$D_2^*(2460)$

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

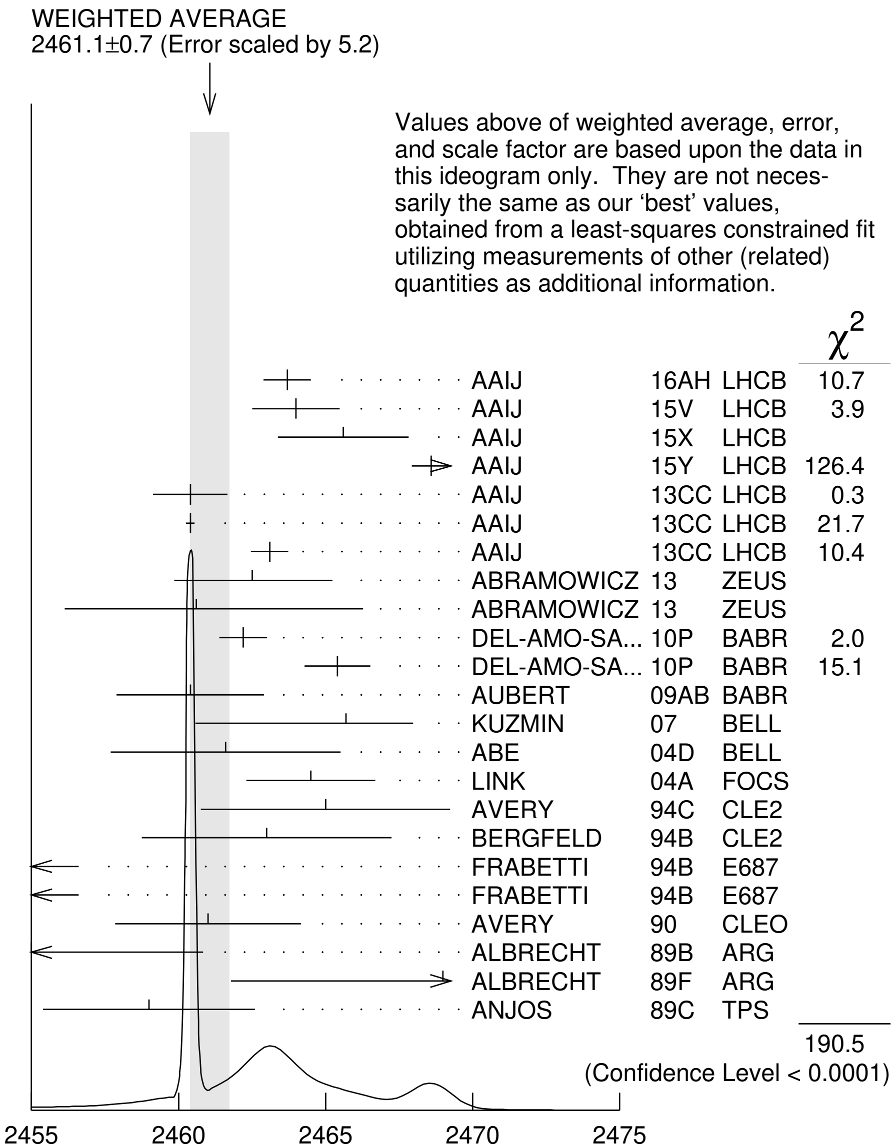
$J^P = 2^+$ assignment strongly favored (ALBRECHT 89B, ALBRECHT 89H), natural parity confirmed by the helicity analysis (DEL-AMO-SANCHEZ 10P). AAIJ 13CC confirms $J^P = 2^+$ and natural parity.

$D_2^*(2460)$ 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)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
$2461.1^{+0.7}_{-0.8}$ OUR FIT	Error includes scale factor of 6.2.					
2461.1±0.7 OUR AVERAGE	Error includes scale factor of 5.2. See the ideogram below.					
2463.7±0.4±0.7	28k	[1] AAIJ	16AH	LHCB	0	$B^- \to D^+\pi^-\pi^-$
2464.0±1.4±0.5	2k	[2] AAIJ	15V	LHCB	0	$B^- \to D^+K^-\pi^-$
2465.6±1.8±1.3		[3] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+\pi^-$
2468.6±0.6±0.3		[4] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0\pi^+\pi^-$
2460.4±0.4±1.2	82k	AAIJ	13CC	LHCB	0	$pp \to D^{*+}\pi^- X$
2460.4±0.1±0.1	675k	AAIJ	13CC	LHCB	0	$pp \to D^+\pi^- X$
2463.1±0.2±0.6	342k	AAIJ	13CC	LHCB	+	$pp \to D^0\pi^+ X$
$2462.5\pm2.4^{+1.3}_{-1.1}$	2.3k	[5] ABRAMOWICZ	13	ZEUS	0	$e^{\pm}p \to D^{(*)+}\pi^- X$
$2460.6\pm4.4^{+3.6}_{-0.8}$	1371	[6] ABRAMOWICZ	13	ZEUS	+	$e^{\pm}p \to D^{(*)0}\pi^+ X$
2462.2±0.1±0.8	243k	DEL-AMO-SA..	10P	BABR	0	$e^+e^- \to D^+\pi^- X$
2465.4±0.2±1.1	111k	[7] DEL-AMO-SA..	10P	BABR	+	$e^+e^- \to D^0\pi^+ X$
2460.4±1.2±2.2	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+\pi^-\pi^-$
$2465.7\pm1.8^{+1.4}_{-4.8}$	2909	KUZMIN	07	BELL	+	$e^+e^- \to$ hadrons
2461.6±2.1±3.3		[8] ABE	04D	BELL	0	$B^- \to D^+\pi^-\pi^-$
2464.5±1.1±1.9	5.8k	[8] LINK	04A	FOCS	0	γ A
2465 ±3 ±3	486	AVERY	94C	CLE2	0	$e^+e^- \to D^+\pi^-$X
2463 ±3 ±3	310	BERGFELD	94B	CLE2	+	$e^+e^- \to D^0\pi^+$X
2453 ±3 ±2	128	FRABETTI	94B	E687	0	γBe $\to D^+\pi^-$X
2453 ±3 ±2	185	FRABETTI	94B	E687	+	γBe $\to D^0\pi^+$X
2461 ±3 ±1	440	AVERY	90	CLEO	0	$e^+e^- \to D^{*+}\pi^-$X
2455 ±3 ±5	337	ALBRECHT	89B	ARG	0	$e^+e^- \to D^+\pi^-$X
2469 ±4 ±6		ALBRECHT	89F	ARG	+	$e^+e^- \to D^0\pi^+$X
2459 ±3 ±2	153	ANJOS	89C	TPS	0	$\gamma N \to D^+\pi^-$X
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2468.1±0.6±0.5		[9] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0\pi^+\pi^-$
$2469.1\pm3.7^{+1.2}_{-1.3}$	1.5k	[10] CHEKANOV	09	ZEUS	0	$e^{\pm}p \to D^{(*)+}\pi^- X$
2463.3±0.6±0.8	20k	ABULENCIA	06A	CDF	0	1900 $p\overline{p} \to D^+\pi^- X$
2467.6±1.5±0.8	3.5k	[11] LINK	04A	FOCS	+	γ A
2461 ±6	126	[12] ABREU	98M	DLPH	0	e^+e^-

2466	± 7	1	ASRATYAN	95	BEBC	0	53,40 $\nu(\overline{\nu}) \rightarrow pX, dX$



$D_2^*(2460)$ mass (MeV)

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances.

[3] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ *S*-wave and the $D\pi$ *S*- and *P*-waves.

[4] Modeling the $\pi^+\pi^-$ *S*-wave with the Isobar formalism.

[5] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1.

[6] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively.
[7] At a fixed width of 50.5 MeV.
[8] Fit includes the contribution from $D_0^*(2400)^0$.
[9] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.
[10] Calculated using the mass difference $m(D_2^{*0}) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG}$ = 2010.27 ± 0.17 MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of $^{+1.2}_{-1.3}$ MeV.
[11] Fit includes the contribution from $D_0^*(2400)^\pm$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^\pm}) - (m_{D_2^*(2460)^0})$.
[12] No systematic error given.

$m_{D_2^*(2460)^0} - m_{D^+}$

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
591.5$^{+0.7}_{-0.8}$ OUR FIT	Error includes scale factor of 5.9.				
593.9±0.6±0.5	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^+\pi^- X$

$m_{D_2^*(2460)^0} - m_{D^{*+}}$

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
450.9$^{+0.7}_{-0.8}$ OUR FIT	Error includes scale factor of 5.9.				
458.8±3.7$^{+1.2}_{-1.3}$	1.5k	CHEKANOV	09	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$

$m_{D_2^*(2460)^\pm} - m_{D_2^*(2460)^0}$

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
2.4±1.7 OUR AVERAGE				
3.1±1.9±0.9	LINK	04A	FOCS	γ A
−2 ±4 ±4	BERGFELD	94B	CLE2	$e^+e^- \to$ hadrons
0 ±4	FRABETTI	94B	E687	γ Be $\to D\pi X$
14 ±5 ±8	ALBRECHT	89F	ARG	$e^+e^- \to D^0\pi^+ X$

$D_2^*(2460)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
47.3± 0.8 OUR AVERAGE	Error includes scale factor of 1.5. See the ideogram below.					
47.0± 0.8± 1.0	28k	[1] AAIJ	16AH	LHCB	0	$B^- \to D^+\pi^-\pi^-$

$43.8\pm 2.9\pm 1.8$	2k	[2] AAIJ	15V	LHCB	0	$B^- \to D^+ K^- \pi^-$
$46.0\pm 3.4\pm 3.2$		[3] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+ \pi^-$
$47.3\pm 1.5\pm 0.7$		[4] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
$43.2\pm 1.2\pm 3.0$	82k	AAIJ	13CC	LHCB	0	$pp \to D^{*+} \pi^- X$
$45.6\pm 0.4\pm 1.1$	675k	AAIJ	13CC	LHCB	0	$pp \to D^+ \pi^- X$
$48.6\pm 1.3\pm 1.9$	342k	AAIJ	13CC	LHCB	+	$pp \to D^0 \pi^+ X$
$46.6\pm 8.1^{+5.9}_{-3.8}$	2.3k	[5] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+} \pi^- X$
$50.5\pm 0.6\pm 0.7$	243k	DEL-AMO-SA...	10P	BABR	0	$e^+ e^- \to D^+ \pi^- X$
$41.8\pm 2.5\pm 2.9$	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+ \pi^- \pi^-$
$49.7\pm 3.8\pm 6.4$	2909	KUZMIN	07	BELL	+	$e^+ e^- \to$ hadrons
$49.2\pm 2.3\pm 1.3$	20k	ABULENCIA	06A	CDF	0	1900 $p\overline{p} \to D^+ \pi^- X$
$45.6\pm 4.4\pm 6.7$		[6] ABE	04D	BELL	0	$B^- \to D^+ \pi^- \pi^-$
$38.7\pm 5.3\pm 2.9$	5.8k	[6] LINK	04A	FOCS	0	γ A
$34.1\pm 6.5\pm 4.2$	3.5k	[7] LINK	04A	FOCS	+	γ A
$28 ^{+8}_{-7} \pm 6$	486	AVERY	94C	CLE2	0	$e^+ e^- \to D^+ \pi^-$ X
$27 ^{+11}_{-8} \pm 5$	310	BERGFELD	94B	CLE2	+	$e^+ e^- \to D^0 \pi^+$ X
$25 \pm 10 \pm 5$	128	FRABETTI	94B	E687	0	γBe $\to D^+ \pi^-$ X
$23 \pm 9 \pm 5$	185	FRABETTI	94B	E687	+	γBe $\to D^0 \pi^+$ X
$20 ^{+9}_{-12} {}^{+9}_{-10}$	440	AVERY	90	CLEO	0	$e^+ e^- \to D^{*+} \pi^-$ X
$15 ^{+13}_{-10} {}^{+5}_{-10}$	337	ALBRECHT	89B	ARG	0	$e^+ e^- \to D^+ \pi^-$ X
$20 \pm 10 \pm 5$	153	ANJOS	89C	TPS	0	$\gamma N \to D^+ \pi^-$ X

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

$46.0\pm 1.4\pm 1.8$		[8] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$

[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

[2] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, nonresonant spin-0 and spin-1 components as well as the $D_0^*(2400)^0$, $D_2^*(2460)^0$ and $D_1^*(2760)^0$ resonances.

[3] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.

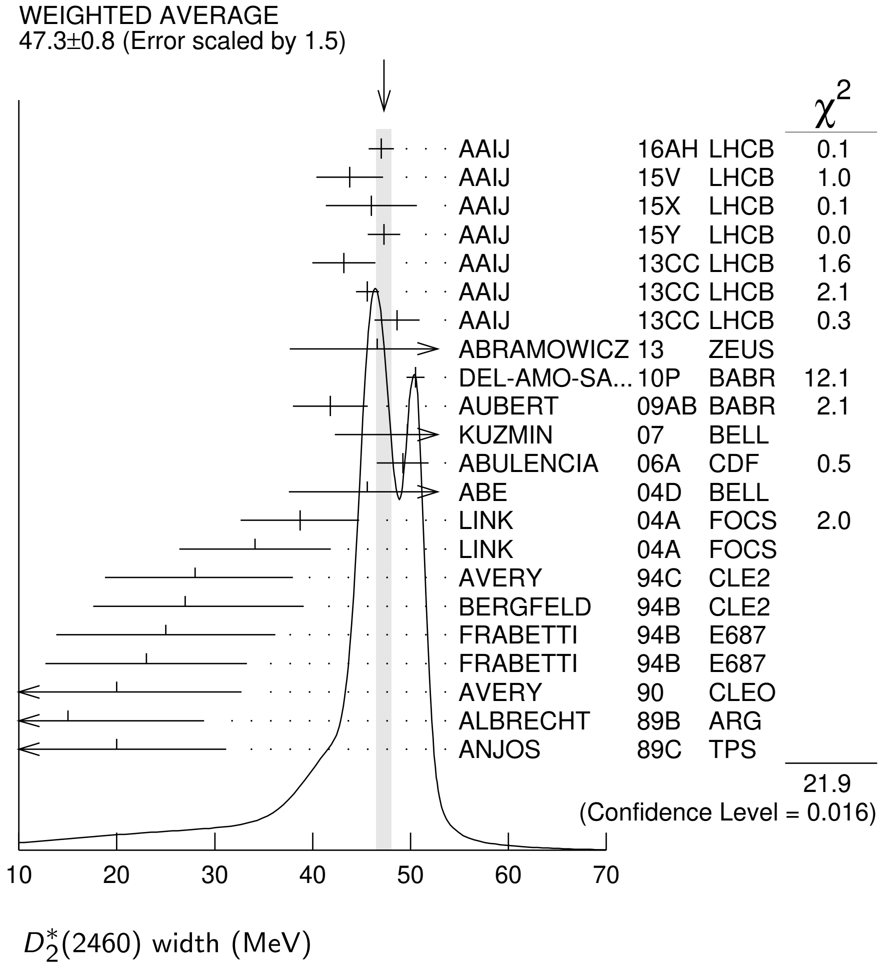
[4] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.

[5] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1.

[6] Fit includes the contribution from $D_0^*(2400)^0$.

[7] Fit includes the contribution from $D_0^*(2400)^\pm$.

[8] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.



$D_2^*(2460)$ DECAY MODES

$\overline{D}_2^*(2460)$ modes are charge conjugates of modes below.

	Mode	Fraction (Γ_i/Γ)
Γ_1	$D\pi^-$	seen
Γ_2	$D^*(2010)\pi^-$	seen
Γ_3	$D\pi^+\pi^-$	
Γ_4	$D^*\pi^+\pi^-$	

$D_2^*(2460)$ BRANCHING RATIOS

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

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
seen	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+\pi^-\pi^-$
seen	337	ALBRECHT	89B	ARG	0	$e^+e^- \to D^+\pi^- X$
seen		ALBRECHT	89F	ARG	$+$	$e^+e^- \to D^0\pi^+ X$
seen		ANJOS	89C	TPS	0	$\gamma N \to D^+\pi^- X$

$\Gamma(D^*(2010)\pi^-)/\Gamma_{\text{total}}$ $\qquad\Gamma_2/\Gamma$

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
seen	ACKERSTAFF	97W	OPAL	0	$e^+e^- \to D^{*+}\pi^- X$
seen	AVERY	90	CLEO	0	$e^+e^- \to D^{*+}\pi^- X$
seen	ALBRECHT	89H	ARG	0	$e^+e^- \to D^*\pi^- X$

$\Gamma(D\pi^-)/\Gamma(D^*(2010)\pi^-)$ $\qquad\Gamma_1/\Gamma_2$

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1.52±0.14 OUR AVERAGE						
$1.4 \pm 0.3 \pm 0.3$	2.3k	[1] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
$1.1 \pm 0.4 {}^{+0.3}_{-0.2}$	1371	[2] ABRAMOWICZ	13	ZEUS	+	$e^\pm p \to D^{(*)0}\pi^+ X$
$1.47 \pm 0.03 \pm 0.16$	379k	DEL-AMO-SA..	10P	BABR	0	$e^+e^- \to D^{(*)+}\pi^- X$
$2.8 \pm 0.8 {}^{+0.5}_{-0.6}$	1.5k	CHEKANOV	09	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
$2.2 \pm 0.7 \pm 0.6$		AVERY	94C	CLE2	0	$e^+e^- \to D^{*+}\pi^- X$
$1.9 \pm 1.1 \pm 0.3$		BERGFELD	94B	CLE2	+	$e^+e^- \to$ hadrons
2.3 ± 0.8		AVERY	90	CLEO	0	e^+e^-
$3.0 \pm 1.1 \pm 1.5$		ALBRECHT	89H	ARG	0	$e^+e^- \to D^*\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1.9 ± 0.5		ABE	04D	BELL	0	$B^- \to D^{(*)+}\pi^-\pi^-$

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1.

[2] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively.

$\Gamma(D\pi^-)/[\Gamma(D\pi^-)+\Gamma(D^*(2010)\pi^-)]$ $\qquad\Gamma_1/(\Gamma_1+\Gamma_2)$

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$0.62 \pm 0.03 \pm 0.02$	8414	[1] AUBERT	09Y	BABR	0	$B^+ \to D_2^{*0}\ell^+\nu_\ell$
$0.62 \pm 0.03 \pm 0.02$	3361	[1] AUBERT	09Y	BABR	+	$\overline{B}^0 \to D_2^{*+}\ell^-\nu_\ell$

[1] Assuming $\Gamma(\Upsilon(4S) \to B^+B^-) / \Gamma(\Upsilon(4S) \to B^0\overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths for charged and neutral D_2^* mesons.

$D_2^*(2460)$ POLARIZATION AMPLITUDE A_{D_2}

A polarization amplitude A_{D_2} is a parameter that depends on the initial polarization of the D_2. For D_2 decays the helicity angle, θ_H, distribution varies like $1 + A_{D_2}\cos^2(\theta_H)$, where θ_H is the angle in the D^* rest frame between the two pions emitted by the $D_2 \to D^*\pi$ and $D^* \to D\pi$.

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
-1.16 ± 0.35	2.3k	[1] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+}\pi^- X$
consistent with -1	243k	DEL-AMO-SA..	10P	BABR	0	$e^+e^- \to D^+\pi^- X$
$-0.74 {}^{+0.49}_{-0.38}$		[2] AVERY	94C	CLE2	0	$e^+e^- \to D^{*+}\pi^- X$

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions.
[2] Systematic uncertainties not estimated.

$D_2^*(2460)$ REFERENCES

AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15V	PR D91 092002	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D93 119901 (errat.)	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)
AUBERT	09AB	PR D79 112004	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)
ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.)
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)
ACKERSTAFF	97W	ZPHY C76 425	K. Ackerstaff *et al.*	(OPAL Collab.)
ASRATYAN	95	ZPHY C68 43	A.E. Asratyan *et al.*	(BIRM, BELG, CERN+)
AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.)
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.) JP
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)
ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)