Weekly Report

Yebo

2020.06.29

ACTS-CEPC

- Changed the resolution of TPC

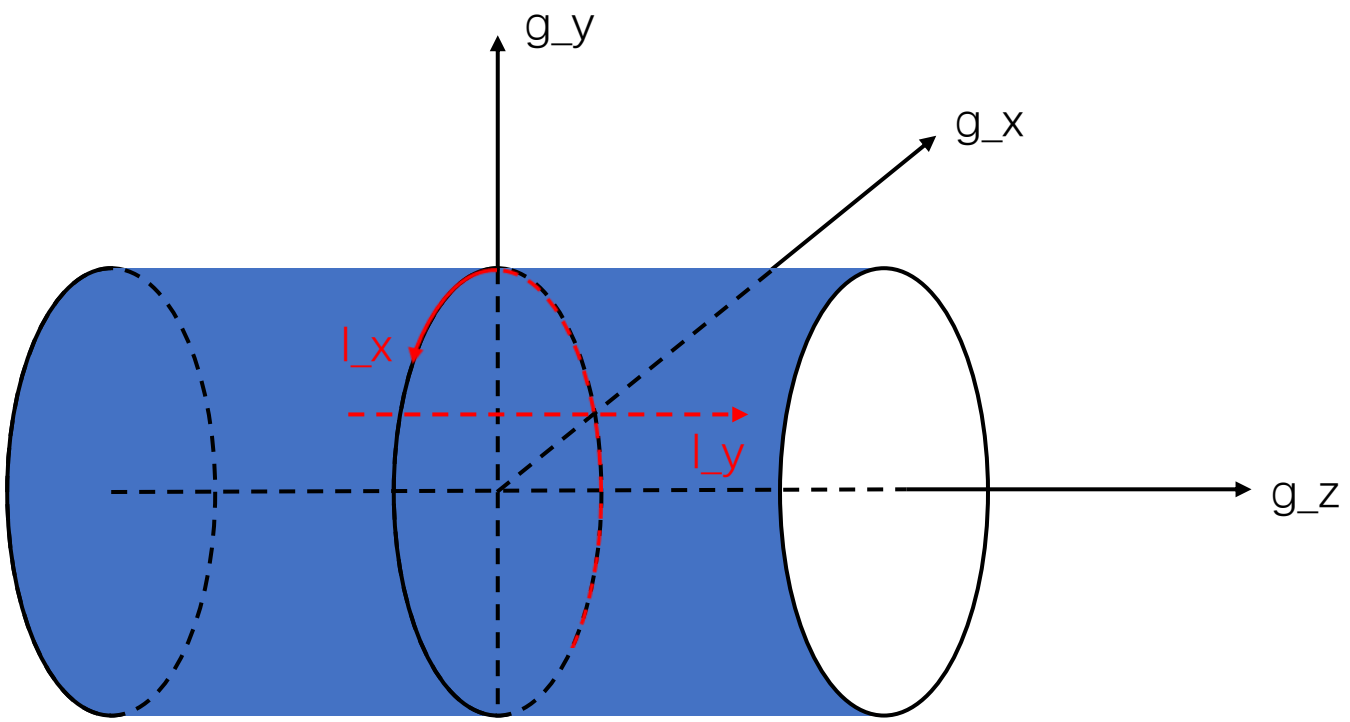
Algorithms/Digitization/src/HitSmearing.cpp — View file @ d55e55fc

```
@@ -15,6 +15,8 @@
 #include "ACTFW/Framework/WhiteBoard.hpp"
 #include "Acts/Geometry/TrackingGeometry.hpp"
 #include "Acts/Utilities/Definitions.hpp"
+#include "Acts/Utilities/Units.hpp"
+using namespace Acts::UnitLiterals;

 FW::HitSmearing::HitSmearing(const Config& cfg, Acts::Logging::Level lvl)
   : BareAlgorithm("HitSmearing", lvl), m_cfg(cfg)
@@ -84,6 +86,16 @@ FW::HitSmearing::execute(const AlgorithmContext& ctx) const
       Acts::BoundVector loc = Acts::BoundVector::Zero();
       loc[Acts::eLOC_0]     = pos[0] + m_cfg.sigmaLoc0 * stdNormal(rng);
       loc[Acts::eLOC_1]     = pos[1] + m_cfg.sigmaLoc1 * stdNormal(rng);
+          //hard code for CEPC - TPC
+          //loc1 - for 2*pi*r
+          if(hit.geometryId().volume()==34)
+          {
+        //      double r = sqrt( (hit.position()[0] * hit.position()[0]) + (hit.position()[1] *
+ hit.position()[1]) );
+                auto loc0_res = 100_um;
+                auto loc1_res = 5_mm;
+                loc[Acts::eLOC_0]     = pos[0] + loc0_res * stdNormal(rng);
+                loc[Acts::eLOC_1]     = pos[1] + loc1_res * stdNormal(rng);
+          }

       // create source link at the end of the container
       auto it = sourceLinks.emplace_hint(
```

Coordinate parameters of TPC

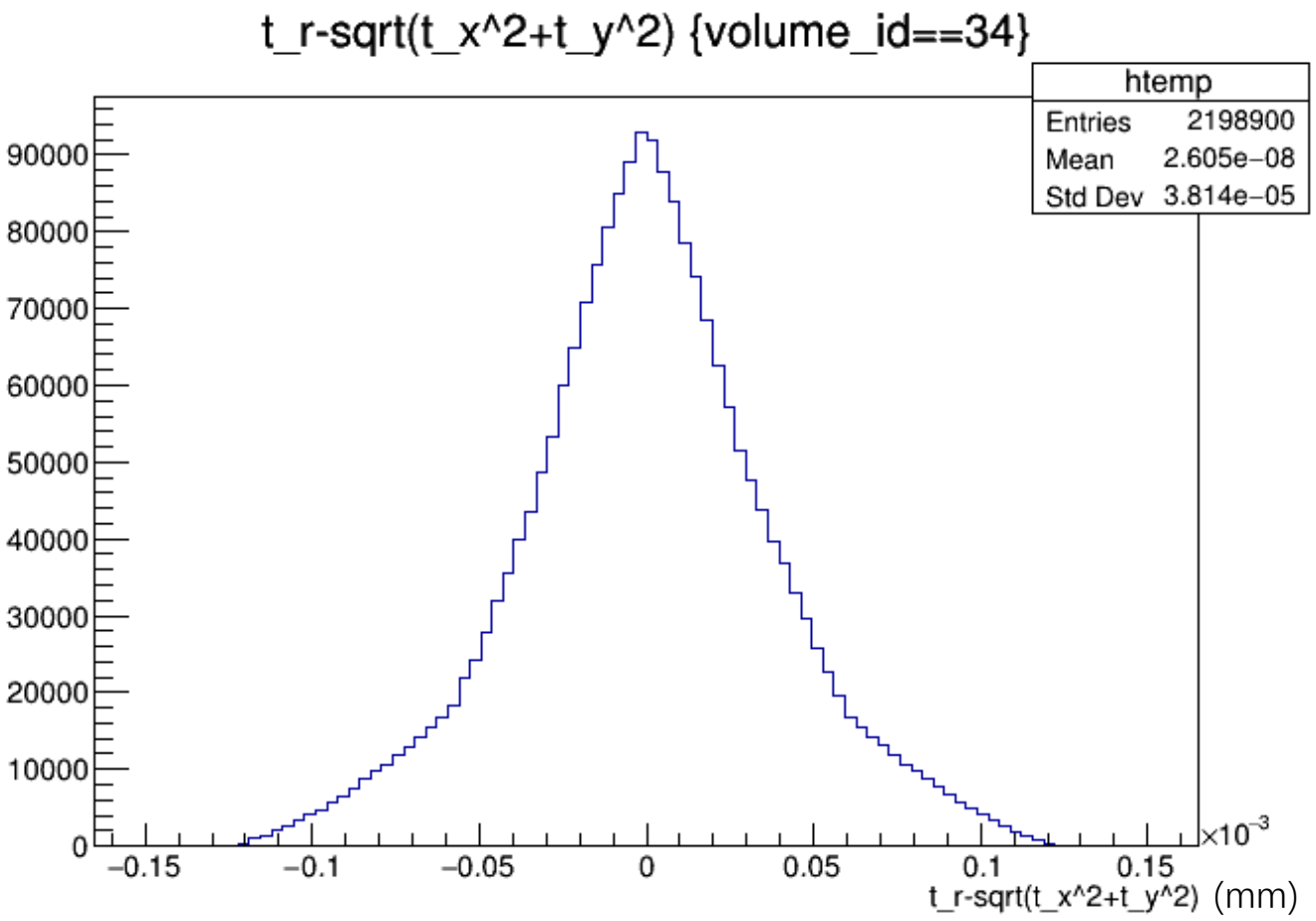


- volume_id = 34: TPC Barrel

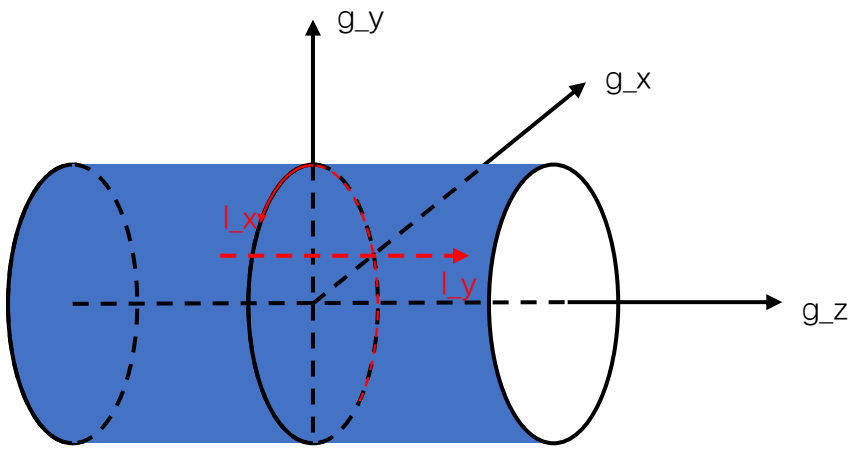
- t_x: true global x
- t_y: true global y
- t_z: true global z
- t_r: true global r
- t_eLOC0: true local x
- t_eLOC1: true local y
- t_ePHI: true φ
- t_eTHETA: true θ

- g_x_hit: hit global x
- g_y_hit: hit global y
- g_z_hit: hit global z
- l_x_hit: hit local x
- l_y_hit: hit local y

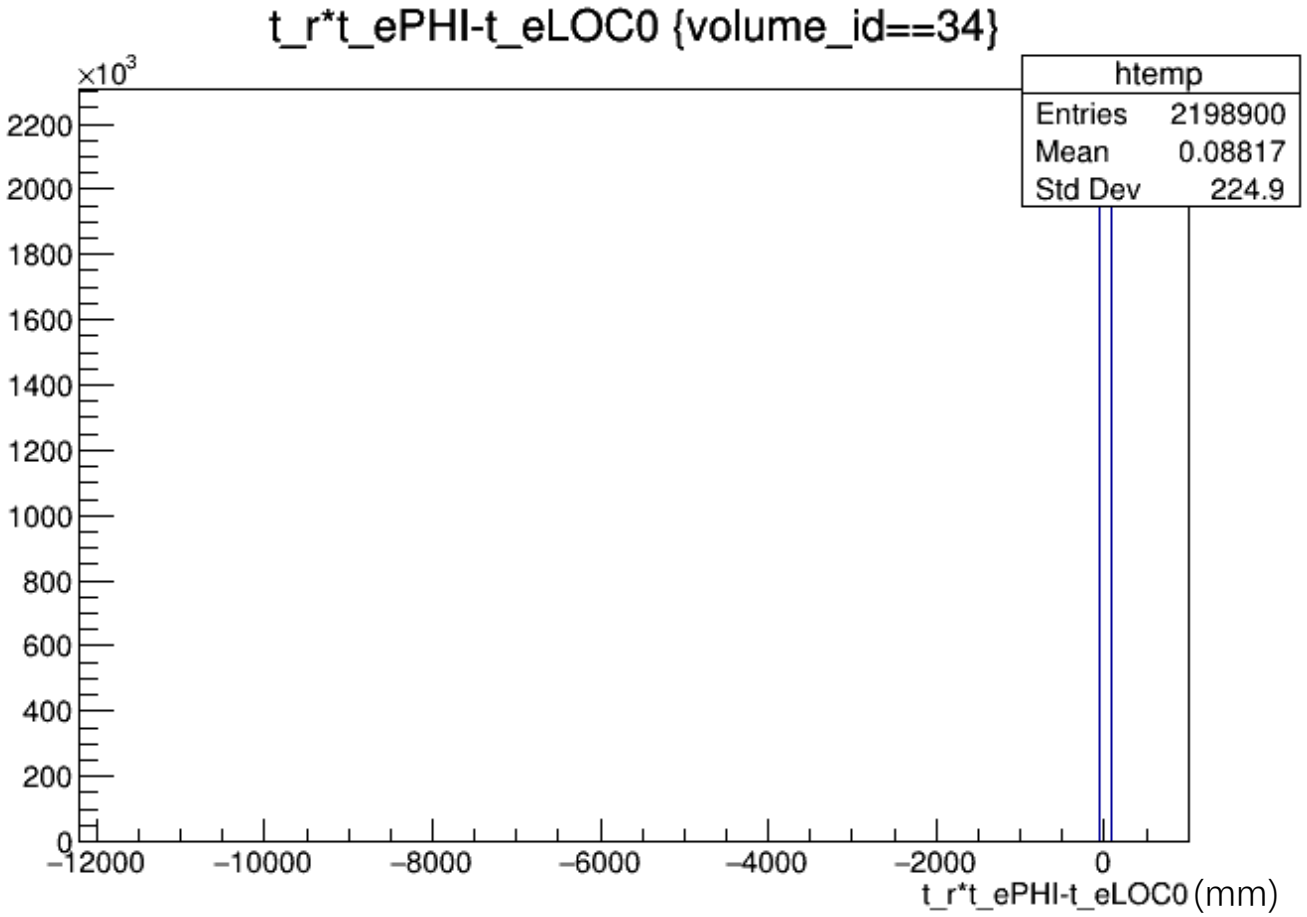
Coordinate parameters of TPC



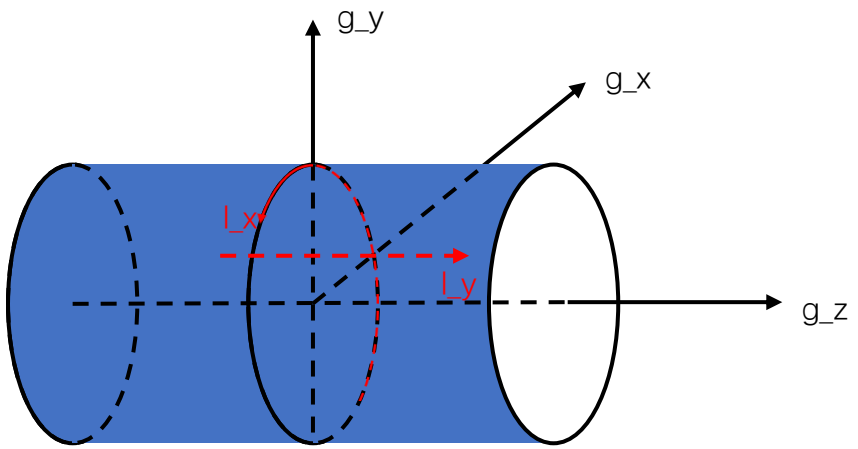
- g_r = sqrt(g_x^2+g_y^2)



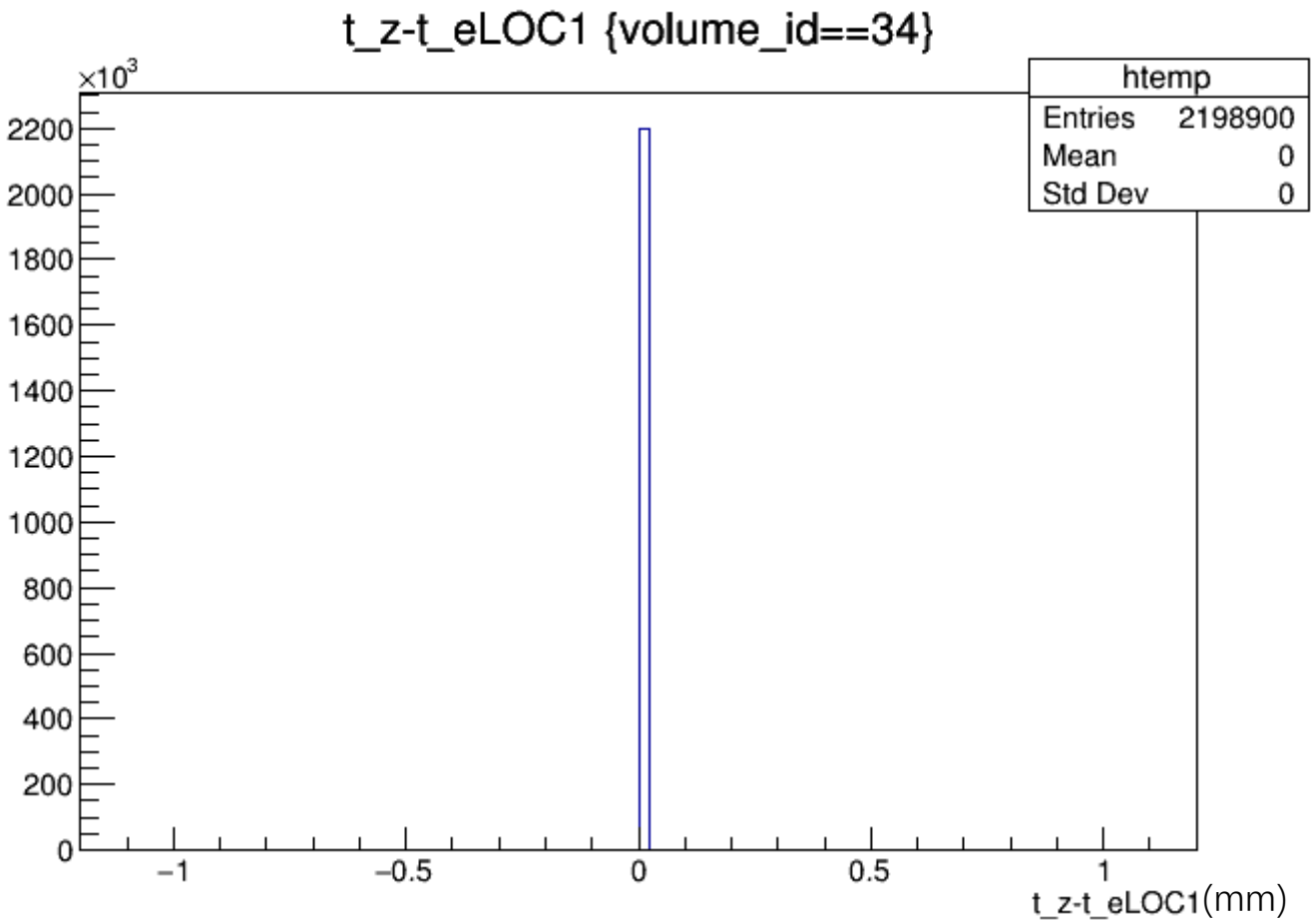
Coordinate parameters of TPC



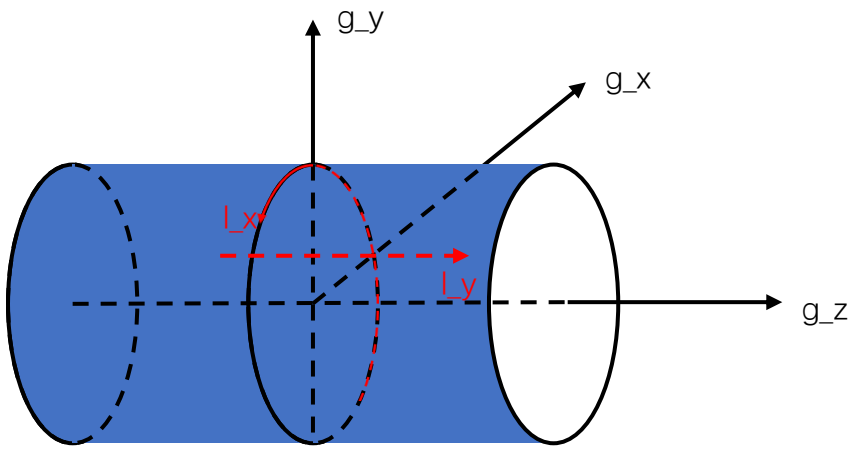
- g_r * φ = l_x



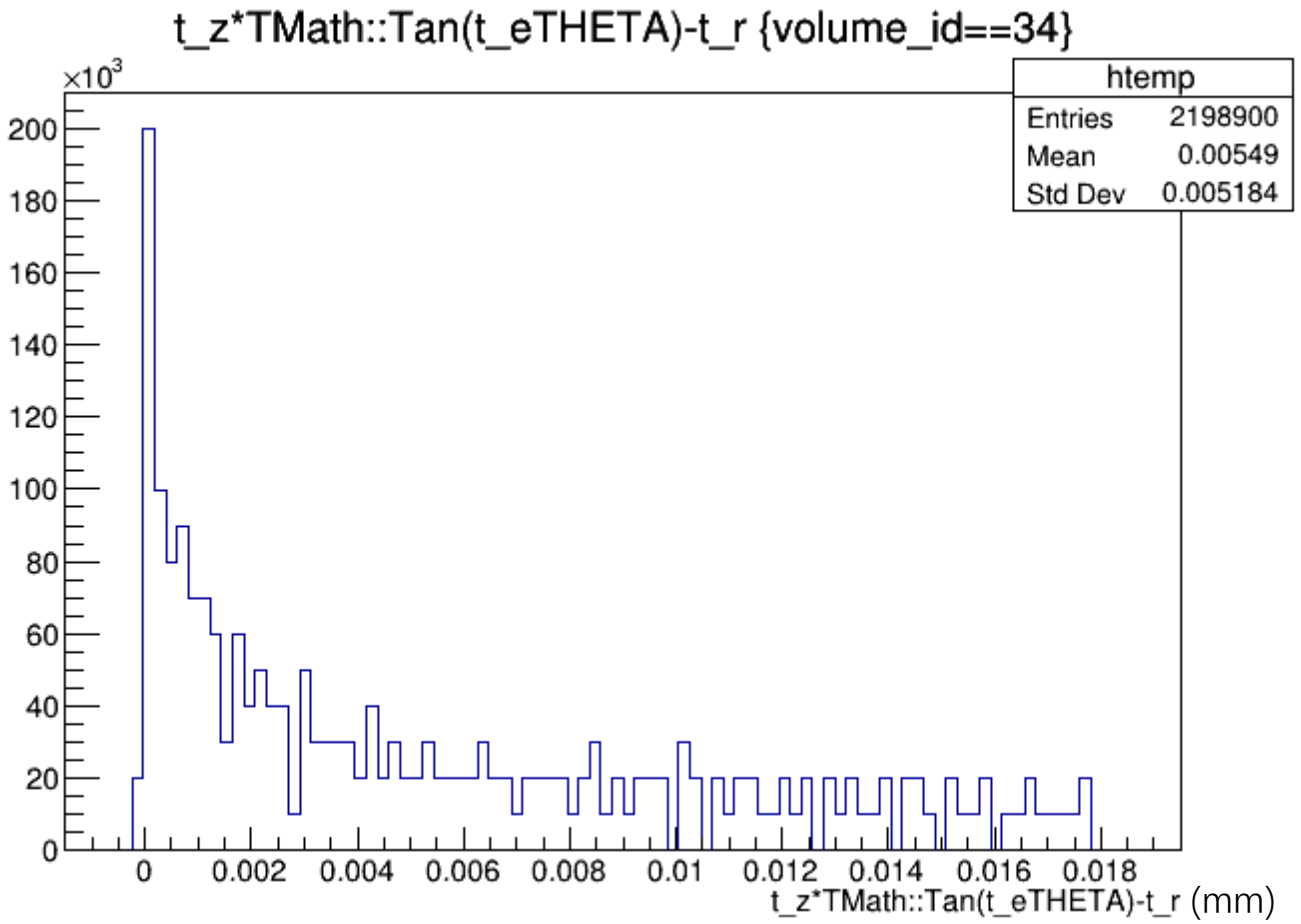
Coordinate parameters of TPC



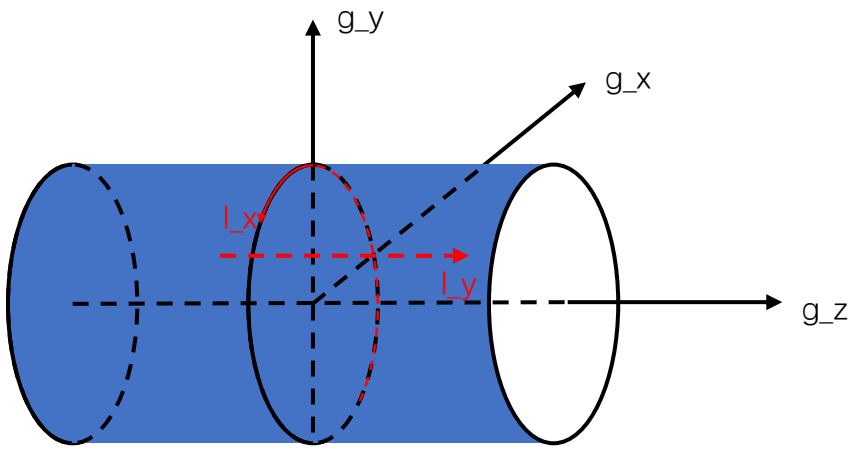
- g_z = l_y



Coordinate parameters of TPC



- $g\_z * \tan(\theta) = g\_r$



ACTS-CEPC

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- Something wrong

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```

- l_x resolution: 0.1 mm
- l_y resolution: 5 mm

ACTS-CEPC

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- Something wrong

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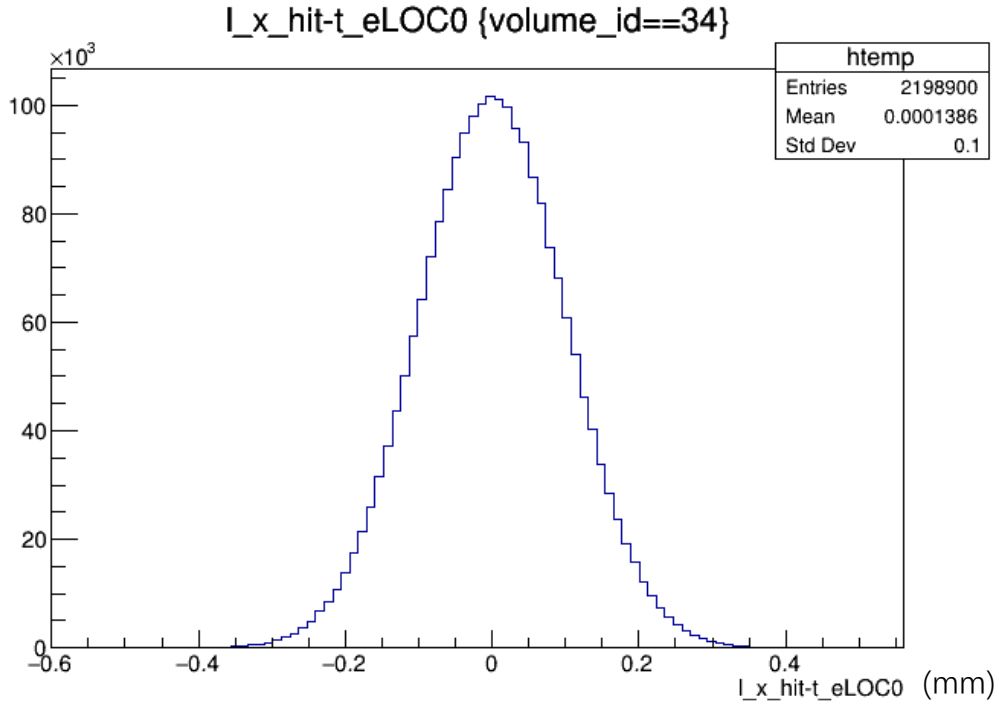
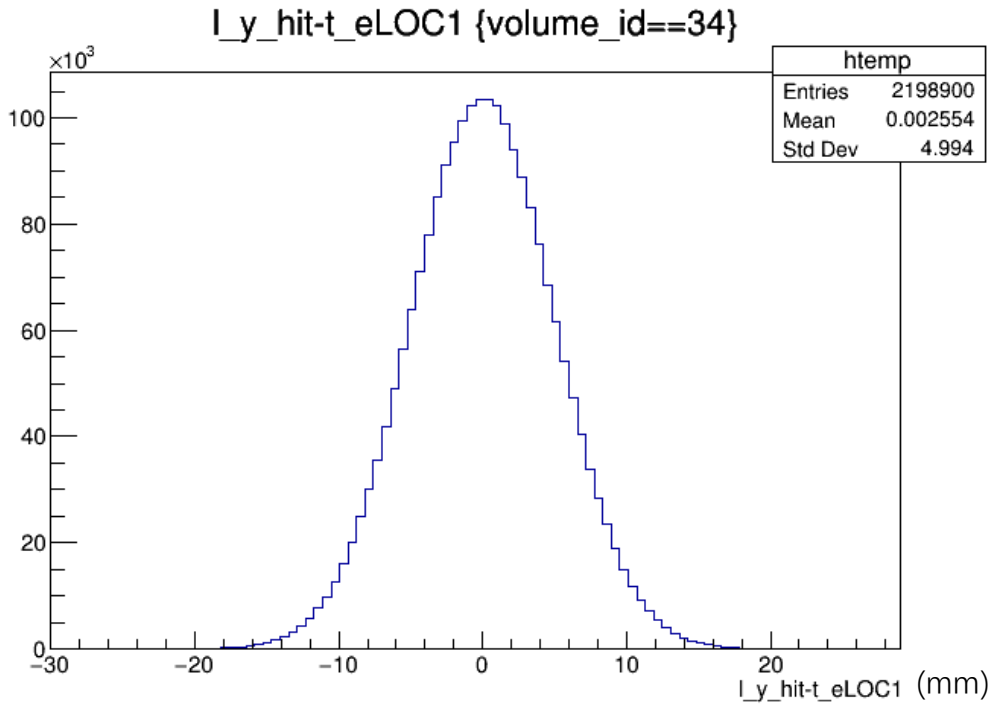
- l_y resolution: 5 mm





ACTS-CEPC

- Changed the resolution of TPC
- Something wrong

- Particle gun: 10000 μ from (0, 0, 0)

- Magnetic field (0, 0, 3T)

- p_T = 100GeV, θ=85°

- Uniform φ

ACTS-CEPC

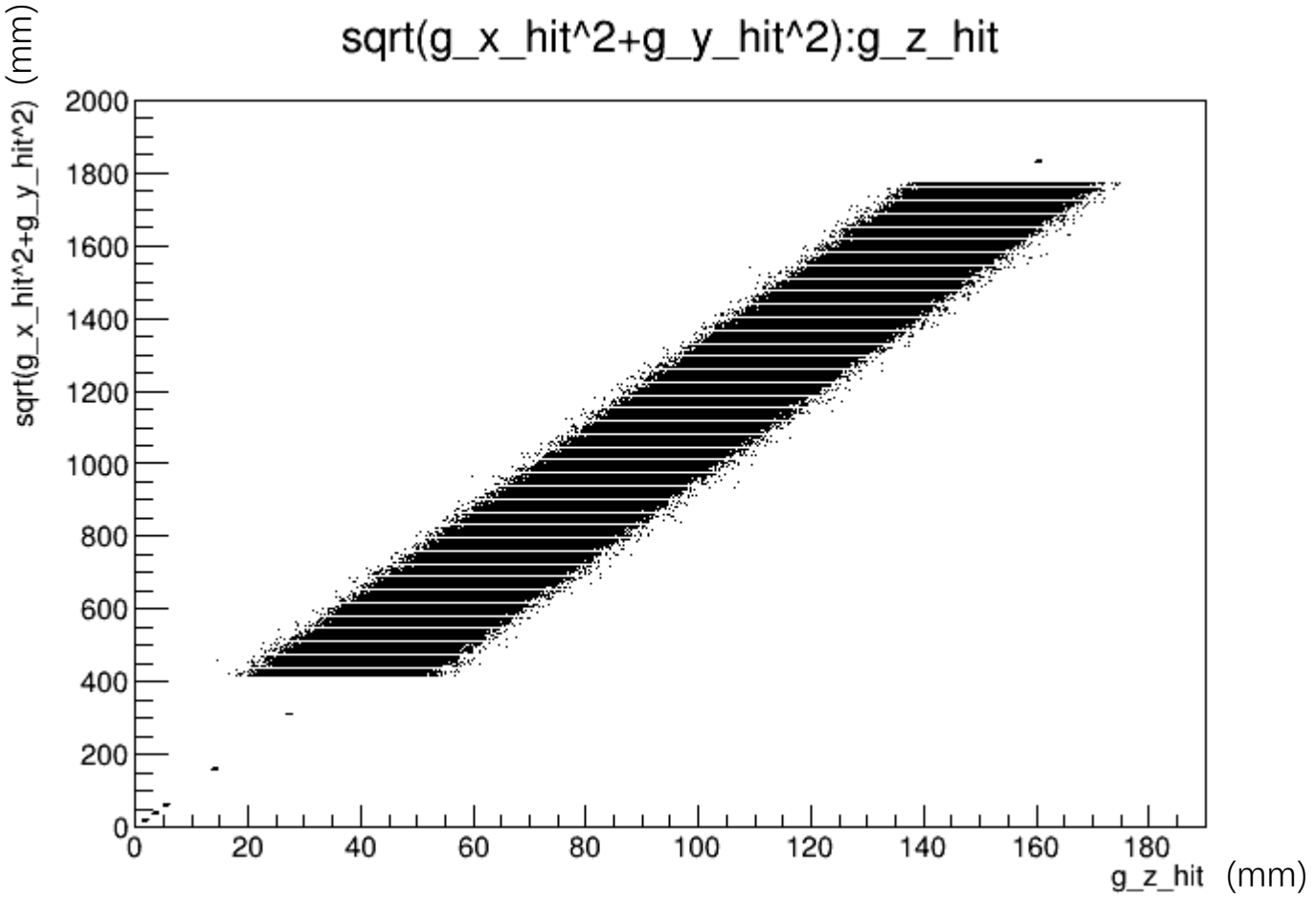
- Changed the resolution of TPC
- Something wrong

```
#theta==85
cos_theta=0.087155743
eta=$(echo "-0.5*l((1-${cos_theta})/(1+${cos_theta}))"|bc -l)

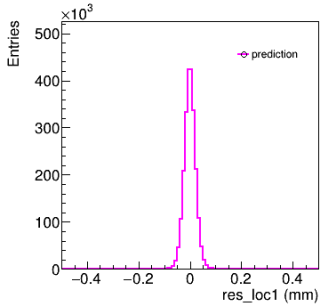
./ActsSimFatrasDD4hep \
--evg-input-type gun \
--dd4hep-input ../../Detectors/DD4hepDetector/compact/CEPC/cepc_v04_master.xml \
--dd4hep-envelopeR 0.1 \
--dd4hep-envelopeZ 0.1 \
--bf-values 0 0 3 \
--pg-pt-range 100 100 \
--pg-eta-range ${eta} ${eta} \
--pg-nparticles 1 \
--events 10000 \
--output-root 1
```

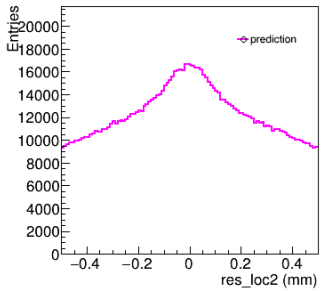
Distribution of hits

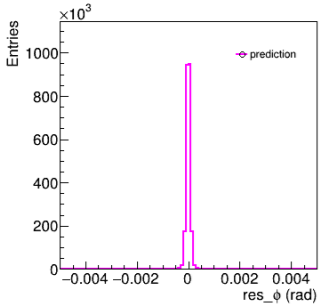
- p_T = 100GeV, θ=85°

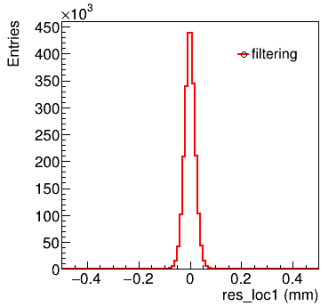


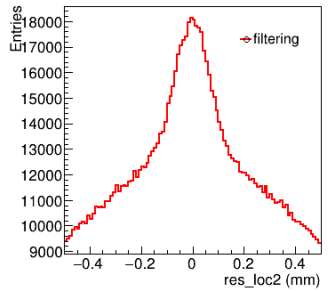
Residual of parameters of each measurements

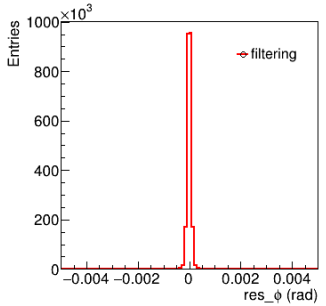


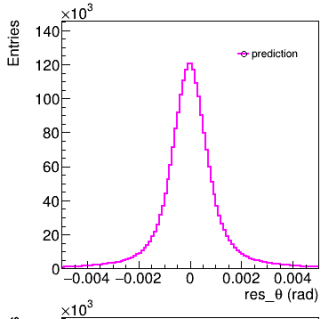


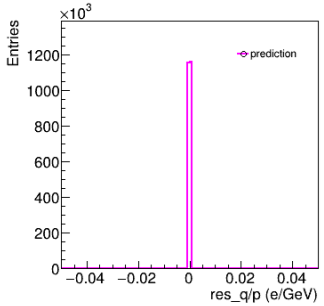




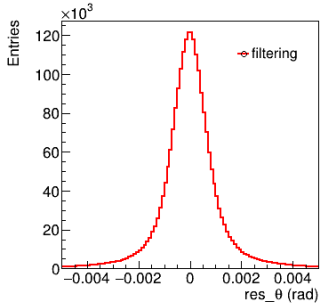


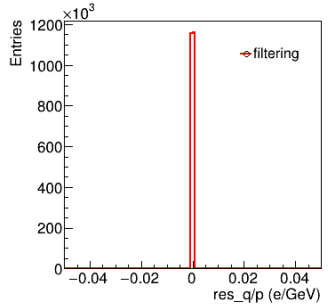




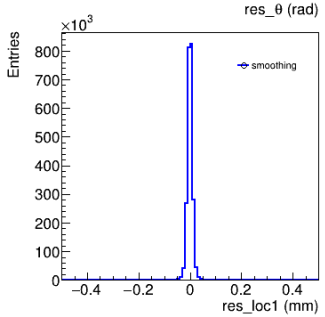


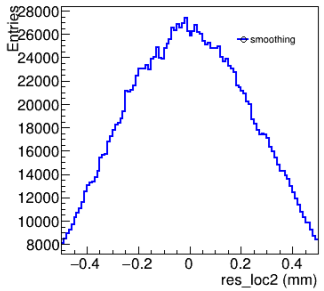
prediction

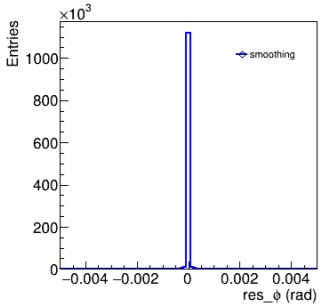


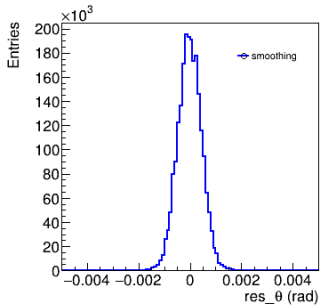


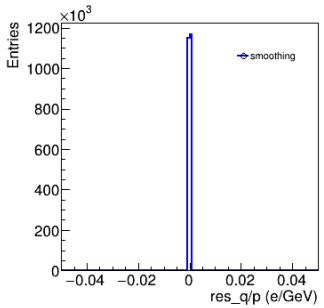
filtering







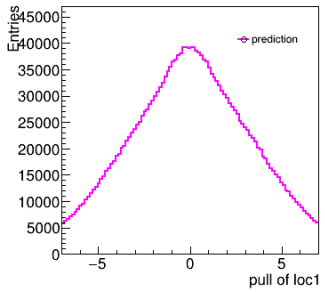


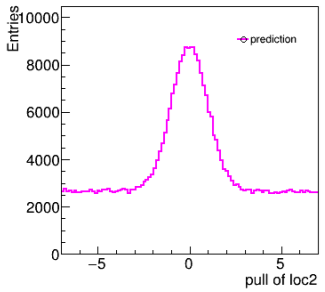


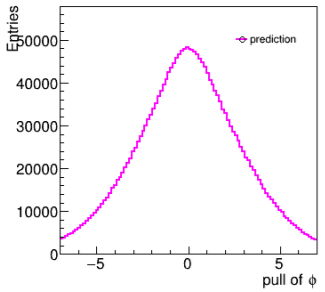
smoothing

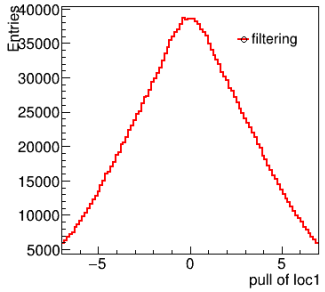
res_loc1 = res_LOC0_prt/flt/smt
res_loc2 = res_LOC1_ prt/flt/smt
res_φ = res_PHI_ prt/flt/smt
res_θ = res_THETA_ prt/flt/smt
res_q/p = res_QOP_ prt/flt/smt

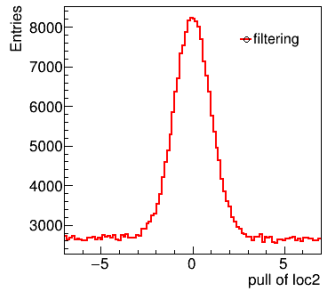
Pull of parameters of each measurements

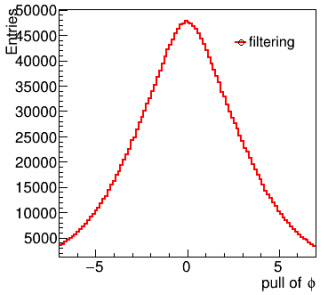


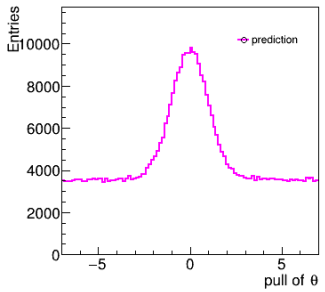


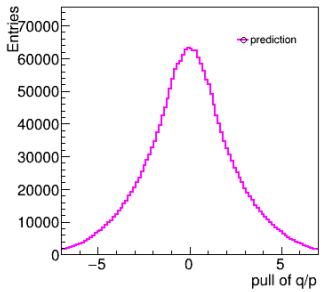




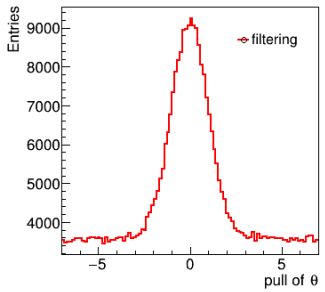


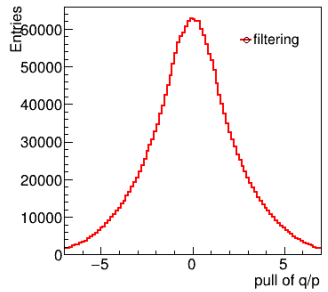




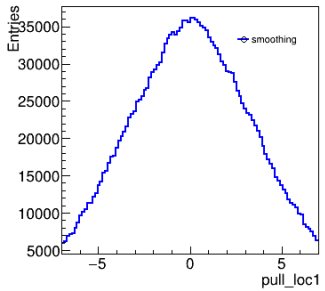


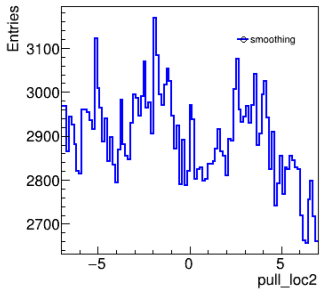
prediction

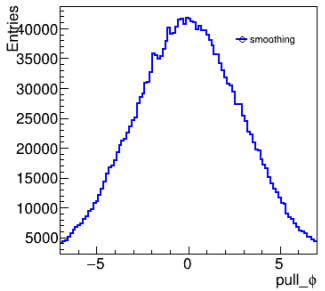


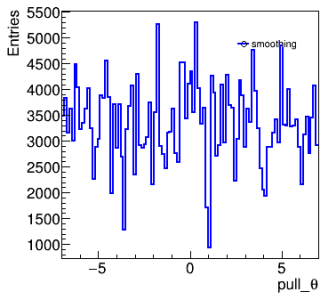


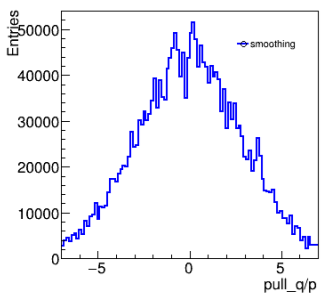
filtering











smoothing

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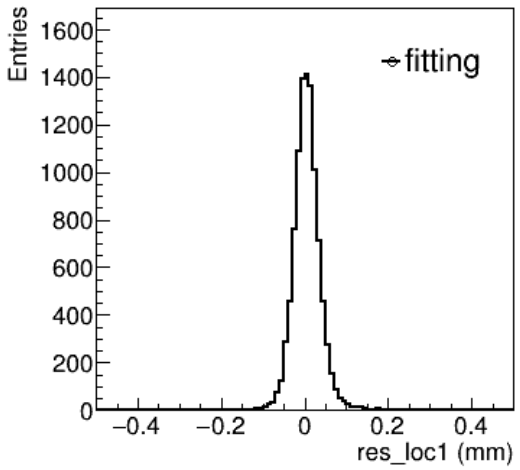
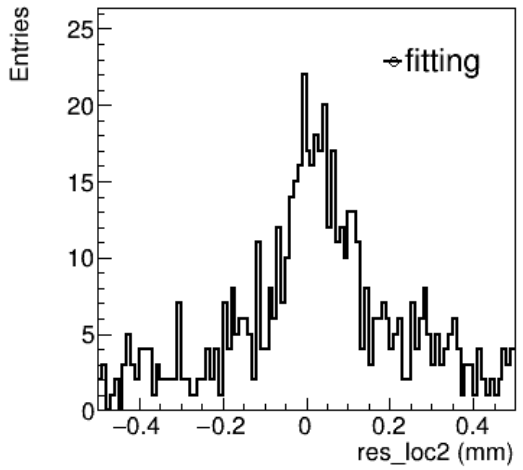
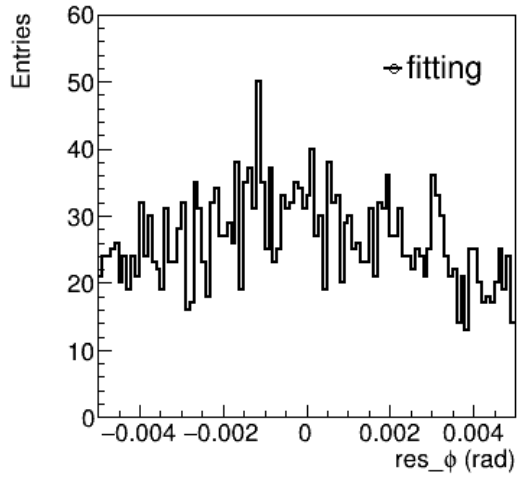
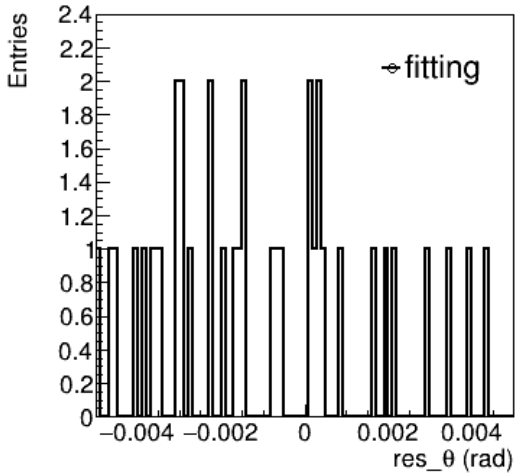
pull_loc2 = pull_LOC1_ prt/flt/smt
pull_φ = pull_PHI_ prt/flt/smt
pull_θ = pull_THETA_ prt/flt/smt
pull_q/p = pull_QOP_ prt/flt/smt

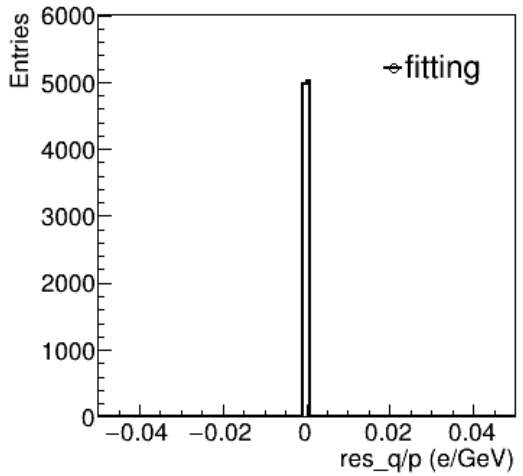
Residual of parameters of the track





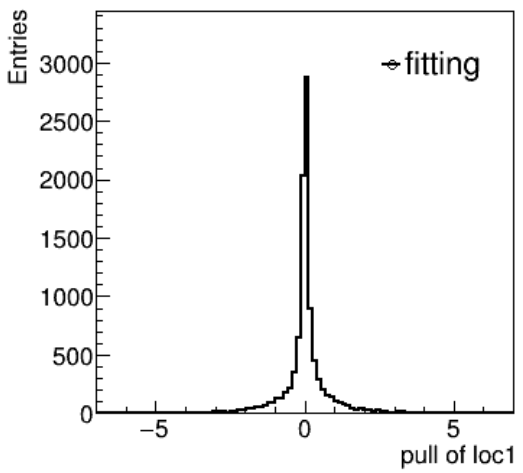


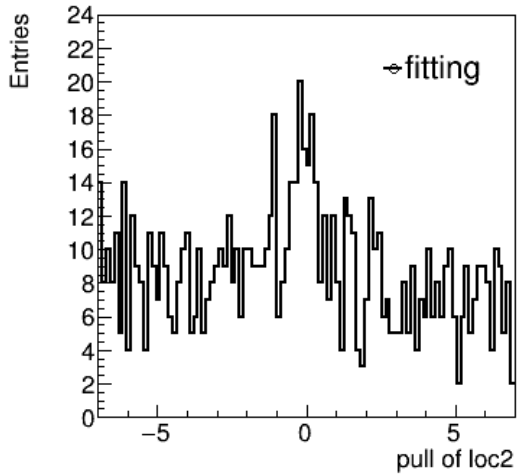


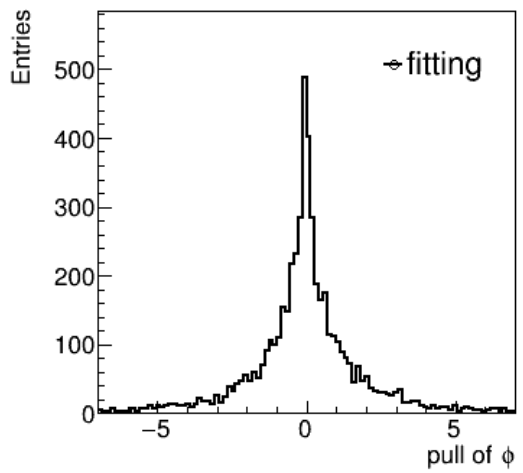


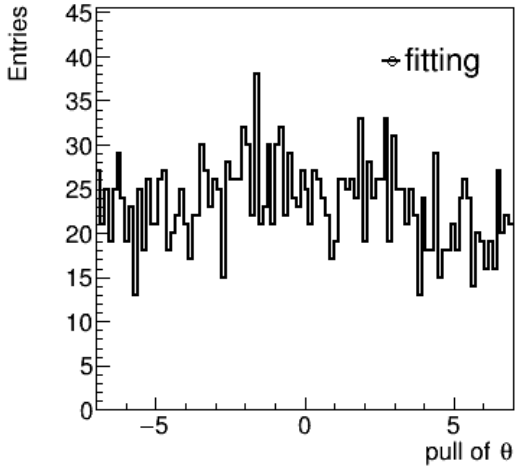
res_loc1 = eLOC0_fit - t_D0
res_loc2 = eLOC1_fit - t_Z0
res_φ = ePHI_fit - t_PHI
res_θ = eTHETA_fit - t_THETA
res_q/p = eQOP_fit - t_QOP

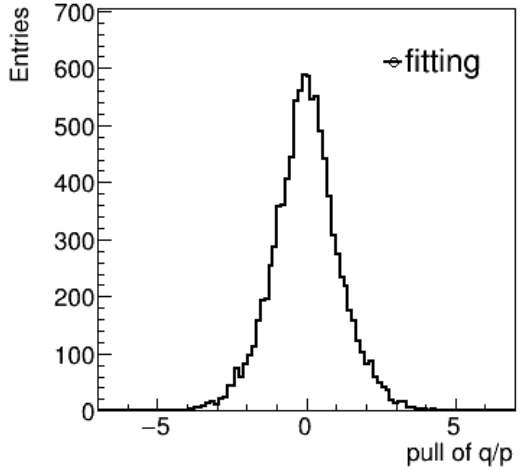
Pull of parameters of the track











pull_loc1 = res_loc1 / err_eLOC0_fit
pull_loc2 = res_loc2 / err_eLOC1_fit
pull_φ = res_φ / err_ePHI_fit
pull_θ = res_ θ / err_eTHETA_fit
pull_q/p = res_q/p / err_eQOP_fit