
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:

$D^0 \rightarrow K^s \pi^+ \pi^-$, $K^s \rightarrow \pi^+ \pi^-$

The procedure I use is to first use PndKinVtxFitter to fit the $\pi^+ \pi^-$ from the K^s decay to a common vertex, and then use PndKinVtxFitter to combine the fitted K^s with another $\pi^+ \pi^-$ pair, to reconstruct the D^0 . The problem is that the fit to the $D^0 \rightarrow K^s \pi^+ \pi^-$ always returns nan for the χ^2 .

The fitting code I use is exactly analogous to that used by Marius to reconstruct $\psi(3770) \rightarrow D^+ D^-$, $D^{*-} \rightarrow K^{*-} \pi^+ \pi^-$, and we think that the problem is due to PndKinVtxFitter not being able to properly handle the neutral K^s 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 239 times
 - 2) [run_ana_dobbs.C](#), downloaded 245 times
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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 D^0 and select for the χ^2 . The cleaned pion sample is used to combine with the K^0 to the D^0 . You can then apply the 4C fit (knowing the initial system) on both D^0 and aD^0 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 μ^+ and μ^- tracks from J/ ψ decay to a common vertex (and in case of more than one found combination taking the one with the best χ^2) and applying a χ^2 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 χ^2 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

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

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, especially 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 χ^2 and the mass resolution?

Cheers
Ralf