PDG Meson Team

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Outline

1. Team/responsibilities
2. Activities for RPP2010
3. $c\bar{c}$ fit
4. Problems
5. Conclusions

Meson Team

Person	Affiliation	Responsibilities
Claude Amsler	Zurich	Notes
Michael Doser	CERN	Management, notes
Simon Eidelman	Novosibirsk	Literature, notes
Thomas Gutsche	Tübingen	Theory, notes
Brian Heltsley	Cornell	Notes
Juan-Jose Hernández-Rey	Valencia	Notes
Alberto Masoni	Cagliari	Notes
Sergio Navas	Granada	$c\bar{c}$ fit, notes
Claudia Patrignani	Genova	$c\bar{c}$ fit, notes
Stefan Spanier	Knoxville	Notes
Nils Törnqvist	Helsinki	Theory, notes
Graziano Venanzoni	Frascati	Notes

Responsibilities

- We are all "encoders" and "overseers" for unstable mesons (LBL terminology)
- In addition, everybody takes care of specific J^{PC} (vectors, scalars, heavy quark, ... states)
- We are also authors and reviewers of our minireviews
- Regular meetings at CERN twice a year (autumn, spring)

Notes – I

- Papers selected (literature search every 2 months) are assigned to a first reader who writes a note specifying what and how should go to the database
- The first reader sends the note to a randomly selected second reader who adds his/her criticism and comments. Iterations continue until both readers agree
- The note approved by both readers is sent to Piotr
  to be implemented in the database
- The reader check the input
- In special cases, the whole group discusses the subject

Notes – II

There are three types of papers:

- There are data to quote – a usual note is written
- No data to quote, but may be useful for some minireview –
  a brief note to keep trace of the paper. Goes to a special ORP (Other related papers) file regularly checked by the minireview authors,
  but NOT to the database. This system replaced the old one
  with (often numerous) ORP's going to the database.
  A big flow of theory/phenomenology papers,
  reduce the length of the Book!
- "Useless" (selected by mistake) – declared empty

Activities for RPP10

- 300 papers selected (302 in 2008)
- 684 (794) new measurements:
  1. 161 (261) – unflavored mesons
  2. 12 (19) – other mesons
  3. 17 (27) – strange mesons
  4. 34 (39) – charmed mesons
  5. 300 (396) – $c\bar{c}$ mesons
  6. 160 (52) – $b\bar{b}$ mesons
- 16 minireviews and notes in the listings:
  (6 updated, 3 unchanged, 7 old hidden)

$c\bar{c}$ Fit – I

- Experiments measure a product (or a ratio) of the branching ratios, often involving more than one particle
- Values quoted by experiments are often based on RPP averages rather than direct measurements ⇒ Hidden non-trivial correlations
- RPP02 introduced a new fit using directly measured quantities ⇒ cross-particle fit, non-standard procedure, standalone fit
- When a branching fraction is measured in different products/ratios, it is necessary to include it as a new fit parameter
- New measurements of branching fractions by different techniques can result in reentering old measurements in the database

$c\bar{c}$ Fit – II

- The fit originally done by hand is now performed at LBNL, special thanks to Piotr and Orin!
- A separate minireview is describing a new fit providing all details (a correlation matrix) and should be updated for each edition
- Today it covers $\psi(2S)$ and $\chi_{cJ}(1P)$. In 2010 the fit includes 4 total widths, 1 partial width, 24 combinations of partial widths, 7 branching ratios, 75 combinations of $\mathcal{B}$ (52 involve more than one particle), 213 measurements and 47 parameters determined
- A necessity to include new particles can soon appear (e.g., J/ψ and η_c)

Problems

- No data entered directly,
  The new PDG software will soon change that
- Proofreading incomplete (no ideograms)
- Some features of the relational database missing
- Cross-particle fitting limited
- Limited automatic rescaling
- Should current structure of the entries be expanded
  to take into account new "properties"?
- New $c\bar{c}$ states are referred to as X, Y, Z by the community, but are required to be X(mass) by PDG until J^{PC} are known

Conclusions

- Still very active and expanding field
- Enormous luminosity of B-factories gives access to hadronic systems with different quantum numbers: radiative return – $J^{PC} = 1^{--}$, 2γ production – $J^{PC} = 0^{--},\ 0^{-+}, 2^{++}, \ldots$ double charmonium production, B decays
- BaBar and Belle collected large $\int Ldt$ at $\Upsilon(1,2,3,4,5S)$, Super-KEKB and Super-B coming
- CLEO-c and BESII – a huge flow of results on regular $c\bar{c}$ states
- BES-III has just started
- VEPP-2M still provides results on the $\rho,\ \omega,\ \phi$, VEPP-2000 started in 2009, KLOE continues analysis, DAFNE-II discussed
- In the more distant future – Gluex (JLAB), PANDA (GSI)
- LHC experiments will be helpful, particularly for $c\bar{c},\ b\bar{b}$