Subject: Influence of the reduced B-field on the track reconstruction
Posted by donghee on Fri, 21 Mar 2014 23:50:47 GMT
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Hi Stefano,

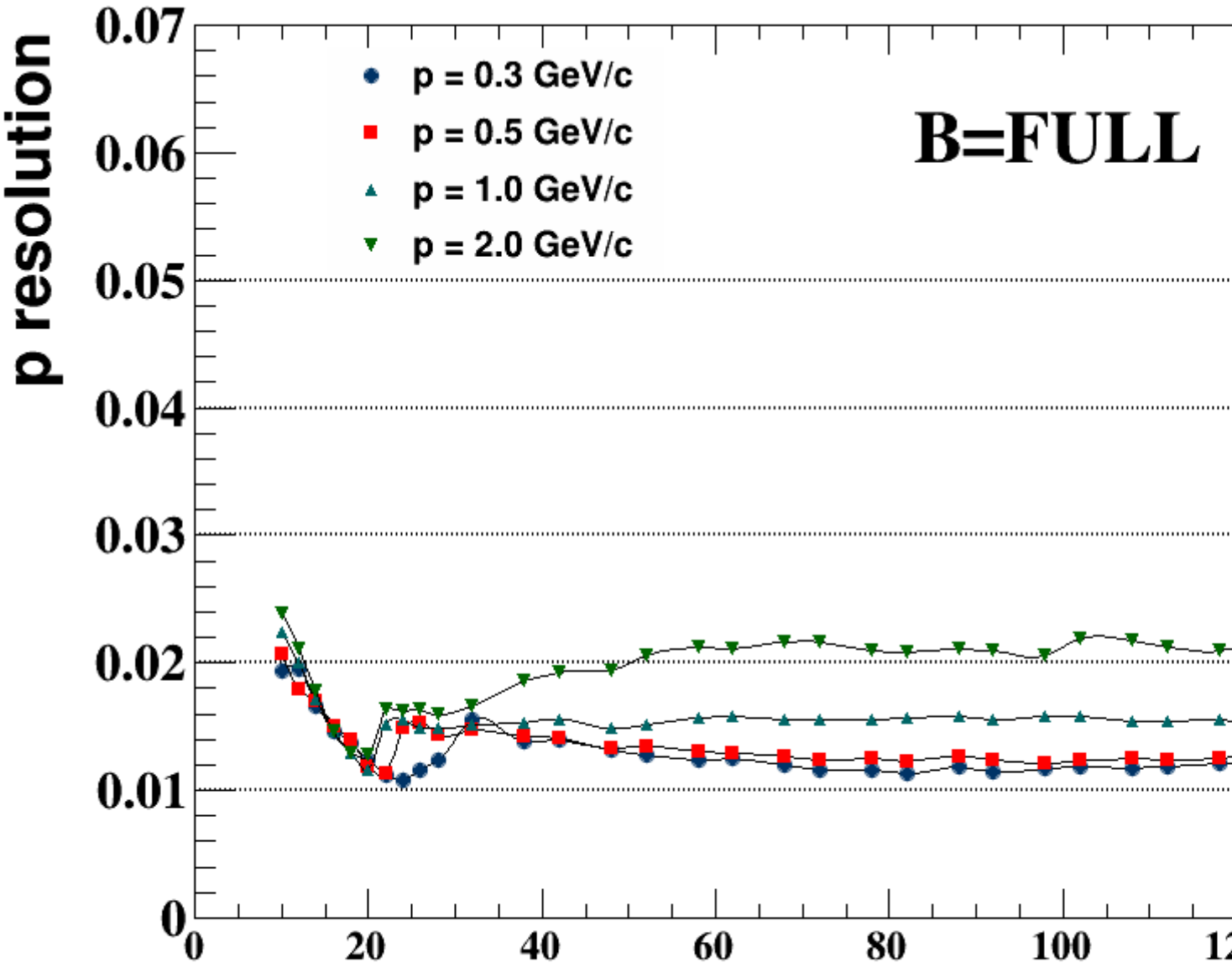
I try to see the effect of reduced B-field, which was intensively discussed during this week.
Two plots are produced to compare the momentum resolution with two diffrent field map configurations for "FULL" and "HALF".
Simulation has been made with single Muon particle with momentum range starting from 0.3 GeV upto 2 GeV, and scan theta between 10 and 148 degree.
PANDAroot Jan14 has been used and simulation codes are attached to cross check.
The pull distributions of momentum for p=0.3 GeV and both Half and Full field map configurations cases are also attached to make sure the fit procedure. (Gauss+Pol(3) has been used.)

The momentum resolution with half field map is factor 2 times worser than FULL field map.
If you want to check the analysis code, please let me know, I will send you.

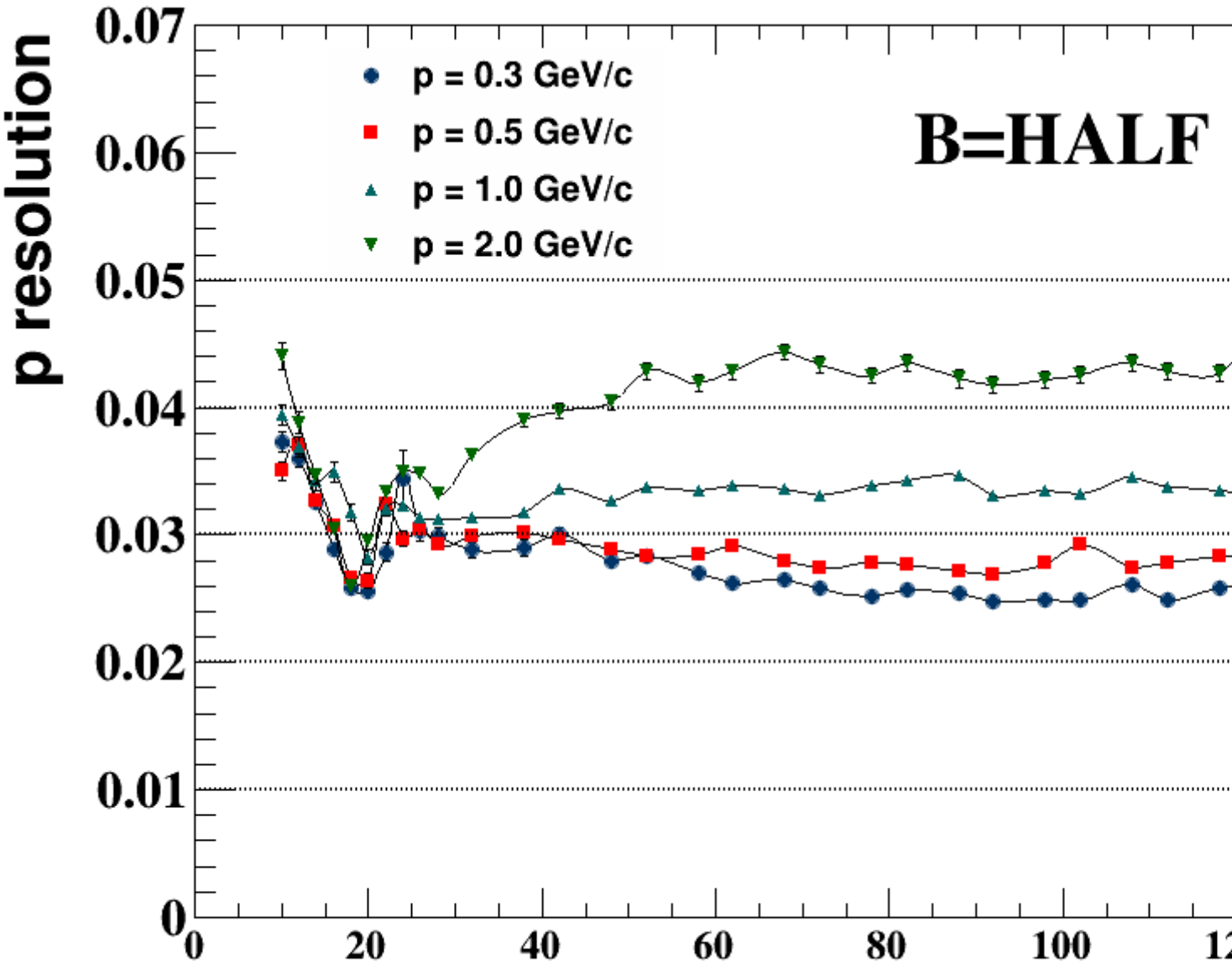
Best wishes,
Donghee

File Attachments

1) run_pid_dig.C, downloaded 523 times
2) run_pid_pid.C, downloaded 520 times
3) run_pid_rec.C, downloaded 543 times
4) run_pid_sim.C, downloaded 493 times
5) resolution_B_half_03.pdf, downloaded 514 times
6) resolution_B_full_03.pdf, downloaded 497 times
7) summary_for_B_full.pdf, downloaded 497 times
8) summary_for_B_full.png, downloaded 1415 times



9) summary_for_B_half.pdf, downloaded 494 times
10) summary_for_B_half.png, downloaded 1275 times



Subject: Re: Influence of the reduced B-field on the track reconstruction
Posted by StefanoSpataro on Sat, 22 Mar 2014 10:51:47 GMT
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Hi,
the field maps are now in svn but the central tracking code is still not changed, since the field there is hardcoded and not retrieved from field maps. In this sense, maybe you can try to use ideal tracking to compare momentum resolution, but not real (for the moment).
Most of the effects of a reduced field would be a worsen in resolution but an increase in acceptance/efficiency for low momentum particles, but this cannot be checked before the tracking code is not updated. I am not sure if also the analysis tools should be updated.

Subject: Re: Influence of the reduced B-field on the track reconstruction
Posted by Gianluigi Boca on Sun, 23 Mar 2014 19:48:26 GMT
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Hi Donghee,
I put in svn a new version of the Pattern Recognition class PndTrkTracking2.cxx and .h;
the field now is not hardcoded anymore (set at 2 Tesla) but rather extracted using

FairRunAna::Instance()->GetField()

(thanks Stefano for giving me the recipe).
Therefore now the momentum values obtained from Pattern Recognition and given as input to the Kalman filter are correct for every magnetic field you use.

Please rerun your Macro and see wht happens now

Gianluigi

Donghee Kang wrote on Sat, 22 March 2014 00:50Hi Stefano,

I try to see the effect of reduced B-field, which was intensively discussed during this week.
Two plots are produced to compare the momentum resolution with two diffrent field map configurations for "FULL" and "HALF".
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The momentum resolution with half field map is factor 2 times worser than FULL field map.
If you want to check the analysis code, please let me know, I will send you.

Best wishes,
Donghee

Subject: Re: Influence of the reduced B-field on the track reconstruction
Posted by donghee on Tue, 25 Mar 2014 13:40:23 GMT
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Hi Gianluigi,

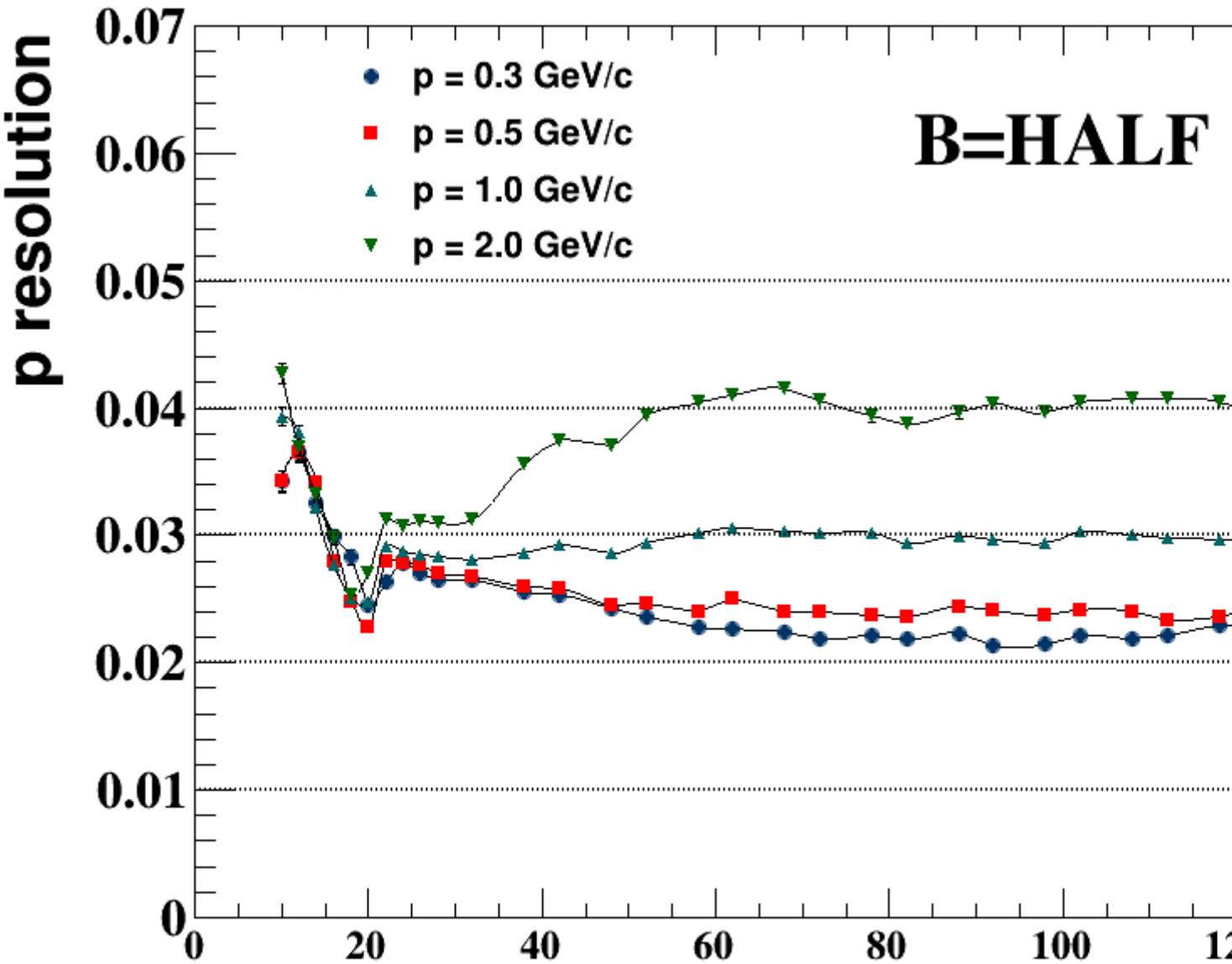
Thank you for your kind update
Introduced new code of the Pattern Recognition class PndTrkTracking2.cxx and .h has been exchanged and run again
Here is the output with new code.

The improvement is a level of few %, not so significant.
I assume that the reduced field map has lower performance than full field map, that should be a natural feature due to small bending power of produced particle inside solenoid field.
It would be great to check again same study with an important physics channel analysis.

Best wishes,
Donghee

File Attachments

1) new_summary_for_B_half.pdf, downloaded 435 times
2) new_summary_for_B_half.png, downloaded 1187 times



Subject: Re: Influence of the reduced B-field on the track reconstruction

Posted by Gianluigi Boca on Tue, 25 Mar 2014 17:01:21 GMT
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Hi Donghee,
so thanks for checking again with the last version of the code.
Having a worse resolution with half the B field is expected on general arguments in magnetic field.

For instance, in the case of an experiment in which tracking is done with normal planar multiwire chambers
and a dipole it is not difficult to show that

Sigma(p)/p = K* Sigma(theta) *p / B

where :
K = constant
Sigma(theta) = error on the bending angle theta ;
p = momentum;
B = magnetic field.

So the fact that you obtain a resolution a factor 2 worse when you use only half of B is in agreement with what expected

cheers Gianluigi

Donghee Kang wrote on Tue, 25 March 2014 14:40Hi Gianluigi,

Thank you for your kind update
Introduced new code of the Pattern Recognition class PndTrkTracking2.cxx and .h has been exchanged and run again
Here is the output with new code.

The improvement is a level of few %, not so significant.
I assume that the reduced field map has lower performance than full field map, that should be a natural feature due to small bending power of produced particle inside solenoid field.
It would be great to check again same study with an important physics channel analysis.

Best wishes,
Donghee

Subject: Re: Influence of the reduced B-field on the track reconstruction
Posted by StefanoSpataro on Tue, 25 Mar 2014 17:03:26 GMT
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I think it would be interesting to check the effect on the efficiency for low momentum particles.

Subject: Re: Influence of the reduced B-field on the track reconstruction

Posted by MartinJGaluska on Thu, 03 Apr 2014 15:06:29 GMT
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Hello,

I am pretty sure that this is the case as it has to deal with a variable and inhomogeneous magnetic field in the Forward Tracker, but just to be sure I ask:
Does the Kalman filter read the magnetic field from the field maps?

Kind regards,
Martin

Subject: Re: Influence of the reduced B-field on the track reconstruction
Posted by StefanoSpataro on Thu, 03 Apr 2014 15:07:48 GMT
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Sure!