# $D^*(2007)^0$

$I(J^P) = \frac{1}{2}(1^-)$
$I$, $J$, $P$ need confirmation.

$J$ consistent with 1, value 0 ruled out (NGUYEN 77).

## $D^*(2007)^0$ MASS

The fit includes $D^{\pm}$, $D^0$, $D_s^{\pm}$, $D^{*\pm}$, $D^{*0}$, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

| VALUE (MeV) | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|
| **2006.85±0.05 OUR FIT** Error includes scale factor of 1.1. | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | |
| 2006 ±1.5 | [1] GOLDHABER 77 | MRK1 | $e^+e^-$ |

[1] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, $D^+$, and $D^0$.

## $m_{D^*(2007)^0} - m_{D^0}$

The fit includes $D^{\pm}$, $D^0$, $D_s^{\pm}$, $D^{*\pm}$, $D^{*0}$, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^{\pm}$ mass and mass difference measurements.

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **142.016±0.030 OUR FIT** Error includes scale factor of 1.5. | | | | |
| **142.016±0.030 OUR AVERAGE** Error includes scale factor of 1.5. | | | | |
| 142.007±0.015±0.014 | 10K | [2] TOMARADZE 15 | CLEO | $e^+e^- \rightarrow$ hadrons |
| 142.2 ±0.3 ±0.2 | 145 | ALBRECHT 95F | ARG | $e^+e^- \rightarrow$ hadrons |
| 142.12 ±0.05 ±0.05 | 1176 | BORTOLETTO 92B | CLE2 | $e^+e^- \rightarrow$ hadrons |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | |
| 142.2 ±2.0 | | SADROZINSKI 80 | CBAL | $D^{*0} \rightarrow D^0\pi^0$ |
| 142.7 ±1.7 | | [3] GOLDHABER 77 | MRK1 | $e^+e^-$ |

[2] Obtained by analyzing CLEO-c data but not authored by the CLEO Collaboration . This value comes from the average of the results for two decay modes, $D^0 \rightarrow K^-\pi^+$ and $D^0 \rightarrow K^-\pi^+\pi^-\pi^+$.

[3] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, $D^+$, and $D^0$.

## $D^*(2007)^0$ WIDTH

| VALUE (MeV) | CL% | DOCUMENT ID | TECN | COMMENT |
|---|---|---|---|---|
| **<2.1** | 90 | [4] ABACHI 88B | HRS | $D^{*0} \rightarrow D^+\pi^-$ |

[4] Assuming $m_{D^{*0}} = 2007.2 \pm 2.1$ MeV/$c^2$.

## $D^*(2007)^0$ DECAY MODES

$\overline{D}^*(2007)^0$ modes are charge conjugates of modes below.

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $D^0\pi^0$ | (64.7±0.9) % |
| $\Gamma_2$ | $D^0\gamma$ | (35.3±0.9) % |

## CONSTRAINED FIT INFORMATION

An overall fit to 2 branching ratios uses 5 measurements and one constraint to determine 2 parameters. The overall fit has a $\chi^2 = 2.5$ for 4 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, $x_i \equiv \Gamma_i/\Gamma_{\text{total}}$. The fit constrains the $x_i$ whose labels appear in this array to sum to one.

| | |
|---|---|
| $x_2$ | −100 |
| | $x_1$ |

## $D^*(2007)^0$ BRANCHING RATIOS

### $\Gamma(D^0\pi^0)/\Gamma(D^0\gamma)$ $\Gamma_1/\Gamma_2$

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1.83±0.07 OUR FIT** | Error includes scale factor of 1.1. | | | | |
| **1.85±0.07 OUR AVERAGE** | | | | | |
| 1.90±0.07±0.05 | 4.9k | ABLIKIM | 15B | BES3 | 10.6 $e^+e^-$ → hadrons |
| 1.74±0.02±0.13 | | AUBERT,BE | 05G | BABR | 10.6 $e^+e^-$ → hadrons |

### $\Gamma(D^0\pi^0)/\Gamma_{\text{total}}$ $\Gamma_1/\Gamma$

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.647±0.009 OUR FIT** | | | | | |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.655±0.008±0.005 | 3.2k | [5] ABLIKIM | 15B | BES3 | $e^+e^-$ → hadrons |
| 0.635±0.003±0.017 | 69k | [5] AUBERT,BE | 05G | BABR | 10.6 $e^+e^-$ → hadrons |
| 0.596±0.035±0.028 | 858 | [6] ALBRECHT | 95F | ARG | $e^+e^-$ → hadrons |
| 0.636±0.023±0.033 | 1097 | [6] BUTLER | 92 | CLE2 | $e^+e^-$ → hadrons |

### $\Gamma(D^0\gamma)/\Gamma_{\text{total}}$ $\Gamma_2/\Gamma$

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **0.353±0.009 OUR FIT** | | | | | |
| **0.381±0.029 OUR AVERAGE** | | | | | |
| 0.404±0.035±0.028 | 456 | [6] ALBRECHT | 95F | ARG | $e^+e^-$ → hadrons |
| 0.364±0.023±0.033 | 621 | [6] BUTLER | 92 | CLE2 | $e^+e^-$ → hadrons |
| 0.37 ±0.08 ±0.08 | | ADLER | 88D | MRK3 | $e^+e^-$ |

• • • We do not use the following data for averages, fits, limits, etc. • • •

| | | | | | | |
|---|---|---|---|---|---|---|
| $0.345 \pm 0.008 \pm 0.005$ | 1.8k | [5] | ABLIKIM | 15B | BES3 | $e^+e^- \rightarrow$ hadrons |
| $0.365 \pm 0.003 \pm 0.017$ | 68k | [5] | AUBERT,BE | 05G | BABR | 10.6 $e^+e^- \rightarrow$ hadrons |
| $0.47 \pm 0.23$ | | | LOW | 87 | HRS | 29 GeV $e^+e^-$ |
| $0.53 \pm 0.13$ | | | BARTEL | 85G | JADE | $e^+e^-$, hadrons |
| $0.47 \pm 0.12$ | | | COLES | 82 | MRK2 | $e^+e^-$ |
| $0.45 \pm 0.15$ | | | GOLDHABER | 77 | MRK1 | $e^+e^-$ |

[5] Derived from the ratio $\Gamma(D^0\pi^0)$ / $\Gamma(D^0\gamma)$ assuming that the branching fractions of $D^{*0} \rightarrow D^0\pi^0$ and $D^{*0} \rightarrow D^0\gamma$ decays sum to 100%

[6] The BUTLER 92 and ALBRECHT 95F branching ratios are not independent, they have been constrained by the authors to sum to 100%.

## $D^*(2007)^0$ REFERENCES


| | | | | |
|---|---|---|---|---|
| ABLIKIM | 15B | PR D91 031101 | M. Ablikim *et al.* | (BES III Collab.) |
| TOMARADZE | 15 | PR D91 011102 | A. Tomaradze *et al.* | (NWES) |
| AUBERT,BE | 05G | PR D72 091101 | B. Aubert *et al.* | (BABAR Collab.) |
| ALBRECHT | 95F | ZPHY C66 63 | H. Albrecht *et al.* | (ARGUS Collab.) |
| BORTOLETTO | 92B | PRL 69 2046 | D. Bortoletto *et al.* | (CLEO Collab.) |
| BUTLER | 92 | PRL 69 2041 | F. Butler *et al.* | (CLEO Collab.) |
| ABACHI | 88B | PL B212 533 | S. Abachi *et al.* | (ANL, IND, MICH, PURD+) |
| ADLER | 88D | PL B208 152 | J. Adler *et al.* | (Mark III Collab.) |
| LOW | 87 | PL B183 232 | E.H. Low *et al.* | (HRS Collab.) |
| BARTEL | 85G | PL 161B 197 | W. Bartel *et al.* | (JADE Collab.) |
| COLES | 82 | PR D26 2190 | M.W. Coles *et al.* | (LBL, SLAC) |
| SADROZINSKI | 80 | Madison Conf. 681 | H.F.W. Sadrozinski *et al.* | (PRIN, CIT+) |
| GOLDHABER | 77 | PL 69B 503 | G. Goldhaber *et al.* | (Mark I Collab.) |
| NGUYEN | 77 | PRL 39 262 | H.K. Nguyen *et al.* | (LBL, SLAC) J |