Subject: eta_c generation with EvtGen
Posted by Dima Melnychuk on Thu, 01 Dec 2011 11:44:57 GMT
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Dear all,

I found one conceptual problem with eta_c event generation which was due to my misunderstanding of EvtGen event generator.

Namely in eta_c produced in p+pbar in formation experiment scan will be performed at several energies around resonance and what it does make sense to study for tracking TDR is one momentum point corresponding to resonance maximum. And here a shape of eta_c resonance should not be considered at all. At least it is my understanding and in this way the studies were done for example for physics book.

But producing eta_c with
PndEvtGenDirect *EvtGen = new PndEvtGenDirect("etac","EtaCInclusive_2phi.dec");
eta_c was taken on different positions of resonance.

Here PndEvtGenDirect behave a little bit strange, namely for one run or one seed of random number generator it takes one fixed mass. And when I generated 1000 eta_c locally with one seed I had as a result for efficiency which was different from efficiency obtained on grid, and as Stefano observed last time eta_c width for 1000 events was 2 times smaller than on grid because it was for one fixed point, whereas on the grid it was averaged over resonance shape.

So I updated run_sim_stt_evt.C for
PndEvtGenDirect *EvtGen = new
PndEvtGenDirect("pbarpSystem","EtaCInclusive_2phi.dec",3.6772);

and in decay file EtaCInclusive_2phi.dec
I replaced etac for pbarpSystem

So at least it's my understanding how it should be done.

So event generation how it was done y now was not incorrect but it was not I supposed its was.

Particularly applying 4C-fit makes sense for fixed pbar momentum for each point of resonance scan.

So, any opinion?

And if there are no objections I would like to ask Stefano to generate once again data on grid. It will require update of run_sim_stt_evt.C and EtaCInclusive_2phi.dec and in principle do not require update of pandaroot on grid (but will require modification of script for data production).

Situation is the same for psi(3770) but this problem is NOT related to multipion channel.

Best regards,

Dima

Subject: Re: eta_c generation with EvtGen
Posted by StefanoSpataro on Thu, 01 Dec 2011 14:48:22 GMT
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Hi,
I just sent eta_c runs 926fix and 926cufix with pbarpSystem as initial state.
Before sending also the psi jobs I would like to check results with the new "fix" code for eta_c, and also the results for the "normal" psi.

Today the grid should be a bit faster than yesterday, we have back KVI fully operational and also Vienna.

Subject: Re: eta_c generation with EvtGen
Posted by Dima Melnychuk on Fri, 02 Dec 2011 13:35:43 GMT
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Hi,

I have rerun eta_c reconstruction for runs 926fix and 926cufix and results are the following.

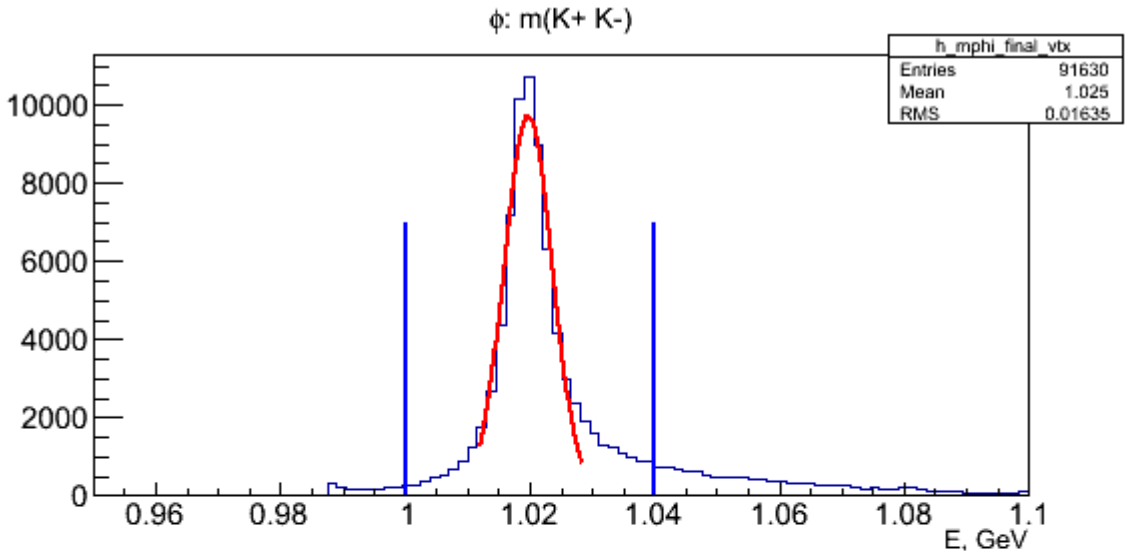
Run 926fix, efficiency 27.3% (vs 25.8% for run 926 where eta_c width was considered) sigma(eta_c)=18.4 MeV (vs 31.6 MeV for run926) and sigma(phi)=3.87 MeV (without changes).

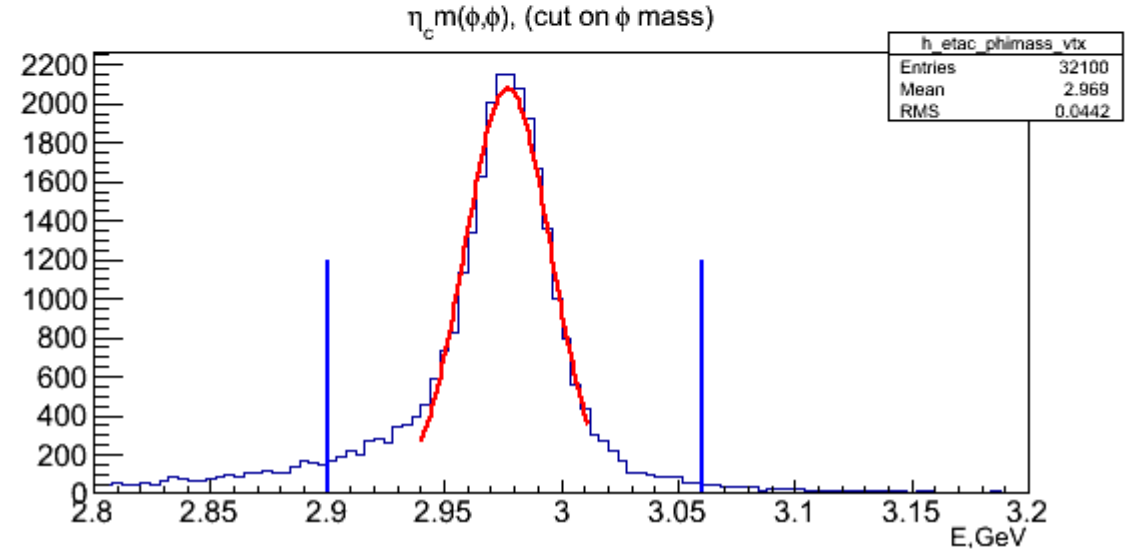
Run 926cufix with cleanup on, efficiency 19.1%, sigma(eta_c)=17.5 MeV, sigma(phi)=3.85 MeV.

So I suppose this run can be used for mixing with background.

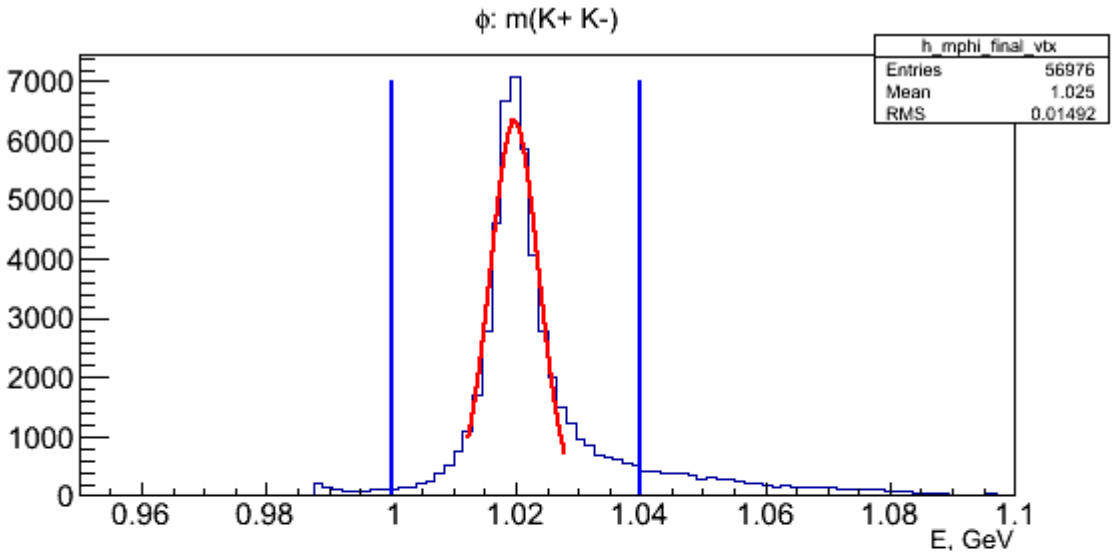
Dima

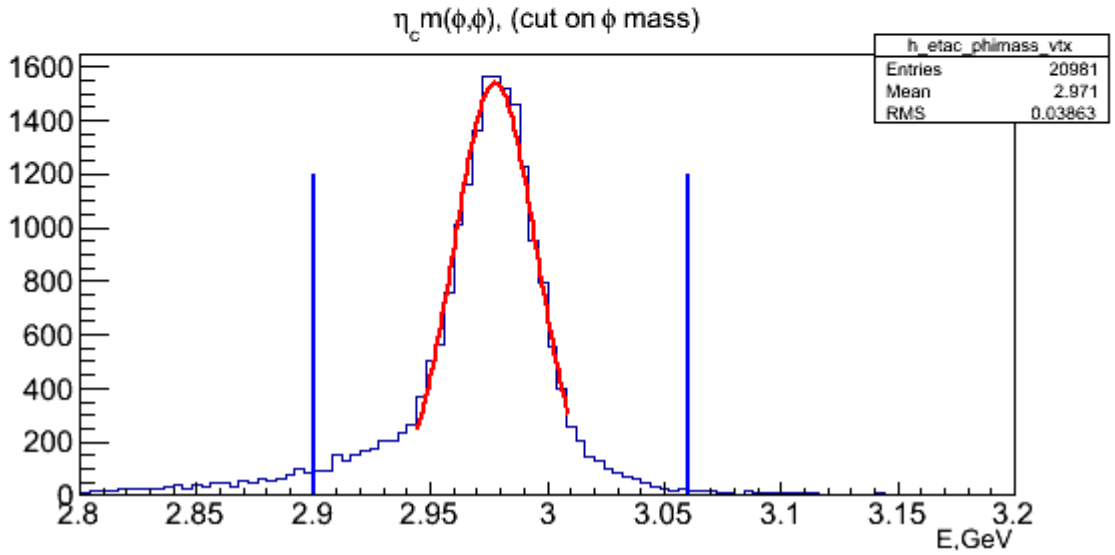
File Attachments
1) m_run926fix.png, downloaded 1351 times





2) m_run926cufix.png, downloaded 1496 times





Subject: Re: eta_c generation with EvtGen
Posted by StefanoSpataro on Fri, 02 Dec 2011 19:52:55 GMT
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Hi,
I have tried to apply the same change for the psi channel, with the following dec:

spataro@briareos:~/trunk/pandaroot/macro/run/tdrct/psi3770$ cat psi3770_fix.dec
noPhotos
#
Decay pbarpSystem
1.0 D+ D- VSS;
Enddecay
#
Decay D-
1.0 K+ pi- pi- PHSP;
Enddecay
#

```
Decay D+
1.0     K- pi+ pi+                  PHSP;
Enddecay
#
End
```

The problem is that in this case pbarpSystem is not a vector, then I have the following error:

```
EvtGen:In readDecayFile, reading:psi3770_fix.dec
EvtGen:As requested, PHOTOS will be turned off.
EvtGen:VSS did not get the correct parent spin
pbarpSystem -> D+ D-  (VSS):
EvtGen:Will terminate execution!
```

I am not sure on what this VSS model is doing, now the question if it we should put phase space as model, or set the initial spin pf pbarpSystem to 1 in the evt.pdl... but there is no reason that a pbar p collision would have only a spin 1!
I could put phase space, but before starting I would like to know what we should use exactly...

Ok, I will run with Phase Space to save some time, wating for some comment on this side.

Subject: Re: eta_c generation with EvtGen
Posted by Dima Melnychuk on Sat, 03 Dec 2011 22:35:52 GMT
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Hi Stefano,

Actually I think that preferable solution here is to put spin of pbarpSystem to 1.

In general in proton-antiproton anihilation limiting to S and P waves 6 states with different quantum numbers are possible. Particularly Psi(3770) as J^(PC)=1^(--) state correspond to ^3S_1 of p-pbar system.

And in principle if we know that Psi(3770) is produced means that anihilation took place with these quantum numbers.

So spin of pbarpSystem should be adjusted to the the spin of particle we want to produced. Of course it's a little bit inconvenient to edit evt.pdl every time for this purpose but I do not know another solution at the moment.

Dima

Subject: Re: eta_c generation with EvtGen
Posted by StefanoSpataro on Sun, 04 Dec 2011 00:24:16 GMT
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Ok,
I sent psi jobs with VSS and a modified evt.pdl (pbarpSystem spin 1).

Subject: Re: eta_c generation with EvtGen
Posted by StefanoSpataro on Tue, 06 Dec 2011 22:24:38 GMT
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I have just sent the mixed events for the four channels.

I have seen many warnings coming from MCTrackAssociator, saying that many tracks have refIndex<0. Let's see what comes out, I am not sure if there are still some bugs in the processing or if it is normal considering that we have also background tracks.