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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  $\chi^2$  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  $\chi^2$  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  $\chi^2$  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  $\chi^2$  selection.

Slides 8, 9, 10 show the distributions of the reconstructed mass versus the  $\chi^2$ . There is an enhancement for both incoming and accepted candidates at the correct mass and low  $\chi^2$  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  $\chi^2$  "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

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### File Attachments

1) [mcm20110922.pdf](#), downloaded 459 times

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