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Nuno questions 290715

Dear Nuno, Many thanks for your questions and comments. Here are some answers (we are working in the others!).

1) selection. would you mention the procedure and criteria utilised in selection optimisation.

Answer: In the case of the $B_s \rightarrow f_0(980)$ channel the selection criteria follows what was made for the Branching Ratio work (AN2012_363), for $B_d \rightarrow K^*$ we used the same cuts because we wanted to follow the same procedure as in the f_0 to have this as our crosscheck channel. In the Λ_b and B_d channels (Xib used basically the same cuts) the selection used is like in previous work about Λ_b lifetime (AN-14-045) by Frank.

2) physics backgrounds: partially and mis reconstructed b decays. a detailed description of these seems to be missing. please include MC plots showing the various components affecting each final state. presumably, MC-derived shapes are employed in the PDFs.

Answer: Unfortunately there is not official MC to do these studies. However we have only found significant background (of this kind) in the channel $B_s \rightarrow f_0(980)$ where the technique used is described in Appendix E of the analysis note.

3) cabibbo suppressed components: this seems to be missing for example for the B^+ case. The $J/\psi\pi$ bump should sit to the right and under the main peak.

Answer: Work in process

4) long lived B^+ background: this was discussed at the earlier stages of the review. please point to the conclusion of the studies performed. (cf fig.3, tab.2)

Answer: After several studies with different vertices and finding that all of them have these long components (looking in the sidebands region), the decision was to model it phenomenologically, ie using exponential components (as many as necessary).

5) K^* swap: you make a selection. in some fraction of the times, an incorrect mass assignment is made. this results in a mass assignment that differs from (is broader than) the signal. a term needs to be added to the likelihood to describe these candidates. The lifetime parameter would still be that of the signal. this is besides the systematic considerations in point 6 of section 6.

Answer: Work in process

6) ct efficiency: the ct distribution may be biased by online as well offline selection and reconstruction. were effects from the latter two considered? a data-based calibration would be suitable. use for example the 2011 B^+ dataset (that is otherwise not utilised in the analysis). or the 2012 unbiased sample from parked data. attempt to extract the efficiency parameters from a fit to this sample.

the linear model in eqn.26 may be appropriate; others could be also tried. then, in the final nominal fit used to extract the lifetime, use a ct-efficiency function with these parameters constrained (via gaussian constraints aka penalty functions).

Answer: Work in process

7) ct resolution: please use the high-statistics trigger-unbiased parked-data 2012 sample, by fitting the prompt components, to calibrate the ct resolution. there were other extensive studies of ct resolution performed in the context of the B_s lifetime difference and ϕ_s paper (BPH-13-012). please attempt to propagate these studies

as cross checksof related effects.

Answer: yes, we will make this studies as soon as Sara sends the unbiased sample, and will review the reference you mention to see what could be done in our case.

8) primary vertex selection: 1.104-7 comment: this issue is being completed in the next version of the AN

Answer: Yes, now it is present in the latest version of the note

9) notation: for consistency with other related CMS publications, it would be nice to use λ instead of λ and of PDL. the is relevant for the PAS/paper.

Answer: Ok. we will change the notation in the next update of the note.

-- JhovannyMejia - 2015-07-30

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