TPC
40 vs 60 layers

Carlos (SBU)

Tune for 40 layers at macro level

```
--- a/macros/g4simulations/G4_Svtx_maps_ladders+intt_ladders+tpc_KalmanPatRec.C
+++ b/macros/g4simulations/G4_Svtx_maps_ladders+intt_ladders+tpc_KalmanPatRec.C
@@ -2,7 +2,7 @@

 const int n_maps_layer = 3;
 const int n_intt_layer = 4;    // must be 0-4, setting this to zero will remove the INTT completely, n < 4 gives you the first n layers
-const int n_gas_layer = 60;
+const int n_gas_layer = 40;
 double inner_cage_radius = 20.;

 int Max_si_layer = n_maps_layer + n_intt_layer + n_gas_layer;
@@ -211,14 +211,8 @@ void Svtx_Cells(int verbosity = 0)
     }

   // TPC cells
-  double diffusion = 0.0057; //0.012: Ne(96%),CF4, etc mm/sqrt(cm) 0.0057: by Alan
-  double electrons_per_kev = 38.;//28., 38.;
-
-  // tpc_cell_x is the TPC pad size.  The actual hit resolution depends not only on this pad size but also on the diffusion in the gas and amplification step
-  double tpc_cell_x = 0.12;
-  // tpc_cell_y is the z "bin" size.  It is approximately the z resolution * sqrt(12)
-  // eventually this will be replaced with an actual simulation of timing amplitude.
-  double tpc_cell_y = 0.17;
+  double tpc_cell_x = 0.12*0.5;
+  double tpc_cell_y = 0.17*0.5;

   // Main switch for TPC distortion
   const bool do_tpc_distortion = true;
@@ -244,10 +238,10 @@ void Svtx_Cells(int verbosity = 0)
   PHG4CylinderCellTPCReco *svtx_cells = new PHG4CylinderCellTPCReco(n_maps_layer+n_intt_layer);
   svtx_cells->Detector("SVTX");
   svtx_cells->setDistortion(tpc_distortion);
-  svtx_cells->setDiffusionT(0.0120);
-  svtx_cells->setDiffusionL(0.0120);
-  svtx_cells->setSmearRPhi(0.09);  // additional smearing of cluster positions
-  svtx_cells->setSmearZ(0.06);        // additional smearing of cluster positions
+  svtx_cells->setDiffusionT(0.0130);
+  svtx_cells->setDiffusionL(0.0130);
+  svtx_cells->setSmearRPhi(0.10);  // additional smearing of cloud positions wrt hits
+  svtx_cells->setSmearZ(0.09);        // additional smearing of cloud positions wrt hits
   svtx_cells->set_drift_velocity(6.0/1000.01);
   svtx_cells->setHalfLength( 105.5 );
   svtx_cells->setElectronsPerKeV(28);
@@ -382,11 +376,11 @@ void Svtx_Reco(int verbosity = 0)

   PHG4TPCClusterizer* tpcclusterizer = new PHG4TPCClusterizer();
   tpcclusterizer->Verbosity(0);
-  tpcclusterizer->setEnergyCut(15/*adc*/);
+  tpcclusterizer->setEnergyCut(0/*15 adc*/);
   tpcclusterizer->setRangeLayers(n_maps_layer+n_intt_layer,Max_si_layer);
-  tpcclusterizer->setFitWindowSigmas(0.0150,0.0160);  // should be changed when TPC cluster resolution changes
-  tpcclusterizer->setFitWindowMax(4/*rphibins*/,3/*zbins*/);
-  tpcclusterizer->setFitEnergyThreshold( 0.05 /*fraction*/ );
+  tpcclusterizer->setFitWindowSigmas(0.0160,0.0160);  // should be changed when TPC cluster resolution changes
+  tpcclusterizer->setFitWindowMax(8/*rphibins*/,6/*zbins*/);
+  tpcclusterizer->setFitEnergyThreshold( 0.01 /*fraction*/ );
   se->registerSubsystem( tpcclusterizer );

   /*
```
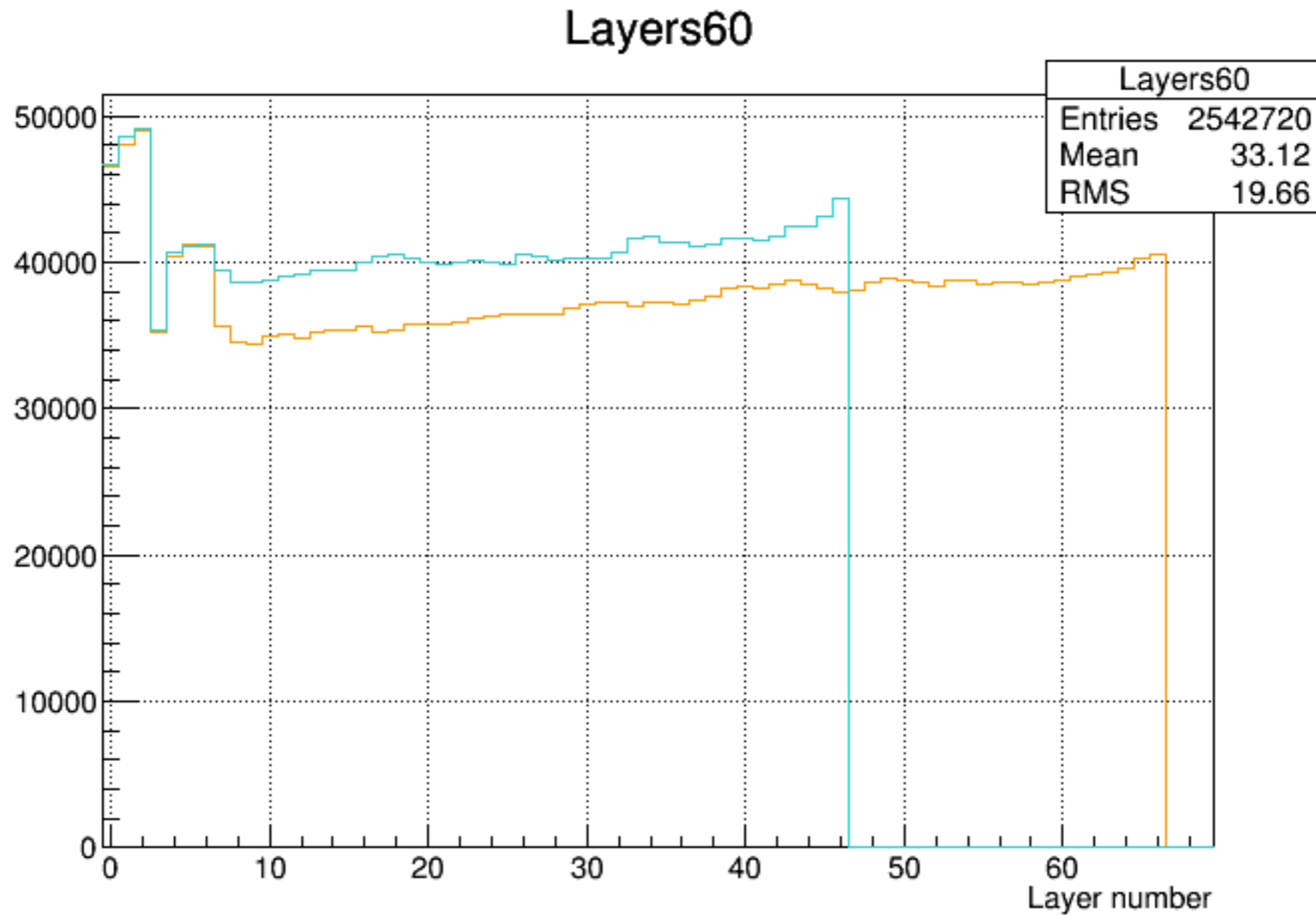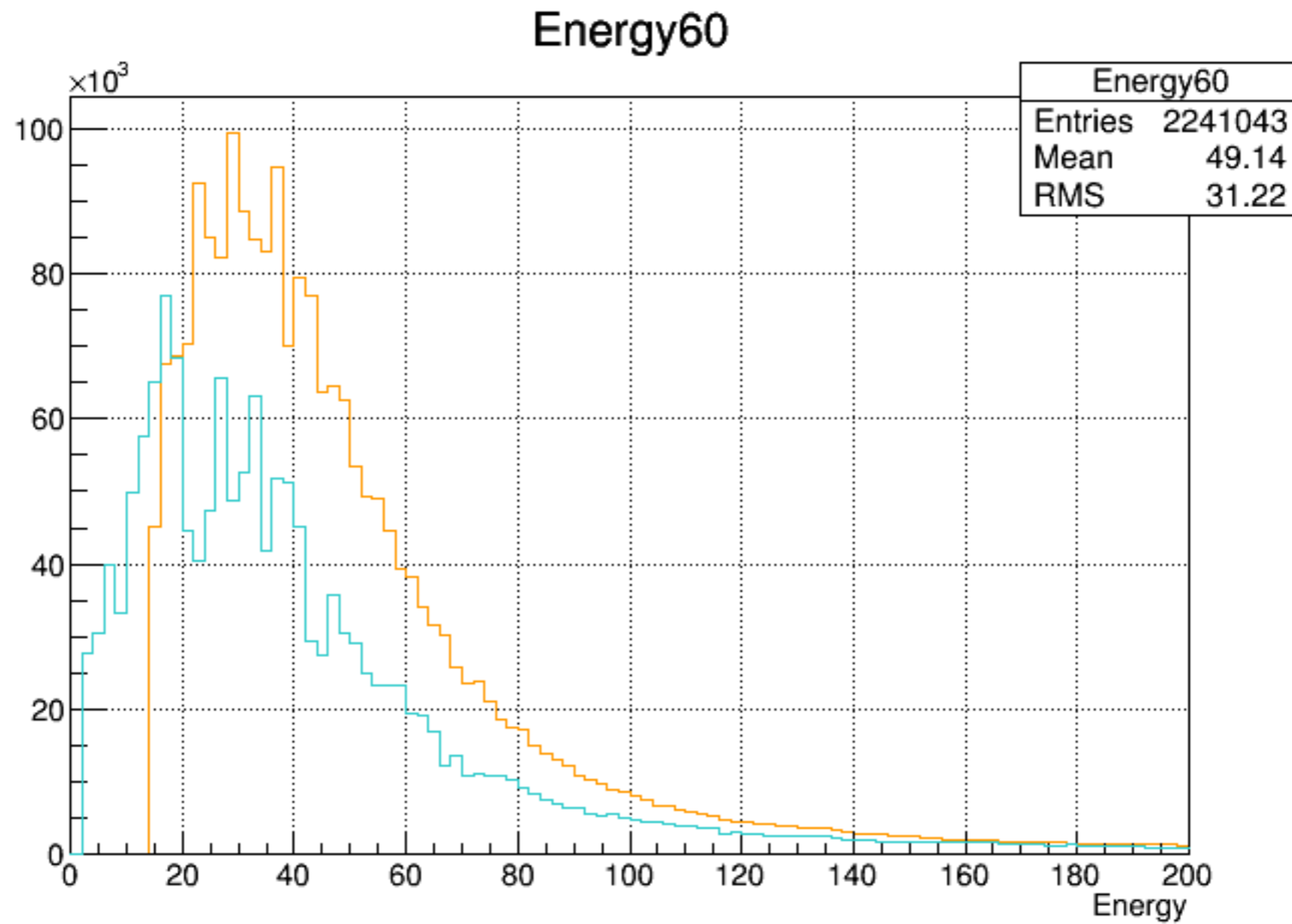
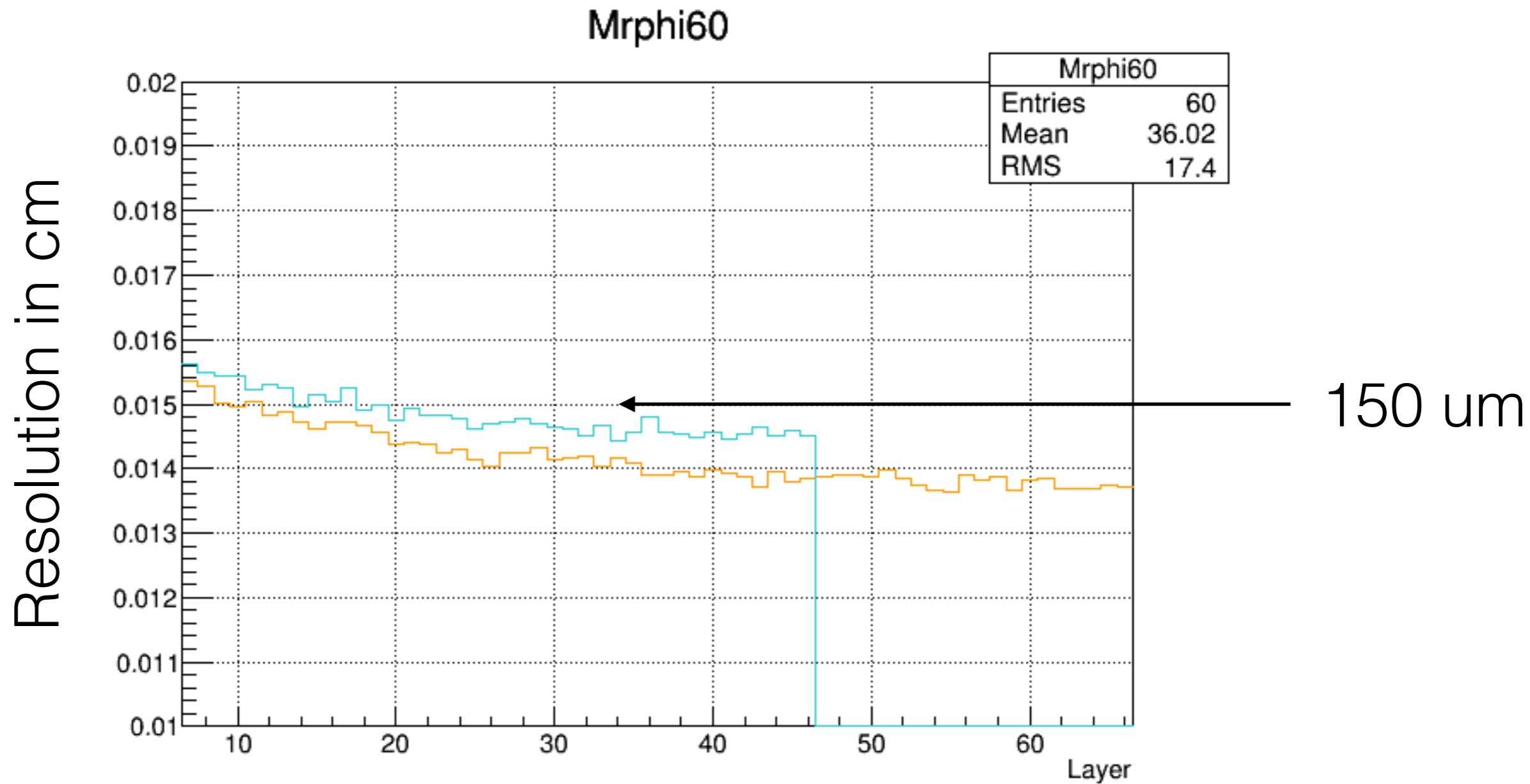# Number of clusters per layer
for MAPS + INTT + TPC (TPC starts at 7)

Layers60

Layers60	
Entries	2542720
Mean	33.12
RMS	19.66

Layer number

Muons at 4-5 GeV

Cluster Energy distribution

Energy60

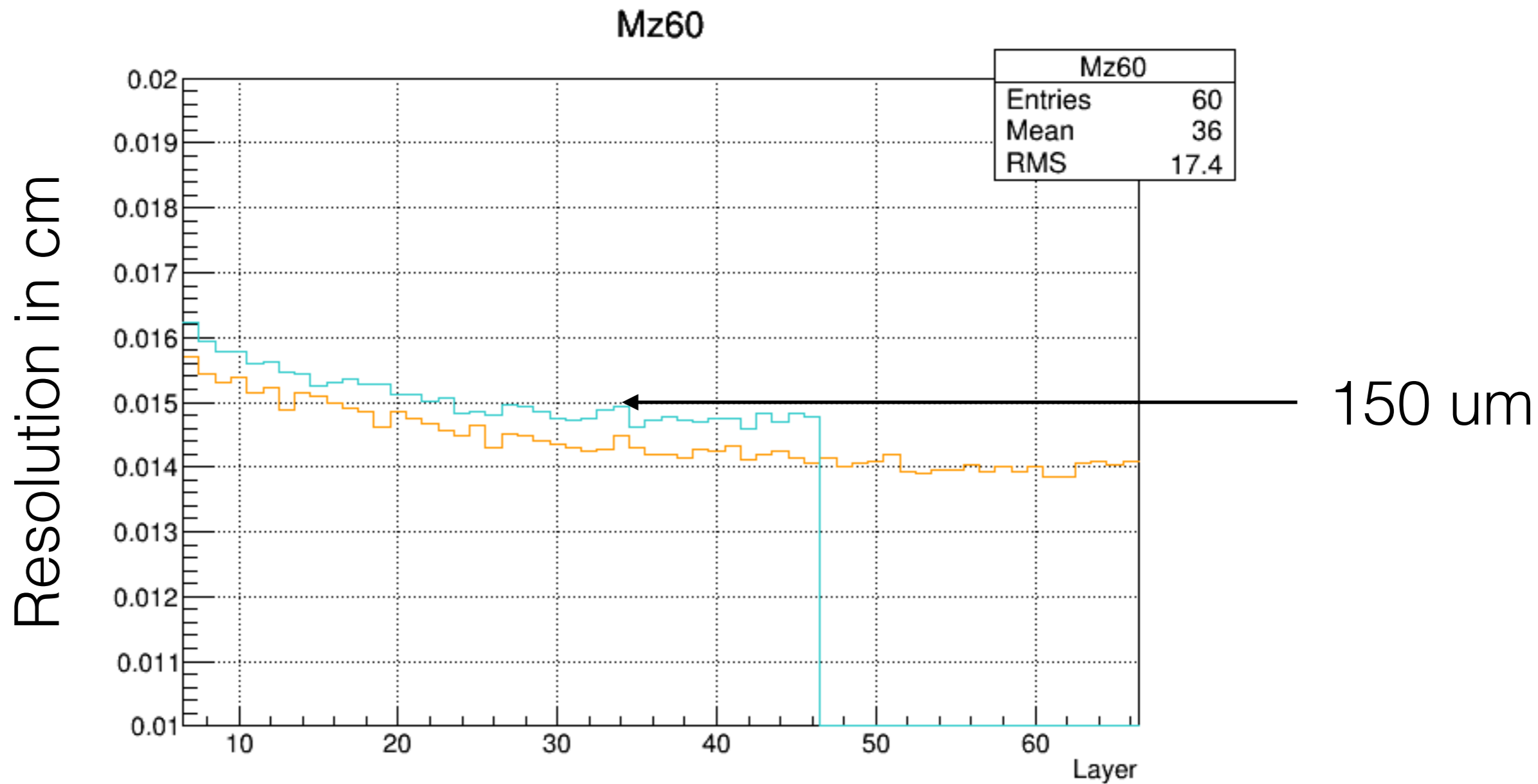| Energy60	
Entries	2241043
Mean	49.14
RMS	31.22

Muons at 4-5 GeV

TPC ClusterRPhi resolution as function of layer number (Sigma fit to drphi distribution)
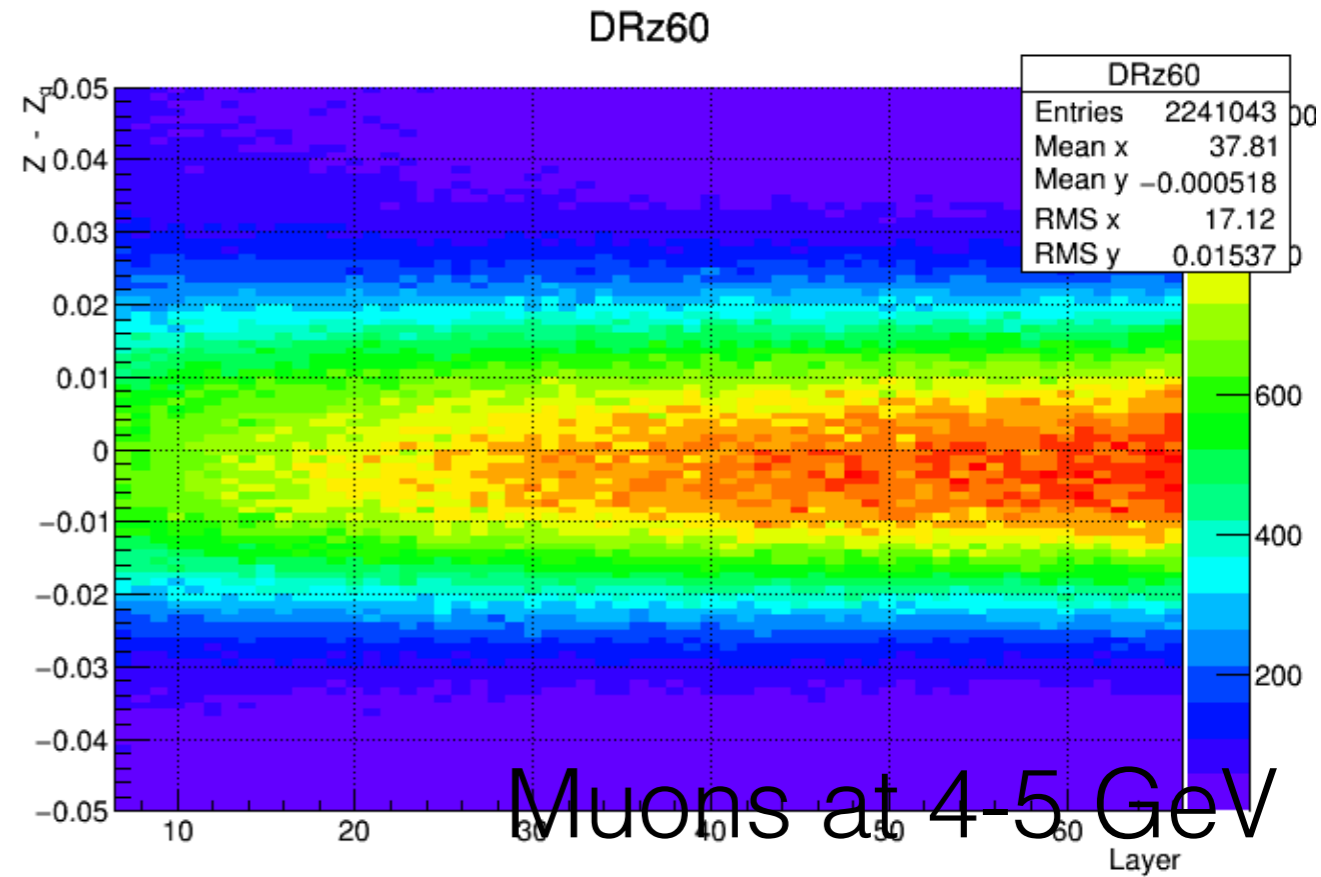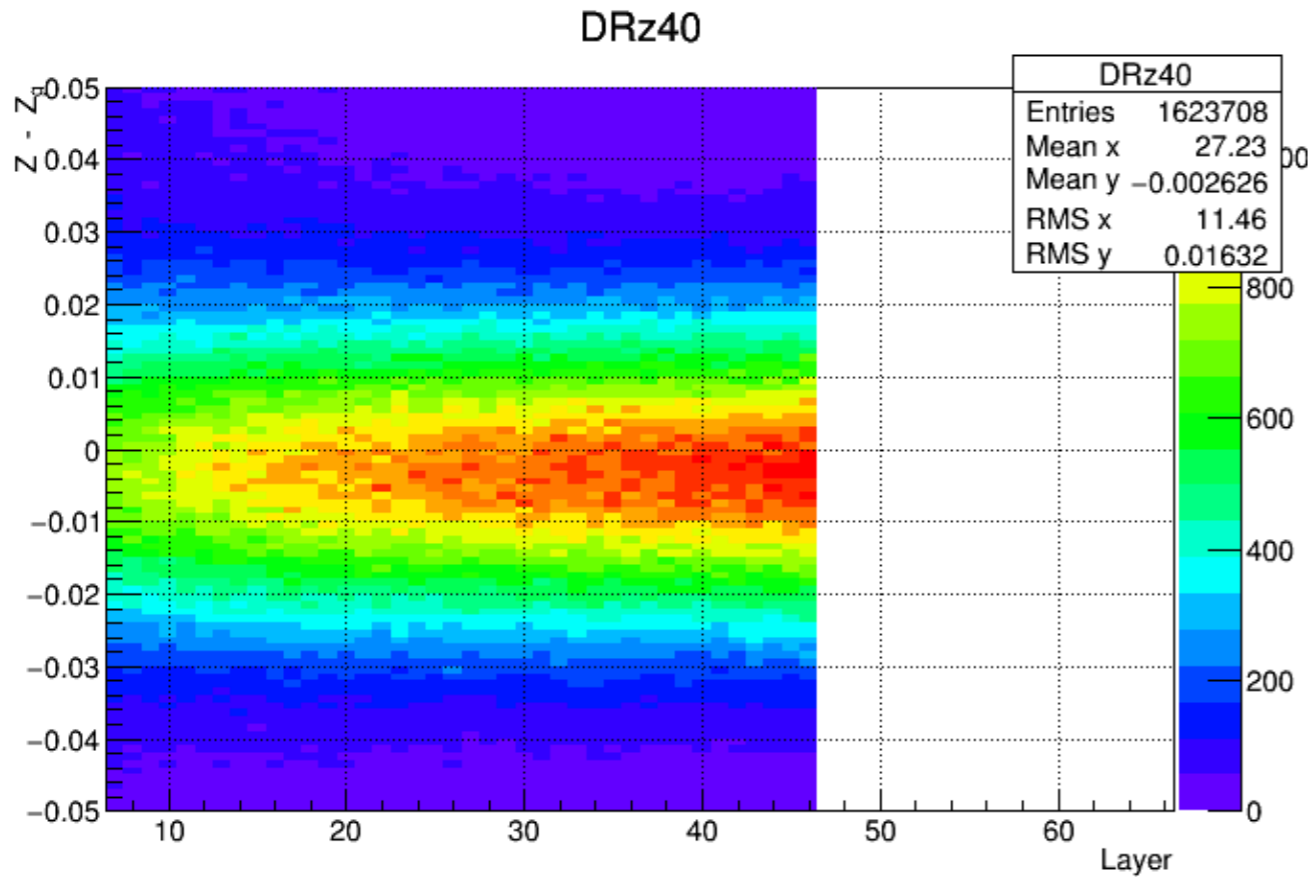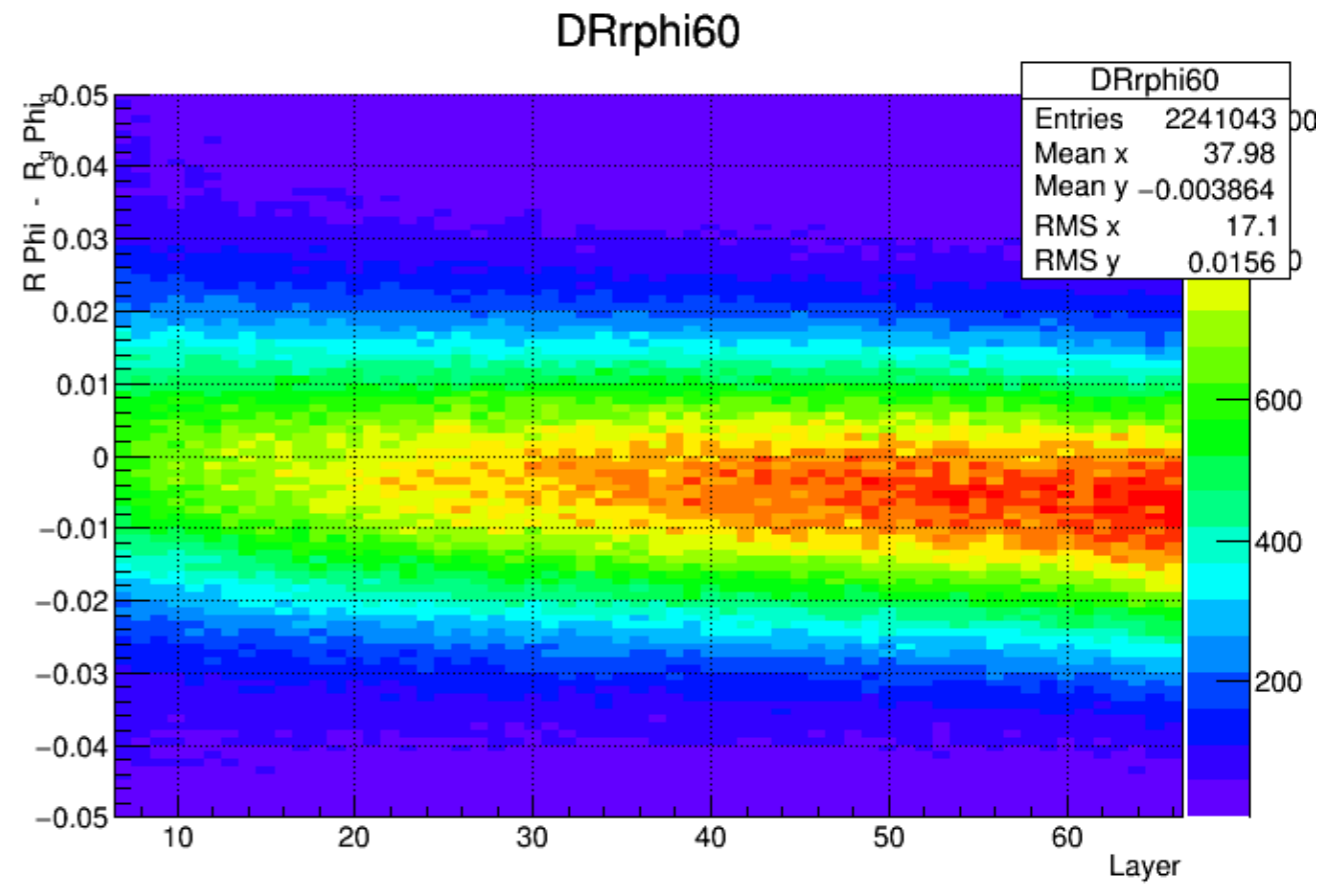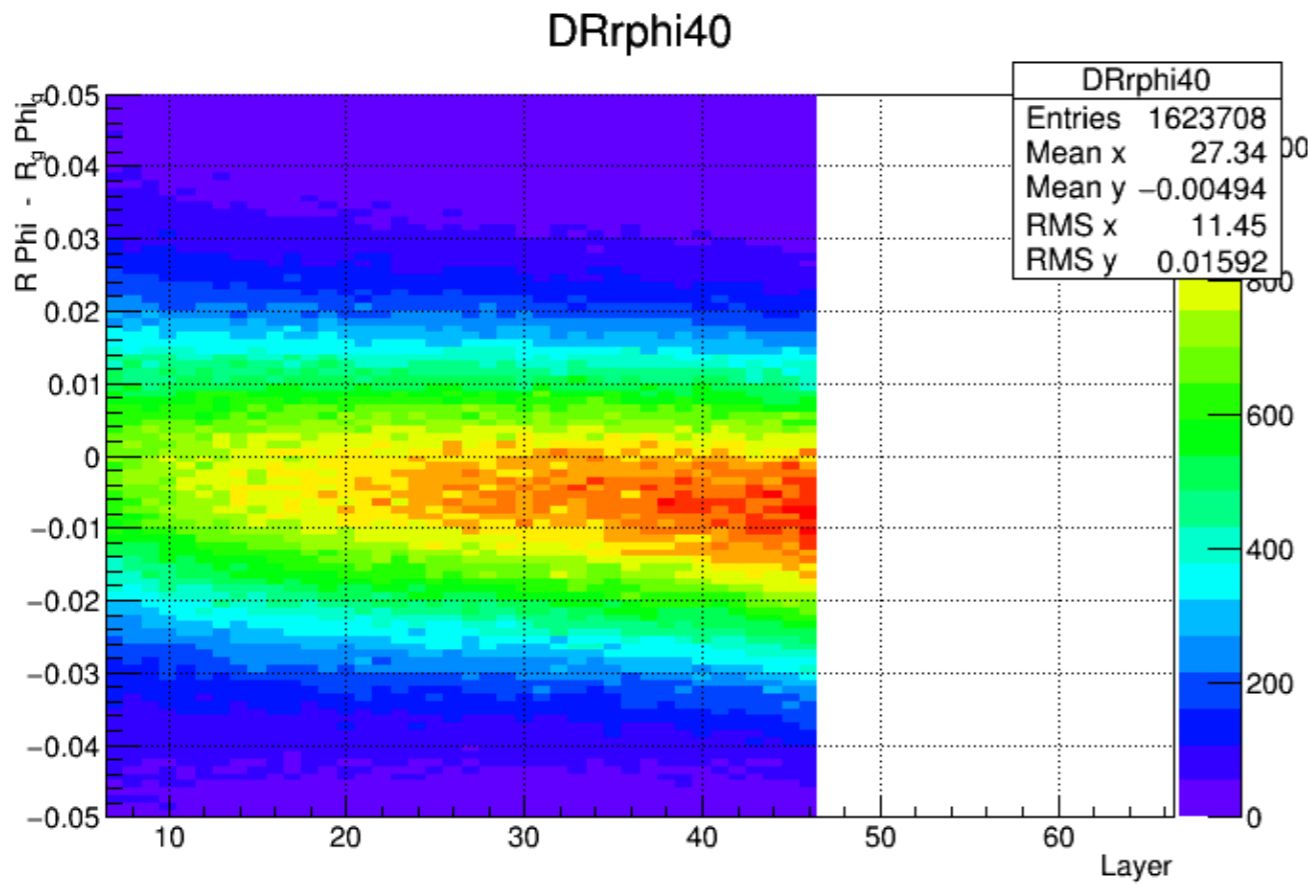

Muons at 4-5 GeV

TPC ClusterZ resolution as function of layer number
(Sigma fit to dz distribution)

Muons at 4-5 GeV

(TPC Cluster X - Matched hit X) as function of layer

DRrphi40

DRrphi40	
Entries	1623708
Mean x	27.34
Mean y	−0.00494
RMS x	11.45
RMS y	0.01592

DRrphi60

DRrphi60	
Entries	2241043
Mean x	37.98
Mean y	−0.003864
RMS x	17.1
RMS y	0.0156

DRz40

DRz40	
Entries	1623708
Mean x	27.23
Mean y	−0.002626
RMS x	11.46
RMS y	0.01632

DRz60

DRz60	
Entries	2241043
Mean x	37.81
Mean y	−0.000518
RMS x	17.12
RMS y	0.01537

Muons at 4-5 GeV