Subject: Panda target and vertex cuts
Posted by Elisabetta Prencipe (2) on Tue, 27 Oct 2015 14:50:26 GMT
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Dear all,

 following a discussion started at the open-charm meeting, and today at the computing meeting, I would like to point you on a non-trial problem.
I am trying to reduce the DPM bkg in the simulation ppbar to Ds- Ds2317+. It turns out that a cut around the vertex position can be effective. However, I am currently using the /rho package, and I did not find a way to compute how effectively the target smearing can affect such a cut. It should be done at level of sim- macro.
Based on MC signal simulations, the vtx resolution ix x,y is in between 50 and 80 micrometer (it depends also on which vtx fitter one makes use of), and it is roughly double value for the z vtx position. However, to apply even a 5 sigma cuts around those distributions, it is not a clever idea, due to the fact that the we cannot assume IP(0,0,0): it is simply non realistic, due to the target smearing, which is still not taken in consideration.

Here is a phD thesis performed in 2011, from T. Randriamalala:
http://www-brs.ub.ruhr-uni-bochum.de/netahtml/HSS/Diss/RandriamalalaTsit ohainaH/diss.pdf

At pag.58-61 studies are reported in this sense, for the pellet target. I point you at pag. 60, fig. 4.34.
If I understand it correctly, a cut at <= 2mm would be safe. Do you agree?

I do not find such a study related to the cluster-jet target, and/or related simulation for a physics channel. Anybody has some any clue?

Looking forward to hear from you,

Elisabetta

Subject: Re: Panda target and vertex cuts
Posted by StefanoSpataro on Tue, 27 Oct 2015 17:38:57 GMT
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Please check the following wiki page:

https://panda-wiki.gsi.de/foswiki/bin/view/Computing/VertexSmearing

I.e., for the Central trackers TDR, it was implemented in the following way:

```
FairPrimaryGenerator* primGen = new FairPrimaryGenerator();
primGen->SetTarget(0., 0.5/2.355);
primGen->SmearVertexZ(kTRUE);
primGen->SmearGausVertexZ(kTRUE);
primGen->SetBeam(0., 0., 0.1, 0.1);
primGen->SmearVertexXY(kTRUE);
fRun->SetGenerator(primGen);
```

Of course the numbers should be updated.

Subject: Re: Panda target and vertex cuts
Posted by Klaus Götzen   on Wed, 28 Oct 2015 08:30:24 GMT
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Hi,

the PhD thesis indeed indicates, that the reactions come from this overlap volume with diameter 1.6mm (+-1 sigma region) in x,y directions and 3mm in z (thickness of the pellet stream). The integral of this 2-D gaussian in x,y between -2...2mm in both directions is something like 97%, which seems to be quite robust against small shifts of the center point (i.e. how well we know the absolute position of this volume in space, which depends on alignment). A shift of 1mm in both x and y still gives P=80%.

-> Your cut of +-2mm around (0,0,0) for the pellet target case might be fine I guess.

Concerning the cluster jet, you can take a look at p. 30, Fig. 5.8 in Target TDR (https://panda.gsi.de/oldwww/archive/TargetTDR/Targets_TDR.pdf). There is reported about a fermi like density function with a diameter of about 12-14mm. This would refer only to the spread in z-direction, so that you in that case can apply a tight cut only on the vertex distance to the z-axis, perhaps combined with a rather wide cut on the vertex z-position.

Best,
Klaus

Subject: Re: Panda target and vertex cuts
Posted by Elisabetta Prencipe (2) on Wed, 28 Oct 2015 08:35:11 GMT
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Hello Klaus,

 many thanks for your detailed answer. I'll do my homework!

elisabetta