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Subject: PndKinVtxFitter

Posted by [Alexandr Zinchenko](#) on Tue, 12 Aug 2014 06:48:11 GMT

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Hello.

I was trying to apply a vertex constrained fit to a charmonium candidate (made of J/psi pi+ pi-)  
The relevant analysis macro lines are as follows (based on tutorials/rho macros)

```
// *** combinatorics for J/psi -> mu+ mu-
jpsi.Combine(muplus, muminus);

// *** combinatorics for psi(2S) -> J/psi pi+ pi-
psi2s.Combine(jpsi, piplus, piminus);

// ***
// *** do VERTEX FIT (psi(2s))
// ***

for (j = psi2s.GetLength()-1; j >= 0; --j) {
  PndKinVtxFitter vtxfitter(psi2s[j]); // instantiate a vertex fitter
  vtxfitter.SetVerbose();
  vtxfitter.Fit();
}
```

The printout from PndKinVtxFitter code (activated by the verbosity flag) is:

```
Initial vertex Position is -0.00141313 -0.0154373 -0.0183913
iteration Number 0
vertex Position is -nan -nan -nan
chi2 in iteration -nan
iteration Number 1
vertex Position is -nan -nan -nan
...
```

Am I doing something wrong or the fitter does not work for such particle combination (1 neutral composite and 2 charged)?

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Subject: Re: PndKinVtxFitter

Posted by [Ralf Kliemt](#) on Tue, 12 Aug 2014 07:43:11 GMT

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Hello Aleksandr,

Your last assumption is correct. The Vertex Fitters work only on charged particles.

In your special case the vertex fit would not help you much. Both the psi2s and the j/psi decay at the interaction point (0,0,0) if you have not set a smeared interaction region during simulations. The four momenta are already calculated at (0,0,0) by default.

Cheers

Ralf

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Subject: Re: PndKinVtxFitter

Posted by [Alexandr Zinchenko](#) on Tue, 12 Aug 2014 11:22:32 GMT

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Maybe I got the logic behind the vertex constrained fit wrong.

In my understanding, this PndKinVtxFitter assumes the decay particles coming from the same vertex

(without assumption on the vertex position itself). Therefore, it can be useful, e.g., to reject background

combinations when building  $J/\psi$  from 2 charged tracks (if the fit quality is not good enough).

If so, considering also neutrals when building more composite objects would help the same way to reject

background combinations. At least (in my understanding),

such an approach was proposed (and realized) during the PANDA Physics Book preparation - see Sect. 4.2.2.3, subsection

on  $p\bar{p} \rightarrow J/\psi \pi^+ \pi^-$ , item 3.

So, it looks like Rho package was able to do such a fit at that time.

Am I wrong?

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Subject: Re: PndKinVtxFitter

Posted by [Stefano Spataro](#) on Tue, 12 Aug 2014 12:18:17 GMT

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In your case you should build a candidate with the 4 particles and fit it, w/o the virtual state.

And the panda physics book was not using rho.

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