$D^*(2010)^\pm$

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

$D^*(2010)^\pm$ 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*	*CHG*	*COMMENT*
2010.26±0.07 OUR FIT Error includes scale factor of 1.1.				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2008 ±3	[1] GOLDHABER 77	MRK1	±	e^+e^-
2008.6 ±1.0	[2] PERUZZI 77	LGW	±	e^+e^-

[1] From simultaneous fit to $D^*(2010)^+$, $D^*(2007)^0$, D^+, and D^0; not independent of FELDMAN 77B mass difference below.
[2] PERUZZI 77 mass not independent of FELDMAN 77B mass difference below and PERUZZI 77 D^0 mass value.

$m_{D^*(2010)^+} - m_{D^+}$

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*
140.66±0.08 OUR FIT				
140.64±0.08±0.06	620	BORTOLETTO92B	CLE2	$e^+e^- \rightarrow$ hadrons

$m_{D^*(2010)^+} - m_{D^0}$

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*
145.4257±0.0017 OUR FIT				
145.4258±0.0020 OUR AVERAGE Error includes scale factor of 1.2.				
145.4259±0.0004±0.0017	312.8k	LEES 13X	BABR	$D^{*\pm} \rightarrow D^0\pi^\pm \rightarrow (K\pi, K3\pi)\pi^\pm$
145.412 ±0.002 ±0.012		ANASTASSOV 02	CLE2	$D^{*\pm} \rightarrow D^0\pi^\pm \rightarrow (K\pi)\,\pi^\pm$
145.54 ±0.08	611	[3] ADINOLFI 99	BEAT	$D^{*\pm} \rightarrow D^0\pi^\pm$
145.45 ±0.02		[3] BREITWEG 99	ZEUS	$D^{*\pm} \rightarrow D^0\pi^\pm \rightarrow (K\pi)\pi^\pm$
145.42 ±0.05		[3] BREITWEG 99	ZEUS	$D^{*\pm} \rightarrow D^0\pi^\pm \rightarrow (K^-3\pi)\pi^\pm$
145.5 ±0.15	103	[4] ADLOFF 97B	H1	$D^{*\pm} \rightarrow D^0\pi^\pm$
145.44 ±0.08	152	[4] BREITWEG 97	ZEUS	$D^{*\pm} \rightarrow D^0\pi^\pm$, $D^0 \rightarrow K^-3\pi$
145.42 ±0.11	199	[4] BREITWEG 97	ZEUS	$D^{*\pm} \rightarrow D^0\pi^\pm$, $D^0 \rightarrow K^-\pi^+$

145.4	±0.2		48	[4] DERRICK	95	ZEUS	$D^{*\pm} \to D^0 \pi^\pm$	
145.39	±0.06	±0.03		BARLAG	92B	ACCM	π^- 230 GeV	
145.5	±0.2		115	[4] ALEXANDER	91B	OPAL	$D^{*\pm} \to D^0 \pi^\pm$	
145.30	±0.06			[4] DECAMP	91J	ALEP	$D^{*\pm} \to D^0 \pi^\pm$	
145.40	±0.05	±0.10		ABACHI	88B	HRS	$D^{*\pm} \to D^0 \pi^\pm$	
145.46	±0.07	±0.03		ALBRECHT	85F	ARG	$D^{*\pm} \to D^0 \pi^+$	
145.5	±0.3		28	BAILEY	83	SPEC	$D^{*\pm} \to D^0 \pi^\pm$	
145.5	±0.3		60	FITCH	81	SPEC	π^- A	
145.3	±0.5		30	FELDMAN	77B	MRK1	$D^{*+} \to D^0 \pi^+$	
• • • We do not use the following data for averages, fits, limits, etc. • • •								
145.4256	±0.0006	±0.0017	138.5k	LEES	13X	BABR	$D^{*\pm} \to D^0 \pi^\pm \to (K^- \pi^+)\pi^\pm$	
145.4266	±0.0005	±0.0019	174.3k	LEES	13X	BABR	$D^{*\pm} \to D^0 \pi^\pm \to (K^- 2\pi^+ \pi^-)\pi^\pm$	
145.44	±0.09		122	[4] BREITWEG	97B	ZEUS	$D^{*\pm} \to D^0 \pi^\pm$, $D^0 \to K^- \pi^+$	
145.8	±1.5		16	AHLEN	83	HRS	$D^{*+} \to D^0 \pi^+$	
145.1	±1.8		12	BAILEY	83	SPEC	$D^{*\pm} \to D^0 \pi^\pm$	
145.1	±0.5		14	BAILEY	83	SPEC	$D^{*\pm} \to D^0 \pi^\pm$	
145.5	±0.5		14	YELTON	82	MRK2	29 $e^+ e^- \to K^- \pi^+$	
∼ 145.5				AVERY	80	SPEC	γ A	
145.2	±0.6		2	BLIETSCHAU	79	BEBC	νp	

[3] Statistical errors only.
[4] Systematic error not evaluated.

$m_{D^*(2010)^+} - m_{D^*(2007)^0}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2.6±1.8	[5] PERUZZI	77	LGW	$e^+ e^-$

[5] Not independent of FELDMAN 77B mass difference above, PERUZZI 77 D^0 mass, and GOLDHABER 77 $D^*(2007)^0$ mass.

$D^*(2010)^\pm$ WIDTH

VALUE (keV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
83.4±1.8 OUR AVERAGE						
83.3±1.2± 1.4		312.8k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0 \pi^\pm \to (K\pi, K3\pi)\pi^\pm$
96 ±4 ±22			[6] ANASTASSOV	02	CLE2	$D^{*\pm} \to D^0 \pi^\pm \to (K\pi)\ \pi^\pm$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
83.4±1.7± 1.5		138.5k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0 \pi^\pm \to (K^- \pi^+)\pi^\pm$
83.2±1.5± 2.6		174.3k	[6] LEES	13X	BABR	$D^{*\pm} \to D^0 \pi^\pm \to (K^- 2\pi^+ \pi^-)\pi^\pm$
<131	90	110	BARLAG	92B	ACCM	π^- 230 GeV

[6] Ignoring the electromagnetic contribution from $D^{*\pm} \to D^\pm \gamma$.

$D^*(2010)^{\pm}$ DECAY MODES

$D^*(2010)^-$ modes are charge conjugates of the modes below.

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D^0\pi^+$	(67.7±0.5) %
Γ_2	$D^+\pi^0$	(30.7±0.5) %
Γ_3	$D^+\gamma$	(1.6±0.4) %

CONSTRAINED FIT INFORMATION

An overall fit to 3 branching ratios uses 6 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 = 0.3$ 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	−62	
x_3	−43	−44
	x_1	x_2

$D^*(2010)^+$ BRANCHING RATIOS

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

VALUE	DOCUMENT ID		TECN	COMMENT
0.677 ±0.005 OUR FIT				
0.677 ±0.006 OUR AVERAGE				
0.6759±0.0029±0.0064	[7,8,9] BARTELT	98	CLE2	e^+e^-
0.688 ±0.024 ±0.013	ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.681 ±0.010 ±0.013	[7] BUTLER	92	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.57 ±0.04 ±0.04	ADLER	88D	MRK3	e^+e^-
0.44 ±0.10	COLES	82	MRK2	e^+e^-
0.6 ±0.15	[9] GOLDHABER	77	MRK1	e^+e^-

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.307 ±0.005 OUR FIT					
0.3073±0.0013±0.0062		[7,8,9] BARTELT	98	CLE2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.312 ±0.011 ±0.008	1404	ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.308 ±0.004 ±0.008	410	[7] BUTLER	92	CLE2	$e^+e^- \to$ hadrons
0.26 ±0.02 ±0.02		ADLER	88D	MRK3	e^+e^-
0.34 ±0.07		COLES	82	MRK2	e^+e^-

$\Gamma(D^+\gamma)/\Gamma_{\text{total}}$ Γ_3/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
0.016 ±0.004 OUR FIT						
0.016 ±0.005 OUR AVERAGE						
0.0168±0.0042±0.0029			[7,8] BARTELT	98	CLE2	e^+e^-
0.011 ±0.014 ±0.016		12	[7] BUTLER	92	CLE2	$e^+e^- \to$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.052	90		ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.17 ±0.05 ±0.05			ADLER	88D	MRK3	e^+e^-
0.22 ±0.12			[10] COLES	82	MRK2	e^+e^-

[7] The branching ratios are not independent, they have been constrained by the authors to sum to 100%.
[8] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.
[9] Assuming that isospin is conserved in the decay.
[10] Not independent of $\Gamma(D^0\pi^+)/\Gamma_{\text{total}}$ and $\Gamma(D^+\pi^0)/\Gamma_{\text{total}}$ measurement.

$D^*(2010)^\pm$ REFERENCES

LEES	13X	PRL 111 111801	J.P. Lees *et al.*	(BABAR Collab.)
Also		PR D88 052003	J.P. Lees *et al.*	(BABAR Collab.)
Also		PR D88 079902 (errat.)	J.P. Lees *et al.*	(BABAR Collab.)
ANASTASSOV	02	PR D65 032003	A. Anastassov *et al.*	(CLEO Collab.)
ADINOLFI	99	NP B547 3	M. Adinolfi *et al.*	(Beatrice Collab.)
BREITWEG	99	EPJ C6 67	J. Breitweg *et al.*	(ZEUS Collab.)
BARTELT	98	PRL 80 3919	J. Bartelt *et al.*	(CLEO Collab.)
ADLOFF	97B	ZPHY C72 593	C. Adloff *et al.*	(H1 Collab.)
BREITWEG	97	PL B401 192	J. Breitweg *et al.*	(ZEUS Collab.)
BREITWEG	97B	PL B407 402	J. Breitweg *et al.*	(ZEUS Collab.)
ALBRECHT	95F	ZPHY C66 63	H. Albrecht *et al.*	(ARGUS Collab.)
DERRICK	95	PL B349 225	M. Derrick *et al.*	(ZEUS Collab.)
BARLAG	92B	PL B278 480	S. Barlag *et al.*	(ACCMOR Collab.)
BORTOLETTO	92B	PRL 69 2046	D. Bortoletto *et al.*	(CLEO Collab.)
BUTLER	92	PRL 69 2041	F. Butler *et al.*	(CLEO Collab.)
ALEXANDER	91B	PL B262 341	G. Alexander *et al.*	(OPAL Collab.)
DECAMP	91J	PL B266 218	D. Decamp *et al.*	(ALEPH 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.)
ALBRECHT	85F	PL 150B 235	H. Albrecht *et al.*	(ARGUS Collab.)
AHLEN	83	PRL 51 1147	S.P. Ahlen *et al.*	(ANL, IND, LBL+)
BAILEY	83	PL 132B 230	R. Bailey *et al.*	(AMST, BRIS, CERN, CRAC+)
COLES	82	PR D26 2190	M.W. Coles *et al.*	(LBL, SLAC)
YELTON	82	PRL 49 430	J.M. Yelton *et al.*	(SLAC, LBL, UCB+)
FITCH	81	PRL 46 761	V.L. Fitch *et al.*	(PRIN, SACL, TORI+)
AVERY	80	PRL 44 1309	P. Avery *et al.*	(ILL, FNAL, COLU)
BLIETSCHAU	79	PL 86B 108	J. Blietschau *et al.*	(AACH3, BONN, CERN+)
FELDMAN	77B	PRL 38 1313	G.J. Feldman *et al.*	(Mark I Collab.)
GOLDHABER	77	PL 69B 503	G. Goldhaber *et al.*	(Mark I Collab.)
PERUZZI	77	PRL 39 1301	I. Peruzzi *et al.*	(LGW Collab.)