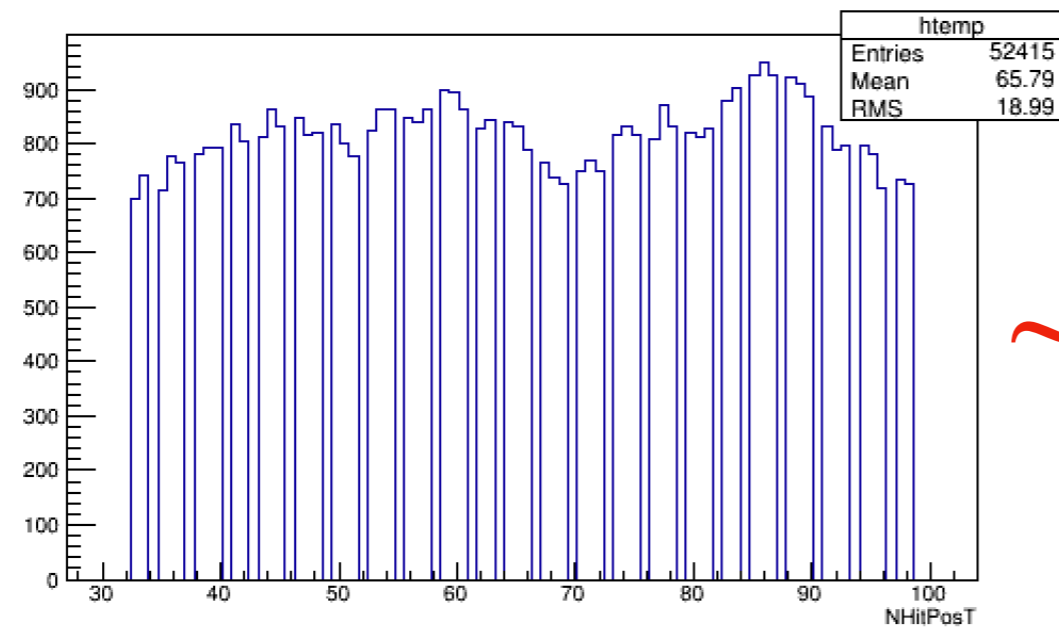
MUON -> Simu/MuonBarrelCollection, MuonEndCapCollection

Hit Position

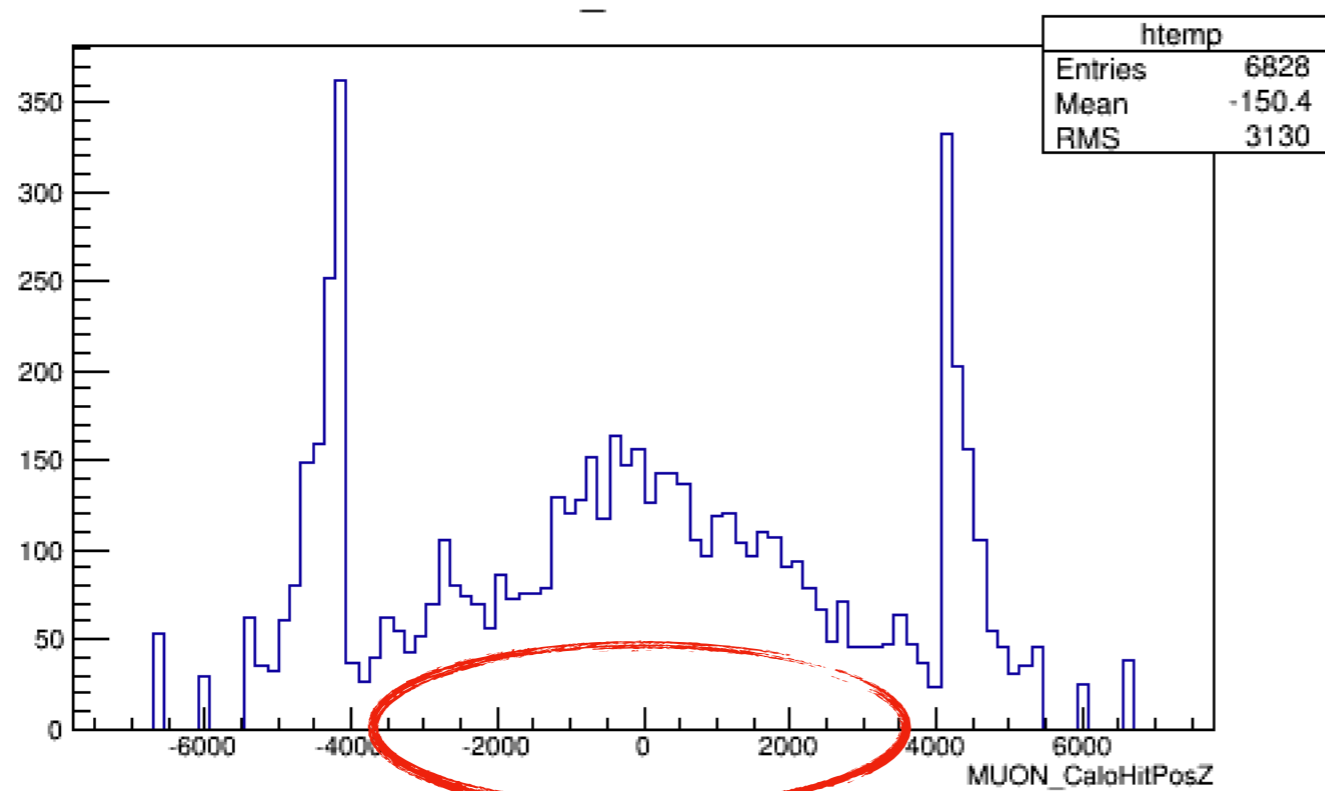
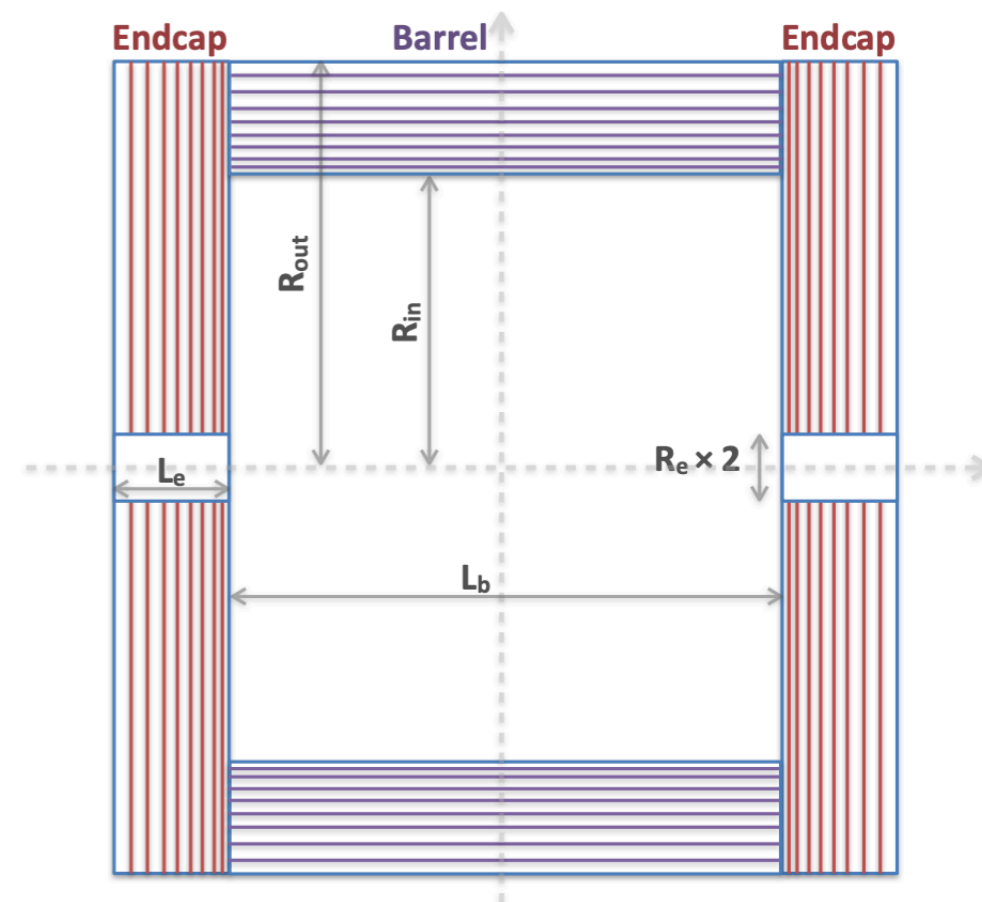
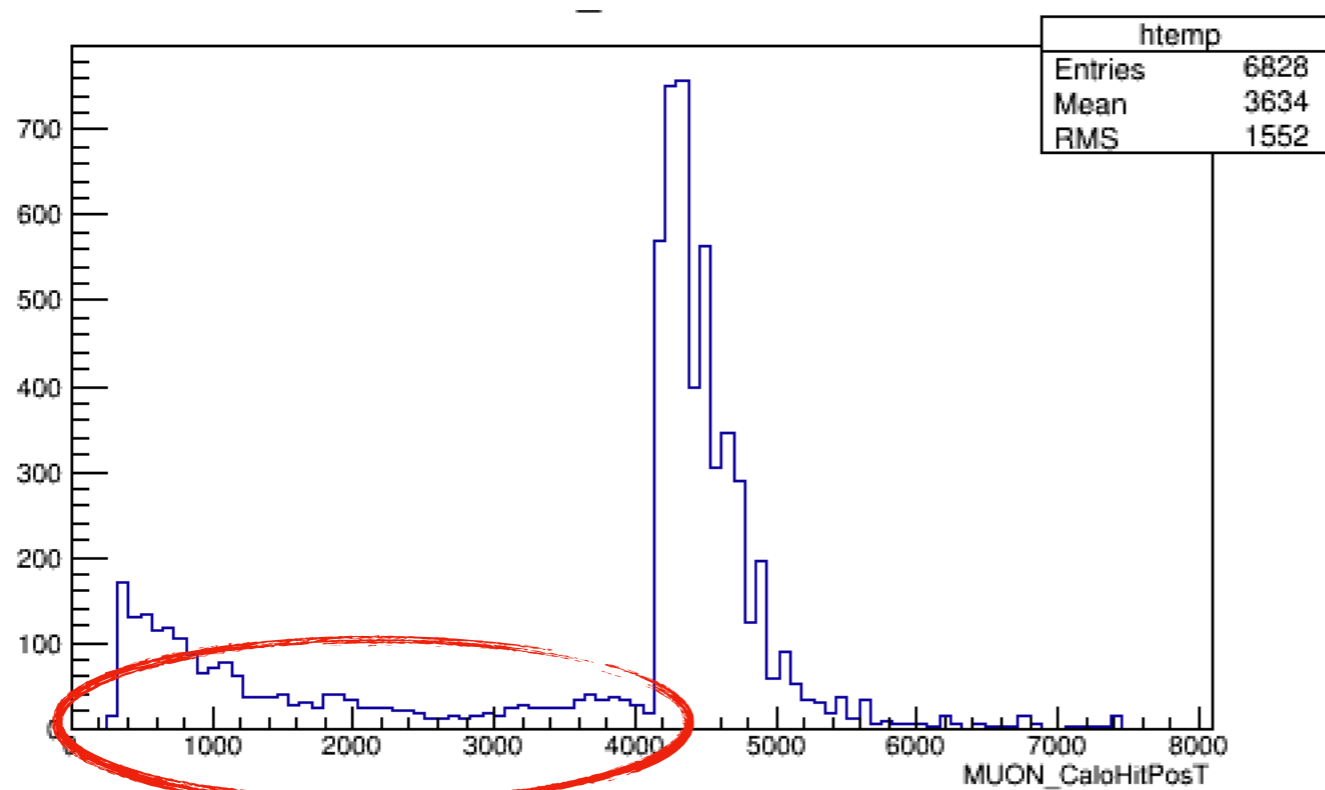
pi+ 10GeV

ClusterHit with t=0

CaloHit in LumiCal



Position of Muon CaloHit?



Parameter	Baseline
$L_b/2$ [m]	4.14
R_{in} [m]	4.40
R_{out} [m]	6.08
L_e [m]	1.72
R_e [m]	0.50
Segmentation in ϕ	12
Number of layers	8
Total thickness of iron ($\lambda = 16.77$ cm)	6.7λ (112 cm) (8/8/12/12/16/16/20/20) cm
Solid angle coverage	$0.98 \times 4\pi$

Diagnosis: Cluster Hit Time = 0

Definition of “Hit In ECAL”: Position of Hit in Cluster

Before: $r < \text{HCALInnerR} \ \& \ |z| < \text{HCALEndCapInnerZ}$

Only
before
HCAL!

Before	IsHitInECAL			
E/GeV	All t=0/All hits	ECAL t=0/All hits	ECAL t=0/ECAL hits	ECAL/All hits
1	5.25%	5.25%	5.66%	92.80%
2	4.04%	4.04%	4.70%	86.09%
3	4.34%	4.34%	5.78%	75.10%
5	3.71%	3.71%	5.76%	64.38%
7	3.54%	3.54%	5.76%	61.51%
10	3.71%	3.71%	6.25%	59.33%
20	3.31%	3.31%	6.45%	51.40%
30	2.89%	2.89%	5.97%	48.36%

Update: $\text{ECALInnerR} < r < \text{HCALInnerR} \ \& \ \text{ECALEndCapInnerZ} < |z| < \text{HCALEndCapInnerZ}$

Between
ECAL & HCAL

Update	IsHitInECAL			
E/GeV	All t=0/All hits	ECAL t=0/All hits	ECAL t=0/ECAL hits	ECAL/All hits
1	5.25%	0.00%	0.00%	0.38%
2	4.04%	0.00%	0.00%	2.79%
3	4.34%	0.00%	0.00%	2.64%
5	3.71%	0.00%	0.00%	2.72%
7	3.54%	0.00%	0.00%	2.84%
10	3.71%	0.00%	0.00%	2.76%
20	3.31%	0.00%	0.00%	2.46%
30	2.89%	0.00%	0.00%	2.16%

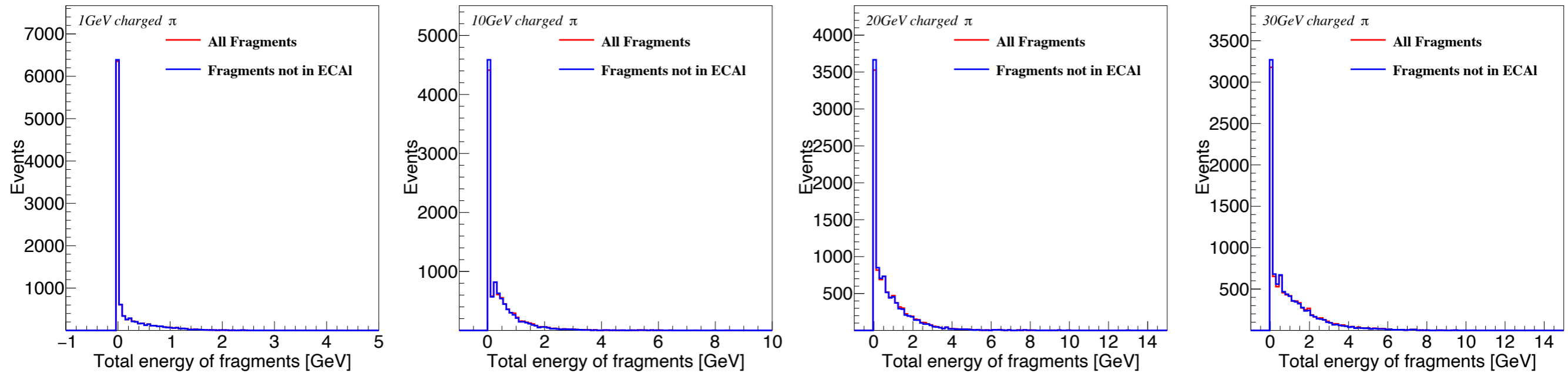
$\text{ECALInnerR}=1847.4\text{mm}$
 $\text{HCALInnerR}=2058.0\text{mm}$
 $\text{ECALEndCapInnerZ}=2450\text{mm}$
 $\text{HCALEndCapInnerZ}=2650\text{mm}$

Ceiling of Fragment Optimization Using ECAL Time

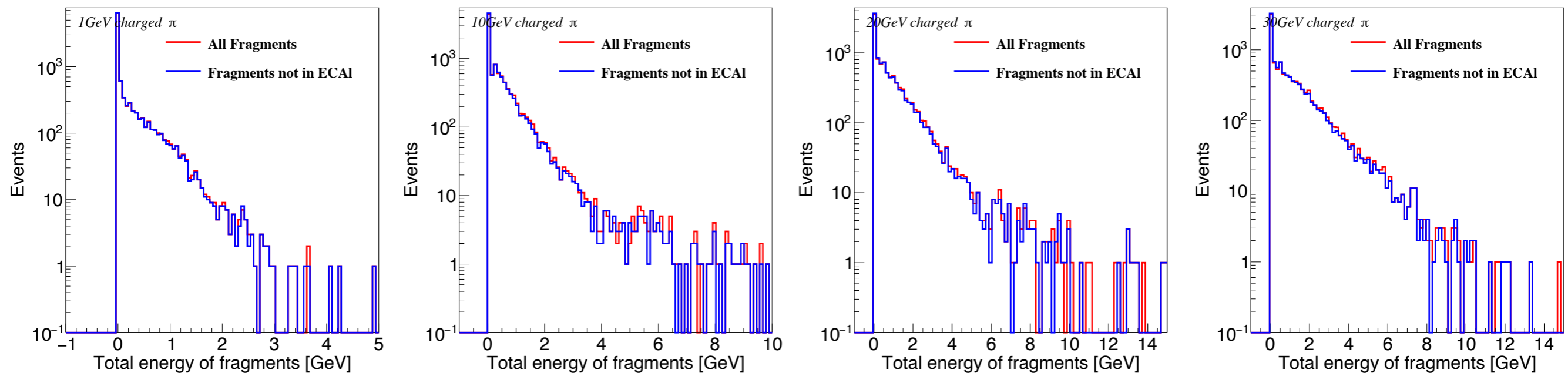
*The fragments whose cluster hits are all **out of ECAL***

New results

Linear



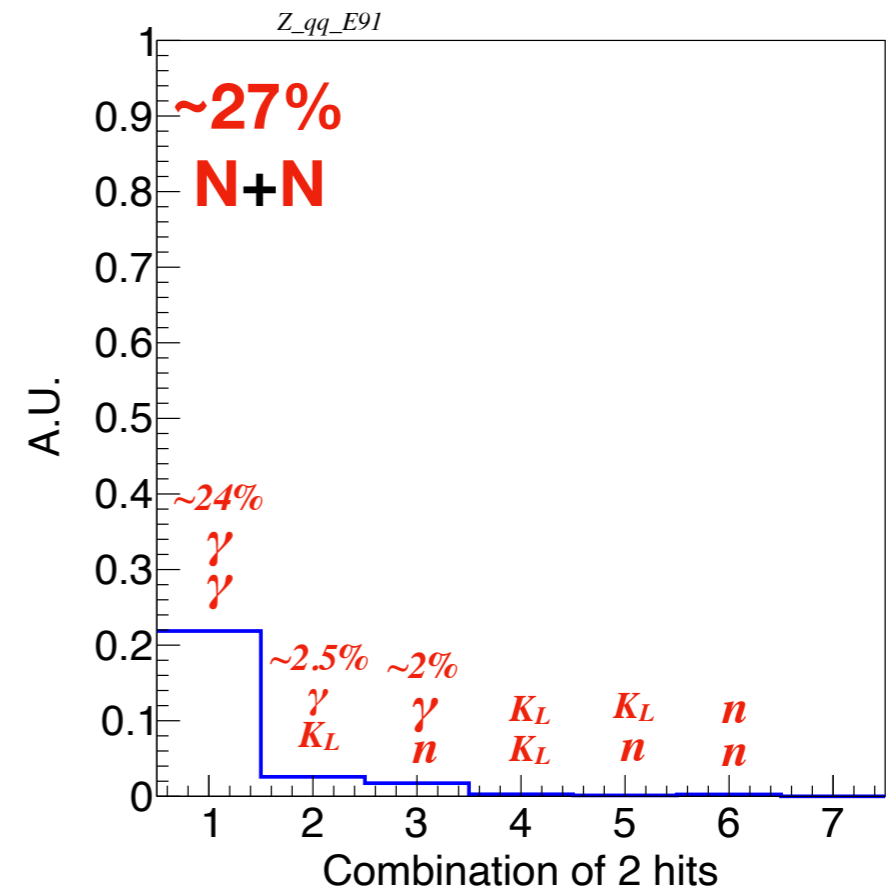
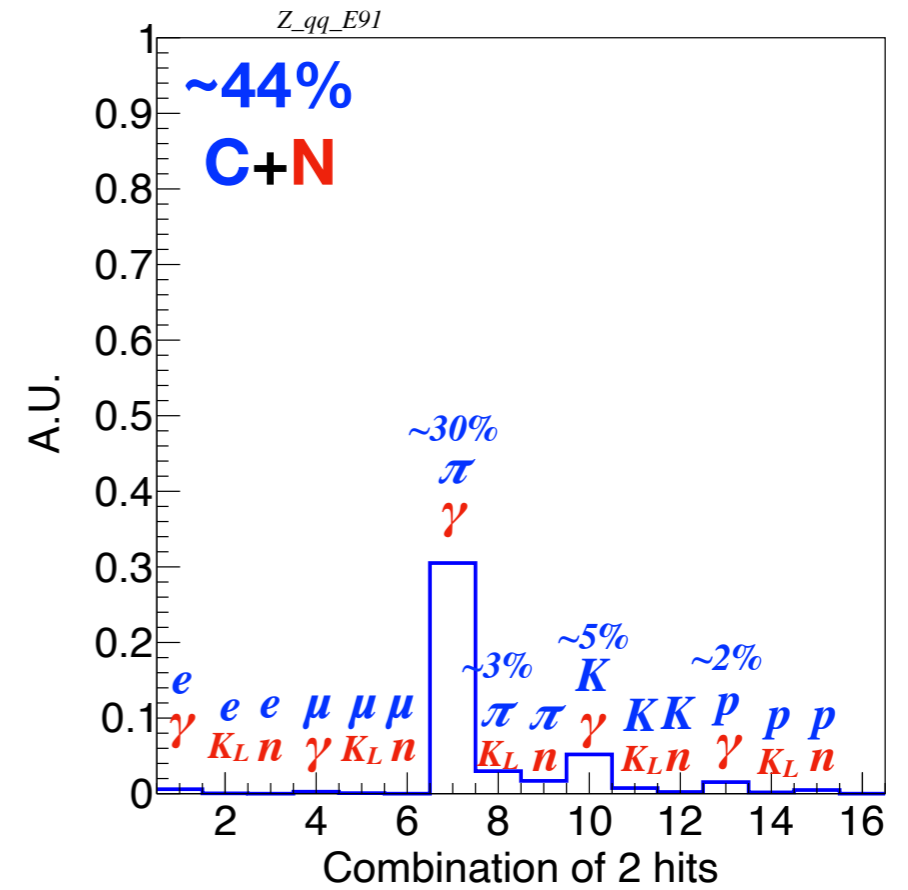
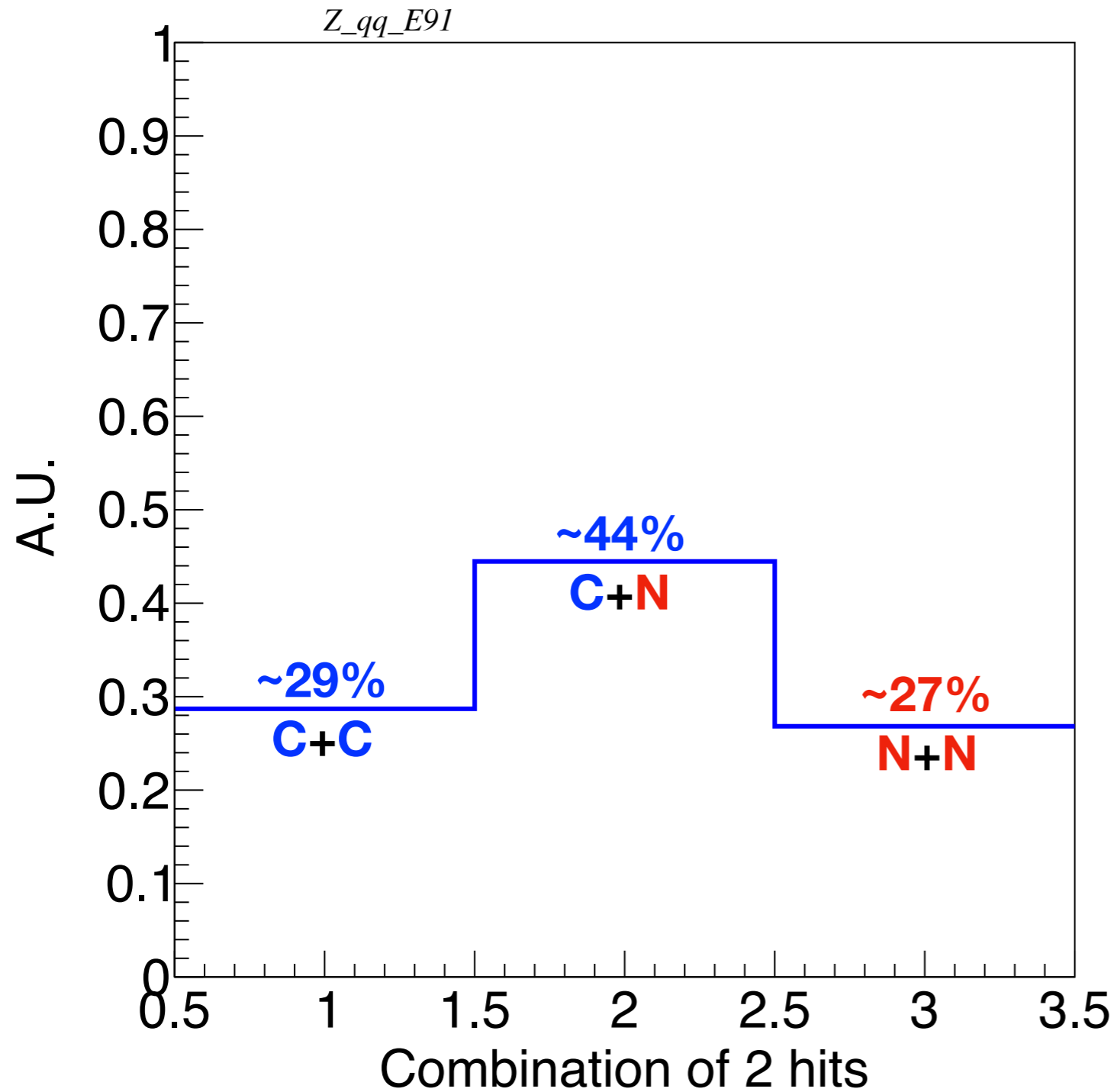
Log



Backup

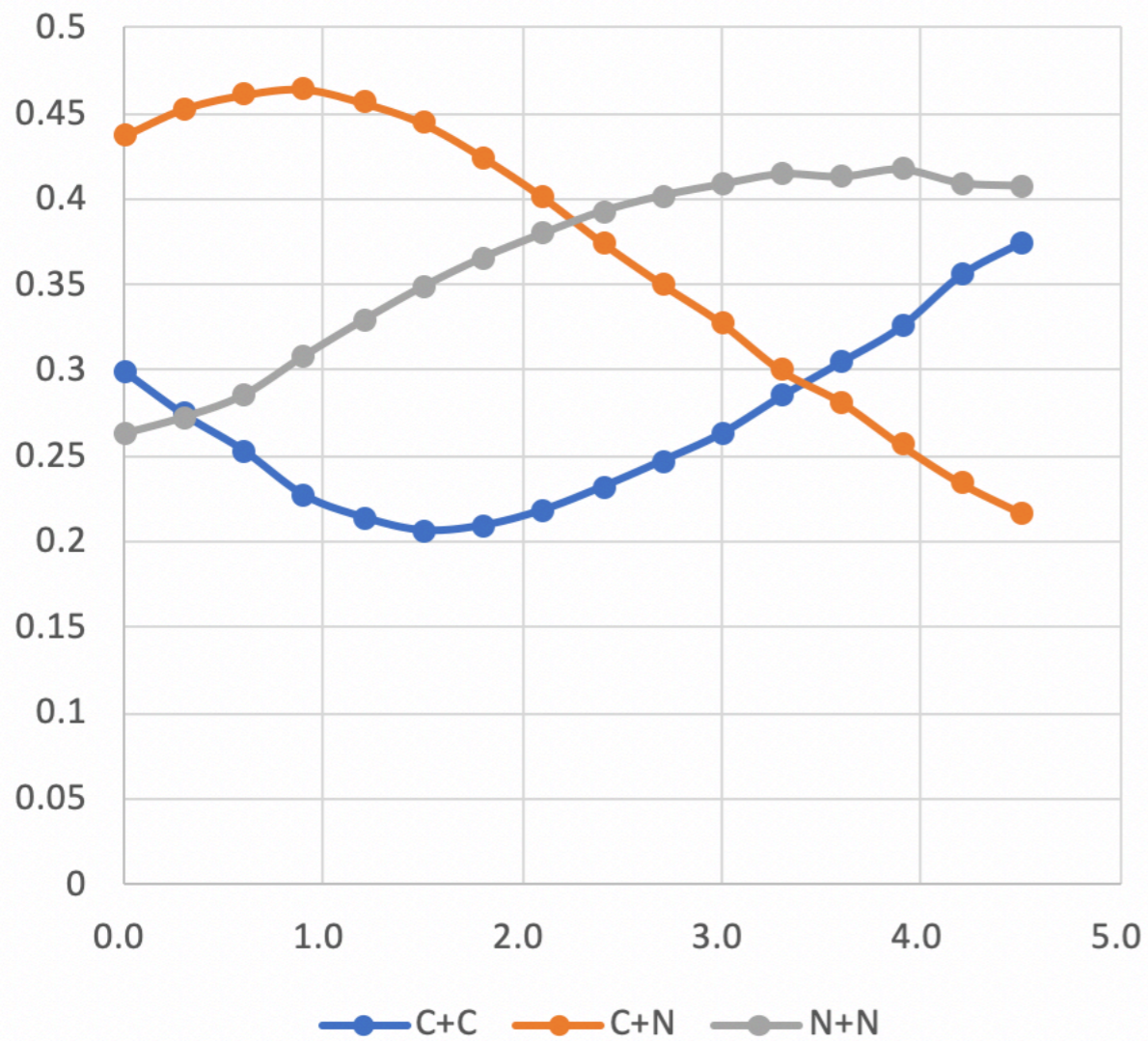
Combination of nearest 2 particles in a event

Z_{qq}

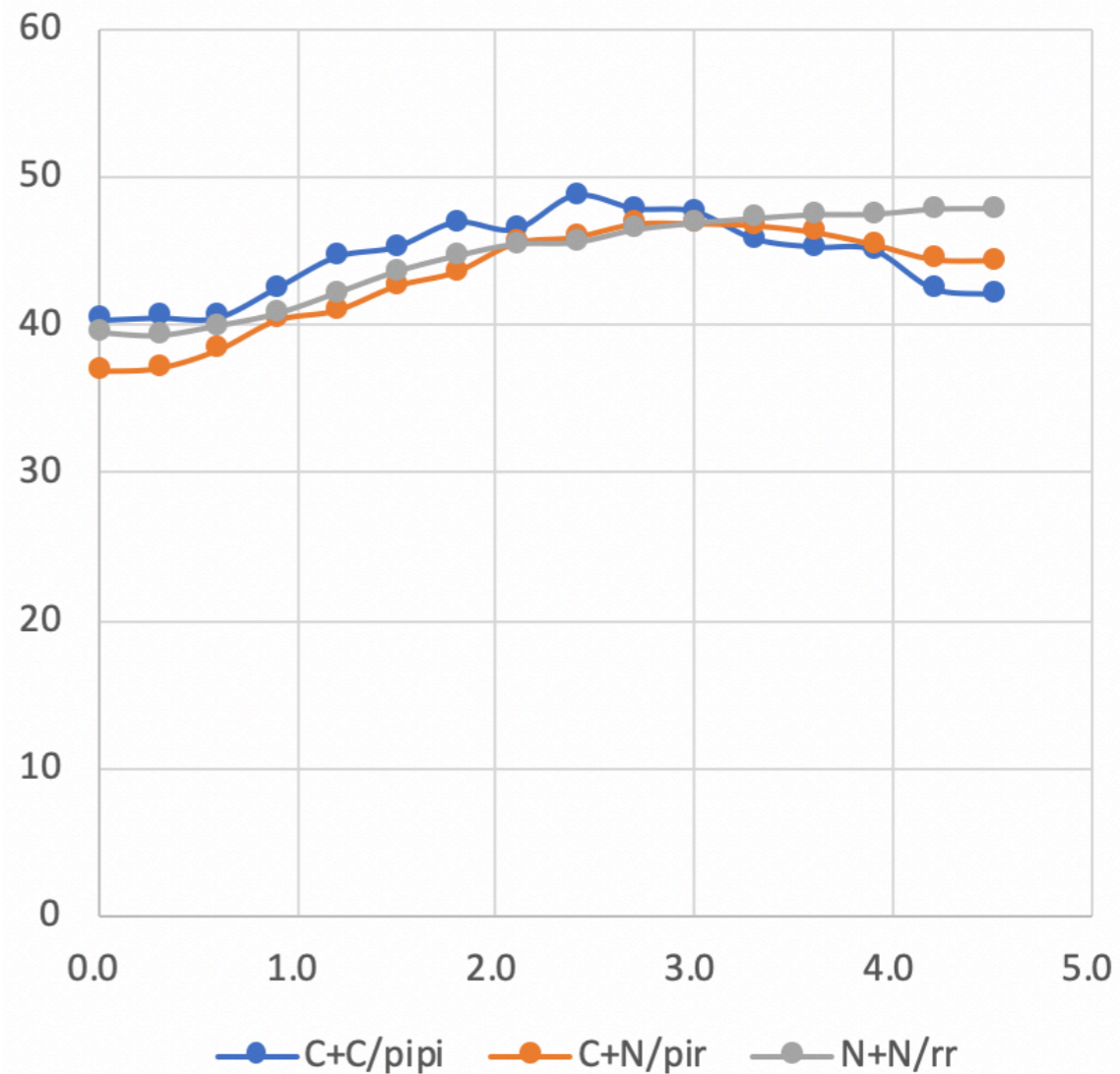


Photon Energy > 200MeV

Proportion vs B Field



Average distance vs B Field

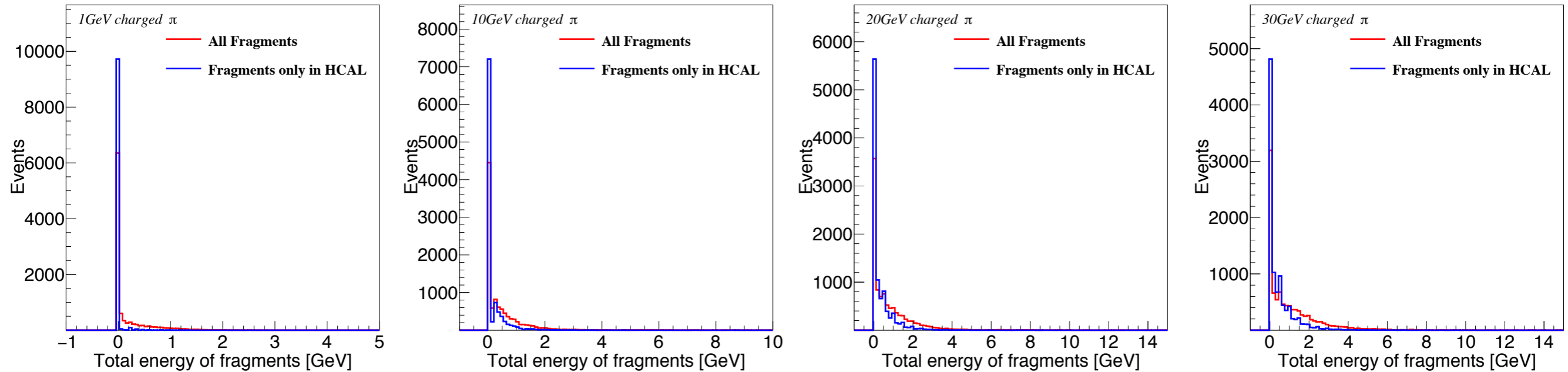


Ceiling of Fragment Optimization Using ECAL Time

The fragments whose cluster hits are all in HCAL

Before results

Linear



Log

