

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

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

$I, J, P$  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
<b>2010.25 ± 0.14 OUR FIT</b>				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2008 ± 3	<sup>1</sup> GOLDHABER 77	MRK1	±	$e^+ e^-$
2008.6 ± 1.0	<sup>2</sup> PERUZZI 77	LGW	±	$e^+ e^-$
<sup>1</sup> From simultaneous fit to $D^*(2010)^+, D^*(2007)^0, D^+$ , and $D^0$ ; not independent of FELDMAN 77B mass difference below.				
<sup>2</sup> 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
<b>140.65 ± 0.10 OUR FIT</b>	Error includes scale factor of 1.1.			
<b>140.64 ± 0.08 ± 0.06</b>	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
<b>145.421 ± 0.010 OUR FIT</b>	Error includes scale factor of 1.1.			
<b>145.421 ± 0.010 OUR AVERAGE</b>				
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	<sup>3</sup> ADINOLFI 99	BEAT	$D^{*\pm} \rightarrow D^0 \pi^\pm$
145.45 ± 0.02		<sup>3</sup> BREITWEG 99	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm \rightarrow (K\pi) \pi^\pm$
145.42 ± 0.05		<sup>3</sup> BREITWEG 99	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm \rightarrow (K^- 3\pi) \pi^\pm$
145.5 ± 0.15	103	<sup>4</sup> ADLOFF 97B	H1	$D^{*\pm} \rightarrow D^0 \pi^\pm$
145.44 ± 0.08	152	<sup>4</sup> BREITWEG 97	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm,$ $D^0 \rightarrow K^- 3\pi$
145.42 ± 0.11	199	<sup>4</sup> BREITWEG 97	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm,$ $D^0 \rightarrow K^- \pi^+$
145.4 ± 0.2	48	<sup>4</sup> DERRICK 95	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm$

145.39 ±0.06 ±0.03		BARLAG	92B	ACCM	$\pi^-$	230 GeV
145.5 ±0.2	115	<sup>4</sup> ALEXANDER	91B	OPAL	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.30 ±0.06		<sup>4</sup> DECAMP	91J	ALEP	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.40 ±0.05 ±0.10		ABACHI	88B	HRS	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.46 ±0.07 ±0.03		ALBRECHT	85F	ARG	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.5 ±0.3	28	BAILEY	83	SPEC	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.5 ±0.3	60	FITCH	81	SPEC	$\pi^- A$	
145.3 ±0.5	30	FELDMAN	77B	MRK1	$D^{*+} \rightarrow D^0 \pi^+$	
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●						
145.44 ±0.09	122	<sup>4</sup> BREITWEG	97B	ZEUS	$D^{*\pm} \rightarrow D^0 \pi^\pm,$ $D^0 \rightarrow K^- \pi^+$	
145.8 ±1.5	16	AHLEN	83	HRS	$D^{*+} \rightarrow D^0 \pi^+$	
145.1 ±1.8	12	BAILEY	83	SPEC	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.1 ±0.5	14	BAILEY	83	SPEC	$D^{*\pm} \rightarrow D^0 \pi^\pm$	
145.5 ±0.5	14	YELTON	82	MRK2	$29 e^+ e^- \rightarrow K^- \pi^+$	
~ 145.5		AVERY	80	SPEC	$\gamma A$	
145.2 ±0.6	2	BLIETSCHAU	79	BEBC	$\nu p$	
<sup>3</sup> Statistical errors only.						
<sup>4</sup> 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	<sup>5</sup> PERUZZI	77	LGW $e^+ e^-$
<sup>5</sup> 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
<b>96 ± 4 ± 22</b>			ANASTASSOV 02	CLE2	$D^{*\pm} \rightarrow D^0 \pi^\pm \rightarrow (K\pi) \pi^\pm$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●					
<131	90	110	BARLAG	92B	ACCM $\pi^-$ 230 GeV

### $D^*(2010)^\pm$ DECAY MODES

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

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $D^0 \pi^+$	(67.7 ± 0.5) %
$\Gamma_2$ $D^+ \pi^0$	(30.7 ± 0.5) %
$\Gamma_3$ $D^+ \gamma$	( 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  $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$ , 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

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

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.677 ± 0.005 OUR FIT</b>			
<b>0.677 ± 0.006 OUR AVERAGE</b>			
0.6759 ± 0.0029 ± 0.0064	<sup>6,7,8</sup> BARTELT	98	CLE2 $e^+ e^-$
0.688 ± 0.024 ± 0.013	ALBRECHT	95F	ARG $e^+ e^- \rightarrow$ hadrons
0.681 ± 0.010 ± 0.013	<sup>6</sup> BUTLER	92	CLE2 $e^+ e^- \rightarrow$ 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	<sup>8</sup> GOLDHABER	77	MRK1 $e^+ e^-$

$\Gamma(D^+ \pi^0) / \Gamma_{\text{total}}$   $\Gamma_2 / \Gamma$

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.307 ± 0.005 OUR FIT</b>				
<b>0.3073 ± 0.0013 ± 0.0062</b>				
	<sup>6,7,8</sup>	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 $e^+ e^- \rightarrow$ hadrons
0.308 ± 0.004 ± 0.008	410	<sup>6</sup> BUTLER	92	CLE2 $e^+ e^- \rightarrow$ hadrons
0.26 ± 0.02 ± 0.02		ADLER	88D	MRK3 $e^+ e^-$
0.34 ± 0.07		COLES	82	MRK2 $e^+ e^-$

$\Gamma(D^+ \gamma) / \Gamma_{\text{total}}$   $\Gamma_3 / \Gamma$

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<b>0.016 ± 0.004 OUR FIT</b>					
<b>0.016 ± 0.005 OUR AVERAGE</b>					
0.0168 ± 0.0042 ± 0.0029			<sup>6,7</sup> BARTELT	98	CLE2 $e^+ e^-$
0.011 ± 0.014 ± 0.016	12		<sup>6</sup> BUTLER	92	CLE2 $e^+ e^- \rightarrow$ hadrons

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

<0.052	90	ALBRECHT	95F ARG	$e^+e^- \rightarrow$ hadrons
0.17 $\pm 0.05$	$\pm 0.05$	ADLER	88D MRK3	$e^+e^-$
0.22 $\pm 0.12$		<sup>9</sup> COLES	82 MRK2	$e^+e^-$

<sup>6</sup> The branching ratios are not independent, they have been constrained by the authors to sum to 100%.

<sup>7</sup> Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.

<sup>8</sup> Assuming that isospin is conserved in the decay.

<sup>9</sup> 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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ADINOLFI 99	NP B547 3	M. Adinolfi <i>et al.</i>	(Beatrice Collab.)
BREITWEG 99	EPJ C6 67	J. Breitweg <i>et al.</i>	(ZEUS Collab.)
BARTELT 98	PRL 80 3919	J. Bartelt <i>et al.</i>	(CLEO II Collab.)
ADLOFF 97B	ZPHY C72 593	C. Adloff <i>et al.</i>	(H1 Collab.)
BREITWEG 97	PL B401 192	J. Breitweg <i>et al.</i>	(ZEUS Collab.)
BREITWEG 97B	PL B407 402	J. Breitweg <i>et al.</i>	(ZEUS Collab.)
ALBRECHT 95F	ZPHY C66 63	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
DERRICK 95	PL B349 225	M. Derrick <i>et al.</i>	(ZEUS Collab.)
BARLAG 92B	PL B278 480	S. Barlag <i>et al.</i>	(ACCMOR 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.)
ALEXANDER 91B	PL B262 341	G. Alexander <i>et al.</i>	(OPAL Collab.)
DECAMP 91J	PL B266 218	D. Decamp <i>et al.</i>	(ALEPH 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.)
ALBRECHT 85F	PL 150B 235	H. Albrecht <i>et al.</i>	(ARGUS Collab.)
AHLEN 83	PRL 51 1147	S.P. Ahlen <i>et al.</i>	(ANL, IND, LBL+)
BAILEY 83	PL 132B 230	R. Bailey <i>et al.</i>	(AMST, BRIS, CERN, CRAC+)
COLES 82	PR D26 2190	M.W. Coles <i>et al.</i>	(LBL, SLAC)
YELTON 82	PRL 49 430	J.M. Yelton <i>et al.</i>	(SLAC, LBL, UCB+)
FITCH 81	PRL 46 761	V.L. Fitch <i>et al.</i>	(PRIN, SACL, TORI+)
AVERY 80	PRL 44 1309	P. Avery <i>et al.</i>	(ILL, FNAL, COLU)
BLIETSCHAU 79	PL 86B 108	J. Blietschau <i>et al.</i>	(AACH3, BONN, CERN+)
FELDMAN 77B	PRL 38 1313	G.J. Feldman <i>et al.</i>	(Mark I Collab.)
GOLDHABER 77	PL 69B 503	G. Goldhaber <i>et al.</i>	(Mark I Collab.)
PERUZZI 77	PRL 39 1301	I. Peruzzi <i>et al.</i>	(LGW Collab.)