Subject: Re: GEM tracking
Posted by Radoslaw Karabowicz on Wed, 29 Apr 2009 09:51:06 GMT
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Dear Stefano et al

Following the todays EVO meeting discussion, I have tried several options:

1. Look at the tracks in the outer regions of the GEM detector, or in other words, the tracks with high enough pt to use the bending power of the magnet. Comparison:
TRACK IN OUTER REGION
******** 3.40493 30.9044 89.3803
******** 0.110931 0.157997 0.53312 ---> 0.566997
ADDING 0.1 TO |p|
0: result pos = (3.37962,30.996,89.3649)
0: result mom = (0.130496,0.185863,0.627145) ---> 0.666997
FITTED MOMENTUM, difference with start momentum is 0.0003
result pos = (2.81193,32.2641,89.3803)
result mom = (0.1866,0.105973,0.631134) ----> 0.666618
TRACK IN INNER REGION WITH SIMILAR MOMENTUM
******** 3.45711 4.23193 89.3803
******** 0.00989272 0.0359984 0.576766 ---> 0.577973
ADDING 0.1 TO |p|
0: result pos = (3.58859,3.96869,89.5048)
0: result mom = (0.0116043,0.0422268,0.676558) ---> 0.677973
FITTED MOMENTUM, difference with start momentum is 0.00003
result pos = (3.70969,4.29123,89.3803)
result mom = (-0.00547421,0.0411893,0.676671) ----> 0.677946

In general, not a big improvement is seen for tracks with higher polar angle.

2. Square the hit errors when inserting into the covariance matrix. Change:
```
  _hitCov[0][0] = hit->GetDr();
  _hitCov[1][1] = hit->GetDp();
```
to:
```
  _hitCov[0][0] = hit->GetDr()*hit->GetDr();
  _hitCov[1][1] = hit->GetDp()*hit->GetDp();
```
No change in the track fitting performance what so ever.

3. Change the initial track momentum errors from setting it to (1.,1.,1.) to 10% of the initial track momentum, i.e. change:
```
   TVector3 StartMomErr = TVector3(1.,1.,1.);
```
to:
```
   TVector3 StartMomErr = TVector3(0.1*StartMom);
```
BINGO!
The track fitting does now:

CORRECT TRACK POSITION, MOMENTUM AT FIRST GEM HIT:
******** -1.91359 7.80279 89.3803
******** -0.146677 0.492359 5.70466 ---> 5.72775
ADDING 0.1 TO MOMENTUM |p|
****

0: result pos = (-1.95901,7.91932,89.2568)
0: result mom = (-0.149238,0.500955,5.80426) ---> 5.82775
1: result pos = (-1.91288,7.80297,89.3803)
1: result mom = (-0.154325,0.491343,5.71709) ---> 5.74024
2: result pos = (-1.91288,7.80297,89.3803)
2: result mom = (-0.154326,0.491344,5.71709) ---> 5.74024
3: result pos = (-1.91288,7.80297,89.3803)
3: result mom = (-0.154326,0.491344,5.71709) ---> 5.74024
4: result pos = (-1.91288,7.80297,89.3803)
4: result mom = (-0.154326,0.491344,5.71709) ---> 5.74024
5: result pos = (-1.91288,7.80297,89.3803)
5: result mom = (-0.154326,0.491344,5.71709) ---> 5.74024
****
result pos = (-1.91288,7.80297,89.3803)
result mom = (0.154326,-0.491344,-5.71709) ----> 5.74024
****

Already after the first iteration we are close enough to initial track momentum. The next iterations do not change results so much.

Finally a success. Thank you all that contributed to solving the GEM problem, especially Christian and Stefano.

yours,
radek
