Subject: Problem with PndKinVtxFitter and Ks decays
Posted by 2dd180b0 on Wed, 28 Nov 2012 12:01:10 GMT
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Dear all,

I've come across a problem while trying to reconstruct the following decay:
D0 -> Ks pi+ pi-, Ks -> pi+ pi-

The procedure I use is to first use PndKinVtxFitter to fit the pi+ pi- from the Ks decay to a common vertex, and then use PndKinVtxFitter to combine the fitted Ks with another pi+ pi- pair, to reconstruct the D0. The problem is that the fit to the D0 -> Ks pi+ pi- always returns nan for the chi^2.

The fitting code I use is exactly analogous to that used by Marius to reconstruct psi(3770) -> D+ D-, D+- -> K+- pi+ pi-, and we think that the problem is due to PndKinVtxFitter not being able to properly handle the neutral Ks candidate.

I've attached the analysis code and EvtGen decay file that I used for this analysis.

Best,
Sean

## File Attachments

1) psi3770.dec, downloaded 275 times
2) run_ana_dobbs.C, downloaded 282 times

Subject: Re: Problem with PndKinVtxFitter and Ks decays
Posted by Ralf Kliemt on Wed, 28 Nov 2012 12:14:12 GMT
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Hallo Dean,

It is a "known issue" that the vertex fitters don't handle neutral particles correctly. In the new year I'll invest some time to repair that behaviour.

Bear in mind that the vertex fitters primarily are made for charged tracks under the common vertex hypothesis. You can, however, fit on the vertex of your pions from the D0 and select for the chi2. The cleaned pion sample is used to combine with the K0 to the D0. You can then apply the 4C fit (knowing the initial system) on both D0 and aD0 for further improvement.

Cheers
Ralf Kliemt

Subject: Re: Problem with PndKinVtxFitter and Ks decays
Posted by Albrecht Gillitzer on Wed, 28 Nov 2012 13:09:18 GMT
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Hello Ralf,

I have another problem with PndKinVtxFitter: After fitting the mu+ and mu- tracks from J/psi decay to a common vertex (and in case of more than one found combination taking the one with the best chi2) and applying a chi2 cut, the mu+mu- invariant mass distribution has a clearly larger width than obtained with the raw, unfitted tracks. I would expect the opposite since after fitting and chi2 cut the result should be closer to reality.
Is this also a "known issue"? And could you please also look into this problem?

cheers, Albrecht

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Subject: Re: Problem with PndKinVtxFitter and Ks decays
Posted by 2dd180b0 on Wed, 28 Nov 2012 13:13:53 GMT
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Dear Ralf,

Thanks for the information!  I'll try doing what you've suggested.

Cheers,
Sean

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Subject: Re: Problem with PndKinVtxFitter and Ks decays
Posted by Ralf Kliemt on Wed, 28 Nov 2012 14:18:55 GMT
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Hello Albrecht,

From the fitter algorithm point of view I think it is not necessary that the composite mass resolution has to improve with a vertex fit, especiually with only two particles at hand. In principle these fitters adjust the momentum directions of the daughter particles.
Could you plot the dependence between the chi2 and the mass resolution?

Cheers
Ralf

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