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# $D_2^*(2460)^0$

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

$J^P = 2^+$ 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.

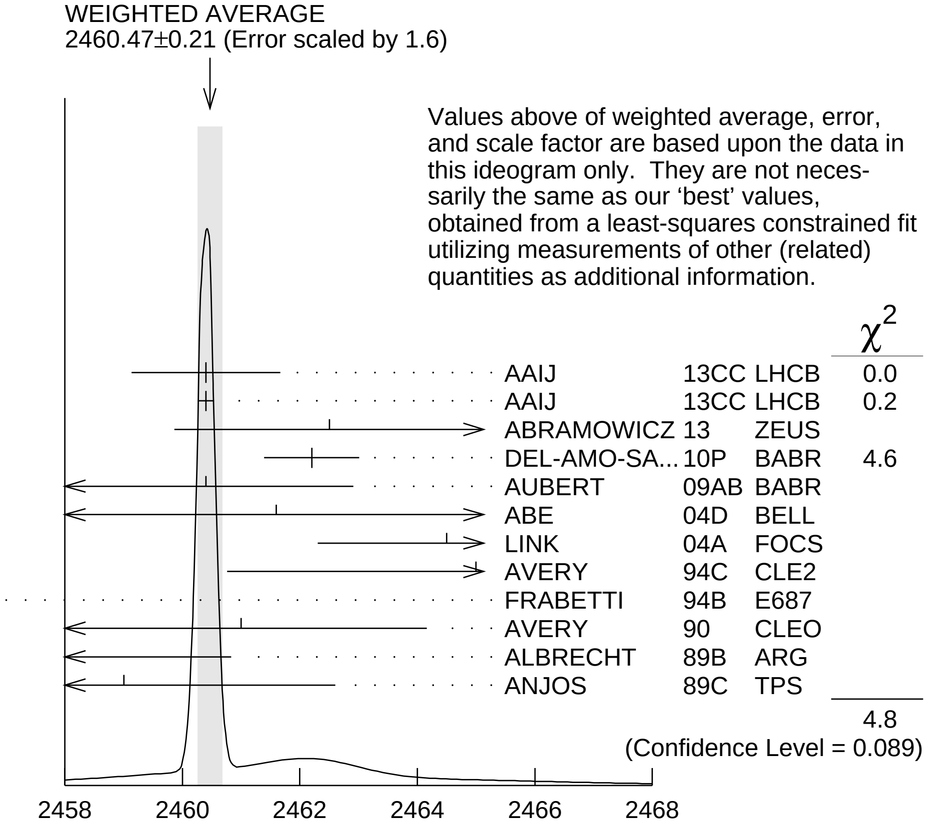
| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2460.57±0.15 OUR FIT** Error includes scale factor of 1.1. | | | | | |
| **2460.47±0.21 OUR AVERAGE** Error includes scale factor of 1.6. See the ideogram below. | | | | | |
| 2460.4 ±0.4 ±1.2 | 82k | AAIJ | 13CC | LHCB | $pp \rightarrow D^{*+}\pi^- X$ |
| 2460.4 ±0.1 ±0.1 | 675k | AAIJ | 13CC | LHCB | $pp \rightarrow D^+\pi^- X$ |
| 2462.5 ±2.4 $^{+1.3}_{-1.1}$ | 2.3k | [1] ABRAMOWICZ | 13 | ZEUS | $e^\pm p \rightarrow D^{(*)+}\pi^- X$ |
| 2462.2 ±0.1 ±0.8 | 243k | DEL-AMO-SA... | 10P | BABR | $e^+e^- \rightarrow D^+\pi^- X$ |
| 2460.4 ±1.2 ±2.2 | 3.4k | AUBERT | 09AB | BABR | $B^- \rightarrow D^+\pi^-\pi^-$ |
| 2461.6 ±2.1 ±3.3 | | [2] ABE | 04D | BELL | $B^- \rightarrow D^+\pi^-\pi^-$ |
| 2464.5 ±1.1 ±1.9 | 5.8k | [2] LINK | 04A | FOCS | $\gamma$ A |
| 2465 ±3 ±3 | 486 | AVERY | 94C | CLE2 | $e^+e^- \rightarrow D^+\pi^- X$ |
| 2453 ±3 ±2 | 128 | FRABETTI | 94B | E687 | $\gamma$Be $\rightarrow D^+\pi^- X$ |
| 2461 ±3 ±1 | 440 | AVERY | 90 | CLEO | $e^+e^- \rightarrow D^{*+}\pi^- X$ |
| 2455 ±3 ±5 | 337 | ALBRECHT | 89B | ARG | $e^+e^- \rightarrow D^+\pi^- X$ |
| 2459 ±3 ±2 | 153 | ANJOS | 89C | TPS | $\gamma N \rightarrow D^+\pi^- X$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 2469.1 ±3.7 $^{+1.2}_{-1.3}$ | 1.5k | [3] CHEKANOV | 09 | ZEUS | $e^\pm p \rightarrow D^{(*)+}\pi^- X$ |
| 2463.3 ±0.6 ±0.8 | 20k | ABULENCIA | 06A | CDF | 1900 $p\overline{p} \rightarrow D^+\pi^- X$ |
| 2461 ±6 | 126 | [4] ABREU | 98M | DLPH | $e^+e^-$ |
| 2466 ±7 | 1 | ASRATYAN | 95 | BEBC | 53,40 $\nu(\overline{\nu}) \rightarrow pX, dX$ |

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

[3] 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.

[4] No systematic error given.




$D_2^*(2460)^0$ mass (MeV)

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

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* |
|---|---|---|---|---|---|
| **590.98±0.18 OUR FIT** | Error includes scale factor of 1.1. | | | | |
| **593.9 ±0.6 ±0.5** | 20k | ABULENCIA | 06A | CDF | 1900 $p\overline{p} \to D^+\pi^- X$ |

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

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.

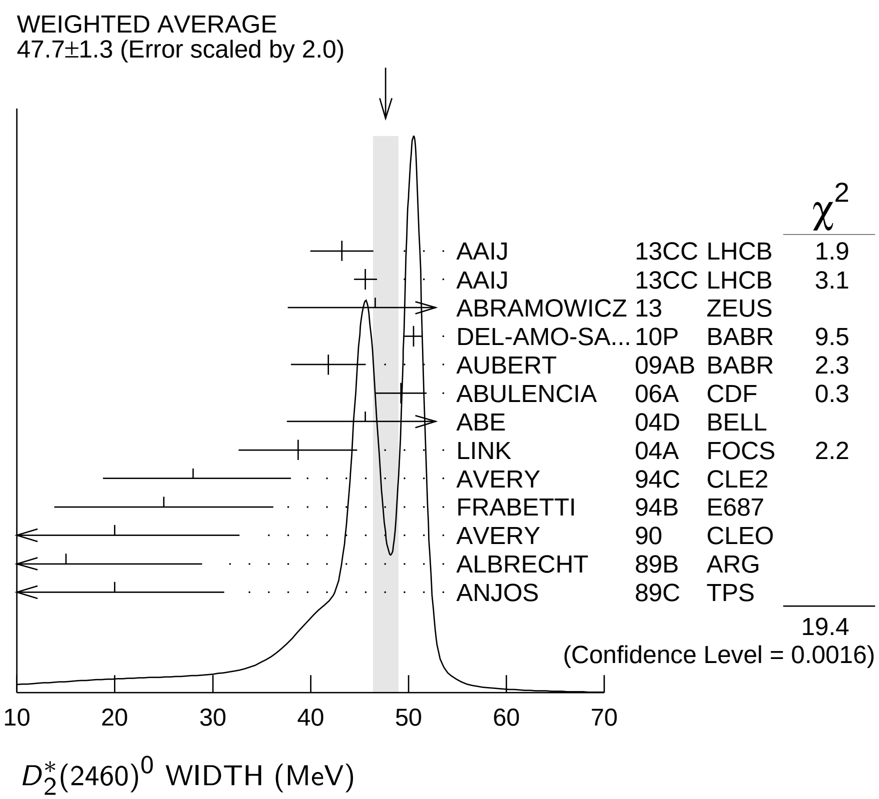
| *VALUE* (MeV) | *EVTS* | *DOCUMENT ID* | | *TECN* | *COMMENT* |
|---|---|---|---|---|---|
| **450.31±0.16 OUR FIT** | Error includes scale factor of 1.1. | | | | |
| **458.8 ±3.7 $^{+1.2}_{-1.3}$** | 1560±230 | CHEKANOV | 09 | ZEUS | $e^{\pm}p \to D^{(*)+}\pi^- X$ |

# $D_2^*(2460)^0$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **47.7± 1.3 OUR AVERAGE** | Error includes scale factor of 2.0. See the ideogram below. | | | | |
| 43.2± 1.2± 3.0 | 82k | AAIJ | 13CC | LHCB | $p p \to D^{*+} \pi^- X$ |
| 45.6± 0.4± 1.1 | 675k | AAIJ | 13CC | LHCB | $p p \to D^+ \pi^- X$ |
| $46.6 \pm 8.1 ^{+5.9}_{-3.8}$ | 2.3k | [5] ABRAMOWICZ | 13 | ZEUS | $e^\pm p \to D^{(*)+} \pi^- X$ |
| 50.5± 0.6± 0.7 | 243k | DEL-AMO-SA... | 10P | BABR | $e^+ e^- \to D^+ \pi^- X$ |
| 41.8± 2.5± 2.9 | 3.4k | AUBERT | 09AB | BABR | $B^- \to D^+ \pi^- \pi^-$ |
| 49.2± 2.3± 1.3 | 20k | ABULENCIA | 06A | CDF | 1900 $p \overline{p} \to D^+ \pi^- X$ |
| 45.6± 4.4± 6.7 | | [6] ABE | 04D | BELL | $B^- \to D^+ \pi^- \pi^-$ |
| 38.7± 5.3± 2.9 | 5.8k | [6] LINK | 04A | FOCS | $\gamma$ A |
| $28 ^{+8}_{-7} \pm 6$ | 486 | AVERY | 94C | CLE2 | $e^+ e^- \to D^+ \pi^- X$ |
| 25 ±10 ± 5 | 128 | FRABETTI | 94B | E687 | $\gamma$ Be $\to D^+ \pi^- X$ |
| $20 ^{+9}_{-12} {}^{+9}_{-10}$ | 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 ±10 ± 5 | 153 | ANJOS | 89C | TPS | $\gamma N \to D^+ \pi^- X$ |

[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 $D_0^*(2400)^0$.



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

$\overline{D}_2^*(2460)^0$ modes are charge conjugates of modes below.

| | Mode | Fraction ($\Gamma_i/\Gamma$) |
|---|---|---|
| $\Gamma_1$ | $D^+\pi^-$ | seen |
| $\Gamma_2$ | $D^*(2010)^+\pi^-$ | seen |
| $\Gamma_3$ | $D^0\pi^+\pi^-$ | not seen |
| $\Gamma_4$ | $D^{*0}\pi^+\pi^-$ | not seen |

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

## $\Gamma(D^+\pi^-)/\Gamma_{total}$ — $\Gamma_1/\Gamma$

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

## $\Gamma(D^*(2010)^+\pi^-)/\Gamma_{total}$ — $\Gamma_2/\Gamma$

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

## $\Gamma(D^+\pi^-)/\Gamma(D^*(2010)^+\pi^-)$ — $\Gamma_1/\Gamma_2$

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **1.54±0.15 OUR AVERAGE** | | | | | |
| 1.4 ±0.3 ±0.3 | 2.3k | [7] ABRAMOWICZ | 13 | ZEUS | $e^\pm p \to D^{(*)+}\pi^- X$ |
| 1.47±0.03±0.16 | 379k | DEL-AMO-SA... | 10P | BABR | $e^+e^- \to D^{(*)+}\pi^- X$ |
| 2.8 ±0.8 $^{+0.5}_{-0.6}$ | 1560 ± 230 | CHEKANOV | 09 | ZEUS | $e^\pm p \to D^{(*)+}\pi^- X$ |
| 2.2 ±0.7 ±0.6 | | AVERY | 94C | CLE2 | $e^+e^- \to D^{*+}\pi^- X$ |
| 2.3 ±0.8 | | AVERY | 90 | CLEO | $e^+e^-$ |
| 3.0 ±1.1 ±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 | $B^- \to D^{(*)+}\pi^-\pi^-$ |

[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.

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

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 0.62±0.03±0.02 | 8414 | [8] AUBERT | 09Y | BABR | $B^+ \to D_2^{*0}\ell^+\nu_\ell$ |

[8] Assuming $\Gamma(\Upsilon(4S) \rightarrow B^+ B^-)$ / $\Gamma(\Upsilon(4S) \rightarrow B^0 \overline{B}^0)$ = 1.065 ± 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, $\theta_H$, distribution varies like $1 + A_{D_2} \cos^2(\theta_H)$, where $\theta_H$ is the angle in the $D^*$ rest frame between the two pions emitted by the $D_2 \rightarrow D^* \pi$ and $D^* \rightarrow D \pi$.

| VALUE | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| $-1.16 \pm 0.35$ | 2.3k | [9] ABRAMOWICZ | 13 | ZEUS | $e^{\pm} p \rightarrow D^{(*)+} \pi^- X$ |
| consistent with $-1$ | 243k | DEL-AMO-SA... | 10P | BABR | $e^+ e^- \rightarrow D^+ \pi^- X$ |
| $-0.74^{+0.49}_{-0.38}$ | | [10] AVERY | 94C | CLE2 | $e^+ e^- \rightarrow D^{*+} \pi^- X$ |

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

## $D_2^*(2460)^0$ REFERENCES


| | | | | |
|---|---|---|---|---|
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| 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.) |
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| 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.) |