$D^*(2010)^\pm$

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

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

$D^*(2010)^\pm$ 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±0.05 OUR FIT					
• • • 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
140.603 ±0.015 OUR FIT					
140.602 ±0.014 OUR AVERAGE					
140.6010±0.0068±0.0129	151k	LEES	17F	BABR	$e^+e^- \to$ hadrons
140.64 ±0.08 ±0.06	620	BORTOLETTO	92B	CLE2	$e^+e^- \to$ 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
145.4258±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	$D^{*\pm} \to D^0\pi^\pm \to (K\pi, K3\pi)\pi^\pm$
145.412 ±0.002 ±0.012		ANASTASSOV	02	CLE2	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\,\pi^\pm$
145.54 ±0.08	611	[1] ADINOLFI	99	BEAT	$D^{*\pm} \to D^0\pi^\pm$
145.45 ±0.02		[1] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K\pi)\pi^\pm$
145.42 ±0.05		[1] BREITWEG	99	ZEUS	$D^{*\pm} \to D^0\pi^\pm \to (K^-3\pi)\pi^\pm$
145.5 ±0.15	103	[2] ADLOFF	97B	H1	$D^{*\pm} \to D^0\pi^\pm$

145.44	±0.08		152	[2] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-3\pi$
145.42	±0.11		199	[2] BREITWEG	97	ZEUS	$D^{*\pm} \to D^0\pi^\pm$, $D^0 \to K^-\pi^+$
145.4	±0.2		48	[2] 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	[2] ALEXANDER	91B	OPAL	$D^{*\pm} \to D^0\pi^\pm$
145.30	±0.06			[2] 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	[2] 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

[1] Statistical errors only.
[2] 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	[1] PERUZZI	77	LGW	e^+e^-

[1] 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	[1] LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K\pi, K3\pi)\pi^\pm$
96 ±4 ±22			[1] 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	[1] LEES	13X	BABR	$D^{*\pm} \to D^0\pi^\pm \to (K^-\pi^+)\pi^\pm$
83.2±1.5± 2.6		174.3k	[1] 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

[1] 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	[1,2,3] BARTELT	98	CLE2	e^+e^-
0.688 ±0.024 ±0.013	ALBRECHT	95F	ARG	$e^+e^- \to$ hadrons
0.681 ±0.010 ±0.013	[1] 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	[3] GOLDHABER	77	MRK1	e^+e^-

[1] The branching ratios are not independent, they have been constrained by the authors to sum to 100%.
[2] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.
[3] Assuming that isospin is conserved in the decay.

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

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.307 ±0.005 OUR FIT					
0.3073±0.0013±0.0062		[1,2,3] 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	[1] 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^-

[1] The branching ratios are not independent, they have been constrained by the authors to sum to 100%.
[2] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.
[3] Assuming that isospin is conserved in the decay.

$\Gamma(D^+\gamma)/\Gamma_{\text{total}}$ 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			[1,2] BARTELT	98	CLE2	e^+e^-
0.011 ±0.014 ±0.016		12	[1] 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			[3] COLES	82	MRK2	e^+e^-

[1] The branching ratios are not independent, they have been constrained by the authors to sum to 100%.
[2] Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.
[3] Not independent of $\Gamma(D^0\pi^+)/\Gamma_{\text{total}}$ and $\Gamma(D^+\pi^0)/\Gamma_{\text{total}}$ measurement.

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

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LEES	13X	PRL 111 111801	J.P. Lees *et al.*	(BABAR Collab.)
Also		PR D88 052003	J.P. Lees *et al.*	(BABAR Collab.)
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ANASTASSOV	02	PR D65 032003	A. Anastassov *et al.*	(CLEO Collab.)
ADINOLFI	99	NP B547 3	M. Adinolfi *et al.*	(Beatrice Collab.)
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BREITWEG	97	PL B401 192	J. Breitweg *et al.*	(ZEUS Collab.)
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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.)
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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)
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FELDMAN	77B	PRL 38 1313	G.J. Feldman *et al.*	(Mark I Collab.)
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PERUZZI	77	PRL 39 1301	I. Peruzzi *et al.*	(LGW Collab.)