Subject: Psi 3770 "best candidate" selection
Posted by Marius Mertens on Wed, 28 Sep 2011 20:29:16 GMT
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Dear all,

a few days ago in the Tracking mailing list the issue was raised that a "best candidate" selection based on fitter chi^2 might favor candidates with larger errors over those with smaller errors, resulting in a selection of actually worse candidates.

I attached a few pictures I produced while trying to investigate the influence of the "best candidate" selection within an event based on the chi^2 result from the execution of a vertex fit.

Slide 2 shows the distribution of chi2 versus the total hit count produced by the decay products for the D+ candidates.
Slide 3 shows the accepted candidates, i.e. candidates with the best chi2 below 18 (more or less arbitrary hard cut). Except this hard cutoff, the shape of the distribution doesn't change much. Slide 4 shows the rejected candidates, i.e. those with not the best chi2 or a value above 18. There is no visible enhancement towards higher hit counts, which would be an indication that potentially better candidates are discarded while worse ones are kept.

Slides 5, 6, 7 show a similar set of distributions for the reconstructed D+ mass versus the total hit count as defined above. For the full sample there is an enhancement around the correct mass which is expected, this shape again doesn't change for the accepted candidates. The rejected candidates' distribution is relatively flat, thus doesn't indicate a negative effect of the chi2 selection.

Slides 8, 9, 10 show the distributions of the reconstructed mass versus the chi2. There is an enhancement for both incoming and accepted candidates at the correct mass and low chi2 which is expected for a pure signal. The "rejected" distribution is again relatively flat.

Summarized, at least for the Psi 3770 channel, there doesn't appear to be a negative impact of the chi2 "best candidate" selection.

Based on these results, I'd personally prefer the selection of the "best candidates" by the fit results over a pre-selection before the fit. I'd be happy to hear your opinion about this.

Marius

File Attachments
1) mcm20110922.pdf, downloaded 544 times

Subject: Re: Psi 3770 "best candidate" selection
Posted by StefanoSpataro on Thu, 29 Sep 2011 08:00:04 GMT
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Hi Marius,
from the 2D plots it is a bit difficult to understand the real impact of the different selections on the distributions.

I would suggest to plot the D invariant mass and the vertex resolution distributions using the "old" fitter chi2 selection and using the "testing" other chi2, normalizing to the same yield inside the peak. In such a way one could see if the distributions get narrower, with less tails, or if they do not change so much.

It would be good to discuss about this on the next pandaroot meeting on monday morning (even if I won't be there, there will be other "experts" around).

Regards

Subject: Re: Psi 3770 "best candidate" selection
Posted by Marius Mertens on Fri, 30 Sep 2011 13:59:42 GMT
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Hi Stefano,

in general I think that if there is no directly visible change in the distributions for a pure signal, the selection does not show a strong negative impact, thus can be considered "okay".

I'll test how the resulting distributions change when using the preselection and let you know about the results.

In Germany there is a holiday on Monday, so I will also not be there. But the tracking EVO on Tuesday might also be a good place to discuss the selection strategy.

Marius
