Subject: geane propagation: floating point exception
Posted by Sebastian Neubert on Mon, 01 Oct 2007 14:02:37 GMT
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Hi!

If I run the demo and try to use geane with the kalman filter I get the following error. Somehow a 0 momentum is appearing. It appears to me to be inside CbmGeanePro, since in geaneTrackRep the values look alright. I am not sure where the bug is.

Could anyone try to reproduce this, please!

```
 *** S/R ERPROP   IERR =    2


    *** Error in subr. TRPROP   2  called bysubr. ERPROP



Program received signal SIGFPE, Arithmetic exception.
[Switching to Thread -1235680064 (LWP 3919)]
0xb35f5757 in CbmTrackParP::SetTrackPar (this=0xbfbb1210, X=-34.426101684570312,
Y=-99.556777954101562,
    Z=-54.186264038085938, Px=-0, Py=0, Pz=-0, Q=-1, CovMatrix=0xbfbb0af0,
o=<incomplete type>,
    dj=<incomplete type>, dk=<incomplete type>)
    at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/trackbase/CbmTrackParP.cxx
:246
246       fQp    = fq/P;
```

Cheers! Sebastian.

Subject: Re: geane propagation: floating point exception
Posted by Andrea Fontana on Mon, 01 Oct 2007 14:13:08 GMT
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Hi Sebastian,
friday I was not in the office. I am now running the demo
but did not encounter this error yet! So far everything seems
ok to me.
From past experience this problem is often due to a track that
does not hit the detector (because of geometric acceptance or
because it is too slow).
I will try to reproduce this...

Ciao,
Andrea

Subject: Re: geane propagation: floating point exception
Posted by Sebastian Neubert on Mon, 01 Oct 2007 15:05:45 GMT
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Hi Andrea!

Did you run runDemo.C?

Sebastian.

Subject: Re: geane propagation: floating point exception
Posted by Andrea Fontana on Tue, 02 Oct 2007 09:40:11 GMT
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Hi Sebastian,
I have run geaneDemo.C without problems.
I am now debugging runDemo.C, but I see strange values for
the MC trackIDs: it seems that they are almost always 0,
even in simulation (class TpcDetector). This we do not understand:
do you have any ideas?
I did not see the 0 momentum error yet, but I expect it
as soon as I have tracks.

Ciao,
Andrea

Subject: Re: geane propagation: floating point exception
Posted by StefanoSpataro on Tue, 02 Oct 2007 09:44:36 GMT
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Hi,
MC trackID = 0 is the first particle in the stack, so let's say the first primary particle in the generator.
So I think this is normal, or at least it should be.

Subject: Re: geane propagation: floating point exception
Posted by asanchez on Tue, 02 Oct 2007 11:24:34 GMT
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When the resetParameters() sets fTarckID =-999
in Process Hits, what does it mean exactly?

Subject: Re: geane propagation: floating point exception
Posted by Sebastian Neubert on Tue, 02 Oct 2007 11:37:28 GMT
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Hi Alicia,

Which file are you talking about? I have grep-ed fro resetParameters but this function seems not to exist..

Cheers, Sebastian.

Subject: Re: geane propagation: floating point exception
Posted by Andrea Fontana on Tue, 02 Oct 2007 12:36:38 GMT
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Ciao Stefano,
yes, this is correct. The problem is that in
DemoPatternRecoTask I always get 0 tracks and I am
trying to understand why. Still working on it...

Andrea

Subject: Re: geane propagation: floating point exception
Posted by asanchez on Tue, 02 Oct 2007 13:20:29 GMT
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Hi that is not any file, that is a void function
to set (reset?) the members functions to zero(?).

I have seen you call directly delete, after having added a hit
in your TpcPoint collection.

I have written that, because some days ago i had some problem
with MCTrack, i got some strange track ids not recognized by the
program.

I have solved this problem, by setting everything to zero as Ralf did for the MVD and not to -999 as i had before.

And after the Stephano comment i hope it doesn't create any problem.

cheers alicia

Subject: Re: geane propagation: floating point exception
Posted by Mohammad Al-Turany on Thu, 04 Oct 2007 08:28:53 GMT
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Hi,

The TarckID is the index of the track in the TClonesArray, So it can never be negative, in the Reset function we decided at some point to initialize it with -999 so that if you see this in a hit

or a point as a track ID, you know immediatly that something is wrong in the processing hits of your detector!

Mohammad

Subject: Re: geane propagation: floating point exception
Posted by Andrea Fontana on Thu, 04 Oct 2007 15:06:53 GMT
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Hi Sebastian,
we are writing with an update on our progress with genfit.
First of all, the error of 0 momentum was due to a series of reasons:

1) the PDG code of the track was hardwired to 211 (pion) in GeaneTrackRep and in the macros we have 13 (muon).

2) the simulated momentum of 0.5 is too low. By increasing it to 1.5 it works. We know that we need to track also slow particles, but this will come...

3) finally we have protected the CbmTrackParP class by rejecting the tracks with 0 momentum that are now skipped. This has been commited to the svn repository.

Moreover, to generalize the use of the detector planes and to make them independent from the particle direction (in the demo they were orthogonal to z) we have modified the DemoRecoHit class. We have created a new class DemoRecoHit which we invite you to look at (it is in the attachment as I cannot commit to recotasks/demo): here we defined a plane at each hit with the correct orientation orthogonal to the track momentum.
This is now general and can be used also with an isotropic generator: for brevity we have done it only in the third constructor DemoRecoHit(CbmMCPoint *point).

Having fixed this, we are now extrapolating muons of 1.5 GeV in the TPC isotropically generated. The Kalman filter seems to be working, but it fails on some tracks. If we shoot along one axis (take X, to cross the TPC) the result is much better and we are now trying to understand this.
We attach the plots of the reconstructed total momentum: in the file X.ps we shoot along X, in Isotropic.ps isotropically.

Other thoughts in our minds:

- is there a way to reject one hit in the extrapolation/filtering if something goes wrong? We have seen the statusFlag in AbsTrackRep. Maybe we could also modify all the extrapolate

methods to return a bool that can be used to decide.

- We had to comment the call to FillGeotrack in DemoKalmanTask.
What is it used for?

For now this is all. Anyway we are very happy!!!

Ciao,
Andrea and Lia

File Attachments

1) X.ps, downloaded 633 times
2) Isotropic.ps, downloaded 644 times
3) DemoRecoHit.cxx, downloaded 663 times

Subject: Re: geane propagation
Posted by Sebastian Neubert on Thu, 11 Oct 2007 08:45:34 GMT
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Hi Andrea and Lia!

The reconstructed momenta look good! Nice!
I have not yet tried out your modified RecoHit but I will soon!

Concerning the limitations you describe I am puzzled. 500 MeV is not a low momentum. I do not understand why the propagation of these particles should be any problem. What is going wrong?

For the dEdx studies only particles below 1GeV are interesting.

The choice of particle ID should not be any problem (especially changing form pion to muon!!!). In fact we will do the tracking always for all 5 hypothesis in parallel. So we WILL use false assumptions. However I do not understand why this should be problematic in the first place.

Concerning the status flag:
Only TrackReps with status=0 will be tracked. You can set the status to any other value to exclude the fit from the tracking. A scheme what the different status-codes might mean has yet to be developed.

Cheers! Sebastian.

Subject: Re: geane propagation
Posted by Sebastian Neubert on Wed, 23 Jan 2008 15:03:30 GMT
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Here is the gdb output of runDemo with geane:

x44e6b766 in CbmTrackParP (this=0xbffdb920, v=0, w=0, Tv=0, Tw=0, qp=0,

CovMatrix=0xbffdbba0, o=
{<TObject> = {_vptr.TObject = 0x42ae5e68, fUniqueID = 0, fBits = 33554432, static fgDtorOnly = 0, static fgObjectStat = false, static fgIsA = 0x826e028}, fX =0, fY = 0, fZ = 18.817180633544922, static fgIsA = 0x9d77b60}, dj=
{<TObject> = {_vptr.TObject = 0x42ae5e68, fUniqueID = 0, fBits = 33554432, static fgDtorOnly = 0, static fgObjectStat = false, static fgIsA = 0x826e028}, fX =1, fY = 0, fZ = 0, static fgIsA = 0x9d77b60}, dk=
{<TObject> = {_vptr.TObject = 0x42ae5e68, fUniqueID = 0, fBits = 33554432, static fgDtorOnly = 0, static fgObjectStat = false, static fgIsA = 0x826e028}, fX =0, fY = 1, fZ = 0, static fgIsA = 0x9d77b60}) at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/trackbase/CbmTrackParP.cxx:45
#1 0x44ecd1f9 in GeaneTrackRep::extrapolate (this=0xa5ae158, pl=@0xbffdcb80, statePred=@0xbffdce00, covPred=@0xbffdcd00, jacobian=@0xbffdcc00)
at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/trackrep/GeaneTrackRep.cxx:151
#2 0x44ecda3d in GeaneTrackRep::predict (this=0xa5ae158, pl=@0xbffdcb80, statePred=@0xbffdce00, covPred=@0xbffdcd00, jacobian=@0xbffdcc00)
at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/trackrep/GeaneTrackRep.cxx:233
#3 0x44e0cf32 in Kalman::processHit (this=0xbffdd020, hit=0xa5af740, rep=0xa5ae158, hitIndex=1)
at /afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/genfit/Kalman.cxx:165
#4 0x44e0c72c in Kalman::continueTrack (this=0xbffdd020, trk=0xa5adc50) at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/genfit/Kalman.cxx:70
#5 0x44e0c62b in Kalman::processTrack (this=0xbffdd020, trk=0xa5adc50) at
/afs/e18/user/sneubert/scratch/PANDA/FAIRRoot/pandarootDev/genfit/Kalman.cxx:45
#6 0x454d01e2 in DemoKalmanTask::Exec (this=0x9d5ae10, opt=0x44ceba20 "")

Subject: Re: geane propagation
Posted by Sebastian Neubert on Wed, 23 Jan 2008 15:31:04 GMT
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Hi Guys!

I probably have to apologize! There error seems to be in genfit ads you suspected andrea. The start state is not properly initialized. I keep looking why.

To avoid such a misunderstanding in the future I would ask you to try to reproduce my errors if this is possible so that we can talk about the same thing.

Mea culpa!
Cheers! Sebastian.

Subject: Re: geane propagation
Posted by Sebastian Neubert on Wed, 23 Jan 2008 15:39:39 GMT
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Ok now was too intimidated
Looking closer I see that indeed there happens an error in GEANE somehow and then I get out a zero state.

The intialization seems to work. There are valid(?) parameters fed to Geane.

Andrea could you check this:

(qp=-2 Dqp=0.1834
TV=0.8391 DTV=0.1526
TW=-0.001362 DTW=0.02911
V=0 DV=0.8391
W=0 DW=1)

Cardinal Rep before Fit
++
AbsTrackRep::Parameters at reference plane DetPlane: O(0.001,0.001,0.001) u(1,0,0) v(0,1,0)
AbsTrackRep::State

5x1 matrix is as follows

| 0 |
---
0 | -2
1 | 0.8391
2 | -0.001362
3 | 0
4 | 0

AbsTrackRep::Covariances

5x5 matrix is as follows

| 0 | 1 | 2 | 3 | 4 |
---
0 | 0.03364 -0.003742 2.434e-05 0 0
1 | -0.003742 0.0233 -1.789e-05 1.788e-05 -2.902e-08
2 | 2.434e-05 -1.789e-05 0.0008471 0.01102 -1.788e-05
3 | 0 1.788e-05 0.01102 0.7041 -0.001142
4 | 0 -2.902e-08 -1.788e-05 -0.001142 1

AbsTrackRep::chi^2
0
++

Before prop:
++
AbsTrackRep::Parameters at reference plane DetPlane: O(0.001,0.001,0.001) u(1,0,0) v(0,1,0)
AbsTrackRep::State

5x1 matrix is as follows

| 0 |
---
0 | -2
1 | 0.8391
2 | -0.001362
3 | 0
4 | 0

AbsTrackRep::Covariances

5x5 matrix is as follows

| 0 | 1 | 2 | 3 | 4 |
---
0 | 0.03364 -0.003742 2.434e-05 0 0
1 | -0.003742 0.0233 -1.789e-05 1.788e-05 -2.902e-08
2 | 2.434e-05 -1.789e-05 0.0008471 0.01102 -1.788e-05
3 | 0 1.788e-05 0.01102 0.7041 -0.001142
4 | 0 -2.902e-08 -1.788e-05 -0.001142 1

AbsTrackRep::chi^2
0
++
qp=-2 Dqp=0.1834
TV=0.8391 DTV=0.1526
TW=-0.001362 DTW=0.02911
V=0 DV=0.8391
W=0 DW=1
*** S/R ERPROP IERR = 2

*** Error in subr. TRPROP 2 called bysubr. ERPROP

After prop:

5x1 matrix is as follows

| 0 |
---
0 | 0
1 | 0
2 | 0
3 | 0
4 | 0

Subject: Re: geane propagation
Posted by asanchez on Wed, 23 Jan 2008 15:44:46 GMT
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Hi Sebastian,
after having runned,
runReco.C i get the following
error message?
Do you have any idea, what is going on?

cheers ALicia.

0 cluster created containing 0 digis from 0
PndTpcRiemannTrackingTask::Exec
0 Riemann Tracks found.
PndTpcRiemannTrackingTask::Exec:: 0 track candidates found.
0 tracks created
KalmanTask::Exec
Fitting done
Starting Analysis
TrackFitStatTask::Exec
TrackFitStatTask:: 0 tracks of 0 found
PndTpcClusterFinderTask::Exec
0 cluster created containing 0 digis from 0
PndTpcRiemannTrackingTask::Exec
0 Riemann Tracks found.
PndTpcRiemannTrackingTask::Exec:: 0 track candidates found.
0 tracks created
KalmanTask::Exec
Fitting done
Starting Analysis
TrackFitStatTask::Exec
TrackFitStatTask:: 0 tracks of 0 found
PndTpcClusterFinderTask::Exec
0 cluster created containing 0 digis from 0
PndTpcRiemannTrackingTask::Exec
0 Riemann Tracks found.
PndTpcRiemannTrackingTask::Exec:: 0 track candidates found.
0 tracks created
KalmanTask::Exec
Fitting done
Starting Analysis
TrackFitStatTask::Exec
TrackFitStatTask:: 0 tracks of 0 found
PndTpcClusterFinderTask::Exec
1 cluster created containing 2 digis from 2

PndTpcRiemannTrackingTask::Exec
1 Riemann Tracks found.
Track0: 1 hits R=
PndTpcRiemannTrackingTask::Exec:: 0 track candidates found.
0 tracks created
KalmanTask::Exec
Fitting done
Starting Analysis
TrackFitStatTask::Exec
TrackFitStatTask:: 0 tracks of 0 found
PndTpcClusterFinderTask::Exec
1 cluster created containing 2 digis from 2
PndTpcRiemannTrackingTask::Exec
1 Riemann Tracks found.
Track0: 1 hits R=
PndTpcRiemannTrackingTask::Exec:: 0 track candidates found.
0 tracks created
KalmanTask::Exec
Fitting done
Starting Analysis
TrackFitStatTask::Exec
TrackFitStatTask:: 0 tracks of 0 found
PndTpcClusterFinderTask::Exec
26 cluster created containing 110 digis from 110
PndTpcRiemannTrackingTask::Exec
7 Riemann Tracks found.
Track0: 3 hits R=
Track1: 6 hits R=0.0171944
Track2: 3 hits R=
Track3: 3 hits R=
Track4: 8 hits R=0.00739902
Track5: 2 hits R=
Track6: 1 hits R=
nhits=6
nhits=8
PndTpcRiemannTrackingTask::Exec:: 2 track candidates found.
mx=-3.54686 my=0.278717
Setting initial p=-0.0104674
mx=-0.768565 my=-0.375309
Setting initial p=0.00445971
2 tracks created
KalmanTask::Exec
starting track0
6 hits in track 0
starting fit
Nystrom:: outside of range (-1000,1000)!
starting track1
8 hits in track 1
starting fit
Nystrom:: outside of range (-1000,1000)!
Fitting done
Starting Analysis

TrackFitStatTask::Exec
Valid MCTrack found with p=0.378068 GeV/c PDGId=2212 q=1 nPndTpcHits=31
theta=1.78292
p=0.0104633 q=1 pstart=0.0104674
p=0.00442795 q=1 pstart=0.00445971
TrackFitStatTask:: 0 tracks of 1 found

*** Break *** segmentation violation

*** Break *** keyboard interrupt macro/tpc/tutorial/runReco.C:101:

*** Break *** keyboard interrupt
Root > .q

Subject: Re: geane propagation
Posted by Sebastian Neubert on Wed, 23 Jan 2008 15:59:18 GMT
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Can you send me the gdb-output please!
Furthermore the patern recognition seems to go wrong... hmmm...
Are you sure the conditions database is initilized correcty?

Sebastian.

Subject: Re: geane propagation: floating point exception
Posted by Sebastian Neubert on Mon, 28 Jan 2008 10:52:44 GMT
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Hi!

I have protected GeaneTrackRep of extrapolation wth small momenta. So the demo with GEANE is running now. However the error appears every event. So nothing is happening at the moment. We have to find out, why the state is set to zero all the time!

Cheers! Sebastian.

Subject: Re: geane propagation: floating point exception
Posted by Sebastian Neubert on Thu, 06 Mar 2008 19:11:20 GMT
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Hi!

After a day of debugging I made some progress with GeaneTrackRep. I found out that I need to use the so called "spu" option to specify the directiion of the particle momentum. The issue is a known problem to me, but the effects that happen when you miss something there were very hard to understand.

Please, Geane-Developers: Go ahead and make your code a little bit more robust and take a look at what I am struggeling to do in GeaneTrackRep.

Best Regards, Sebastian.