$\chi_{c1}(3872)$

$I^G(J^{PC}) = 0^+(1^{++})$

also known as $X(3872)$

This state shows properties different from a conventional $q\overline{q}$ state. A candidate for an exotic structure. See the review on non-$q\overline{q}$ states.

First observed by CHOI 03 in $B \to K\pi^+\pi^- J/\psi(1S)$ decays as a narrow peak in the invariant mass distribution of the $\pi^+\pi^- J/\psi(1S)$ final state. Isovector hypothesis excluded by AUBERT 05B and CHOI 11.

AAIJ 13Q perform a full five-dimensional amplitude analysis of the angular correlations between the decay products in $B^+ \to \chi_{c1}(3872) K^+$ decays, where $\chi_{c1}(3872) \to J/\psi\pi^+\pi^-$ and $J/\psi \to \mu^+\mu^-$, which unambiguously gives the $J^{PC} = 1^{++}$ assignment under the assumption that the $\pi^+\pi^-$ and J/ψ are in an S-wave. AAIJ 15AO extend this analysis with more data to limit D-wave contributions to $< 4\%$ at 95% CL.

See the review on "Spectroscopy of Mesons Containing Two Heavy Quarks."

$\chi_{c1}(3872)$ MASS FROM $J/\psi X$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
3871.64 ± 0.06 OUR AVERAGE					
3870.2 ± 0.7 ±0.3	24.6	ABLIKIM	23W	BES3	$e^+e^- \to J/\psi(1S)\pi^+\pi^-\omega$
3871.64 ± 0.06 ±0.01	19.8k	[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$
3871.9 ± 0.7 ±0.2	20	ABLIKIM	14	BES3	$e^+e^- \to J/\psi\pi^+\pi^-\gamma$
3871.95 ± 0.48 ±0.12	0.6k	AAIJ	12H	LHCB	$pp \to J/\psi\pi^+\pi^- X$
3871.85 ± 0.27 ±0.19	170	[2] CHOI	11	BELL	$B \to K\pi^+\pi^- J/\psi$
3873 $^{+1.8}_{-1.6}$ ±1.3	27	[3] DEL-AMO-SA...	10B	BABR	$B \to \omega J/\psi K$
3871.61 ± 0.16 ±0.19	6k	[3,4] AALTONEN	09AU	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$
3871.4 ± 0.6 ±0.1	93.4	AUBERT	08Y	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$
3868.7 ± 1.5 ±0.4	9.4	AUBERT	08Y	BABR	$B^0 \to K^0_S J/\psi\pi^+\pi^-$
3871.8 ± 3.1 ±3.0	522	[3,5] ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
3871.57 ± 0.09	155	[6] AAIJ	23AP	LHCB	$B^0_s \to J/\psi 2(\pi^+\pi^-)$
3871.695 ± 0.067 ±0.068	15.6k	[7] AAIJ	20AD	LHCB	$pp \to J/\psi\pi^+\pi^- X$
3871.59 ± 0.06 ±0.03	4.2k	[8] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$
3873.3 ± 1.1 ±1.0	45	[9] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$
3860.0 ±10.4	13.6	[3,10] AGHASYAN	18A	COMP	$\gamma^* N \to X\pi^\pm N'$

3868.6	± 1.2	±0.2	8	[11] AUBERT	06	BABR	$B^0 \to K^0_S J/\psi\pi^+\pi^-$
3871.3	± 0.6	±0.1	61	[11] AUBERT	06	BABR	$B^- \to K^- J/\psi\pi^+\pi^-$
3873.4	± 1.4		25	[12] AUBERT	05R	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$
3871.3	± 0.7	±0.4	730	[3,13] ACOSTA	04	CDF2	$p\overline{p} \to J/\psi\pi^+\pi^- X$
3872.0	± 0.6	±0.5	36	[14] CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$
3836	±13		58	[3,15] ANTONIAZZI	94	E705	300 $\pi^\pm$ Li $\to J/\psi\pi^+\pi^- X$

[1] Calculated from $m_{\chi_{c1}(3872)} - m_{\psi(2S)} = 185.54 \pm 0.06$ MeV obtained by combining the data with $\chi_{c1}(3872)$ produced in B^+ decays from AAIJ 20S and inclusive b-hadron decays from AAIJ 20AD and using $m_{\psi(2S)} = 3686.097$ MeV. Breit-Wigner parametrization.
[2] The mass difference for the $\chi_{c1}(3872)$ produced in B^+ and B^0 decays is $(-0.71 \pm 0.96 \pm 0.19)$ MeV.
[3] Width consistent with detector resolution.
[4] A possible equal mixture of two states with a mass difference greater than 3.6 MeV/c^2 is excluded at 95% CL.
[5] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{J/\psi}$ using $m_{J/\psi}$=3096.916 MeV.
[6] From a fit of a relativistic S-wave Breit-Wigner convolved with the detector resolution. The width of $\chi_{c1}(3872)$ is constrained to the PDG 22 value. Systematic errors not evaluated.
[7] Using $\chi_{c1}(3872)$ produced in inclusive b-hadron decays and $m_{\psi(2S)} = 3686.097 \pm 0.010$ MeV. Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S.
[8] Using Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S.
[9] Fit with fixed width and including two resonances, $\chi_{c0}(3915)$ and $X(3960)$.
[10] Could be a different state.
[11] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} = 3686.093$ MeV. Superseded by AUBERT 08Y.
[12] Calculated from the corresponding $m_{\chi_{c1}(3872)} - m_{\psi(2S)}$ using $m_{\psi(2S)} =$ 3685.96MeV. Superseded by AUBERT 06.
[13] Superseded by AALTONEN 09AU.
[14] Superseded by CHOI 11.
[15] A lower mass value can be due to an incorrect momentum scale for soft pions.

$\chi_{c1}(3872)$ MASS FROM $\overline{D}^{*0} D^0$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$3873.71^{+0.56}_{-0.50} \pm 0.13$		[1] HIRATA	23	BELL	$B^0 \to D^0\overline{D}^{*0}K^0$, $B^+ \to D^0\overline{D}^{*0}K^+$
$3872.9\ ^{+0.6}_{-0.4}\ ^{+0.4}_{-0.5}$	50	[2,3] AUSHEV	10	BELL	$B \to \overline{D}^{*0} D^0 K$
$3875.1\ ^{+0.7}_{-0.5} \pm 0.5$	33 ± 6	[3] AUBERT	08B	BABR	$B \to \overline{D}^{*0} D^0 K$
$3875.2 \pm 0.7\ ^{+0.9}_{-1.8}$	24 ± 6	[3,4] GOKHROO	06	BELL	$B \to D^0\overline{D}^0\pi^0 K$

[1] From a fit of a Breit-Wigner function with energy dependent width.
[2] Calculated from the measured $m_{\chi_{c1}(3872)} - m_{D^{*0}} - m_{\overline{D}^0} = 1.1^{+0.6}_{-0.4}{}^{+0.1}_{-0.3}$ MeV.

[3] Experiments report $D^{*0}\overline{D}^0$ invariant mass above $D^{*0}\overline{D}^0$ threshold because D^{*0} decay products are kinematically constrained to the D^{*0} mass, even though the D^{*0} may decay off-shell.
[4] Superseded by AUSHEV 10.

$m_{\chi_{c1}(3872)} - m_{J/\psi}$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
774.9±3.1±3.0	522	ABAZOV	04F	D0	$p\overline{p} \to J/\psi\pi^+\pi^- X$

$m_{\chi_{c1}(3872)} - m_{\psi(2S)}$

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
185.598±0.067±0.068	15.6k	[1] AAIJ	20AD	LHCB	$pp \to J/\psi\pi^+\pi^- X$
185.54 ±0.06	19.8k	[2] AAIJ	20S	LHCB	$pp \to J/\psi\pi^+\pi^- X$
187.4 ±1.4	25	[3] AUBERT	05R	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$

[1] Using $\chi_{c1}(3872)$ produced in inclusive *b*-hadron decays. Breit-Wigner parametrization. Superseded by the combined value in AAIJ 20S.
[2] Combining $m_{\chi_{c1}(3872)} - m_{\psi(2S)}$ = 185.49 ± 0.06 ± 0.03 MeV from AAIJ 20S and the measured mass difference from AAIJ 20AD. Breit-Wigner parametrization.
[3] Superseded by AUBERT 06.

$\chi_{c1}(3872)$ WIDTH

VALUE (MeV)	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
1.19±0.21 OUR AVERAGE			Error includes scale factor of 1.1.			
1.39±0.24±0.10		15.6k	[1] AAIJ	20AD	LHCB	$pp \to J/\psi\pi^+\pi^- X$
$0.96^{+0.19}_{-0.18}\pm0.21$		4.2k	[2] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^- K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<2.4	90		ABLIKIM	14	BES3	$e^+e^- \to J/\psi\pi^+\pi^-\gamma$
<1.2	90		CHOI	11	BELL	$B \to K\pi^+\pi^- J/\psi$
<3.3	90		AUBERT	08Y	BABR	$B^+ \to K^+ J/\psi\pi^+\pi^-$
<4.1	90	69	AUBERT	06	BABR	$B \to K\pi^+\pi^- J/\psi$
<2.3	90	36	[3] CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

[1] Using $\chi_{c1}(3872)$ produced in inclusive *b*-hadron decays. Breit-Wigner parametrization.
[2] Using Breit-Wigner parametrization. Partially overlapping dataset with that of AAIJ 20AD.
[3] Superseded by CHOI 11.

$\chi_{c1}(3872)$ WIDTH FROM $\overline{D}^{*0} D^0$ MODE

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$5.2^{+2.2}_{-1.5}\pm0.4$		[1] HIRATA	23	BELL	$B^0 \to D^0\overline{D}^{*0}K^0$, $B^+ \to D^0\overline{D}^{*0}K^+$
$3.9^{+2.8}_{-1.4}{}^{+0.2}_{-1.1}$	50	[2] AUSHEV	10	BELL	$B \to \overline{D}^{*0}D^0 K$
$3.0^{+1.9}_{-1.4}\pm0.9$	33 ± 6	AUBERT	08B	BABR	$B \to \overline{D}^{*0}D^0 K$

[1] From a fit of a Breit-Wigner function with energy dependent width.

[2] With a measured value of B($B \to \chi_{c1}(3872) K$) $\times$ B($\chi_{c1}(3872) \to D^{*0} \overline{D}^0$) = $(0.80 \pm 0.20 \pm 0.10) \times 10^{-4}$, assumed to be equal for both charged and neutral modes.

$\chi_{c1}(3872)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$e^+ e^-$	$< 2.7 \times 10^{-7}$	90%
Γ_2	$\pi^+ \pi^- \pi^0$	$< 8 \times 10^{-3}$	90%
Γ_3	$\pi^+ \pi^- J/\psi(1S)$	(3.5 ± 0.9) %	
Γ_4	$\pi^+ \pi^- \pi^0 J/\psi(1S)$	not seen	
Γ_5	$\omega \eta_c(1S)$	< 30 %	90%
Γ_6	$\rho(770)^0 J/\psi(1S)$	(2.8 ± 0.7) %	
Γ_7	$\omega J/\psi(1S)$	(4.1 ± 1.4) %	
Γ_8	$\phi \phi$	not seen	
Γ_9	$D^0 \overline{D}^0 \pi^0$	(45 ± 21) %	
Γ_{10}	$\overline{D}^{*0} D^0$	(34 ± 12) %	
Γ_{11}	$\gamma \gamma$	< 10 %	90%
Γ_{12}	$D^0 \overline{D}^0$	< 26 %	90%
Γ_{13}	$D^+ D^-$	< 17 %	90%
Γ_{14}	$\pi^0 \chi_{c2}$	< 4 %	90%
Γ_{15}	$\pi^0 \chi_{c1}$	$(3.1^{+1.5}_{-1.3})$ %	
Γ_{16}	$\pi^0 \chi_{c0}$	< 13 %	90%
Γ_{17}	$\pi^+ \pi^- \eta_c(1S)$	< 13 %	90%
Γ_{18}	$\pi^0 \pi^0 \chi_{c0}$	< 6 %	90%
Γ_{19}	$\pi^+ \pi^- \chi_{c0}$	< 2.0 %	90%
Γ_{20}	$\pi^+ \pi^- \chi_{c1}$	$< 7 \times 10^{-3}$	90%
Γ_{21}	$p \overline{p}$	$< 2.2 \times 10^{-5}$	95%
	Radiative decays		
Γ_{22}	$\gamma D^+ D^-$	< 3.5 %	90%
Γ_{23}	$\gamma \overline{D}^0 D^0$	< 6 %	90%
Γ_{24}	$\gamma J/\psi$	$(7.8 \pm 2.9) \times 10^{-3}$	
Γ_{25}	$\gamma \chi_{c1}$	$< 8 \times 10^{-3}$	90%
Γ_{26}	$\gamma \chi_{c2}$	< 2.9 %	90%
Γ_{27}	$\gamma \psi(2S)$	possibly seen	
	***C*-violating decays**		
Γ_{28}	$\eta J/\psi$	< 1.7 %	90%

$\chi_{c1}(3872)$ PARTIAL WIDTHS

$\Gamma(e^+ e^-)$ — Γ_1

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
< 0.32	90	[1] ABLIKIM	23O	BES3	$e^+ e^- \to \pi^+ \pi^- J/\psi$

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

$<$ 4.3	90	[2] ABLIKIM	15V	BES3	4.0–4.4 $e^+e^- \to \pi^+\pi^- J/\psi$
$<$280	90	[3] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[1] Fit to cross section using a total width value of 1.19 $\pm$ 0.21 MeV and B($\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)$) = (3.8 $\pm$ 1.2)% from PDG 20.

[2] ABLIKIM 15V reports this limit from the measurement of $\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S)) \times \Gamma(\chi_{c1}(3872) \to e^+e^-)/\Gamma < 0.13$ eV using $\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))/\Gamma = 3\%$.

[3] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. Assuming that $\Gamma(\pi^+\pi^- J/\psi)$ of $\chi_{c1}(3872)$ is the same as that of $\psi(2S)$ (85.4 keV).

$\chi_{c1}(3872)$ $\Gamma(i)\Gamma(e^+e^-)/\Gamma(\text{total})$

$\Gamma(\pi^+\pi^- J/\psi(1S)) \times \Gamma(e^+e^-)/\Gamma_{total}$ $\Gamma_3\Gamma_1/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
$< 7.5 \times 10^{-3}$	90	[1] ABLIKIM	23O	BES3	$e^+e^- \to \pi^+\pi^- J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$ 0.13	90	ABLIKIM	15V	BES3	4.0–4.4 $e^+e^- \to \pi^+\pi^- J/\psi$
$<$ 6.2	90	[2,3] AUBERT	05D	BABR	10.6 $e^+e^- \to K^+K^-\pi^+\pi^-\gamma$
$<$ 8.3	90	[3] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi$
$<$10	90	[4] YUAN	04	RVUE	$e^+e^- \to \pi^+\pi^- J/\psi$

[1] Fit to cross section using a total width value of 1.19 $\pm$ 0.21 MeV from PDG 20.

[2] Using B($\chi_{c1}(3872) \to J/\psi\pi^+\pi^-$) · B($J/\psi \to \mu^+\mu^-$) · $\Gamma(\chi_{c1}(3872) \to e^+e^-)$ $<$ 0.37 eV from AUBERT 05D and B($J/\psi \to \mu^+\mu^-$) = 0.0588 $\pm$ 0.0010 from the PDG 04.

[3] Assuming $\chi_{c1}(3872)$ has $J^{PC} = 1^{--}$.

[4] Using BAI 98E data on $e^+e^- \to \pi^+\pi^-\ell^+\ell^-$. From theoretical calculation of the production cross section and using B($J/\psi \to \mu^+\mu^-$) = (5.88 $\pm$ 0.10)%.

$\chi_{c1}(3872)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(\pi^+\pi^- J/\psi(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_3\Gamma_{11}/\Gamma$

VALUE (eV)	*CL%*	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$5.5^{+4.1}_{-3.8} \pm 0.7$		3	[1] TERAMOTO	21	BELL	$e^+e^- \to \gamma^*\gamma$ at Υ(nS)
$<$12.9	90		[2] DOBBS	05	CLE3	$e^+e^- \to \pi^+\pi^- J/\psi\gamma$

[1] Measured in single-tag two-photon production assuming Q^2 dependence of a $c\overline{c}$ meson model. Here, $\Gamma(\chi_{c1}(3872) \to \gamma\gamma)$ is the reduced two-photon decay width, $\widetilde{\Gamma}_{\gamma\gamma}$.

[2] Assuming $\chi_{c1}(3872)$ has positive C parity and spin 0.

$\Gamma(\omega J/\psi(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ $\Gamma_7\Gamma_{11}/\Gamma$

VALUE (eV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<$1.7	90	[1] LEES	12AD	BABR	$e^+e^- \to e^+e^-\omega J/\psi$

[1] Assuming $\chi_{c1}(3872)$ has spin 2.

$\Gamma(\pi^+\pi^-\eta_c(1S)) \times \Gamma(\gamma\gamma)/\Gamma_{total}$ — $\Gamma_{17}\Gamma_{11}/\Gamma$

VALUE (eV)	CL%	DOCUMENT ID		TECN	COMMENT
<11.1	90	LEES	12AE	BABR	$e^+e^- \to e^+e^-\pi^+\pi^-\eta_c$

$\chi_{c1}(3872)$ BRANCHING RATIOS

$\Gamma(\pi^+\pi^-\pi^0)/\Gamma_{total}$ — Γ_2/Γ

VALUE (%)	CL%	DOCUMENT ID		TECN	COMMENT
<0.8	90	[1,2] YIN	23	BELL	$B^+ \to \chi_{c1}(3872)K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.1	90	[2,3] YIN	23	BELL	$B^0 \to \chi_{c1}(3872)K^0$

[1] YIN 23 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 1.9\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3\times10^{-4}$.

[2] Assuming the decay products, $\pi^+\pi^-\pi^0$, are uniformly distributed in phase space. The limit is the 90% "credible" upper limit (i.e. Bayesian).

[3] YIN 23 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\pi^0)/\Gamma_{total}] \times [B(B^0 \to \chi_{c1}(3872)K^0)] < 1.5\times10^{-6}$ which we divide by our best value $B(B^0 \to \chi_{c1}(3872)K^0) = 1.4\times10^{-4}$.

$\Gamma(\pi^+\pi^-J/\psi(1S))/\Gamma_{total}$ — Γ_3/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.035±0.009 OUR AVERAGE					
$0.035\pm0.002\pm0.009$		[1] AAIJ	20S	LHCB	$B^+ \to J/\psi\pi^+\pi^-K^+$
$0.038\pm0.004\pm0.010$		[2] CHOI	11	BELL	$B^+ \to \pi^+\pi^-J/\psi K^+$
$0.037\pm0.007^{+0.009}_{-0.010}$	93	[3,4] AUBERT	08Y	BABR	$B \to \chi_{c1}(3872)K$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	151	[5] BALA	15	BELL	$B \to \chi_{c1}(3872)K\pi$
$0.056\pm0.018^{+0.014}_{-0.015}$	30	[6] AUBERT	05R	BABR	$B^+ \to K^+\pi^+\pi^-J/\psi$
$0.060\pm0.013\pm0.016$	36	[7] CHOI	03	BELL	$B^+ \to K^+\pi^+\pi^-J/\psi$

[1] AAIJ 20S reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (7.95 \pm 0.15 \pm 0.33)\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.3 \pm 0.6)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] CHOI 11 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (8.63 \pm 0.82 \pm 0.52)\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.3 \pm 0.6)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] AUBERT 08Y reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (8.4 \pm 1.5 \pm 0.7)\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = (2.3 \pm 0.6)\times10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[4] superseded by LEES 20C

[5] BALA 15 reports $B(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi) \times B(B^0 \to \chi_{c1}(3872)K^+\pi^-) = (7.9 \pm 1.3 \pm 0.4)\times10^{-6}$ and $B(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi) \times B(B^+ \to \chi_{c1}(3872)K^0\pi^+) = (10.6 \pm 3.0 \pm 0.9)\times10^{-6}$.

[6] Superseded by AUBERT 08Y. AUBERT 05R reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] = (1.28 \pm 0.41)\times10^{-5}$ which we divide by our

best value B($B^+ \to \chi_{c1}(3872) K^+$) = $(2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[7] CHOI 03 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] / [B(B^+ \to \psi(2S) K^+)] / [B(\psi(2S) \to J/\psi(1S)\pi^+\pi^-)] = 0.063 \pm 0.012 \pm 0.007$ which we multiply or divide by our best values B($B^+ \to \chi_{c1}(3872) K^+$) = $(2.3 \pm 0.6) \times 10^{-4}$, B($B^+ \to \psi(2S) K^+$) = $(6.24 \pm 0.21) \times 10^{-4}$, B($\psi(2S) \to J/\psi(1S)\pi^+\pi^-$) = $(34.69 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(\pi^+\pi^-\pi^0 J/\psi(1S))/\Gamma_{total}$ — Γ_4/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] WANG	11B	BELL	$\Upsilon(2S) \to \gamma X$
not seen	[2] SHEN	10A	BELL	$\Upsilon(1S) \to \gamma X$

[1] WANG 11B reports B($\Upsilon(2S) \to \gamma\chi_{c1}(3872)$) × B($\chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi$) < 2.4×10^{-6} at 95% CL.

[2] SHEN 10A reports B($\Upsilon(1S) \to \gamma\chi_{c1}(3872)$) × B($\chi_{c1} \to \pi^+\pi^-\pi^0 J/\psi$) < 2.8×10^{-6} at 95% CL.

$\Gamma(\omega\eta_c(1S))/\Gamma_{total}$ — Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.30	90	[1] VINOKUROVA	15	BELL	$B^+ \to \omega\eta_c K^+$

[1] VINOKUROVA 15 reports $[\Gamma(\chi_{c1}(3872) \to \omega\eta_c(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 6.9 \times 10^{-5}$ which we divide by our best value B($B^+ \to \chi_{c1}(3872) K^+$) = 2.3×10^{-4}.

$\Gamma(\rho(770)^0 J/\psi(1S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_6/Γ_3

VALUE (%)	DOCUMENT ID		TECN	COMMENT
78.6±2.3±2.0	[1] AAIJ	23S	LHCB	$B^+ \to K^+ J/\psi\pi^+\pi^-$

[1] Assuming pure ρ contribution only, i.e. excluding the contribution from ρ-ω interference. Using B($\rho^0 \to \pi^+\pi^-$) = 100%.

$\Gamma(\omega J/\psi(1S))/\Gamma_{total}$ — Γ_7/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.026 \pm 0.010 \pm 0.007$	21 ± 7	[1] DEL-AMO-SA..	10B	BABR	$B^+ \to \omega J/\psi K^+$

[1] DEL-AMO-SANCHEZ 10B reports $[\Gamma(\chi_{c1}(3872) \to \omega J/\psi(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (6 \pm 2 \pm 1) \times 10^{-6}$ which we divide by our best value B($B^+ \to \chi_{c1}(3872) K^+$) = $(2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. DEL-AMO-SANCHEZ 10B also reports B($B^0 \to \chi_{c1}(3872) K^0$) × B($\chi_{c1}(3872) \to J/\psi\omega$) = $(6 \pm 3 \pm 1) \times 10^{-6}$.

$\Gamma(\omega J/\psi(1S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_7/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
1.16±0.24 OUR AVERAGE	Error includes scale factor of 1.2.			
$1.24 \pm 0.33 \pm 0.10$	[1,2] AAIJ	23S	LHCB	$B^+ \to K^+ J/\psi\pi^+\pi^-$
$1.6 ^{+0.4}_{-0.3} \pm 0.2$	[3] ABLIKIM	19V	BES	$e^+e^- \to \gamma\omega J/\psi$

0.8 ±0.3	[4] DEL-AMO-SA..10B		BABR	$B \to \omega J/\psi K$

[1] AAIJ 23S reports $[\Gamma(\chi_{c1}(3872) \to \omega J/\psi(1S))/\Gamma(\chi_{c1}(3872) \to \pi^+\pi^- J/\psi(1S))] \times [B(\omega(782) \to \pi^+\pi^-)] = (1.9 \pm 0.4 \pm 0.3) \times 10^{-2}$ which we divide by our best value $B(\omega(782) \to \pi^+\pi^-) = (1.53 \pm 0.12) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] Excluding ρ-ω interference effects.

[3] Fit with fixed width and including two resonances, $\chi_{c0}(3915)$ and $X(3960)$.

[4] Statistical and systematic errors added in quadrature. Uses the values of $B(B \to \chi_{c1}(3872) K) \times B(\chi_{c1}(3872) \to J/\psi\pi^+\pi^-)$ reported in AUBERT 08Y, taking into account the common systematics.

$\Gamma(\phi\phi)/\Gamma_{\text{total}}$ — Γ_8/Γ

VALUE	DOCUMENT ID		TECN	COMMENT
not seen	[1] AAIJ	17BB	LHCB	pp at 7, 8 TeV

[1] AAIJ 17BB reports $B(b \to \chi_{c1}(3872)\text{anything}) \times B(\chi_{c1}(3872) \to \phi\phi) < 4.5 \times 10^{-7}$ at 95% CL.

$\Gamma(D^0\overline{D}^0\pi^0)/\Gamma_{\text{total}}$ — Γ_9/Γ

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.45^{+0.16}_{-0.19}{}^{+0.11}_{-0.12}}$		17	[1] GOKHROO	06	BELL	$B^+ \to D^0\overline{D}^0\pi^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.26	90		[2] CHISTOV	04	BELL	Sup. by GOKHROO 06

[1] GOKHROO 06 reports $[\Gamma(\chi_{c1}(3872) \to D^0\overline{D}^0\pi^0)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (1.02 \pm 0.31^{+0.21}_{-0.29}) \times 10^{-4}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \to D^0\overline{D}^0\pi^0)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 0.6 \times 10^{-4}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3 \times 10^{-4}$.

$\Gamma(D^0\overline{D}^0\pi^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_9/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.16	90	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\overline{D}^{*0} D^0)/\Gamma_{\text{total}}$ — Γ_{10}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.34±0.08±0.09	41^{+9}_{-8}	[1] AUSHEV	10	BELL	$B^+ \to D^{*0}\overline{D}^0 K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.73±0.26±0.19	27 ± 6	[2] AUBERT	08B	BABR	$B^+ \to \overline{D}^{*0} D^0 K^+$

[1] AUSHEV 10 reports $[\Gamma(\chi_{c1}(3872) \to \overline{D}^{*0} D^0)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (0.77 \pm 0.16 \pm 0.10) \times 10^{-4}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AUBERT 08B reports $[\Gamma(\chi_{c1}(3872) \to \overline{D}^{*0} D^0)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (1.67 \pm 0.36 \pm 0.47) \times 10^{-4}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^{*0} D^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{10}/Γ_3

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
11.77±3.09	50	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\gamma)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.10	90	[1] WICHT	08	BELL	$e^+e^- \to \Upsilon(4S)$

[1] WICHT 08 reports $[\Gamma(\chi_{c1}(3872) \to \gamma\gamma)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 2.4 \times 10^{-5}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3 \times 10^{-4}$.

$\Gamma(D^0\overline{D}^0)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.26	90	[1] CHISTOV	04	BELL	$B \to K D^0 \overline{D}^0$

[1] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \to D^0\overline{D}^0)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 6 \times 10^{-5}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3 \times 10^{-4}$.

$\Gamma(D^+D^-)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.17	90	[1] CHISTOV	04	BELL	$B \to K D^+ D^-$

[1] CHISTOV 04 reports $[\Gamma(\chi_{c1}(3872) \to D^+D^-)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 4 \times 10^{-5}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3 \times 10^{-4}$.

$\Gamma(\pi^0\chi_{c2})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{14}/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.1	90	ABLIKIM	19U	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^0\chi_{c1})/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.035	90	[1] BHARDWAJ	19	BELL	$B^\pm \to \pi^0\chi_{c1}K^\pm$

[1] BHARDWAJ 19 reports $[\Gamma(\chi_{c1}(3872) \to \pi^0\chi_{c1})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 8.1 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3 \times 10^{-4}$.

$\Gamma(\pi^0\chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{15}/Γ_3

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT
$88^{+33}_{-27}\pm10$	10.8	ABLIKIM	19U	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^0\chi_{c0})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{16}/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
< 3.6	90	ABLIKIM	22D	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<19	90	ABLIKIM	19U	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^+\pi^-\eta_c(1S))/\Gamma_{total}$ Γ_{17}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.13	90	[1] VINOKUROVA 15	BELL	$B^+ \to \pi^+\pi^-\eta_c K^+$

[1] VINOKUROVA 15 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\eta_c(1S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 3.0 \times 10^{-5}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3 \times 10^{-4}$.

$\Gamma(\pi^0\pi^0\chi_{c0})/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{18}/Γ_3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.7	90	ABLIKIM 22D	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^+\pi^-\chi_{c0})/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{19}/Γ_3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.56	90	ABLIKIM 22D	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\pi^+\pi^-\chi_{c1})/\Gamma_{total}$ Γ_{20}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<7 \times 10^{-3}$	90	[1] BHARDWAJ 16	BELL	$B^+ \to \pi^+\pi^-\chi_{c1} K^+$

[1] BHARDWAJ 16 reports $[\Gamma(\chi_{c1}(3872) \to \pi^+\pi^-\chi_{c1})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 1.5 \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3 \times 10^{-4}$.

$\Gamma(p\overline{p})/\Gamma_{total}$ Γ_{21}/Γ

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$<2.2 \times 10^{-5}$	95	[1] AAIJ 17AD	LHCB	$B^+ \to p\overline{p}K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$<7 \times 10^{-5}$	95	[2] AAIJ 13S	LHCB	$B^+ \to p\overline{p}K^+$

[1] AAIJ 17AD reports $[\Gamma(\chi_{c1}(3872) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 0.5 \times 10^{-8}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3 \times 10^{-4}$.

[2] AAIJ 13S reports $[\Gamma(\chi_{c1}(3872) \to p\overline{p})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 1.7 \times 10^{-8}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3 \times 10^{-4}$.

Radiative decays

$\Gamma(\gamma D^+ D^-)/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{22}/Γ_3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.99	90	ABLIKIM 20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\overline{D}^0 D^0)/\Gamma(\pi^+\pi^- J/\psi(1S))$ Γ_{23}/Γ_3

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<1.58	90	ABLIKIM 20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma J/\psi)/\Gamma_{total}$ Γ_{24}/Γ

VALUE (units 10^{-3})	EVTS	DOCUMENT ID	TECN	COMMENT
$7.8^{+2.2}_{-2.0} \pm 2.0$		[1] BHARDWAJ 11	BELL	$B^\pm \to \gamma J/\psi K^\pm$

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

12.2±3.5±3.2	20	[2] AUBERT	09B	BABR	$B^+ \to \gamma J/\psi K^+$
14 ±5 ±4	19	[3] AUBERT,BE	06M	BABR	$B^+ \to \gamma J/\psi K^+$

[1] BHARDWAJ 11 reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (1.78^{+0.48}_{-0.44} \pm 0.12) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[2] AUBERT 09B reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (2.8 \pm 0.8 \pm 0.1) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

[3] Superseded by AUBERT 09B. AUBERT,BE 06M reports $[\Gamma(\chi_{c1}(3872) \to \gamma J/\psi)/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (3.3 \pm 1.0 \pm 0.3) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\gamma J/\psi)/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{24}/Γ_3

VALUE	DOCUMENT ID		TECN	COMMENT
0.79±0.28	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\chi_{c1})/\Gamma_{total}$ — Γ_{25}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<8 × 10^{-3}	90	[1] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c1}\gamma K^\pm$

[1] BHARDWAJ 13 reports $[\Gamma(\chi_{c1}(3872) \to \gamma\chi_{c1})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 1.9\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3\times10^{-4}$.

$\Gamma(\gamma\chi_{c1})/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{25}/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.89	90	CHOI	03	BELL	$B \to K\pi^+\pi^- J/\psi$

$\Gamma(\gamma\chi_{c2})/\Gamma_{total}$ — Γ_{26}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.029	90	[1] BHARDWAJ	13	BELL	$B^\pm \to \chi_{c2}\gamma K^\pm$

[1] BHARDWAJ 13 reports $[\Gamma(\chi_{c1}(3872) \to \gamma\chi_{c2})/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] < 6.7\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = 2.3\times10^{-4}$.

$\Gamma(\gamma\psi(2S))/\Gamma_{total}$ — Γ_{27}/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
possibly seen	36 ± 9	[1] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S) K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
not seen		[2] BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S) K^+$
0.042±0.012±0.011	25 ± 7	[3] AUBERT	09B	BABR	$B^+ \to \gamma\psi(2S) K^+$

[1] From 36.4 ± 9.0 events of $\chi_{c1}(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ.

[2] BHARDWAJ 11 reports $B(B^+ \to K^+\chi_{c1}(3872)) \times B(\chi_{c1} \to \gamma\psi(2S)) < 3.45\times10^{-6}$ at 90% CL.

[3] AUBERT 09B reports $[\Gamma(\chi_{c1}(3872) \to \gamma\psi(2S))/\Gamma_{total}] \times [B(B^+ \to \chi_{c1}(3872) K^+)] = (9.5 \pm 2.7 \pm 0.6) \times 10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872) K^+) = (2.3 \pm 0.6) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\gamma\psi(2S))/\Gamma(\pi^+\pi^- J/\psi(1S))$ — Γ_{27}/Γ_3

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.42	90	ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$

$\Gamma(\gamma\psi(2S))/\Gamma(\gamma J/\psi)$ — Γ_{27}/Γ_{24}

VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.59	90		ABLIKIM	20W	BES3	$e^+e^- \to \gamma\chi_{c1}(3872)$
2.46±0.64±0.29		36 ± 9	[1] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S)K^+$
<2.1	90		BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S)K^+$
3.4 ±1.4			AUBERT	09B	BABR	$B^+ \to \gamma c\overline{c}K'$

[1] From 36.4 ± 9.0 events of $\chi_{c1}(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ.

C-violating decays

$\Gamma(\eta J/\psi)/\Gamma_{\text{total}}$ — Γ_{28}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.017	90	[1,2] IWASHITA	14	BELL	$B \to K\eta J/\psi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.034	90	[3] AUBERT	04Y	BABR	$B \to K\eta J/\psi$

[1] IWASHITA 14 reports $[\Gamma(\chi_{c1}(3872) \to \eta J/\psi)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 3.8\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3\times10^{-4}$.

[2] IWASHITA 14 also scans the $\eta J/\psi$ mass range 3.8–4.75 GeV and sets upper limits for $B(B^\pm \to \chi_{c1}(3872)K^\pm)\times B(\chi_{c1}(3872) \to \eta J/\psi)$ in 5 MeV intervals.

[3] AUBERT 04Y reports $[\Gamma(\chi_{c1}(3872) \to \eta J/\psi)/\Gamma_{\text{total}}] \times [B(B^+ \to \chi_{c1}(3872)K^+)] < 7.7\times10^{-6}$ which we divide by our best value $B(B^+ \to \chi_{c1}(3872)K^+) = 2.3\times10^{-4}$.

$\chi_{c1}(3872)$ REFERENCES

AAIJ	23AP	JHEP 2307 084	R. Aaij et al.	(LHCb Collab.)
AAIJ	23S	PR D108 L011103	R. Aaij et al.	(LHCb Collab.)
ABLIKIM	23O	PR D107 032007	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	23W	PRL 130 151904	M. Ablikim et al.	(BESIII Collab.)
HIRATA	23	PR D107 112011	H. Hirata et al.	(BELLE Collab.)
YIN	23	PR D107 052004	J.H. Yin et al.	(BELLE Collab.)
ABLIKIM	22D	PR D105 072009	M. Ablikim et al.	(BESIII Collab.)
PDG	22	PTEP 2022 083C01	R.L. Workman et al.	(PDG Collab.)
TERAMOTO	21	PRL 126 122001	Y. Teramoto et al.	(BELLE Collab.)
AAIJ	20AD	PR D102 092005	R. Aaij et al.	(LHCb Collab.)
AAIJ	20S	JHEP 2008 123	R. Aaij et al.	(LHCb Collab.)
ABLIKIM	20W	PRL 124 242001	M. Ablikim et al.	(BESIII Collab.)
LEES	20C	PRL 124 152001	J.P. Lees et al.	(BABAR Collab.)
PDG	20	PTEP 2020 083C01	P.A. Zyla et al.	(PDG Collab.)
ABLIKIM	19U	PRL 122 202001	M. Ablikim et al.	(BESIII Collab.)
ABLIKIM	19V	PRL 122 232002	M. Ablikim et al.	(BESIII Collab.)
BHARDWAJ	19	PR D99 111101	V. Bhardwaj et al.	(BELLE Collab.)
AGHASYAN	18A	PL B783 334	M. Aghasyan et al.	(COMPASS Collab.)
AAIJ	17AD	PL B769 305	R. Aaij et al.	(LHCb Collab.)
AAIJ	17BB	EPJ C77 609	R. Aaij et al.	(LHCb Collab.)
BHARDWAJ	16	PR D93 052016	V. Bhardwaj et al.	(BELLE Collab.)
AAIJ	15AO	PR D92 011102	R. Aaij et al.	(LHCb Collab.)
ABLIKIM	15V	PL B749 414	M. Ablikim et al.	(BESIII Collab.)
BALA	15	PR D91 051101	A. Bala et al.	(BELLE Collab.)
VINOKUROVA	15	JHEP 1506 132	A. Vinokurova et al.	(BELLE Collab.)
Also		JHEP 1702 088 (errat.)	A. Vinokurava et al.	(BELLE Collab.)

AAIJ	14AH	NP B886 665	R. Aaij *et al.*	(LHCb Collab.)
ABLIKIM	14	PRL 112 092001	M. Ablikim *et al.*	(BESIII Collab.)
IWASHITA	14	PTEP 2014 043C01	T. Iwashita *et al.*	(BELLE Collab.)
AAIJ	13Q	PRL 110 222001	R. Aaij *et al.*	(LHCb Collab.) JP
AAIJ	13S	EPJ C73 2462	R. Aaij *et al.*	(LHCb Collab.)
BHARDWAJ	13	PRL 111 032001	V. Bhardwaj *et al.*	(BELLE Collab.)
AAIJ	12H	EPJ C72 1972	R. Aaij *et al.*	(LHCb Collab.)
LEES	12AD	PR D86 072002	J.P. Lees *et al.*	(BABAR Collab.)
LEES	12AE	PR D86 092005	J.P. Lees *et al.*	(BABAR Collab.)
BHARDWAJ	11	PRL 107 091803	V. Bhardwaj *et al.*	(BELLE Collab.)
CHOI	11	PR D84 052004	S.-K. Choi *et al.*	(BELLE Collab.)
WANG	11B	PR D84 071107	X.L. Wang *et al.*	(BELLE Collab.)
AUSHEV	10	PR D81 031103	T. Aushev *et al.*	(BELLE Collab.)
DEL-AMO-SA...	10B	PR D82 011101	P. del Amo Sanchez *et al.*	(BABAR Collab.)
SHEN	10A	PR D82 051504	C.P. Shen *et al.*	(BELLE Collab.)
AALTONEN	09AU	PRL 103 152001	T. Aaltonen *et al.*	(CDF Collab.)
AUBERT	09B	PRL 102 132001	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	08B	PR D77 011102	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	08Y	PR D77 111101	B. Aubert *et al.*	(BABAR Collab.)
WICHT	08	PL B662 323	J. Wicht *et al.*	(BELLE Collab.)
AUBERT	06	PR D73 011101	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	06M	PR D74 071101	B. Aubert *et al.*	(BABAR Collab.)
GOKHROO	06	PRL 97 162002	G. Gokhroo *et al.*	(BELLE Collab.)
AUBERT	05B	PR D71 031501	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	05D	PR D71 052001	B. Aubert *et al.*	(BABAR Collab.)
AUBERT	05R	PR D71 071103	B. Aubert *et al.*	(BABAR Collab.)
DOBBS	05	PRL 94 032004	S. Dobbs *et al.*	(CLEO Collab.)
ABAZOV	04F	PRL 93 162002	V.M. Abazov *et al.*	(D0 Collab.)
ACOSTA	04	PRL 93 072001	D. Acosta *et al.*	(CDF Collab.)
AUBERT	04Y	PRL 93 041801	B. Aubert *et al.*	(BABAR Collab.)
CHISTOV	04	PRL 93 051803	R. Chistov *et al.*	(BELLE Collab.)
PDG	04	PL B592 1	S. Eidelman *et al.*	(PDG Collab.)
YUAN	04	PL B579 74	C.Z. Yuan *et al.*	
CHOI	03	PRL 91 262001	S.-K. Choi *et al.*	(BELLE Collab.)
BAI	98E	PR D57 3854	J.Z. Bai *et al.*	(BES Collab.)
ANTONIAZZI	94	PR D50 4258	L. Antoniazzi *et al.*	(E705 Collab.)