Cylindrical MAPS clustering - DCA pull

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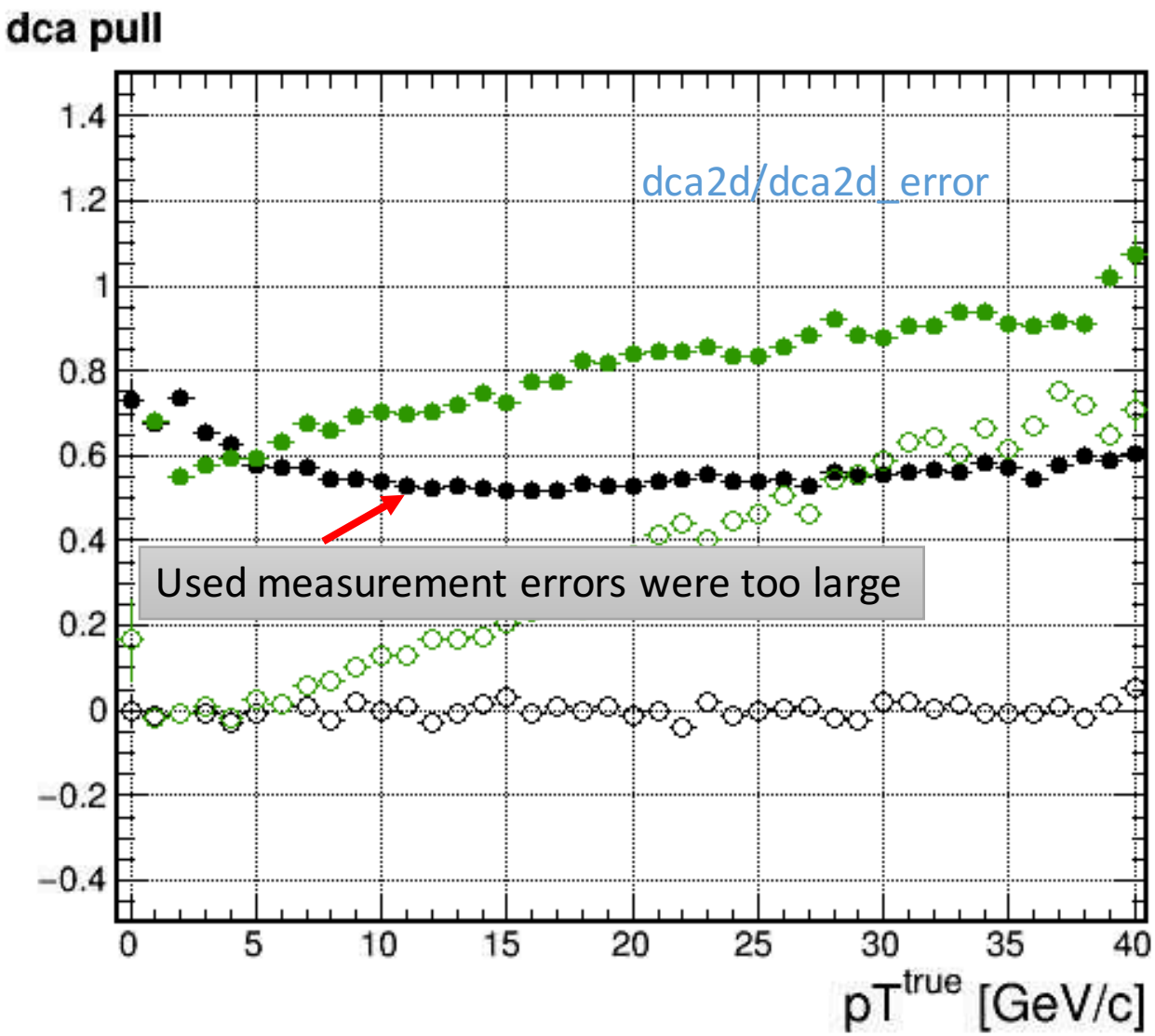
The problem:

	sigma	mean
GenFit	Black dot	Black circle
Alan	Green dot	Green circle



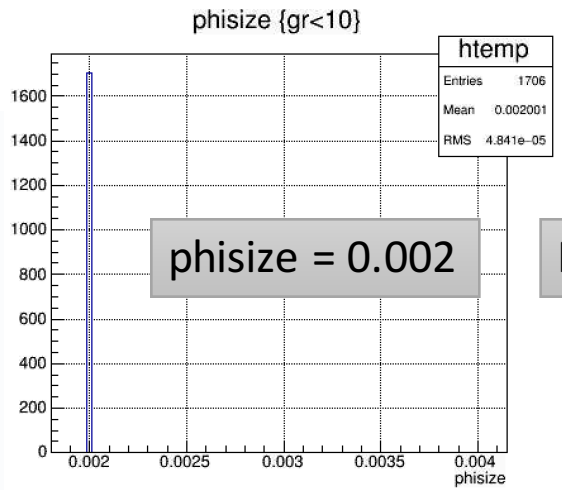
Cylindrical MAPS+TPC configurartion

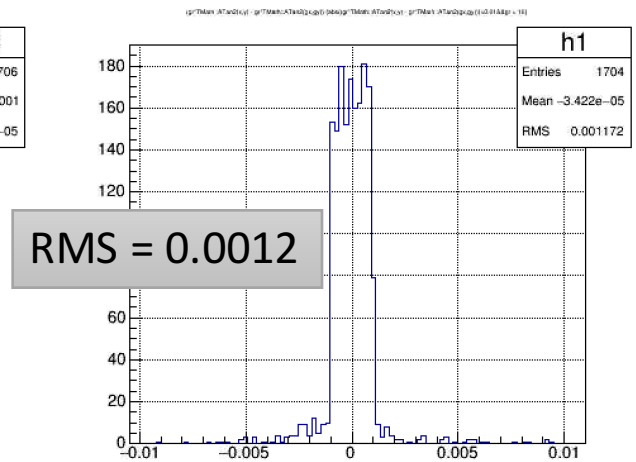
```
  double svxcellsizex[3] = {0.0020, 0.0020, 0.0020};
  double svxcellsizey[3] = {0.0020, 0.0020, 0.0020};

  double diffusion = 0.0057;
  double electrons_per_kev = 38.;

  // tpc_cell_x is the TPC pad size.  The actual hit
d amplification step
  double tpc_cell_x = 0.12;
  // tpc_cell_y is the z "bin" size.  It is approxima
  // eventually this will be replaced with an actual
  double tpc_cell_y = 0.17;
```

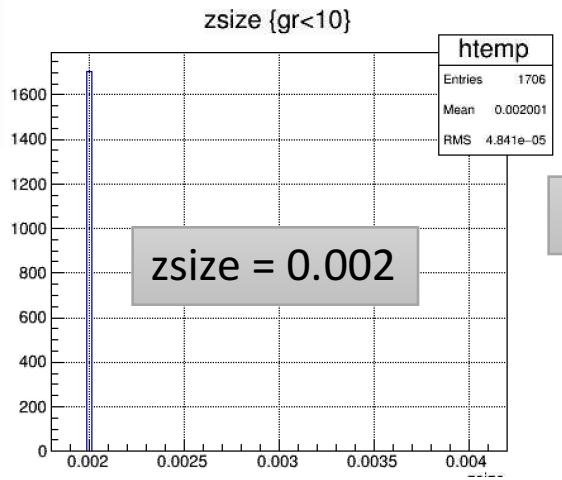
MAPS clustering

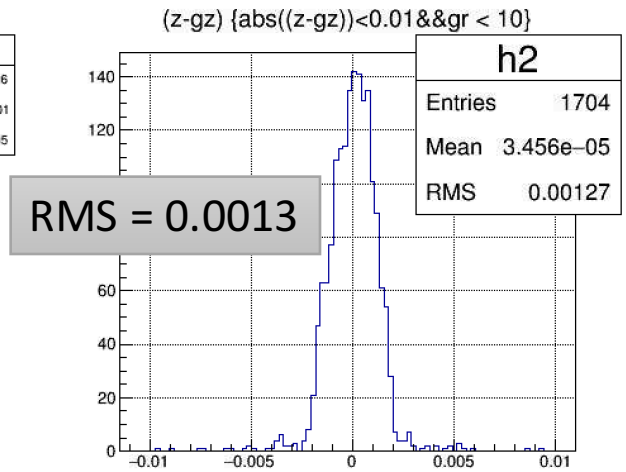
in PHG4SvtxCluster:

```
TMatrixF DIM(3,3);
DIM[0][0] = pow(0.0*0.5*thickness,2);
DIM[0][1] = 0.0;
DIM[0][2] = 0.0;
DIM[1][0] = 0.0;
DIM[1][1] = pow(0.5*phisize,2);
DIM[1][2] = 0.0;
DIM[2][0] = 0.0;
DIM[2][1] = 0.0;
DIM[2][2] = pow(0.5*zsize,2);

TMatrixF ERR(3,3);
ERR[0][0] = pow(0.0*0.5*thickness*invsqrt12,2);
ERR[0][1] = 0.0;
ERR[0][2] = 0.0;
ERR[1][0] = 0.0;
ERR[1][1] = pow(0.5*phisize*invsqrt12,2);
ERR[1][2] = 0.0;
ERR[2][0] = 0.0;
ERR[2][1] = 0.0;
ERR[2][2] = pow(0.5*zsize*invsqrt12,2);
```









0.0012 ~ 0.004/sqrt(12)

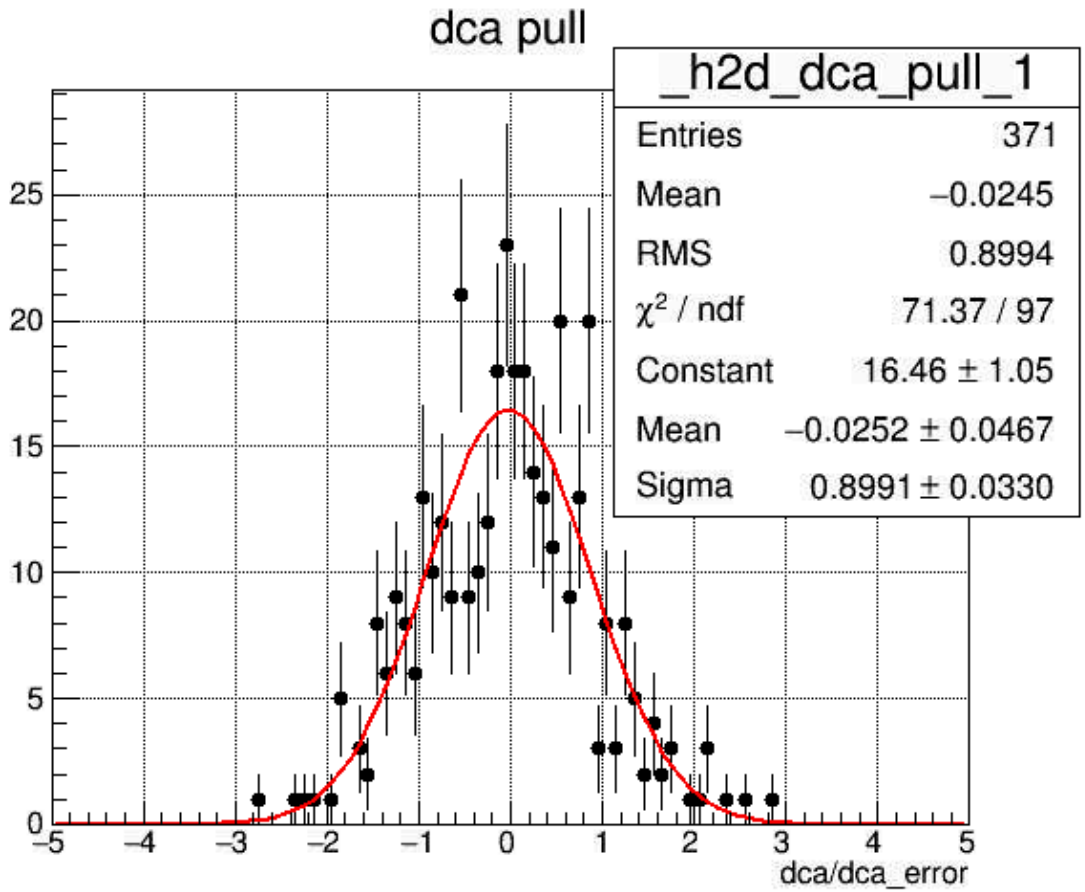
SvtxCluster::get functions

```
float SvtxCluster_v1::get_phi_size() const {

  TMatrixF COVAR(3,3);
  for (unsigned int i=0; i<3; ++i) {
    for (unsigned int j=0; j<3; ++j) {
      COVAR[i][j] = get_size(i,j);
    }
  }

  float phi = -1.0*atan2(_pos[1],_pos[0]);

  TMatrixF ROT(3,3);
  ROT[0][0] = cos(phi);
  ROT[0][1] = -sin(phi);
  ROT[0][2] = 0.0;
  ROT[1][0] = sin(phi);
  ROT[1][1] = cos(phi);
  ROT[1][2] = 0.0;
  ROT[2][0] = 0.0;
  ROT[2][1] = 0.0;
  ROT[2][2] = 1.0;

  TMatrixF ROT_T(3,3);
  ROT_T.Transpose(ROT);

  TMatrixF TRANS(3,3);
  TRANS = ROT * COVAR * ROT_T;

  return 2.0*sqrt(TRANS[1][1]);
}
```

```
float SvtxCluster_v1::get_phi_error() const {

  TMatrixF COVAR(3,3);
  for (unsigned int i=0; i<3; ++i) {
    for (unsigned int j=0; j<3; ++j) {
      COVAR[i][j] = get_error(i,j);
    }
  }

  float phi = -1.0*atan2(_pos[1],_pos[0]);

  TMatrixF ROT(3,3);
  ROT[0][0] = cos(phi);
  ROT[0][1] = -sin(phi);
  ROT[0][2] = 0.0;
  ROT[1][0] = sin(phi);
  ROT[1][1] = cos(phi);
  ROT[1][2] = 0.0;
  ROT[2][0] = 0.0;
  ROT[2][1] = 0.0;
  ROT[2][2] = 1.0;

  TMatrixF ROT_T(3,3);
  ROT_T.Transpose(ROT);

  TMatrixF TRANS(3,3);
  TRANS = ROT * COVAR * ROT_T;

  return sqrt(TRANS[1][1]);
}
```

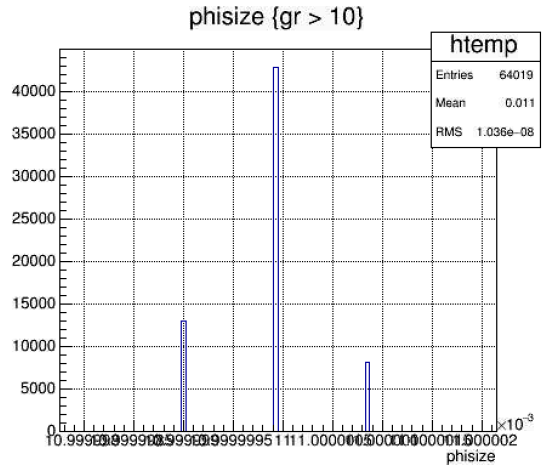
40 GeV muon result:

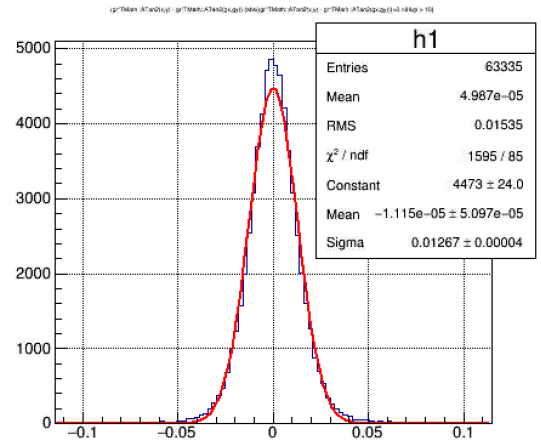
Any how if I use 0.004/sqrt(12) for MAPS cluster errors:

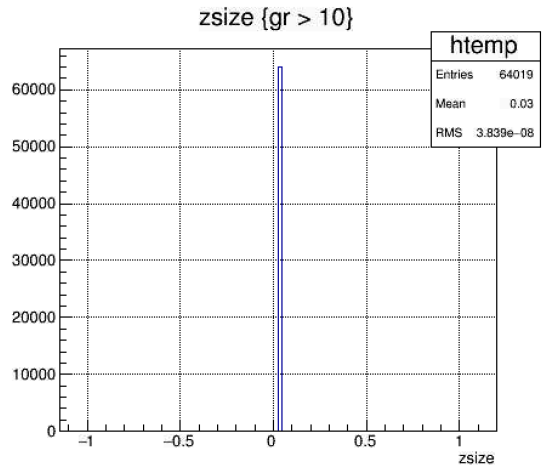


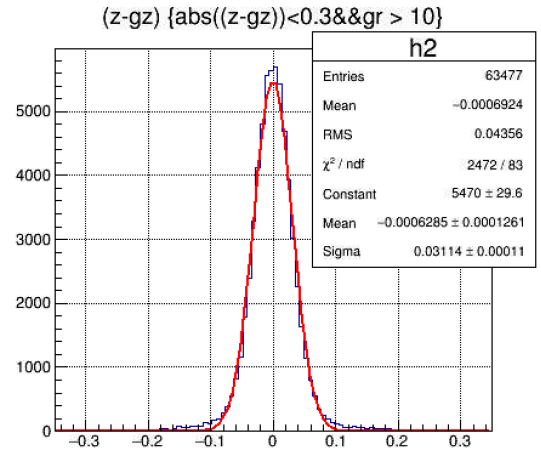
TPC Clustering

```
TMatrixF DIM(3,3);
DIM[0][0] = 0.0;//pow(0.0*0.5*thickness,2);
DIM[0][1] = 0.0;
DIM[0][2] = 0.0;
DIM[1][0] = 0.0;
DIM[1][1] = pow(0.5*0.011,2);
DIM[1][2] = 0.0;
DIM[2][0] = 0.0;
DIM[2][1] = 0.0;
DIM[2][2] = pow(0.5*0.03,2);

TMatrixF ERR(3,3);
ERR[0][0] = 0.0;//pow(0.0*0.5*thickness*invsqrt12,2);
ERR[0][1] = 0.0;
ERR[0][2] = 0.0;
ERR[1][0] = 0.0;
ERR[1][1] = pow(0.5*0.011*invsqrt12,2);
ERR[1][2] = 0.0;
ERR[2][0] = 0.0;
ERR[2][1] = 0.0;
ERR[2][2] = pow(0.5*0.03*invsqrt12,2);
```









Backups: