
Subject: PndVtxPRG vs PndKinVtxFitter

Posted by [Karin Schönning](#) on Fri, 24 Oct 2014 09:44:50 GMT

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Hi, after advice from Ralph and Stefano I ran some simulations of the pbar p -> Lambdabar Lambda at 4 GeV with ideal tracking (no Kalman filter) and compared the results for two different vertex fitters, PndVtxPRG and PndKinVtxFitter.

This part of my analysis macro look like:

```
for (j=0;j<lamb.GetLength();++j)
{
    PndVtxPRG vtxfitterlb(lamb[j]);

    vtxfitterlb.Fit();
    double chi2_vtx = vtxfitterlb.GetChi2(); // access chi2 of fit
    double prob_vtx = vtxfitterlb.GetProb(); // access probability of fit
    h0b_chi2_vf->Fill(chi2_vtx);
    hlamb_prob_vf->Fill(prob_vtx);
    bool checkb=vtxfitterlb.Fit();
    if(checkb)
        // when good enough, fill some histos
    {

        RhoCandidate *lambv = lamb[j]->GetFit(); // access the fitted cand

        .
        .
        .
        .
    }
    and so on.
```

The PndKinVtxFitter gives slightly higher Lambda efficiency than PndVtxPRG.
Here are the results:

PndKinVtxFitter:

Lambda eff, no vertex fit: 15.2%
Lambda eff, vertex fit: 14.9%
Lambdabar eff, no vertex fit: 61.5%
Lambdabar eff, vertex fit: 59.2%
LLbar eff, vertex fit: 6.8%

PndVtxPRG:

Lambda eff, no vertex fit: 15.2%
Lambda eff, vertex fit: 11.0%
Lambdabar eff, no vertex fit: 61.5%
Lambdabar eff, vertex fit: 52.9%
LLbar eff, vertex fit: 5.5%

Unfortunately, the results do not improve so much when running with half solenoid field. The lambda yield before vertex fit is larger but the lambdabar yield, and the yield after vertex fit, is worse than with the full field. I should mention that here, I don't cut on the mass at all.

PndKinVtxFitter, half solenoid field:

Lambda eff, no vertex fit: 18.4%
Lambda eff, vertex fit: 10.3%
Lambdabar eff, no vertex fit: 54.9%
Lambdabar eff, vertex fit: 39.2%
LLbar eff, vertex fit: 5.6%

PndVtxPRG, half solenoid field:

Lambda eff, no vertex fit: 18.4%
Lambda eff, vertex fit: 10.0%
Lambdabar eff, no vertex fit: 54.9%
Lambdabar eff, vertex fit: 36.8%
LLbar eff, vertex fit: 5.2%

I would still expect a larger improvement when running with half field so I don't understand this.

/Karin

Subject: Re: PndVtxPRG vs PndKinVtxFitter
Posted by [Stefano Spataro](#) on Fri, 24 Oct 2014 10:56:40 GMT
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Did I understood correctly that the loss in efficiency for the vertex fitter for the full field does not happen? I had understood from your last talk that you were seeing the same drop also at the correct field.

Subject: Re: PndVtxPRG vs PndKinVtxFitter
Posted by [Karin Schönning](#) on Fri, 24 Oct 2014 12:53:25 GMT
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For the full field, with ideal tracking, the efficiency goes down only a little (for lambdas from 15.2% to 14.9%) with PndKinVtxFitter, after changing the criterion from

```
if (prob_vtx>0.0002) // as in the talk
```

to

```
bool checkb=vtxfitterlb.Fit();  
if(checkb) //current cut
```

With the PndVtxPRG and with if (prob_vtx>0.0002) for PndKinVtxFitter it goes down more (with the same amount, is that a coincidence?)

Subject: Re: PndVtxPRG vs PndKinVtxFitter
Posted by [Ralf Kliemt](#) on Fri, 24 Oct 2014 14:31:38 GMT
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Hi Karin,

There is a potential bug (marked in red). Simply use `bool checkb=vtxfitterlb.Fit();` as the fit statement in the beginning of the block.

Karin Schönning wrote on Fri, 24 October 2014 11:44for (j=0;j<lambb.GetLength();++j)

```
{  
  
    PndVtxPRG vtxfitterlb(lambb[j]);  
  
    vtxfitterlb.Fit();  
    double chi2_vtx = vtxfitterlb.GetChi2(); // access chi2 of fit  
    double prob_vtx = vtxfitterlb.GetProb(); // access probability of fit  
    h0b_chi2_vf->Fill(chi2_vtx);  
    hlambb_prob_vf->Fill(prob_vtx);  
    bool checkb=vtxfitterlb.Fit();  
        if(checkb)  
            // when good enough, fill some histos  
    {  
  
        RhoCandidate *lambv = lambb[j]->GetFit(); // access the fitted cand
```

Do you apply other selections, such as a distance cut to the interaction point? The PndVtxPrg should be just a touch less accurate then the PndKinVtxFitter. I expect no different efficiency drops by fitting.

Cheers
Ralf

Subject: Re: PndVtxPRG vs PndKinVtxFitter
Posted by [Karin Schönning](#) on Tue, 28 Oct 2014 09:32:34 GMT
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Indeed, this helps and now the fitter efficiency of the PndVtxFiter is almost 100%. I haven't checked the PndVtxPRG yet though.
