$D_2^*(2460)^0$

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

$J^P = 2^+$ 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.

$D_2^*(2460)0$ 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	COMMENT
2460.7 ±0.4 OUR FIT Error includes scale factor of 3.1.					
2460.56±0.35 OUR AVERAGE Error includes scale factor of 2.6. See the ideogram below.					
2463.7 ±0.4 ±0.7	28k	[1] AAIJ	16AH	LHCB	$B^- \to D^+\pi^-\pi^-$
2460.4 ±0.4 ±1.2	82k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
2460.4 ±0.1 ±0.1	675k	AAIJ	13CC	LHCB	$pp \to D^+\pi^- X$
2462.5 ±2.4 $^{+1.3}_{-1.1}$	2.3k	[2] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
2462.2 ±0.1 ±0.8	243k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^+\pi^- X$
2460.4 ±1.2 ±2.2	3.4k	AUBERT	09AB	BABR	$B^- \to D^+\pi^-\pi^-$
2461.6 ±2.1 ±3.3		[3] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
2464.5 ±1.1 ±1.9	5.8k	[3] LINK	04A	FOCS	γ A
2465 ±3 ±3	486	AVERY	94C	CLE2	$e^+e^- \to D^+\pi^-$X
2453 ±3 ±2	128	FRABETTI	94B	E687	γBe $\to D^+\pi^-$X
2461 ±3 ±1	440	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^-$X
2455 ±3 ±5	337	ALBRECHT	89B	ARG	$e^+e^- \to D^+\pi^-$X
2459 ±3 ±2	153	ANJOS	89C	TPS	$\gamma N \to D^+\pi^-$X
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2469.1 ±3.7 $^{+1.2}_{-1.3}$	1.5k	[4] CHEKANOV	09	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
2463.3 ±0.6 ±0.8	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^+\pi^- X$
2461 ±6	126	[5] ABREU	98M	DLPH	e^+e^-
2466 ±7	1	ASRATYAN	95	BEBC	53,40 $\nu(\overline{\nu}) \to pX,dX$

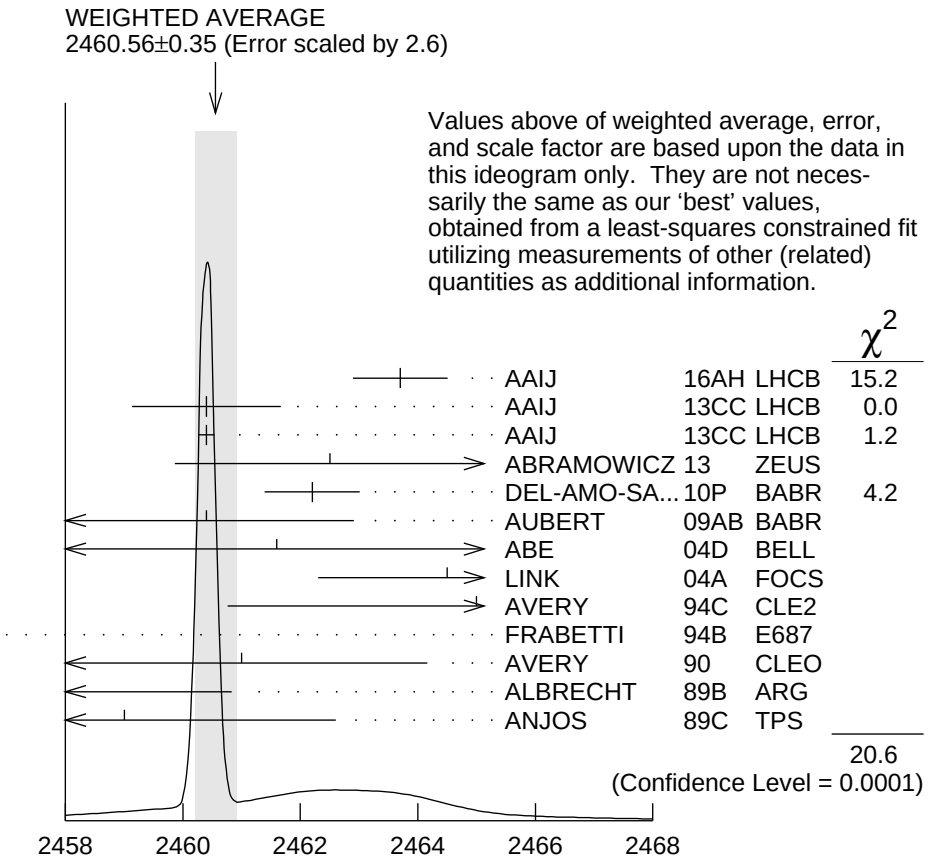
[1] From the amplitude analysis in the model describing the $D^+\pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

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

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

[4] Calculated using the mass difference $m(D_2^{*0}) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG} = 2010.27 \pm 0.17$ MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of $^{+1.2}_{-1.3}$ MeV.

[5] No systematic error given.



$m_{D_2^{*0}} - m_{D^+}$

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*
591.1±0.4 OUR FIT	Error includes scale factor of 2.6.				
593.9±0.6±0.5	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \rightarrow D^+\pi^- X$

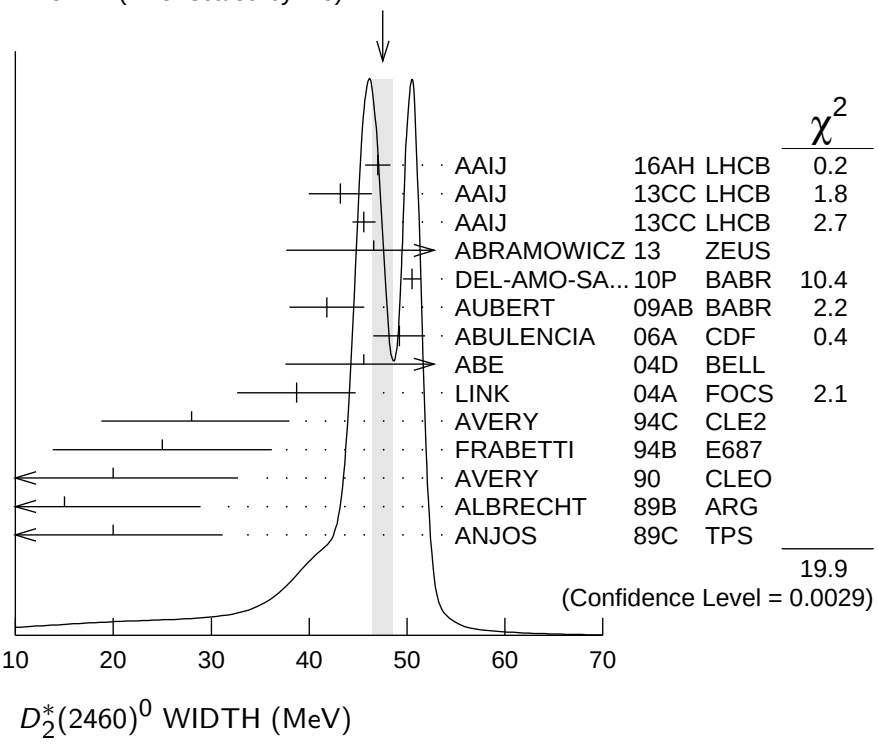
$m_{D_2^{*0}} - m_{D^{*+}}$

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*
450.4±0.4 OUR FIT	Error includes scale factor of 2.9.				
$458.8\pm3.7^{+1.2}_{-1.3}$	1560 ± 230	CHEKANOV	09	ZEUS	$e^\pm p \rightarrow D^{(*)+}\pi^- X$

$D_2^*(2460)^0$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
47.5± 1.1 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.					
$47.0 \pm 0.8 \pm 1.0$	28k	[6] AAIJ	16AH	LHCB	$B^- \to D^+\pi^-\pi^-$
$43.2 \pm 1.2 \pm 3.0$	82k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
$45.6 \pm 0.4 \pm 1.1$	675k	AAIJ	13CC	LHCB	$pp \to D^+\pi^- X$
$46.6 \pm 8.1^{+5.9}_{-3.8}$	2.3k	[7] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
$50.5 \pm 0.6 \pm 0.7$	243k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^+\pi^- X$
$41.8 \pm 2.5 \pm 2.9$	3.4k	AUBERT	09AB	BABR	$B^- \to D^+\pi^-\pi^-$
$49.2 \pm 2.3 \pm 1.3$	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^+\pi^- X$
$45.6 \pm 4.4 \pm 6.7$		[8] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
$38.7 \pm 5.3 \pm 2.9$	5.8k	[8] LINK	04A	FOCS	γ A
$28\ ^{+8}_{-7} \pm 6$	486	AVERY	94C	CLE2	$e^+e^- \to D^+\pi^-$X
$25 \pm 10 \pm 5$	128	FRABETTI	94B	E687	γBe $\to D^+\pi^-$X
$20\ ^{+9}_{-12}\ ^{+9}_{-10}$	440	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^-$X
$15\ ^{+13}_{-10}\ ^{+5}_{-10}$	337	ALBRECHT	89B	ARG	$e^+e^- \to D^+\pi^-$X
$20 \pm 10 \pm 5$	153	ANJOS	89C	TPS	$\gamma N \to D^+\pi^-$X



[6] 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.

[7] 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.
[8] Fit includes the contribution from $D_0^*(2400)^0$.

$D_2^*(2460)^0$ DECAY MODES

$\overline{D}_2^*(2460)^0$ 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	$D^0\pi^+\pi^-$	not seen
Γ_4	$D^{*0}\pi^+\pi^-$	not seen

$D_2^*(2460)^0$ BRANCHING RATIOS

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

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

$\Gamma(D^*(2010)^+\pi^-)/\Gamma_{total}$ Γ_2/Γ

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

$\Gamma(D^+\pi^-)/\Gamma(D^*(2010)^+\pi^-)$ Γ_1/Γ_2

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
1.54±0.15 OUR AVERAGE					
$1.4 \pm 0.3 \pm 0.3$	2.3k	[9] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
$1.47 \pm 0.03 \pm 0.16$	379k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^{(*)+}\pi^- X$
$2.8 \pm 0.8\ ^{+0.5}_{-0.6}$	1560 ± 230	CHEKANOV	09	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
$2.2 \pm 0.7 \pm 0.6$		AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^- X$
2.3 ± 0.8		AVERY	90	CLEO	e^+e^-
$3.0 \pm 1.1 \pm 1.5$		ALBRECHT	89H	ARG	$e^+e^- \to D^*\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1.9 ± 0.5		ABE	04D	BELL	$B^- \to D^{(*)+}\pi^-\pi^-$

[9] 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.

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

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$0.62\pm0.03\pm0.02$	8414	[10] AUBERT	09Y BABR	$B^+ \to D_2^{*0}\ell^+\nu_\ell$

[10] 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.

$D_2^*(2460)^0$ 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	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
-1.16 ± 0.35	2.3k	[11] ABRAMOWICZ13	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
consistent with -1	243k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^+\pi^- X$
$-0.74^{+0.49}_{-0.38}$		[12] AVERY	94C CLE2	$e^+e^- \to D^{*+}\pi^- X$

[11] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions.

[12] Systematic uncertainties not estimated.

$D_2^*(2460)^0$ REFERENCES

AAIJ	16AH	PR D94 072001	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.)
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.)
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	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)