Subject: entries at unphysical mass after vertex fit
Posted by Albrecht Gillitzer on Thu, 04 Dec 2014 09:17:53 GMT
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Hi all,

When comparing the Lambda mass spectrum evaluated before and after the vertex fit using PndKinVtxFitter, one can see that the fwhm of the Lambda mass distribution improves by the vertex fit but in contrast larger tails in the mass distribution are created. On the low mass side the tails extend far into the unphysical region at masses below the sum mass of the daughter particles M_sum = m_pi + m_p.
The attached plot has been generated from 10000 events 4 GeV/c pbar p --> Xibar+ Xi- (PHSP) --> Lambdabar pi+ Lambda pi- --> pbar pi+ pi+ p pi- pi- with the oct14 release. Upper row: Lambda mass before vertex fit / Lower row: after vertex fit // Left: lin y axis / Right: log y axis.
The corresponding plot for Lambdabar shows the same feature. Simulation and analysis of the same reaction with the scrut14 release also shows the same feature.

My interpretation: Can it be that in the vertex fit the 3-momenta of the daughter particles are modified according to the modified track parameters as a result of the fit, but their energies are left unchanged? As a consequence the energy momentum relation would be destroyed and particles no longer would have the correct mass value.

Albrecht

File Attachments

1) LambdaMass_4p.pdf, downloaded 651 times

Subject: Re: entries at unphysical mass after vertex fit
Posted by Ralf Kliemt on Thu, 04 Dec 2014 10:49:43 GMT
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Hallo Albrecht,

Firstly I suggest you do a crosscheck with the other vertex fitter PndVtxPRG. From my understanding there you don't alter the momentum magnitude and energy of the daughter particles.

Secondly, you may want to study the fit quality (chisquare) for the unphysical candidates.

Kind regards.
Ralf

Subject: Re: entries at unphysical mass after vertex fit
Posted by Ralf Kliemt on Thu, 04 Dec 2014 10:59:03 GMT
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Hi again,

Please plot the masses of the daughters (pions/protons) before and after the fit. Those should be exact needles.

Cheers

Subject: Re: entries at unphysical mass after vertex fit
Posted by Jennifer Pütz on Mon, 17 Aug 2015 13:16:16 GMT
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Hi everyone,

I found the same probelm as Albrecht. I ploted the difference of the masses of the daughters before and after the fit and saw that they are not exact needles. So I had a closer look into the PndKinVtxFitter and found that the four-momentum of the dauhgters after the vertex fit is set to (p_vtx, E_vtx). p_tx and E_vtx are the 3-momentum-vector and the energy of the daughter particle comming out of the vertex fit.
But E_vtx is not taking the mass hypothesis of the dauhgter particle into account. So I replaced E_vtx with sqrt(p_vtx^2 + m^2). (This was already implemented in the code but commented out.)
After doing that, the unphysical masses for Lambda0 have disappeared and the mass differences show now exact needles (see attached files).

Best,

Jenny

File Attachments

1) Lambda0Mass_vtxfit_uncorrected.pdf, downloaded 738 times
2) Lambda0Mass_vtxfit_daughters_uncorrected.pdf, downloaded 634 times
3) Lambda0Mass_vtxfit_corrected.pdf, downloaded 665 times
4) Lambda0Mass_vtxfit_daughters_corrected.pdf, downloaded 623 times

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