
Subject: Initial 4 vector in EvtGen(Direct)
Posted by [MartinJGaluska](#) on Thu, 10 Jul 2014 17:30:32 GMT
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Dear all,

when I run a simulation with the standard sim macro from macro/run and set the beam momentum to 8.636 GeV/c the initial 4 vector is set to the following values:

$(E, p_x, p_y, p_z) = (9.62509, 0, 0, 8.636)$

(I have checked the equations and they seem fine to me.)

I want to simulate the process
 $p + \bar{p} \rightarrow X(4260) \rightarrow J/\psi \pi^+ \pi^-$
with EvtGen(Direct).

The mass of X(4260) is set to 4.25 GeV with a width of 108 MeV and I don't use ppbarSystem as intermediate state (should I do that?).

EvtGen(Direct) gives me the following output for the initial 4 vector:

```
##### Generating with following conditions:
```

```
incident 4-mom : (10.116, 0, 0, 9.129), m = 4.357
```

```
#####
```

The output seems to depend on the random seed. Does that mean that EvtGen ignores the beam momentum which I set and instead uses its "random" beam momentum? And if so, does it use this "random" beam momentum for all events that are run with this random seed or is it different for each event?

Which is the correct 4 momentum to use when I want to calculate the missing mass or do a 4C fit?

Kind regards,
Martin

PS: After thinking about it I believe that I should insert the ppbarSystem which should reflect the beam momentum spread, is that correct?

Subject: Re: Initial 4 vector in EvtGen(Direct)
Posted by [StefanoSpataro](#) on Thu, 10 Jul 2014 19:06:33 GMT
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You should use pbarpsystem as initial state, and let it decay into J/psi pi+ pi- w/o any intermediate X resonance in evtgen.

If you use an initial resonance, then your initial mass has a smearing due to the particle width

(108MeV in your case), then it will change with the random seed.
I hope i have clarified the situation.

Subject: Re: Initial 4 vector in EvtGen(Direct)
Posted by [MartinJGaluska](#) on Thu, 10 Jul 2014 19:09:39 GMT
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Thank you for your reply, Stefano.

In the meantime I have started using this:

Decay pbarpSystem
1.0 Y(4260) PHSP;
Enddecay

Decay Y(4260)
1.0 J/psi pi+ pi- PHSP;
Enddecay

Should I rerun the simulation or is that also fine?

Kind regards,
Martin

Subject: Re: Initial 4 vector in EvtGen(Direct)
Posted by [StefanoSpataro](#) on Thu, 10 Jul 2014 19:12:53 GMT
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noPhotos

Decay pbarpSystem
1.0 J/psi pi+ pi- PHSP;
Enddecay

This is the correct version. You should rerun your sim.

Subject: Re: Initial 4 vector in EvtGen(Direct)
Posted by [StefanoSpataro](#) on Thu, 10 Jul 2014 19:13:48 GMT
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Note that in pandaRoot there is a new event generator for J/psi pi pi states, maybe it could be worth to take a look.

Subject: Re: Initial 4 vector in EvtGen(Direct)

Posted by [MartinJGaluska](#) on Thu, 10 Jul 2014 19:21:07 GMT

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Ok, thank you very much for the fast reply! By the way I reduced the width of ppbarSystem in evt.pdl and in the sim macro to 1 MeV which is about the resolution for the center of mass energy. The standard setting of 100 MeV seemed very high or did I misunderstand that?

Subject: Re: Initial 4 vector in EvtGen(Direct)

Posted by [StefanoSpataro](#) on Thu, 10 Jul 2014 19:53:13 GMT

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In reality the parameter max_Dm is set to zero, and this limits the smearing -> for pbarpsystem there is no smearing.
