# Meson Full Listings

## $D^0$

### CONSTRAINED FIT INFORMATION

An overall fit to 47 branching ratios uses 102 measurements and one constraint to determine 26 parameters. The overall fit has a $\chi^2 = 50.6$ for 77 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{total}$. The fit constrains the $x_i$ whose labels appear in this array to sum to one.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $x_9$ | 17 | | | | | | | | | |
| $x_{20}$ | 11 | 3 | | | | | | | | |
| $x_{21}$ | 63 | 27 | 11 | | | | | | | |
| $x_{22}$ | 10 | 3 | 42 | 13 | | | | | | |
| $x_{23}$ | 11 | 4 | 52 | 15 | 80 | | | | | |
| $x_{31}$ | 19 | 8 | 15 | 29 | 26 | 27 | | | | |
| $x_{39}$ | 28 | 12 | 6 | 44 | 7 | 8 | 13 | | | |
| $x_{48}$ | 8 | 3 | 35 | 11 | 53 | 66 | 18 | 7 | | |
| $x_{57}$ | 18 | 8 | 3 | 29 | 4 | 5 | 9 | 39 | 4 | |
| $x_{66}$ | 7 | 2 | 32 | 9 | 49 | 62 | 17 | 5 | 41 | 3 |
| $x_{69}$ | 7 | 3 | 33 | 10 | 70 | 63 | 19 | 5 | 42 | 3 |
| $x_{72}$ | 6 | 2 | 27 | 8 | 42 | 52 | 14 | 5 | 54 | 3 |
| $x_{75}$ | 8 | 3 | 39 | 11 | 60 | 75 | 20 | 6 | 50 | 4 |
| $x_{81}$ | 10 | 4 | 43 | 14 | 67 | 84 | 29 | 8 | 56 | 4 |
| $x_{82}$ | 9 | 4 | 16 | 13 | 34 | 29 | 42 | 6 | 20 | 4 |
| $x_{84}$ | 7 | 3 | 4 | 11 | 6 | 7 | 5 | 24 | 10 | 9 |
| $x_{88}$ | 4 | 2 | 5 | 6 | 7 | 9 | 4 | 13 | 13 | 5 |
| $x_{99}$ | 4 | 1 | 15 | 5 | 24 | 30 | 8 | 3 | 45 | 2 |
| $x_{107}$ | 6 | 2 | 4 | 9 | 7 | 7 | 27 | 4 | 5 | 3 |
| $x_{118}$ | 35 | 15 | 6 | 55 | 8 | 9 | 16 | 24 | 6 | 16 |
| $x_{119}$ | 4 | 2 | 11 | 6 | 17 | 22 | 7 | 3 | 14 | 2 |
| $x_{120}$ | 8 | 3 | 28 | 11 | 43 | 53 | 15 | 6 | 35 | 3 |
| $x_{124}$ | 7 | 3 | 23 | 10 | 36 | 45 | 13 | 5 | 30 | 3 |
| $x_{137}$ | 5 | 2 | 23 | 6 | 35 | 44 | 12 | 4 | 29 | 2 |
| $x_{154}$ | −29 | −19 | −49 | −38 | −70 | −82 | −55 | −32 | −76 | −24 |
| | $x_8$ | $x_9$ | $x_{20}$ | $x_{21}$ | $x_{22}$ | $x_{23}$ | $x_{31}$ | $x_{39}$ | $x_{48}$ | $x_{57}$ |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $x_{69}$ | 39 | | | | | | | | | |
| $x_{72}$ | 32 | 33 | | | | | | | | |
| $x_{75}$ | 31 | 48 | 39 | | | | | | | |
| $x_{81}$ | 51 | 53 | 43 | 63 | | | | | | |
| $x_{82}$ | 18 | 24 | 15 | 22 | 27 | | | | | |
| $x_{84}$ | 4 | 5 | 5 | 5 | 6 | 3 | | | | |
| $x_{88}$ | 6 | 6 | 7 | 7 | 8 | 3 | 4 | | | |
| $x_{99}$ | 18 | 19 | 24 | 22 | 25 | 9 | 4 | 6 | | |
| $x_{107}$ | 5 | 5 | 4 | 6 | 8 | 11 | 1 | 1 | 2 | |
| $x_{118}$ | 5 | 6 | 5 | 7 | 8 | 8 | 6 | 4 | 3 | 5 |
| $x_{119}$ | 13 | 14 | 11 | 16 | 18 | 7 | 2 | 2 | 6 | 2 |
| $x_{120}$ | 33 | 34 | 28 | 40 | 44 | 16 | 4 | 5 | 16 | 4 |
| $x_{124}$ | 27 | 28 | 23 | 33 | 37 | 13 | 4 | 4 | 13 | 4 |
| $x_{137}$ | 27 | 28 | 23 | 33 | 36 | 13 | 3 | 4 | 13 | 3 |
| $x_{154}$ | −51 | −56 | −55 | −62 | −74 | −44 | −20 | −25 | −39 | −25 |
| | $x_{66}$ | $x_{69}$ | $x_{72}$ | $x_{75}$ | $x_{81}$ | $x_{82}$ | $x_{84}$ | $x_{88}$ | $x_{99}$ | $x_{107}$ |

| | | | | | |
|---|---|---|---|---|---|
| $x_{119}$ | 7 | | | | |
| $x_{120}$ | 6 | 12 | | | |
| $x_{124}$ | 6 | 10 | 24 | | |
| $x_{137}$ | 4 | 9 | 23 | 19 | |
| $x_{154}$ | −22 | −19 | −46 | −39 | −37 |
| | $x_{118}$ | $x_{119}$ | $x_{120}$ | $x_{124}$ | $x_{137}$ |

### $D^0$ BRANCHING RATIOS

See the "Note on $D$ Meson Branching Fractions" and the "Note on Semileptonic Decays of $D$ and $B$ Mesons," in the $D^\pm$ Listings.

Some older, now obsolete results have been omitted from these Listings. They may be found in our 1990 edition (Phys. Lett. **B239**).

#### Inclusive modes

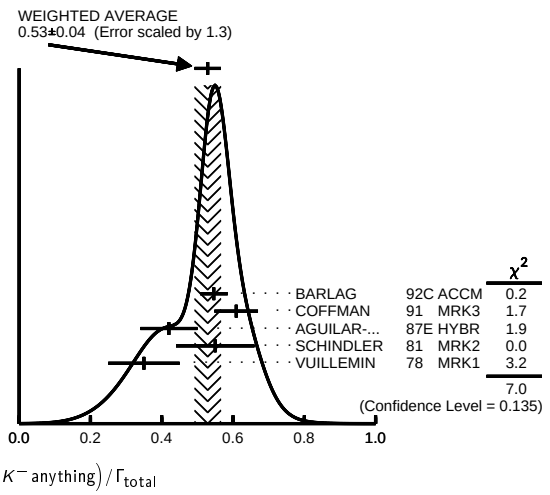
**$\Gamma(e^+ \text{anything})/\Gamma_{total}$** — **$\Gamma_1/\Gamma$**

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.077±0.012 OUR AVERAGE** | | Error includes scale factor of 1.1. | | | |
| 0.15 ±0.05 | | AGUILAR-... | 87E | HYBR | $\pi p$, $pp$ 360, 400 GeV |
| 0.075±0.011±0.004 | 137 | BALTRUSAIT...85B | | MRK3 | $e^+e^-$ 3.77 GeV |
| 0.055±0.037 | 12 | SCHINDLER | 81 | MRK2 | $e^+e^-$ 3.771 GeV |

**$\Gamma(K^- \text{anything})/\Gamma_{total}$** — **$\Gamma_3/\Gamma$**

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.53 ±0.04 OUR AVERAGE** | | Error includes scale factor of 1.3. See the ideogram below. | | | |
| $0.546^{+0.039}_{-0.038}$ | | [12] BARLAG | 92C | ACCM | $\pi^-$ Cu 230 GeV |
| 0.609±0.032±0.052 | | COFFMAN | 91 | MRK3 | $e^+e^-$ 3.77 GeV |
| 0.42 ±0.08 | | AGUILAR-... | 87E | HYBR | $\pi p$, $pp$ 360, 400 GeV |
| 0.55 ±0.11 | 121 | SCHINDLER | 81 | MRK2 | $e^+e^-$ 3.771 GeV |
| 0.35 ±0.10 | 19 | VUILLEMIN | 78 | MRK1 | $e^+e^-$ 3.772 GeV |

[12] BARLAG 92C computes the branching fraction using topological normalization.




**$[\Gamma(\overline{K}^0 \text{anything}) + \Gamma(K^0 \text{anything})]/\Gamma_{total}$** — **$\Gamma_4/\Gamma$**

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.42 ±0.05 OUR AVERAGE** | | | | | |
| 0.455±0.050±0.032 | | COFFMAN | 91 | MRK3 | $e^+e^-$ 3.77 GeV |
| 0.29 ±0.11 | 13 | SCHINDLER | 81 | MRK2 | $e^+e^-$ 3.771 GeV |
| 0.57 ±0.26 | 6 | VUILLEMIN | 78 | MRK1 | $e^+e^-$ 3.772 GeV |

**$\Gamma(K^+ \text{anything})/\Gamma_{total}$** — **$\Gamma_5/\Gamma$**

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **$0.034^{+0.006}_{-0.004}$ OUR AVERAGE** | | | | | |
| $0.034^{+0.007}_{-0.005}$ | | [13] BARLAG | 92C | ACCM | $\pi^-$ Cu 230 GeV |
| 0.028±0.009±0.004 | | COFFMAN | 91 | MRK3 | $e^+e^-$ 3.77 GeV |
| $0.03^{+0.05}_{-0.02}$ | | AGUILAR-... | 87E | HYBR | $\pi p$, $pp$ 360, 400 GeV |
| 0.08 ±0.03 | 25 | SCHINDLER | 81 | MRK2 | $e^+e^-$ 3.771 GeV |

[13] BARLAG 92C computes the branching fraction using topological normalization.

#### Semileptonic modes

**$\Gamma(K^- \text{"}e^+\text{"} \nu_e)/\Gamma_{total}$** — **$\Gamma_7/\Gamma$**

We average our $K^- e^+ \nu_e$ and $K^- \mu^+ \nu_\mu$ branching fractions, multiplying the latter by a phase-space factor of 1.03 to be able to use it with the $K^- e^+ \nu_e$ fraction.

| VALUE | DOCUMENT ID | | COMMENT |
|---|---|---|---|
| **0.0368±0.0021 OUR AVERAGE** | Error includes scale factor of 1.1. | | |
| 0.0380±0.0022 | PDG | 94 | Our $\Gamma(K^- e^+ \nu_e)/\Gamma_{total}$ |
| 0.033 ±0.004 | PDG | 94 | 1.03 × our $\Gamma(K^- \mu^+ \nu_\mu)/\Gamma_{total}$ |

**$\Gamma(K^- e^+ \nu_e)/\Gamma_{total}$** — **$\Gamma_8/\Gamma$**

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.0380±0.0022 OUR FIT** | | Error includes scale factor of 1.1. | | | |
| **0.034 ±0.005 ±0.004** | 55 | [14] ADLER | 89 | MRK3 | $e^+e^-$ 3.77 GeV |

[14] Experiment gives $|V_{cd}/V_{cs}|^2 = 0.057^{+0.038}_{-0.015} \pm 0.005$.