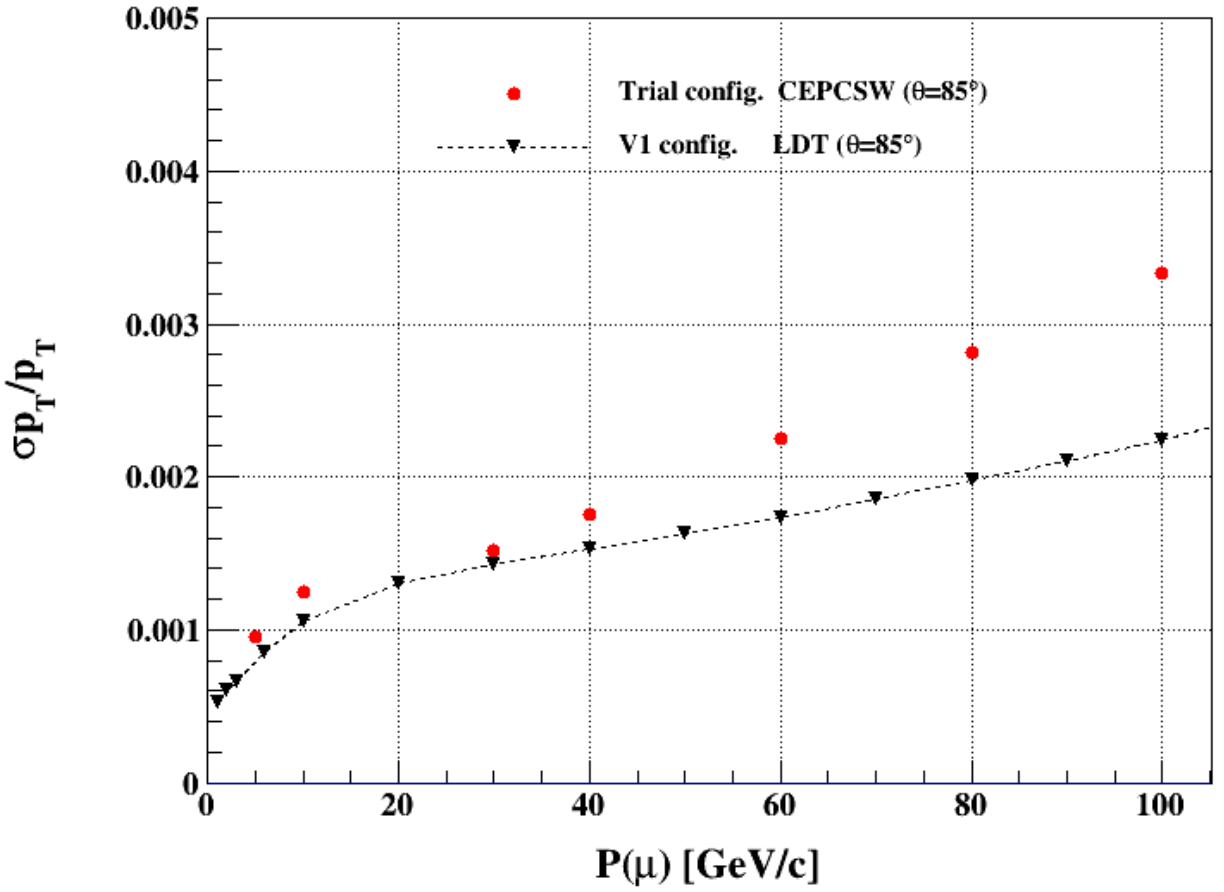
Status report from using CEPCSW

06/04/2021

Momentum resolution comparison

・Without changing current scheme but add more points. (p=40, 60, 80 GeV)

(・run LDT simulation with 85 degree incident angle)



Momentum resolution

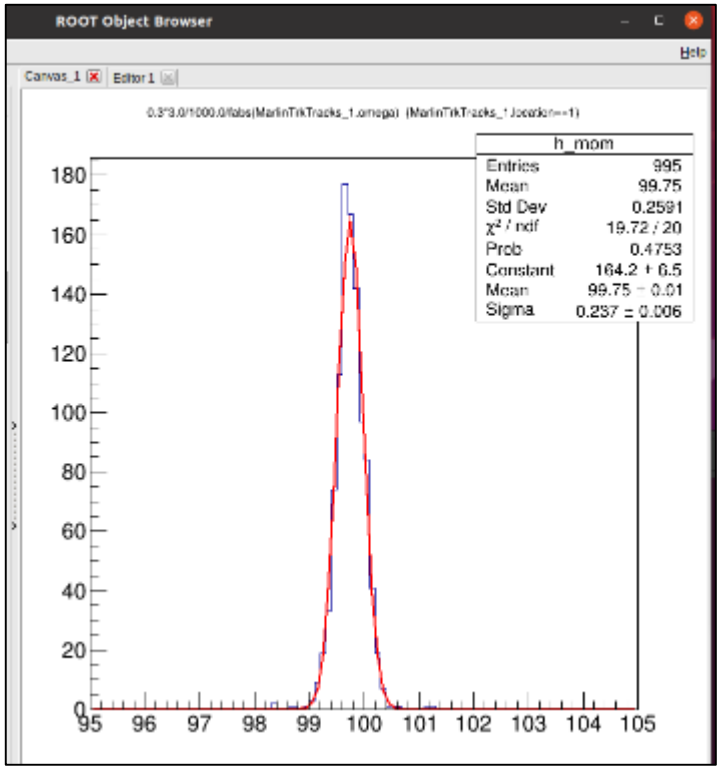
- Flow in the run script

-- “SubsetTrack”
(VXD/SIT/FTD)

-- “MarlinTrk”
(“SubsetTrack” + SET)

-- “RecGenfitAlgSDT”
(MarlinTrk + DC)

Plot momentum from “MarlinTrk” where DC is not participated in the tracking



Using p=0.3・B・R = 0.3B/omega

$\sigma P/P = 0.237\text{GeV}/100\text{GeV} = 2.37 \times 10^{-3}$ …

Tracker resolution setting in RecGenfit

- Resolution settings

Setting for the genfit part in the run script

```
269  ##############################################################################
270  # RecGenfitAlgSDT
271  ##############################################################################
272  from Configurables import RecGenfitAlgSDT
273  recGenfitAlgSDT = RecGenfitAlgSDT("RecGenfitAlgSDT")
274  #recGenfitAlgSDT.debug=2
275  recGenfitAlgSDT.debugPid=1
276  #recGenfitAlgSDT.OutputLevel=DEBUG
277  recGenfitAlgSDT.isUseFixedSiHitError=True
278  #recGenfitAlgSDT.fitSiliconOnly=True
279
```

sdt/Reconstruction/RecGenfitAlg/src/GenfitTrack.cpp

```
278      //space point error matrix, lower triangle?, unit cm
279      if(isUseFixedSiHitError){
280          hitCov_3[0][0]=0.0003*0.0003;
281          hitCov_3[1][1]=0.0003*0.0003;
282          hitCov_3[2][2]=0.0003*0.0003;
283      }else{
284          hitCov_3.Zero();
285          hitCov_3[0][0]=cov[0]*dd4hep::mm*dd4hep::mm;
286          //hitCov_3[1][0]=cov[1]*dd4hep::mm*dd4hep::mm;
287          //hitCov_3[0][1]=cov[1]*dd4hep::mm*dd4hep::mm;
288          hitCov_3[1][1]=cov[2]*dd4hep::mm*dd4hep::mm;
289          //hitCov_3[2][0]=cov[3]*dd4hep::mm*dd4hep::mm;
290          //hitCov_3[0][2]=cov[3]*dd4hep::mm*dd4hep::mm;
291          //hitCov_3[2][1]=cov[4]*dd4hep::mm*dd4hep::mm;
292          //hitCov_3[1][2]=cov[4]*dd4hep::mm*dd4hep::mm;
293          hitCov_3[2][2]=cov[5]*dd4hep::mm*dd4hep::mm;
294      }
295      for (int i=0;i<3;i++){
296          p[i]+=gRandom->Gaus(0,0.0003);
297      }
```

1) Resolution for silicon hits are set as hardcoded one by my settings.

2) Additional smearing term ?

(-- digitization of silicon tracker hits already include searing ?)

Right now, checking . . .

- What is the coordinate and corresponding error of it (res.) ?

(• Surely other parts as well)

```
223
224       gear::MeasurementSurface const* ms = _GEAR->getMeasurementSurfaceStore().GetMeasurementSurface( encoder.lowWord() );;
225       CLHEP::Hep3Vector globalPoint(pos[0],pos[1],pos[2]);
226       CLHEP::Hep3Vector localPoint = ms->getCoordinateSystem()->getLocalPoint(globalPoint);
227       CLHEP::Hep3Vector localPointSmeared = localPoint;
228
```

```
254
255         localPointSmeared.setX( localPoint.x() + gsl_ran_gaussian(_rng, resU) );
256         localPointSmeared.setY( localPoint.y() + gsl_ran_gaussian(_rng, resV) );
257
```

```
311       // fucd: next TODO: cov[0] = resU*reU, cov[2] = resV*
312       if(_usePlanarTag){
313         std::array<float, 6> cov;
314         cov[0] = u_direction[0];
315         cov[1] = u_direction[1];
316         cov[2] = resU;
317         cov[3] = v_direction[0];
318         cov[4] = v_direction[1];
319         cov[5] = resV;
320         trkHit.setCovMatrix(cov);
321       /* zoujh: TODO - generate TrackerHitPlane with podio
322       trkHit->setU( u_direction ) ;
323       trkHit->setV( v_direction ) ;
324
```