

X(4260)

$$I^G(J^{PC}) = ?(1^{--})$$

Seen in radiative return from e^+e^- collisions at $\sqrt{s} = 9.54\text{--}10.58$ GeV by AUBERT,B 05I, HE 06B, and YUAN 07, and in e^+e^- collisions at $\sqrt{s} \approx 4.26$ GeV by COAN 06. Possibly seen by AUBERT 06 in $B^- \rightarrow K^- \pi^+ \pi^- J/\psi$. See also the mini-review under the X(3872). (See the index for the page number.)

X(4260) MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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4263⁺⁸₋₉ OUR AVERAGE Error includes scale factor of 1.1.

4247 ± 12 ⁺¹⁷ ₋₃₂		¹ YUAN	07 BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
4284 ⁺¹⁷ ₋₁₆ ± 4	13.6	HE	06B CLEO	9.4–10.6 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
4259 ± 8 ⁺² ₋₆	125	² AUBERT,B	05I BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$

¹ From a two-resonance fit.

² From a single-resonance fit. Two interfering resonances are not excluded.

X(4260) WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
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95 ± 14 OUR AVERAGE

108 ± 19 ± 10		³ YUAN	07 BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
73 ⁺³⁹ ₋₂₅ ± 5	13.6	HE	06B CLEO	9.4–10.6 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
88 ± 23 ⁺⁶ ₋₄	125	⁴ AUBERT,B	05I BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$

³ From a two-resonance fit.

⁴ From a single-resonance fit. Two interfering resonances are not excluded.

X(4260) DECAY MODES

Mode	Fraction (Γ_i/Γ)
Γ_1 e^+e^-	
Γ_2 $J/\psi\pi^+\pi^-$	seen
Γ_3 $J/\psi\pi^0\pi^0$	[a] seen
Γ_4 $J/\psi K^+K^-$	[a] seen
Γ_5 $J/\psi\eta$	[a] not seen
Γ_6 $J/\psi\pi^0$	[a] not seen
Γ_7 $J/\psi\eta'$	[a] not seen
Γ_8 $J/\psi\pi^+\pi^-\pi^0$	[a] not seen
Γ_9 $J/\psi\eta\eta$	[a] not seen
Γ_{10} $\psi(2S)\pi^+\pi^-$	[a] not seen

Γ_{11}	$\psi(2S)\eta$	[a] not seen
Γ_{12}	$\chi_{c0}\omega$	[a] not seen
Γ_{13}	$\chi_{c1}\gamma$	[a] not seen
Γ_{14}	$\chi_{c2}\gamma$	[a] not seen
Γ_{15}	$\chi_{c1}\pi^+\pi^-\pi^0$	[a] not seen
Γ_{16}	$\chi_{c2}\pi^+\pi^-\pi^0$	[a] not seen
Γ_{17}	$\phi\pi^+\pi^-$	[a] not seen
Γ_{18}	$\phi f_0(980) \rightarrow \phi\pi^+\pi^-$	
Γ_{19}	$D\bar{D}$	not seen
Γ_{20}	$p\bar{p}$	
Γ_{21}	$K_S^0 K^\pm \pi^\mp$	
Γ_{22}	$K^+ K^- \pi^0$	

[a] See COAN 06 for details.

$X(4260) \Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(J/\psi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_2\Gamma_1/\Gamma$

VALUE (eV) EVTS DOCUMENT ID TECN COMMENT

$5.9^{+1.2}_{-0.9}$ OUR AVERAGE

$6.0 \pm 1.2^{+4.7}_{-0.5}$		⁵ YUAN	07	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
$8.9^{+3.9}_{-3.1} \pm 1.8$	8.1	HE	06B	CLEO	9.4–10.6 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
$5.5 \pm 1.0^{+0.8}_{-0.7}$	125	⁶ AUBERT,B	05I	BABR	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$20.6 \pm 2.3^{+9.1}_{-1.7}$		⁷ YUAN	07	BELL	10.58 $e^+e^- \rightarrow \gamma\pi^+\pi^- J/\psi$

⁵ Solution I of two equivalent solutions in a fit using two interfering resonances.

⁶ From a single-resonance fit. Two interfering resonances are not excluded.

⁷ Solution II of two equivalent solutions in a fit using two interfering resonances.

$\Gamma(\psi(2S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$ $\Gamma_{10}\Gamma_1/\Gamma$

VALUE (eV) CL% DOCUMENT ID TECN COMMENT

• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.3	90	⁸ LIU	08H	RVUE	10.58 $e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$
$7.4^{+2.1}_{-1.7}$		⁹ LIU	08H	RVUE	10.58 $e^+e^- \rightarrow \psi(2S)\pi^+\pi^-\gamma$

⁸ For constructive interference with the $X(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances.

⁹ For destructive interference with the $X(4360)$ in a combined fit of AUBERT 07S and WANG 07D data with three resonances.

$\Gamma(J/\psi K^+ K^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_4\Gamma_1/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.2	90	¹⁰ YUAN	08	BELL $e^+ e^- \rightarrow \gamma K^+ K^- J/\psi$
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¹⁰ From a fit of the broad $K^+ K^- J/\psi$ enhancement including a coherent $X(4260)$ amplitude with mass and width from YUAN 07.

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{17}\Gamma_1/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<0.4	90	AUBERT, BE	06D	BABR $10.6 e^+ e^- \rightarrow K^+ K^- \pi^+ \pi^- \gamma$
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$\Gamma(\phi f_0(980) \rightarrow \phi\pi^+\pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{18}\Gamma_1/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<0.29	90	¹¹ AUBERT	07AK	BABR $10.6 e^+ e^- \rightarrow \pi^+ \pi^- K^+ K^- \gamma$
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¹¹ AUBERT 07AK reports $[\Gamma(X(4260) \rightarrow \phi f_0(980) \rightarrow \phi\pi^+\pi^-) \times \Gamma(X(4260) \rightarrow e^+ e^-)/\Gamma_{\text{total}}] \times [B(\phi(1020) \rightarrow K^+ K^-)] < 0.14$ eV. We divide by our best value $B(\phi(1020) \rightarrow K^+ K^-) = 48.9 \times 10^{-2}$.

$\Gamma(K_S^0 K^\pm \pi^\mp) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{21}\Gamma_1/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.5	90	AUBERT	08S	BABR $10.6 e^+ e^- \rightarrow K_S^0 K^\pm \pi^\mp \gamma$
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$\Gamma(K^+ K^- \pi^0) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$ $\Gamma_{22}\Gamma_1/\Gamma$

<u>VALUE (eV)</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.6	90	AUBERT	08S	BABR $10.6 e^+ e^- \rightarrow K^+ K^- \pi^0 \gamma$
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X(4260) BRANCHING RATIOS

$\Gamma(p\bar{p})/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{20}/Γ_2

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>COMMENT</u>
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<0.13	90	¹² AUBERT	06B $e^+ e^- \rightarrow p\bar{p}\gamma$
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$\Gamma(D\bar{D})/\Gamma(J/\psi\pi^+\pi^-)$ Γ_{19}/Γ_2

<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
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<1.0	90	¹² AUBERT	07BE	BABR $e^+ e^- \rightarrow D\bar{D}\gamma$
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¹² Using 4259 ± 10 MeV for the mass and 88 ± 24 MeV for the width of $X(4260)$.

X(4260) REFERENCES

AUBERT	08S	PR D77 092002	B. Aubert <i>et al.</i>	(BABAR Collab.)
LIU	08H	PR D78 014032	Z.Q. Liu, X.S. Qin, C.Z. Yuan	
YUAN	08	PR D77 011105R	C.Z. Yuan <i>et al.</i>	(BELLE Collab.)
AUBERT	07AK	PR D76 012008	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07BE	PR D76 111105R	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	07S	PRL 98 212001	B. Aubert <i>et al.</i>	(BABAR Collab.)
WANG	07D	PRL 99 142002	X.L. Wang <i>et al.</i>	(BELLE Collab.)
YUAN	07	PRL 99 182004	C.Z. Yuan <i>et al.</i>	(BELLE Collab.)
AUBERT	06	PR D73 011101R	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06B	PR D73 012005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06D	PR D74 091103R	B. Aubert <i>et al.</i>	(BABAR Collab.)
COAN	06	PRL 96 162003	T.E. Coan <i>et al.</i>	(CLEO Collab.)
HE	06B	PR D74 091104R	Q. He <i>et al.</i>	(CLEO Collab.)
AUBERT,B	05I	PRL 95 142001	B. Aubert <i>et al.</i>	(BABAR Collab.)

OTHER RELATED PAPERS

ALBUQUERQ...	09	NP A815 53	R.M. Albuquerque, M. Nielsen	
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KALASHNIK...	08	PR D77 054025	Yu.S. Kalashnikova, A.V. Nefediev	
PAKHLOVA	08	PR D77 011103R	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
PAKHLOVA	07	PRL 98 092001	G. Pakhlova <i>et al.</i>	(BELLE Collab.)
CHIU	06	PR D73 094510	T.-W. Chiu, T.-H. Hsieh	
HOU	06	PR D74 017504	W.-S. Hou	
MO	06	PL B640 182	X.H. Mo <i>et al.</i>	
QIAO	06	PL B639 263	C. Qiao	
ROSNER	06C	PR D74 076006	J.L. Rosner	
SWANSON	06	PRPL 429 243	E.S. Swanson	(PITT)
YUAN	06	PL B634 399	C.Z. Yuan, P. Wang, X.H. Mo	
BIGI	05	PR D72 114016	I. Bigi <i>et al.</i>	
CLOSE	05A	PL B628 215	F.E. Close, P.R. Page	
KOU	05	PL B631 164	E. Kou	
LIU	05	PR D72 054023	X. Liu, X.Q. Zeng, X.Q. Li	
LLANES-EST...	05	PR D72 031503	F. Llanes-Estrada	
MAIANI	05A	PR D72 031502R	L. Maiani <i>et al.</i>	
ZHU	05	PL B625 212	S.-L. Zhu	