$D^*(2007)^0$

$I(J^P) = \frac{1}{2}(1^-)$

$J^P = 1^-$ established by ABLIKIM 23AZ.

$D^*(2007)^0$ 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
142.014±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	[1] TOMARADZE 15	CLEO	$e^+e^- \to$ hadrons
142.2 ±0.3 ±0.2	145	ALBRECHT 95F	ARG	$e^+e^- \to$ hadrons
142.12 ±0.05 ±0.05	1176	BORTOLETTO 92B	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
142.2 ±2.0		SADROZINSKI 80	CBAL	$D^{*0} \to D^0\pi^0$
142.7 ±1.7		[2] GOLDHABER 77	MRK1	e^+e^-

[1] 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, $D^0 \to K^-\pi^+$ and $D^0 \to K^-\pi^+\pi^-\pi^+$.

[2] 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	[1] ABACHI 88B	HRS	$D^{*0} \to D^+\pi^-$

[1] 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 (Γ_i/Γ)	Confidence level
Γ_1	$D^0\pi^0$	(64.7 ±0.9) %	
Γ_2	$D^0\gamma$	(35.3 ±0.9) %	
Γ_3	$D^0 e^+ e^-$	(3.91±0.33) × 10^{-3}	
Γ_4	$\mu^+\mu^-$	< 2.5 × 10^{-8}	90%
Γ_5	$e^+ e^-$	< 1.7 × 10^{-6}	90%

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 $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, 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

$\Gamma(D^0\pi^0)/\Gamma_{\text{total}}$ Γ_1/Γ

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	[1] ABLIKIM	15B	BES3	$e^+e^- \to$ hadrons
0.635±0.003±0.017	69k	[1] AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons
0.596±0.035±0.028	858	[2] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.636±0.023±0.033	1097	[2] BUTLER	92	CLE2	$e^+e^- \to$ hadrons

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

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

$\Gamma(D^0\gamma)/\Gamma_{\text{total}}$ Γ_2/Γ

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	[1] ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.364±0.023±0.033	621	[1] BUTLER	92	CLE2	$e^+e^- \to$ 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±0.008±0.005	1.8k	[2]	ABLIKIM	15B	BES3	$e^+e^- \to$ hadrons
0.365±0.003±0.017	68k	[2]	AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons
0.47 ±0.23			LOW	87	HRS	29 GeV e^+e^-
0.53 ±0.13			BARTEL	85G	JADE	e^+e^-, hadrons
0.47 ±0.12			COLES	82	MRK2	e^+e^-
0.45 ±0.15			GOLDHABER	77	MRK1	e^+e^-

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

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

$\Gamma(D^0\pi^0)/\Gamma(D^0\gamma)$ Γ_1/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.83 ±0.07 OUR FIT					
1.85 ±0.07 OUR AVERAGE					
1.90 ±0.07 ±0.05	4.9k	ABLIKIM	15B	BES3	10.6 $e^+e^- \to$ hadrons
1.74 ±0.02 ±0.13		AUBERT,BE	05G	BABR	10.6 $e^+e^- \to$ hadrons

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

1.789±0.082	[1]	AAIJ	22N	LHCB	$B^0, B_s^0 \to \overline{D}^{*0}(K\pi,\ \pi\pi)$

[1] Statistical error only.

$\Gamma(D^0e^+e^-)/\Gamma(D^0\gamma)$ Γ_3/Γ_2

VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT
11.08±0.76±0.49	421	ABLIKIM	21BD	BES3	4.178 GeV e^+e^-

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$ Γ_4/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.5\times10^{-8}$	90	[1] AAIJ	23D	LHCB	$B^- \to \pi^-\mu^+\mu^-$

[1] AAIJ 23D reports $< 2.6\times10^{-8}$ from a measurement of $[\Gamma(D^*(2007)^0 \to \mu^+\mu^-)/\Gamma_{\text{total}}] \times [\text{B}(B^+ \to \overline{D}^*(2007)^0\pi^+)]$ assuming $\text{B}(B^+ \to \overline{D}^*(2007)^0\pi^+) = (4.90 \pm 0.17)\times10^{-3}$, which we rescale to our best value $\text{B}(B^+ \to \overline{D}^*(2007)^0\pi^+) = 5.17\times10^{-3}$. The reported value also assumes $\text{B}(B^- \to J/\psi(1S)K^-) = (10.20\pm0.19)\times10^{-4}$ and $\text{B}(J/\psi(1S) \to \mu^+\mu^-) = (59.61\pm0.33)\times10^{-3}$ for the normalization mode $B^- \to J/\psi(1S)K^-$.

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$ Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.7\times10^{-6}$	90	SHEMYAKIN	20	CMD3	$e^+e^- \to D^0\pi^0,\ D^0\gamma$

$D^*(2007)^0$ REFERENCES

AAIJ	23D	EPJ C83 666	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	23AZ	PL B846 138245	M. Ablikim *et al.*	(BESIII Collab.) JP
AAIJ	22N	PR D105 072005	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	21BD	PR D104 112012	M. Ablikim *et al.*	(BESIII Collab.)
SHEMYAKIN	20	PAN 83 954	D.N. Shemyakin	(CMD-3 Collab.)
ABLIKIM	15B	PR D91 031101	M. Ablikim *et al.*	(BESIII 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.)