

$D^*(2007)^0$

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

 $J^P = 1^-$ 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	$e^+e^- \rightarrow$ hadrons
142.2 ±0.3 ±0.2	145	ALBRECHT 95F	ARG	$e^+e^- \rightarrow$ hadrons
142.12 ±0.05 ±0.05	1176	BORTOLETTO92B	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		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, $D^0 \rightarrow K^- \pi^+$ and $D^0 \rightarrow K^- \pi^+ \pi^- \pi^+$.				
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	$D^{*0} \rightarrow D^+ \pi^-$
¹ Assuming $m_{D^{*0}} = 2007.2 \pm 2.1$ MeV/ c^2 .				

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

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

Mode	Fraction (Γ_i/Γ)	Confidence level
$\Gamma_1 \quad D^0 \pi^0$	(64.7 \pm 0.9) %	
$\Gamma_2 \quad D^0 \gamma$	(35.3 \pm 0.9) %	
$\Gamma_3 \quad D^0 e^+ e^-$	(3.91 \pm 0.33) $\times 10^{-3}$	
$\Gamma_4 \quad \mu^+ \mu^-$	< 2.5 $\times 10^{-8}$	90%
$\Gamma_5 \quad e^+ e^-$	< 1.7 $\times 10^{-6}$	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 $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$, 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.

$$x_2 \begin{vmatrix} & -100 \\ & \\ & \\ & \\ & \end{vmatrix} x_1$$

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

$\Gamma(D^0 \pi^0) / \Gamma_{\text{total}}$					Γ_1 / Γ
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.647\pm0.009 OUR FIT					

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

0.655 \pm 0.008 \pm 0.005	3.2k	¹ ABLIKIM	15B BES3	$e^+ e^- \rightarrow$ hadrons
0.635 \pm 0.003 \pm 0.017	69k	¹ AUBERT,BE	05G BABR	10.6 $e^+ e^- \rightarrow$ hadrons
0.596 \pm 0.035 \pm 0.028	858	² ALBRECHT	95F ARG	$e^+ e^- \rightarrow$ hadrons
0.636 \pm 0.023 \pm 0.033	1097	² BUTLER	92 CLE2	$e^+ e^- \rightarrow$ hadrons

¹ 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%.

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
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	
0.353\pm0.009 OUR FIT					

0.381 \pm 0.029 OUR AVERAGE

0.404 \pm 0.035 \pm 0.028	456	¹ ALBRECHT	95F ARG	$e^+ e^- \rightarrow$ hadrons
0.364 \pm 0.023 \pm 0.033	621	¹ BUTLER	92 CLE2	$e^+ e^- \rightarrow$ hadrons
0.37 \pm 0.08 \pm 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	$e^+e^- \rightarrow$ hadrons
0.365 ± 0.003 ± 0.017	68k	² AUBERT, BE	05G	BABR	10.6 $e^+e^- \rightarrow$ 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 $D^{*0} \rightarrow D^0\pi^0$ and $D^{*0} \rightarrow D^0\gamma$ 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 $e^+e^- \rightarrow$ hadrons
1.74 ± 0.02 ± 0.13		AUBERT, BE	05G	BABR	10.6 $e^+e^- \rightarrow$ hadrons

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

1.789 ± 0.082		¹ AAIJ	22N	LHCB	$B^0, B_s^0 \rightarrow \bar{D}^{*0}(K\pi, \pi\pi)$
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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 × 10⁻⁸	90	¹ AAIJ	23D	LHCB $B^- \rightarrow \pi^- \mu^+ \mu^-$

¹ AAIJ 23D reports $< 2.6 \times 10^{-8}$ from a measurement of $[\Gamma(D^{*(2007)0} \rightarrow \mu^+\mu^-) / \Gamma_{\text{total}}] \times [B(B^+ \rightarrow \bar{D}^{*(2007)0}\pi^+)]$ assuming $B(B^+ \rightarrow \bar{D}^{*(2007)0}\pi^+) = (4.90 \pm 0.17) \times 10^{-3}$, which we rescale to our best value $B(B^+ \rightarrow \bar{D}^{*(2007)0}\pi^+) = 5.17 \times 10^{-3}$. The reported value also assumes $B(B^- \rightarrow J/\psi(1S)K^-) = (10.20 \pm 0.19) \times 10^{-4}$ and $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = (59.61 \pm 0.33) \times 10^{-3}$ for the normalization mode $B^- \rightarrow J/\psi(1S)K^-$.

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

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 1.7 × 10⁻⁶	90	SHEMYAKIN	20	CMD3 $e^+e^- \rightarrow D^0\pi^0, D^0\gamma$

$D^*(2007)^0$ REFERENCES

AAIJ	23D	EPJ C83 666	R. Aaij <i>et al.</i>	(LHCb Collab.)
ABLIKIM	23AZ	PL B846 138245	M. Ablikim <i>et al.</i>	(BESIII Collab.) JP
AAIJ	22N	PR D105 072005	R. Aaij <i>et al.</i>	(LHCb Collab.)
ABLIKIM	21BD	PR D104 112012	M. Ablikim <i>et al.</i>	(BESIII Collab.)
SHEMYAKIN	20	PAN 83 954	D.N. Shemyakin	(CMD-3 Collab.)
ABLIKIM	15B	PR D91 031101	M. Ablikim <i>et al.</i>	(BESIII Collab.)
TOMARADZE	15	PR D91 011102	A. Tomaradze <i>et al.</i>	(NWES)
AUBERT,BE	05G	PR D72 091101	B. Aubert <i>et al.</i>	(BABAR Collab.)
ALBRECHT	95F	ZPHY C66 63	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
BORTOLETTO	92B	PRL 69 2046	D. Bortoletto <i>et al.</i>	(CLEO Collab.)
BUTLER	92	PRL 69 2041	F. Butler <i>et al.</i>	(CLEO Collab.)
ABACHI	88B	PL B212 533	S. Abachi <i>et al.</i>	(ANL, IND, MICH, PURD+)
ADLER	88D	PL B208 152	J. Adler <i>et al.</i>	(Mark III Collab.)
LOW	87	PL B183 232	E.H. Low <i>et al.</i>	(HRS Collab.)
BARTEL	85G	PL 161B 197	W. Bartel <i>et al.</i>	(JADE Collab.)
COLES	82	PR D26 2190	M.W. Coles <i>et al.</i>	(LBL, SLAC)
SADROZINSKI	80	Madison Conf. 681	H.F.W. Sadrozinski <i>et al.</i>	(PRIN, CIT+)
GOLDHABER	77	PL 69B 503	G. Goldhaber <i>et al.</i>	(Mark I Collab.)
