

$D_3^*(2750)$

$$I(J^P) = \frac{1}{2}(3^-)$$

OMITTED FROM SUMMARY TABLE

 J^P determined by AAIJ 15Y from the Dalitz plot analysis of $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$ decays. J^P consistent with natural parity (AAIJ 13CC). **$D_3^*(2750)$ MASS**

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|---|-------|---|------|--------|---|
| 2763.5 ± 3.4 OUR AVERAGE | | Error includes scale factor of 2.2. See the ideogram below. | | | |
| 2775.5 ± 4.5 ± 6.5 | 28k | ¹ AAIJ | 16AH | LHCB | $B^- \rightarrow D^+ \pi^- \pi^-$ |
| 2798 ± 7 ± 7 | | ² AAIJ | 15Y | LHCB | $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$ |
| 2761.1 ± 5.1 ± 6.5 | 14k | AAIJ | 13CC | LHCB 0 | $pp \rightarrow D^{*+} \pi^- X$ |
| 2760.1 ± 1.1 ± 3.7 | 56k | AAIJ | 13CC | LHCB 0 | $pp \rightarrow D^+ \pi^- X$ |
| 2771.7 ± 1.7 ± 3.8 | 20k | AAIJ | 13CC | LHCB + | $pp \rightarrow D^0 \pi^+ X$ |
| 2752.4 ± 1.7 ± 2.7 | 23.5k | ³ DEL-AMO-SA..10P | BABR | 0 | $e^+ e^- \rightarrow D^{*+} \pi^- X$ |
| 2763.3 ± 2.3 ± 2.3 | 11.3k | ³ DEL-AMO-SA..10P | BABR | 0 | $e^+ e^- \rightarrow D^+ \pi^- X$ |
| 2769.7 ± 3.8 ± 1.5 | 5.7k | ^{3,4} DEL-AMO-SA..10P | BABR | + | $e^+ e^- \rightarrow D^0 \pi^+ X$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| 2802 ± 11 ± 10 | | ⁵ AAIJ | 15Y | LHCB | $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$ |

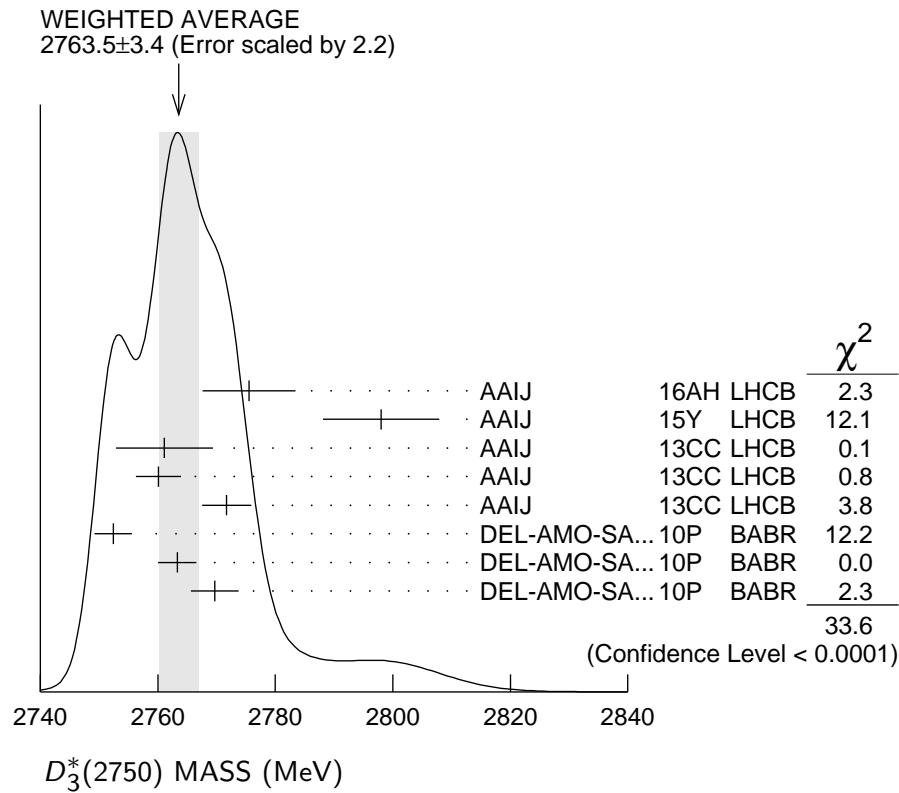
¹ From the amplitude analysis in the model describing the $D^+ \pi^-$ wave together with virtual contributions from the $D^*(2007)^0$ and B^{*0} states, and components corresponding to the $D_2^*(2460)^0$, $D_1^*(2680)^0$, $D_3^*(2760)^0$, and $D_2^*(3000)^0$ resonances.

² Modeling the $\pi^+ \pi^-$ S-wave with the Isobar formalism.

³ The states observed in the $D^* \pi$ and $D \pi$ final states are not necessarily the same.

⁴ At a fixed width of 60.9 MeV.

⁵ Modeling the $\pi^+ \pi^-$ S-wave with the K-matrix formalism.



$D_3^*(2750)$ WIDTH

| VALUE (MeV) | EVTS | DOCUMENT ID | TECN | CHG | COMMENT |
|---|--------------------|------------------------------|------|--------|---|
| 66 ± 5 | OUR AVERAGE | | | | |
| $95.3 \pm 9.6 \pm 34.0$ | 28k | ⁶ AAIJ | 16AH | LHCb | $B^- \rightarrow D^+ \pi^- \pi^-$ |
| $105 \pm 18 \pm 24$ | | ⁷ AAIJ | 15Y | LHCb | $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$ |
| $74.4 \pm 3.4 \pm 37.0$ | 14k | AAIJ | 13CC | LHCb 0 | $pp \rightarrow D^{*+} \pi^- X$ |
| $74.4 \pm 3.4 \pm 19.1$ | 56k | AAIJ | 13CC | LHCb 0 | $pp \rightarrow D^+ \pi^- X$ |
| $66.7 \pm 6.6 \pm 10.5$ | 20k | AAIJ | 13CC | LHCb + | $pp \rightarrow D^0 \pi^+ X$ |
| $71 \pm 6 \pm 11$ | 23.5k | ⁸ DEL-AMO-SA..10P | BABR | | $e^+ e^- \rightarrow D^{*+} \pi^- X$ |
| $60.9 \pm 5.1 \pm 3.6$ | 11.3k | ⁸ DEL-AMO-SA..10P | BABR | | $e^+ e^- \rightarrow D^+ \pi^- X$ |
| ● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ● | | | | | |
| $154 \pm 27 \pm 16$ | | ⁹ AAIJ | 15Y | LHCb | $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$ |

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

⁸ The states observed in the $D^* \pi$ and $D \pi$ final states are not necessarily the same.

⁹ Modeling the $\pi^+ \pi^-$ S-wave with the K-matrix formalism.

$D_3^*(2750)$ DECAY MODES

| Mode | Fraction (Γ_i/Γ) |
|--------------------------|--------------------------------|
| Γ_1 $D\pi$ | seen |
| Γ_2 $D^+\pi^-$ | seen |
| Γ_3 $D^0\pi^\pm$ | seen |
| Γ_4 $D^*\pi$ | seen |
| Γ_5 $D^{*+}\pi^-$ | seen |

 $D_3^*(2750)$ BRANCHING RATIOS

| $\Gamma(D^+\pi^-)/\Gamma(D^{*+}\pi^-)$ | | | | | Γ_2/Γ_5 |
|--|-------|-------------------------------|------|--------------------------------------|---------------------|
| VALUE | EVTs | DOCUMENT ID | TECN | COMMENT | |
| $0.42 \pm 0.05 \pm 0.11$ | 34.8k | ¹⁰ DEL-AMO-SA..10P | BABR | $e^+e^- \rightarrow D^{(*)+}\pi^- X$ | |

¹⁰The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.

 $D_3^*(2750)$ POLARIZATION AMPLITUDE A_D

A polarization amplitude A_D is a parameter that depends on the initial polarization of the $D_3^*(2750)$. For $D_3^*(2750)$ decays the helicity angle, θ_H , distribution varies like $1 + A_D \cos(\theta_H)$, where θ_H is the angle in the D^* rest frame between the two pions emitted by the $D_3^*(2750) \rightarrow D^*\pi$ and $D^* \rightarrow D\pi$.

| VALUE | EVTs | DOCUMENT ID | TECN | COMMENT |
|------------------|-------|-------------------------------|------|------------------------------------|
| -0.33 ± 0.28 | 23.5k | ¹¹ DEL-AMO-SA..10P | BABR | $e^+e^- \rightarrow D^{*+}\pi^- X$ |

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

¹¹Systematic uncertainties not estimated. The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.

 $D_3^*(2750)$ REFERENCES

| | | | |
|-------------------|--------------------|----------------------------------|-------------------|
| AAIJ | 16AH PR D94 072001 | R. Aaij <i>et al.</i> | (LHCb Collab.) |
| AAIJ | 15Y PR D92 032002 | R. Aaij <i>et al.</i> | (LHCb Collab.) JP |
| AAIJ | 13CC JHEP 1309 145 | R. Aaij <i>et al.</i> | (LHCb Collab.) |
| DEL-AMO-SA... 10P | PR D82 111101 | P. del Amo Sanchez <i>et al.</i> | (BABAR Collab.) |