

# $D_3^*(2750)$

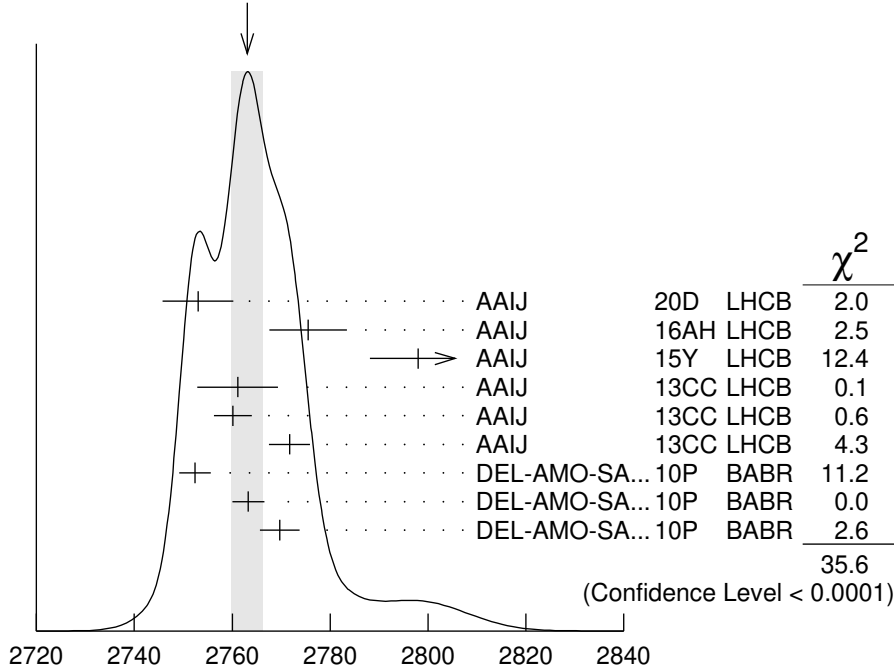
$$I(J^P) = \frac{1}{2}(3^-)$$

$J^P$  determined by AAIJ 15Y from the Dalitz plot analysis of  $B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$  decays.

## $D_3^*(2750)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>2763.1 ± 3.2 OUR AVERAGE</b>		Error includes scale factor of 2.1. See the ideogram below.			
2753 ± 4 ± 6	79k	<sup>1</sup> AAIJ	20D	LHCB	$B^- \rightarrow D^{*+} \pi^- \pi^-$
2775.5 ± 4.5 ± 6.5	28k	<sup>2</sup> AAIJ	16AH	LHCB	$B^- \rightarrow D^+ \pi^- \pi^-$
2798 ± 7 ± 7		<sup>3</sup> 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	<sup>4</sup> DEL-AMO-SA..10P	BABR	0	$e^+ e^- \rightarrow D^{*+} \pi^- X$
2763.3 ± 2.3 ± 2.3	11.3k	<sup>4</sup> DEL-AMO-SA..10P	BABR	0	$e^+ e^- \rightarrow D^+ \pi^- X$
2769.7 ± 3.8 ± 1.5	5.7k	<sup>4,5</sup> 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		<sup>6</sup> AAIJ	15Y	LHCB	$B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$

WEIGHTED AVERAGE  
2763.1 ± 3.2 (Error scaled by 2.1)



$D_3^*(2750)$  MASS (MeV)

<sup>1</sup> From a full four-body amplitude analysis of the  $B^- \rightarrow D^{*+} \pi^- \pi^-$  decay.

<sup>2</sup> 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.

<sup>3</sup> Modeling the  $\pi^+\pi^-$  S-wave with the Isobar formalism.

<sup>4</sup> The states observed in the  $D^*\pi$  and  $D\pi$  final states are not necessarily the same.

<sup>5</sup> At a fixed width of 60.9 MeV.

<sup>6</sup> Modeling the  $\pi^+\pi^-$  S-wave with the K-matrix formalism.

### $D_3^*(2750)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
<b>66 ± 5</b>	<b>OUR AVERAGE</b>				
66 ±10 ±14	79k	<sup>1</sup> AAIJ	20D	LHCB	$B^- \rightarrow D^{*+} \pi^- \pi^-$
95.3 ± 9.6 ± 34.0	28k	<sup>2</sup> AAIJ	16AH	LHCB	$B^- \rightarrow D^+ \pi^- \pi^-$
105 ±18 ±24		<sup>3</sup> AAIJ	15Y	LHCB	$B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$
74.4 ± 3.4 ± 37.0	14k	AAIJ	13CC	LHCB 0	$pp \rightarrow D^{*+} \pi^- X$
74.4 ± 3.4 ± 19.1	56k	AAIJ	13CC	LHCB 0	$pp \rightarrow D^+ \pi^- X$
66.7 ± 6.6 ± 10.5	20k	AAIJ	13CC	LHCB +	$pp \rightarrow D^0 \pi^+ X$
71 ± 6 ± 11	23.5k	<sup>4</sup> DEL-AMO-SA..10P	BABR		$e^+ e^- \rightarrow D^{*+} \pi^- X$
60.9 ± 5.1 ± 3.6	11.3k	<sup>4</sup> DEL-AMO-SA..10P	BABR		$e^+ e^- \rightarrow D^+ \pi^- X$

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

154 ±27 ±16		<sup>5</sup> AAIJ	15Y	LHCB	$B^0 \rightarrow \bar{D}^0 \pi^+ \pi^-$
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<sup>1</sup> From a full four-body amplitude analysis of the  $B^- \rightarrow D^{*+} \pi^- \pi^-$  decay.

<sup>2</sup> 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.

<sup>3</sup> Modeling the  $\pi^+\pi^-$  S-wave with the Isobar formalism.

<sup>4</sup> The states observed in the  $D^*\pi$  and  $D\pi$  final states are not necessarily the same.

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

### $D_3^*(2750)$ DECAY MODES

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $D\pi$	seen
$\Gamma_2$ $D^+ \pi^-$	seen
$\Gamma_3$ $D^0 \pi^\pm$	seen
$\Gamma_4$ $D^* \pi$	seen
$\Gamma_5$ $D^{*+} \pi^-$	seen

### $D_3^*(2750)$ BRANCHING RATIOS

$\Gamma(D^+ \pi^-)/\Gamma(D^{*+} \pi^-)$				$\Gamma_2/\Gamma_5$
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
<b>0.42 ± 0.05 ± 0.11</b>	34.8k	<sup>1</sup> DEL-AMO-SA..10P	BABR	$e^+ e^- \rightarrow D^{(*)+} \pi^- X$

<sup>1</sup> The 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,  $\theta_H$ , distribution varies like  $1 + A_D \cos(\theta_H)$ , where  $\theta_H$  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
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●				
$-0.33 \pm 0.28$	23.5k	<sup>1</sup> DEL-AMO-SA..10P	BABR	$e^+ e^- \rightarrow D^{*+} \pi^- X$
<sup>1</sup> Systematic 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	20D	PR D101 032005	R. Aaij <i>et al.</i>	(LHCb Collab.)
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.)