NODE=M254

$D_2^*(2460)$

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

$D_2^*(2460)$ MASS

NODE=M254M

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.

NODE=M254M

NODE=M254M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT	
2461.1±0.8 OUR FIT Error includes scale factor of 6.3. [$2461.1^{+0.7}_{-0.8}$ MeV OUR 2023 FIT Scale factor = 6.2]						NEW
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	$B^- \to D^+\pi^-\pi^-$	OCCUR=2
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	+	$B^0 \to \overline{D}^0K^+\pi^-$	
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	$pp \to D^+\pi^-X$	OCCUR=2
2463.1±0.2±0.6	342k	AAIJ 13CC	LHCB	+	$pp \to D^0\pi^+X$	OCCUR=3
$2462.5\pm2.4^{+1.3}_{-1.1}$	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	+	$e^\pm p \to D^{(*)0}\pi^+X$	OCCUR=2
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	+	$e^+e^- \to D^0\pi^+X$	OCCUR=2
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 $\to D^0\pi^+X$	OCCUR=2
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	+	$e^+e^- \to D^0\pi^+X$	OCCUR=2
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	+	$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2
$2469.1\pm3.7^{+1.2}_{-1.3}$	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	OCCUR=2
2461 ±6	126	[12] ABREU 98M	DLPH	0	e^+e^-	
2466 ±7	1	ASRATYAN 95	BEBC	0	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. NODE=M254M;LINKAGE=B

[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. NODE=M254M;LINKAGE=A

[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. NODE=M254M;LINKAGE=CA

[4] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M254M;LINKAGE=BC

[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. NODE=M254M;LINKAGE=AR

[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. NODE=M254M;LINKAGE=AB

[7] At a fixed width of 50.5 MeV. NODE=M254M;LINKAGE=DE

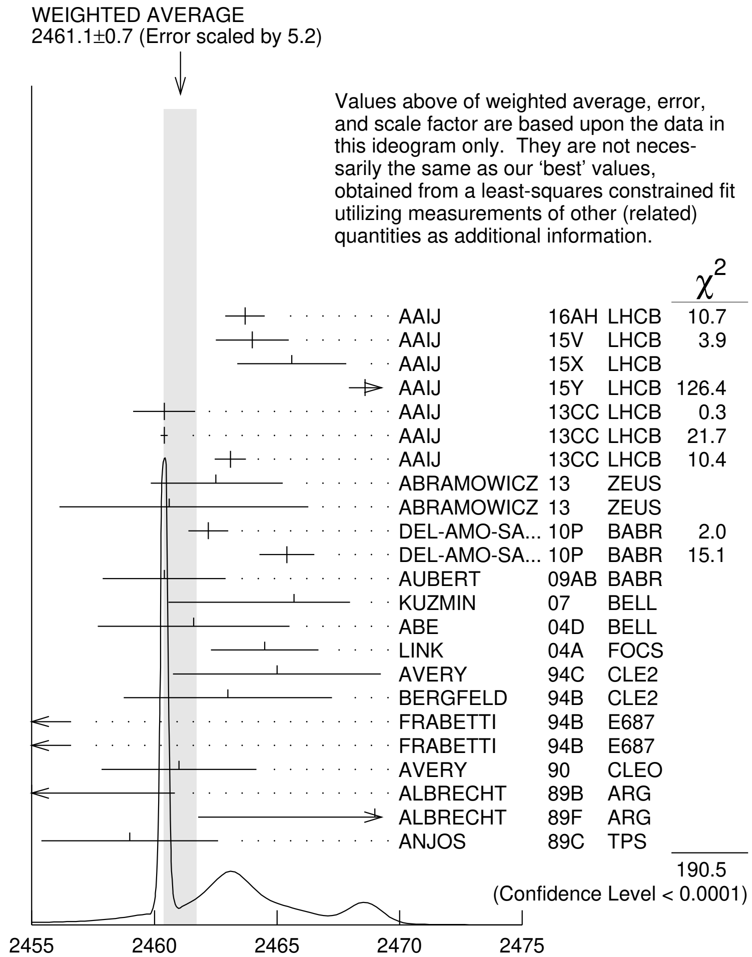
[8] Fit includes the contribution from $D_0^*(2400)^0$. NODE=M254M;LINKAGE=LI

[9] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M254M;LINKAGE=CC

[10] 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. NODE=M254M;LINKAGE=CH

[11] Fit includes the contribution from $D_0^*(2400)^{\pm}$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^{\pm}}) - (m_{D_2^*(2460)^0})$. NODE=M254M;LINKAGE=LC

[12] No systematic error given. NODE=M254M;LINKAGE=K



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

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

NODE=M254DM

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. NODE=M254DM

NODE=M254DM

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
591.5±0.8 OUR FIT Error includes scale factor of 6.0. [$591.5^{+0.7}_{-0.8}$ MeV OUR 2023 FIT Scale factor = 5.9]					
593.9±0.6±0.5	20k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^+\pi^- X$

NEW

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

NODE=M254DM2

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. NODE=M254DM2

NODE=M254DM2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
450.9±0.8 OUR FIT Error includes scale factor of 6.0. [$450.9^{+0.7}_{-0.8}$ MeV OUR 2023 FIT Scale factor = 5.9]					
$\mathbf{458.8 \pm 3.7^{+1.2}_{-1.3}}$	1.5k	CHEKANOV	09	ZEUS	$e^{\pm}p \to D^{(*)+}\pi^- X$

NEW

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

NODE=M254DMC

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	γBe $\to D\pi$X
14 ±5 ±8	ALBRECHT	89F	ARG	$e^+ e^- \to D^0 \pi^+$X

NODE=M254DMC

$D_2^*(2460)$ WIDTH

NODE=M254W

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± 2.9± 1.8	2k	[2] AAIJ	15V	LHCB	0	$B^- \to D^+ K^- \pi^-$
46.0± 3.4± 3.2		[3] AAIJ	15X	LHCB	+	$B^0 \to \overline{D}^0 K^+ \pi^-$
47.3± 1.5± 0.7		[4] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
43.2± 1.2± 3.0	82k	AAIJ	13CC	LHCB	0	$p p \to D^{*+} \pi^- X$
45.6± 0.4± 1.1	675k	AAIJ	13CC	LHCB	0	$p p \to D^+ \pi^- X$
48.6± 1.3± 1.9	342k	AAIJ	13CC	LHCB	+	$p p \to D^0 \pi^+ X$
46.6± 8.1$^{+5.9}_{-3.8}$	2.3k	[5] ABRAMOWICZ	13	ZEUS	0	$e^\pm p \to D^{(*)+} \pi^- X$
50.5± 0.6± 0.7	243k	DEL-AMO-SA...	10P	BABR	0	$e^+ e^- \to D^+ \pi^- X$
41.8± 2.5± 2.9	3.4k	AUBERT	09AB	BABR	0	$B^- \to D^+ \pi^- \pi^-$
49.7± 3.8± 6.4	2909	KUZMIN	07	BELL	+	$e^+ e^- \to$ hadrons
49.2± 2.3± 1.3	20k	ABULENCIA	06A	CDF	0	1900 $p\overline{p} \to D^+ \pi^- X$
45.6± 4.4± 6.7		[6] ABE	04D	BELL	0	$B^- \to D^+ \pi^- \pi^-$
38.7± 5.3± 2.9	5.8k	[6] LINK	04A	FOCS	0	γ A
34.1± 6.5± 4.2	3.5k	[7] LINK	04A	FOCS	+	γ A
28 $^{+8}_{-7}$ ± 6	486	AVERY	94C	CLE2	0	$e^+ e^- \to D^+ \pi^-$X
27 $^{+11}_{-8}$ ± 5	310	BERGFELD	94B	CLE2	+	$e^+ e^- \to D^0 \pi^+$X
25 ±10 ± 5	128	FRABETTI	94B	E687	0	γBe $\to D^+ \pi^-$X
23 ± 9 ± 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 ±10 ± 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± 1.4± 1.8		[8] AAIJ	15Y	LHCB	+	$B^0 \to \overline{D}^0 \pi^+ \pi^-$

NODE=M254W

OCCUR=3

OCCUR=2

OCCUR=3

OCCUR=2

OCCUR=2

OCCUR=2

[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.

NODE=M254W;LINKAGE=D

[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.

NODE=M254W;LINKAGE=A

[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.

NODE=M254W;LINKAGE=AC

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

NODE=M254W;LINKAGE=B

[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.

NODE=M254W;LINKAGE=AR

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

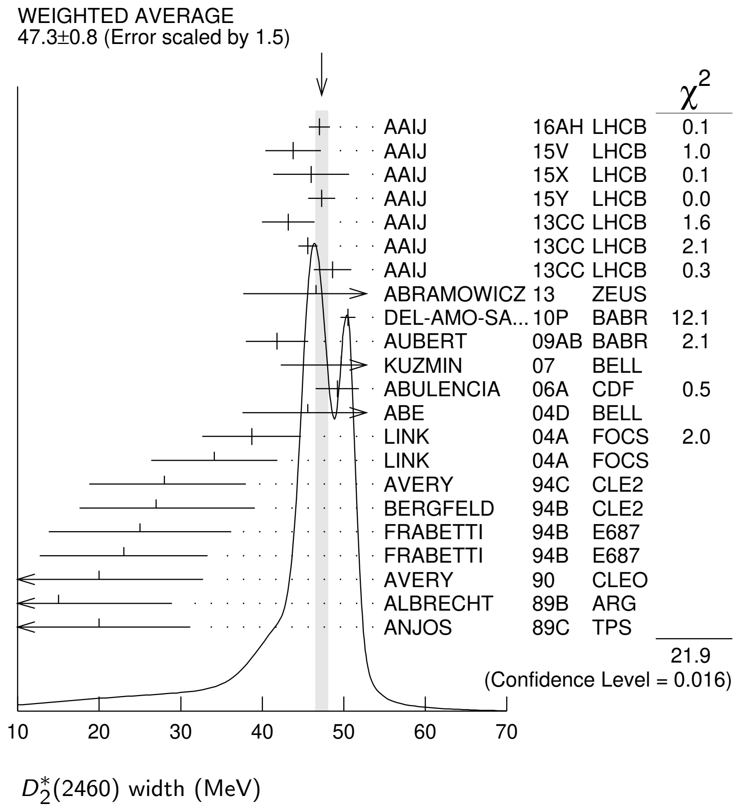
NODE=M254W;LINKAGE=LI

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

NODE=M254W;LINKAGE=LC

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

NODE=M254W;LINKAGE=C



$D_2^*(2460)$ DECAY MODES

NODE=M254215;NODE=M254

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

NODE=M254

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$D\pi^-$	seen	DESIG=1
Γ_2	$D^*(2010)\pi^-$	seen	DESIG=2
Γ_3	$D\pi^+\pi^-$		DESIG=3
Γ_4	$D^*\pi^+\pi^-$		DESIG=4

$D_2^*(2460)$ BRANCHING RATIOS

NODE=M254220

$\Gamma(D\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M254R1
NODE=M254R1

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	$\gamma N \to D^+\pi^- X$

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

NODE=M254R2
NODE=M254R2

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	$e^+e^- \to D^*\pi^- X$

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

NODE=M254R3
NODE=M254R3

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	$e^+e^- \to D^{*+}\pi^- X$

OCCUR=2

1.9 ±1.1 ±0.3	BERGFELD	94B	CLE2	+	$e^+e^- \to$ hadrons	OCCUR=2
2.3 ±0.8	AVERY	90	CLEO	0	e^+e^-	
3.0 ±1.1 ±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. NODE=M254R3;LINKAGE=AR

[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. NODE=M254R3;LINKAGE=AB

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

NODE=M254R01

VALUE	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
0.62±0.03±0.02	8414	[1] AUBERT	09Y	BABR	0	$B^+ \to D_2^{*0}\ell^+\nu_\ell$	
0.62±0.03±0.02	3361	[1] AUBERT	09Y	BABR	+	$\overline{B}^0 \to D_2^{*+}\ell^-\nu_\ell$	OCCUR=2

[1] Assuming $\Gamma(\Upsilon(4S) \to B^+B^-)$ / $\Gamma(\Upsilon(4S) \to B^0\overline{B}^0)$ = 1.065 ± 0.026 and equal partial widths for charged and neutral D_2^* mesons. NODE=M254R01;LINKAGE=AU

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

NODE=M254PAM

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 $D^* \to D\pi$. NODE=M254PAM

NODE=M254PAM

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. NODE=M254PAM;LINKAGE=AB

[2] Systematic uncertainties not estimated. NODE=M254PAM;LINKAGE=AV

$D_2^*(2460)$ REFERENCES

NODE=M254

AAIJ	16AH	PR D94 072001	R. Aaij *et al.*	(LHCb Collab.)	REFID=57518
AAIJ	15V	PR D91 092002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56575
Also		PR D93 119901 (errat.)	R. Aaij *et al.*	(LHCb Collab.)	REFID=57289
AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
AUBERT	09AB	PR D79 112004	B. Aubert *et al.*	(BABAR Collab.)	REFID=52941
AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52929
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52733
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.)	REFID=51054
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46315
ACKERSTAFF	97W	ZPHY C76 425	K. Ackerstaff *et al.*	(OPAL Collab.)	REFID=45788
ASRATYAN	95	ZPHY C68 43	A.E. Asratyan *et al.*	(BIRM, BELG, CERN+)	REFID=44439
AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.)	REFID=44096
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)	REFID=41013
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931
ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=41001
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)	REFID=40737