

ϕ_1 Section Status

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Disclaimer

- This presentation does not reflect directly any section editor opinion
 - Basically, I will give an overview on the section, but I will concentrate the comments on my part
 - I have just the responsibility of the 2-Body and Quasi-2-Body Time dependent measurements
 - I've just started to write the section...
- The presentation is divided in 3 parts:
 - Section organization
 - Source: Owen's presentation at June 2010 BaBar Collaboration Meeting: <http://hypernews.slac.stanford.edu/HyperNews/BFLB/get/AUX/2010/09/29/15.30-29073-bf-beta-long-june2010.pdf>
 - Physics issues
 - Technical issues
- These are my impressions in this first phase (mainly questions!). Comments are welcome: I will take note of them!
 - Everything is a work in progress (not conclusion yet!)

People Involved (source: Owen's presentation)

- Section editors
 - BaBar: Owen Long
 - Belle: Yoshi Sakai
 - Theory: Ikaros Bigi
- Identified section contributors
 - BaBar:
 - Eli Ben-Haim (charmless 3-body)
 - Adrian Bevan ($J/\psi \pi^0$, advise on main $c\bar{c}s$)
 - Chunhui Chen ($c\bar{c}s$, $D\bar{D}$, ...)
 - Chih-hsiang Cheng ($c\bar{c}s$, $D^0 h^0$, ...)
 - Alfio Lazzaro (charmless 2b and Q2b)
 - Belle section contributors still to be identified
 - Yoshi has identified some contributors, but he wants to check with them before giving officially their names

Overview of the measurements

- Identify the measurements by their processes (HFAG distinction)
 - $b \rightarrow c\bar{c}s$
 - $b \rightarrow c\bar{u}d$
 - $b \rightarrow c\bar{c}d$
 - Charmless $b \rightarrow q\bar{q}s$

(I will not give details on the modes. You can guess the decays 😊. See Owen's slides for more details)

- Frankly, I would not use the word “penguin” to distinguish the last process when describing the measurements
 - I don't like to mix theoretical and experimental considerations

Charmless modes

- We can distinguish the measurements in
 - 2-body: $\pi^0 K_S$
 - Quasi-2-body: $\eta' K_S, \eta' K_L, \omega K_S$
 - 3-body non-Dalitz analysis: $\pi^0 \pi^0 K_S, K_S K_S K_S$
 - 3-body Dalitz analysis: $K^+ K^- K_S, K^+ K^- K_L, \pi^+ \pi^- K_S$
 - Angular analysis: $\phi K_S \pi^0$
- Note that I prefer to keep separated K_S and K_L modes:
 - Very different reconstruction technique and selection
- Current status of publication (source HFAG):
 - In red modes which are published by both BaBar and Belle
 - In blue modes which are published by BaBar (preliminary or not measurement by Belle)
 - In brown modes which are published by Belle (preliminary results in BaBar)
 - In green preliminary results for both BaBar and Belle (Belle $K^+ K^- K_S$ paper (657M $B\bar{B}$) accepted by PRD)

Yet another process

- Charmless process $b \rightarrow q\bar{q}d$
 - 2-body mode $K_S K_S$
- The analysis has a lot of similarities with the other 2-body mode for the experimental part, but it is completely different from the theoretical point of view
 - Expected no CP violation
- Where should we include this mode?
 - I suggest to include it in this section, clearly explaining that is not a measurement of ϕ_1

Some Owen's questions

- “Do we include full discussion of experimental bounds on ΔS and ΔC from charmless BFs here (e.g. from SU3 relations)? Or is this discussed in the charmless B decays (Sec. 12.4) before the ϕ_1 section with a brief mention of it here that refers back to Sec. 12.4?”
 - Yoshi comment: “It seems to me to be natural to describe bound on ΔS in our section. But, I think it is up to Sec. 12.4 authors. If they mentions on ΔS and ΔC bounds in their natural flow, we can refer it in our section.”
- “Do we comment on discrepancies in early measurements that caused a lot of excitement or simply present the ultimate results with no historical context?”
 - Yoshi comment: “I would vote to include some brief comments on early discrepancy citing Refs.”
- In both cases I agree with Yoshi's suggestions
 - Last comment is interesting for a general discussion

Level of details

- From Owen's presentation:
 - It should read like a book, *not like a PRL*.
 - No need to cover every little detail. That's what the journal articles are for
 - No need to write in terse, compact, telegraph style of PRL
 - Cover details that are unique to a measurement, if they are:
 - essential for interpreting the measurement
 - a key point of the analysis
 - Cover details that are used for many similar measurements once, as an example, and then refer back to the example
 - many things will be described for the main $c\bar{c}$ s measurement and not repeated

Level of details

- I agree with Owen's comments, but:
 - I did a fast “poll” asking to my student what he would like to read in this book and the answer is:
 - “Describe in details how the measures were made”
 - I don't think the PRL articles have a lot of little details
 - Should we extend the details, taking part of the description from internal notes?
 - For example, the main problem in charmless modes is the background contamination:
 - Should we enrich the description on the book?
- Rough estimation of my part: 2 pages

Link to other sections

- Besides theory, formalisms and variables descriptions, we require a description of:
 - PID
 - K_L reconstruction
 - Vertex reconstruction in case of no-primary tracks (like $\pi^0 K_S$ mode)
 - Vertex resolution
 - Tagging
- Some parameters used in the analyses are taken from the PDG (lifetime, mixing frequency)
 - Different version of the PDG, depending when the analysis was completed. How should we report these values?

Stylistic issues and open questions

- Use a common format for the tables (EPJC)
 - Where we should put the tables (top/bottom/middle of the page?)
- I understand that we cannot have the same format for the plots, so I suggest to put the minimal number of plots:
 - Avoid to include the plots for the same analysis from Babar and Belle
 - By the way, same considerations for position of the plots as in the tables
- It is not clear to me how we should merge the Babar and Belle results in the text?
 - Table with two columns? Two different sub-sections?
 - Describe similarities and difference in the analyses? (If so, any suggestion on which strategy to follow?)

Technicalities

- I can download the package in svn remotely (on my laptop) using the command:

```
svn co svn+ssh://lazzaro@noric10.slac.stanford.edu/nfs/slac/g/bflb/svn/Book
```

- Then I can use the standard svn commands remotely
- To compile I use (inside the trunk):
./pbf-make-section Phi1_or_Beta
- Is there any command to clean up the files which are produced by the compilation?