

$D^*(2010)^\pm$

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

I, J, P need confirmation.

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

The fit includes $D^\pm, D^0, D_s^\pm, D^{*\pm}, D^{*0}$, and $D_s^{*\pm}$ mass and mass difference measurements.

VALUE (MeV)	DOCUMENT ID	TECN	CHG	COMMENT
2010.0±0.4 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	MRK1	±	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 $D^\pm, D^0, D_s^\pm, D^{*\pm}, D^{*0}$, and $D_s^{*\pm}$ mass and mass difference measurements.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
140.64±0.10 OUR FIT	Error includes scale factor of 1.1.			
140.64±0.08±0.06	620	BORTOLETTO92B	CLE2	$e^+e^- \rightarrow$ hadrons

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

The fit includes $D^\pm, D^0, D_s^\pm, D^{*\pm}, D^{*0}$, and $D_s^{*\pm}$ mass and mass difference measurements.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
145.421±0.010 OUR FIT	Error includes scale factor of 1.1.			
145.421±0.010 OUR AVERAGE				
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	$D^{*\pm} \rightarrow D^0 \pi^\pm,$
145.42 ±0.11	199	⁴ BREITWEG 97	ZEUS	$D^0 \rightarrow K^- 3\pi,$ $D^{*\pm} \rightarrow D^0 \pi^\pm,$
145.4 ±0.2	48	⁴ DERRICK 95	ZEUS	$D^0 \rightarrow K^- \pi^+,$ $D^{*\pm} \rightarrow D^0 \pi^\pm$

145.39 ±0.06 ±0.03			BARLAG	92B ACCM	π^- 230 GeV
145.5 ±0.2	115	⁴	ALEXANDER	91B OPAL	$D^{*\pm} \rightarrow D^0 \pi^\pm$
145.30 ±0.06		⁴	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	π^- 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	⁴	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	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 MRK1	$e^+ e^-$
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
96 ± 4 ± 22			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	π^- 230 GeV

$D^*(2010)^\pm$ 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 $\langle \delta x_i \delta x_j \rangle / (\delta x_i \delta x_j)$, 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

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

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

<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.307 ± 0.005 OUR FIT				
0.3073 ± 0.0013 ± 0.0062				
	^{6,7,8}	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	⁶ 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	$e^+ e^-$

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

<u>VALUE</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.016 ± 0.004 OUR FIT					
0.016 ± 0.005 OUR AVERAGE					
0.0168 ± 0.0042 ± 0.0029			^{6,7} BARTELT	98 CLE2	$e^+ e^-$
0.011 ± 0.014 ± 0.016	12		⁶ 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 ±0.05 ±0.05		ADLER	88D MRK3	e^+e^-
0.22 ±0.12		⁹ COLES	82 MRK2	e^+e^-

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

⁷ Systematic error includes theoretical error on the prediction of the ratio of hadronic modes.

⁸ Assuming that isospin is conserved in the decay.

⁹ 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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YELTON	82	PRL 49 430	J.M. Yelton <i>et al.</i>	(SLAC, LBL, UCB+)
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