

GROUND-STATE D MESONS (D^+ , D^0 , D_s^+)

New in the 2006 Review:

<i>BABAR</i>	5	}	48 PAPERS	{	semileptonic	10
<i>BELLE</i>	4				leptonic and f_D	3
<i>BES</i>	5				Cabibbo allowed	4
<i>CDF</i>	2				Cabibbo suppressed	10
<i>CHORUS</i>	2				rare or forbidden	4
<i>CLEO</i>	14				Dalitz plot	5
<i>FOCUS</i>	15				mixing	7
<i>HERA-B</i>	1				other	5

(Some papers contribute to more than one category—for example, Cabibbo allowed and Dalitz plot—but only one entry is given per paper.)

Major improvements, brought on by better data and recommendations by Patricia Burchat and David Asner:

(1) There are now good Dalitz-plot analyses of several 3-body decays of D mesons, such as

$$D^0 \rightarrow K_S^0 \pi^+ \pi^- \rightarrow K_S^0 \rho^0, K^{*-} \pi^+, \text{ etc.}$$

(BABAR uses 17 amplitudes to fit this decay!) Due to interference effects, the sums of the sub-mode branching fractions don't add to one. Where we have them, we use the “fit fractions” obtained from such analyses, and no longer use older sub-mode fractions obtained from invariant-mass projections. This is rather like the 1960's, when resonances were often first seen in total cross sections and invariant-mass plots. With better data, partial-wave and Dalitz-plot analyses made these first results obsolete.

This change means that the Summary Table no longer gives a $D^0 \rightarrow K^{*-} \pi^+$ branching fraction, but instead gives the $D^0 \rightarrow K^{*-} \pi^+ \rightarrow K_S^0 \pi^+ \pi^-$ fraction as a sub-mode of $D^0 \rightarrow K_S^0 \pi^+ \pi^-$, and the $D^0 \rightarrow K^{*-} \pi^+ \rightarrow K^- \pi^0 \pi^+$ fraction as a sub-mode of $D^0 \rightarrow K^- \pi^0 \pi^+$.

This change and the next one required a lot of mark-up of the Data Listings and a lot of work by Piotr.

(2) In D decays with a K_S^0 , the assumption used to be that the K_S^0 was born as the Cabibbo-favored \bar{K}^0 rather than as the doubly Cabibbo-suppressed K^0 . However, interference between the two amplitudes can invalidate this assumption by a few percent. Thus, for all the well-measured branching fractions with a K_S^0 , which we used to list as \bar{K}^0 modes, we now list as K_S^0 modes (dividing the old \bar{K}^0 branching fractions by two).

(3) A note on “Dalitz-Plot Analysis Formalism,” written by David Asner, was added in the Data Listings. This accompanies the note, “Review of Charm Dalitz-Plot Analyses,” also written by Asner, which discusses what is presently known experimentally.

BARYONS ($p \rightarrow \Omega^-$, $N^* \rightarrow \Omega^*$, charm baryons, pentaquarks)

New in the 2006 Review:

$p \rightarrow \Omega^-$	16	}	63 PAPERS
$N^* \rightarrow \Omega^*$	9		
charm baryons	13		
pentaquarks	25 (mostly negative)		

ISSUES (not many):

• The neutron lifetime—A new measurement of the neutron lifetime is 6.5 standard deviations from our average of previous results, and 5.6 standard deviations from the previous most precise result. What to do? (The neutron lifetime is an important number!) I pointed out the discrepancy in a footnote to the value, left the value OUT of the average, and put in the header note to the lifetime this statement:

“The most recent result, that of SEREBROV 05, is so far from other results that it makes no sense to include it in the average. It is up to workers in this field to resolve this issue. Until this major disagreement is understood, our present average of 885.7 ± 0.8 s must be suspect.”

After some discussion, the authors of SEREBROV 05 agreed to this treatment. So did my advisor on the neutron, Stuart Freedman.

• Exotic baryons

- ▷ Martian canals DEAD
- ▷ Piltdown Man DEAD
- ▷ N rays DEAD
- ▷ Anomalous water DEAD
- ▷ Cold fusion DEAD
- ▷ Bigfoot DEAD(?)
- ▷ PENTAQUARKS DEAD