

$$I(J^P) = 0(0^-)$$

I, *J*, *P* need confirmation. Quantum numbers shown are quark-model predictions.

B⁰_s MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
5366.93 ± 0.10 OUR FIT					
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	ERAGE 128 32 3	¹ AAIJ ² AAIJ ³ AAIJ ⁴ AAIJ ⁵ AAIJ LOUVOT ⁶ ACOSTA ⁷ ABE ABREU	21C 19U 18AC 16U 12E 09 06 96B 94D	LHCB LHCB LHCB LHCB BELL CDF CDF DLPH	pp at 7, 8, 13 TeV pp at 7, 8 TeV pp at 7 TeV $e^+e^- \rightarrow \Upsilon(5S)$ $p\overline{p}$ at 1.96 TeV $p\overline{p}$ at 1.8 TeV $e^+e^- \rightarrow Z$
5359 ± 19 ± 7	1	' AKERS	94J	OPAL	$e^+e^- \rightarrow Z$
\bullet • • We do not use the	2 following	data for averages	93G , fits,	ALEP limits, e	$e \cdot e \rightarrow \angle$ tc. • • •
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	6 14	DRUTSKOY ⁸ AKERS ABE	07A 94J 93F	BELL OPAL CDF	Repl. by LOUVOT 09 $e^+e^- \rightarrow Z$ Repl. by ABE 96B
5383.3 \pm 4.5 \pm 5.0 14 ABE 93F CDF Repl. by ABE 96B ¹ Uses $B_{S}^{0} \rightarrow J/\psi \pi^{+} \pi^{-} K^{+} K^{-}$ decays. ² Uses $B_{S}^{0} \rightarrow J/\psi p \overline{p}$ decays. ³ Uses $B_{S} \rightarrow \chi_{c1} K^{+} K^{-}$ mode. ⁴ Uses $J/\psi \rightarrow \mu^{+} \mu^{-}, \phi \rightarrow K^{+} K^{-}$ decays, and observes 128 \pm 13 events of $B_{S}^{0} \rightarrow J/\psi \phi \phi$. ⁵ Uses $B_{S}^{0} \rightarrow J/\psi \phi$ fully reconstructed decays. ⁶ Uses exclusively reconstructed final states containing a $J/\psi \rightarrow \mu^{+} \mu^{-}$ decays. ⁷ From the decay $B_{S} \rightarrow J/\psi (1S) \phi$. ⁸ From the decay $B_{S} \rightarrow D_{S}^{-} \pi^{+}$.					

$m_{B_s^0} - m_B$

 m_B is the average of our B masses $(m_{B^\pm}\!+\!m_{B^0})/2.$

VALUE (I	MeV)	CL%	DOCUMENT ID		TECN	COMMENT
$87.37\pm$	0.12 OUR FIT					
87.42±	0.24 OUR AVERA	GE				
$87.60\pm$	0.44 ± 0.09]	AAIJ	15 U	LHCB	<i>pp</i> at 7, 8 TeV
$87.42\pm$	0.30 ± 0.09	2	² AAIJ	12E	LHCB	рраt 7 TeV
$86.64\pm$	0.80 ± 0.08	3	³ ACOSTA	06	CDF	<i>р</i> рат 1.96 ТеV
• • • ٧	We use the followin	ng data for	averages but no	t for f	fits. • •	•
89.7 ±	2.7 ± 1.2		ABE	96 B	CDF	<i>р</i> рат 1.8 ТеV
• • • ٧	We do not use the	following c	lata for averages	, fits,	limits, e	tc. ● ● ●
80 to	o 130	68	LEE-FRANZINI	90	CSB2	$e^+e^- \rightarrow \Upsilon(5S)$
https:/	//pdg.lbl.gov		Page 1		Creat	ed: 5/30/2025 07:50

- ¹ The reported result is $m_{B_s^0} m_{B^0} = 87.45 \pm 0.44 \pm 0.09$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^{\pm}} + m_{B^0})/2$. Uses the mode $B_s^0 \rightarrow \psi(2S) K^- \pi^+$.
- ² The reported result is $m_{B_s^0} m_{B^+} = 87.52 \pm 0.30 \pm 0.12$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^\pm} + m_{B^0})/2$.
- ³ The reported result is $m_{B_s^0} m_{B^0} = 86.38 \pm 0.90 \pm 0.06$ MeV. We convert it to the mass difference with respect to the average of $(m_{B^\pm} + m_{B^0})/2$.

$$m_{B_{sH}^0} - m_{B_{sL}^0}$$

See the $B_s^0 - \overline{B}_s^0$ MIXING section near the end of these B_s^0 Listings.

B_s^0 MEAN LIFE

The mean B_s^0 lifetime is defined and computed as $1/\Gamma_{B_s^0}$, where $\Gamma_{B_s^0}$ is the average decay width of the B_s^0 mass eigenstates.

VALUE (10 ⁻¹² s)	EVTS	DOCUMENT ID		TECN	COMMENT		
1.516±0.006 OUR EVALUATION (Produced by HFLAV)							
$\bullet \bullet \bullet$ We do not use	the following	data for average	es, fits	s, limits,	etc. • • •		
$1.518\!\pm\!0.041\!\pm\!0.027$	1	AALTONEN	11 AP	CDF	<i>р</i> р at 1.96 ТеV		
$1.398 \!\pm\! 0.044 \!+\! 0.028 \\ - 0.025$	2	ABAZOV	06V	D0	<i>р</i> р at 1.96 ТеV		
$1.42 \begin{array}{c} +0.14 \\ -0.13 \end{array} \pm 0.03$	3	ABREU	00Y	DLPH	$e^+e^- \rightarrow Z$		
$1.53 \begin{array}{c} +0.16 \\ -0.15 \end{array} \pm 0.07$	4	ABREU,P	00 G	DLPH	$e^+e^- \rightarrow Z$		
$1.36 \ \pm 0.09 \ +0.06 \\ -0.05$	5	ABE	99 D	CDF	<i>рр</i> at 1.8 ТеV		
$1.72 \begin{array}{c} +0.20 \\ -0.19 \end{array} \begin{array}{c} +0.18 \\ -0.17 \end{array}$	6	ACKERSTAFF	98F	OPAL	$e^+e^- \rightarrow Z$		
$1.50 \begin{array}{c} +0.16 \\ -0.15 \end{array} \pm 0.04$	5	ACKERSTAFF	98 G	OPAL	$e^+e^- \rightarrow Z$		
$1.47 \pm 0.14 \pm 0.08$	4	BARATE	98C	ALEP	$e^+e^- \rightarrow Z$		
1.51 ± 0.11	-	BARATE	98C	ALEP	$e^+e^- \rightarrow Z$		
$1.56 \begin{array}{r} +0.29 \\ -0.26 \end{array} \begin{array}{r} +0.08 \\ -0.07 \end{array}$	5	ABREU	96F	DLPH	Repl. by ABREU 00Y		
$1.65 \begin{array}{c} +0.34 \\ -0.31 \end{array} \pm 0.12$	4	ABREU	96F	DLPH	Repl. by ABREU 00Y		
$1.76\ \pm 0.20\ +0.15\\-0.10$	8	ABREU	96F	DLPH	Repl. by ABREU 00Y		
$1.60\ \pm 0.26\ +0.13\\-0.15$	g	ABREU	96F	DLPH	Repl. by ABREU,P 00G		
$1.67\ \pm 0.14$	10	ABREU	96F	DLPH	$e^+e^- \rightarrow Z$		
$1.61 \begin{array}{r} +0.30 \\ -0.29 \end{array} \begin{array}{r} +0.18 \\ -0.16 \end{array}$	90 4	BUSKULIC	96E	ALEP	Repl. by BARATE 98C		
$1.54 \begin{array}{c} +0.14 \\ -0.13 \end{array} \pm 0.04$	5	BUSKULIC	96M	ALEP	$e^+e^- \rightarrow Z$		
$1.42 \begin{array}{c} +0.27 \\ -0.23 \end{array} \pm 0.11$	76 5	ABE	95 R	CDF	Repl. by ABE 99D		
				C			

1.74	$^{+1.08}_{-0.69}$	± 0.07	8	11 ABE	95 R	CDF	Sup. by ABE 96N
1.54	$^{\rm +0.25}_{\rm -0.21}$	± 0.06	79	⁵ AKERS	95 G	OPAL	Repl. by ACKER- STAFF 98G
1.59	$^{+0.17}_{-0.15}$	± 0.03	134	⁵ BUSKULIC	95 0	ALEP	Sup. by BUSKULIC 96M
0.96	± 0.37		41	¹² ABREU	94E	DLPH	Sup. by ABREU 96F
1.92	$^{+0.45}_{-0.35}$	± 0.04	31	⁵ BUSKULIC	9 4C	ALEP	Sup. by BUSKULIC 950
1.13	$^{+0.35}_{-0.26}$	± 0.09	22	⁵ ACTON	93H	OPAL	Sup. by AKERS 95G

¹AALTONEN 11AP combines the fully reconstructed $B_s^0 \rightarrow D_s^- \pi^+$ decays and partially reconstructed $B_s^0 \rightarrow D_s X$ decays.

²Measured using $D_{s}\mu^{+}$ vertices.

³Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices.

⁴ Measured using D_s hadron vertices.

⁵ Measured using $D_s^- \ell^+$ vertices.

⁶ACKERSTAFF 98F use fully reconstructed $D_s^- \rightarrow \phi \pi^-$ and $D_s^- \rightarrow K^{*0} K^-$ in the inclusive B_s^0 decay.

⁷Combined results from $D_s^-\ell^+$ and D_s hadron.

⁸ Measured using $\phi \ell$ vertices. ⁹ Measured using inclusive D_s vertices.

¹⁰ Combined result for the four ABREU 96F methods. ¹¹ Exclusive reconstruction of $B_s \rightarrow \psi \phi$.

 $^{12}\mathrm{ABREU}$ 94E uses the flight-distance distribution of $D_{\boldsymbol{s}}$ vertices, $\phi\text{-lepton}$ vertices, and $D_{s}\mu$ vertices.

Г_{*B*⁰_s}

"OUR EVALUATION" includes the measurements of $\Gamma_{B_{c}^{0}}$ and $\Delta\Gamma_{B_{c}^{0}}$ listed

in this section, as well as constraints from effective lifetimes with pure CP modes and flavor-specific modes.

<u>VALUE (10¹² s⁻¹)</u>	DOCUMENT ID	TECN	COMMENT
0.6598±0.0025 OUR EVAL	JATION (Produc	ced by HFLA	V)
0.6611±0.0028 OUR AVER	AGE Error include	es scale facto	r of 2.0. See the ideogram
below.			
$0.6527^{+0.0013}_{-0.0015}\pm 0.0022$	¹ AAIJ	24A LHCB	pp at 13 TeV
$0.6687 \pm 0.0015 \pm 0.0022$	^{2,3} AAD	21AE ATLS	<i>pp</i> at 13 TeV
$0.608 \pm 0.018 \pm 0.012$	⁴ AAIJ	21AN LHCB	<i>pp</i> at 7, 8 TeV
$0.6531 \!\pm\! 0.0042 \!\pm\! 0.0026$	^{3,5} SIRUNYAN	21E CMS	<i>pp</i> at 13 TeV
$0.650 \pm 0.006 \pm 0.004$	⁶ AAIJ	17∨ LHCB	<i>pp</i> at 7, 8 TeV
$0.676 \pm 0.004 \pm 0.004$	^{3,7} AAD	16AP ATLS	<i>pp</i> at 8 TeV
$0.668 \pm 0.011 \pm 0.006$	⁸ AAIJ	16AK LHCB	<i>pp</i> at 7, 8 TeV
$0.6704 \pm 0.0043 \pm 0.0055$	³ KHACHATRY.	16s CMS	<i>pp</i> at 8 TeV
$0.6603 \!\pm\! 0.0027 \!\pm\! 0.0015$	⁹ AAIJ	151 LHCB	<i>pp</i> at 7, 8 TeV
$0.677 \pm 0.007 \pm 0.004$	³ AAD	14∪ ATLS	pp at 7 TeV
$0.654 \pm 0.008 \pm 0.004$	³ AALTONEN	12aj CDF	<i>р</i> рат 1.96 ТеV
$0.693 \begin{array}{c} +0.018 \\ -0.017 \end{array}$	³ ABAZOV	12D D0	<i>рр</i> at 1.96 ТеV
https://pdg.lbl.gov	Page 3		Created: 5/30/2025 07:50

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

	2		
$0.6531 \pm 0.0042 \pm 0.0026$	³ SIRUNYAN	21e CMS	<i>pp</i> at 13 TeV
$0.6563 \!\pm\! 0.0021$	^{3,10} AAIJ	19Q LHCB	Repl. by AAIJ 24A
$0.661 \ \pm 0.004 \ \pm 0.006$	¹¹ AAIJ	13AR LHCB	Repl. by AAIJ 151
$0.677 \pm 0.007 \pm 0.004$	³ AAD	12cv ATLS	Repl. by AAD 14∪
$0.657 \ \pm 0.009 \ \pm 0.008$	³ AAIJ	12D LHCB	Repl. by AAIJ 13AR
$0.654\ \pm 0.011\ \pm 0.005$	^{3,12} AALTONEN	12D CDF	Repl. by AALTONEN 12AJ
$0.672\ \pm 0.027\ \pm 0.013$	³ ABAZOV	09E D0	Repl. by ABAZOV 08AM
$0.658\ \pm 0.017\ \pm 0.009$	^{3,13} AALTONEN	08J CDF	Repl. by AALTONEN 12D
$0.658\ \pm 0.022\ \pm 0.004$	³ ABAZOV	08AM D0	Repl. by ABAZOV 12D
$\begin{array}{ccc} 0.658 \ \pm 0.035 \ \begin{array}{c} + \ 0.0130 \\ - \ 0.004 \end{array}$	^{3,13} ABAZOV	07 D0	Repl. by ABAZOV 09E
$0.714 \begin{array}{c} +0.007 \\ -0.008 \end{array} \pm 0.010$	^{3,13} ACOSTA	05 CDF	Repl. by AALTONEN 08J

WEIGHTED AVERAGE 0.6611±0.0028 (Error scaled by 2.0)



¹Reports $\Gamma_s - \Gamma_d = -0.0056 \stackrel{+0.0013}{_{-0.0015}} \pm 0.0014 \text{ ps}^{-1}$ using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays and the current B^0 lifetime of 1.517 ± 0.004 ps^{-1} .

^{ps -.} ² Reports a combination of 0.6703 \pm 0.0014 \pm 0.0018 ps⁻¹ with AAD 16AP. ³ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays. ⁴ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays with $J/\psi \rightarrow$ e^+e^- .

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- ⁵ Reports a combination of 0.6590 \pm 0.0032 \pm 0.0023 ps⁻¹ with KHACHATRYAN 16S. ⁶ Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \, K^+ \, K^-$ in the region m(KK) > 1.05 GeV.
- $^7\,\text{Reports}$ a combination of 0.675 \pm 0.003 \pm 0.003 ps^{-1} with AAD 14U.

⁷ Reports a combination of 0.675 \pm 0.003 \pm 0.003 ps \div with AAD 140. ⁸ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow \psi(2S)\phi$ decays. ⁹ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays. ¹⁰ Reports $\Gamma_s - \Gamma_d = -0.0041 \pm 0.0024 \pm 0.0015 \text{ ps}^{-1}$ using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays and the B^0 lifetime of 1.520 \pm 0.004 ps⁻¹. The results are further combined with those coming from $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$, $B_s^0 \rightarrow D_s^0 = -1$.

 $\psi(2S)\phi$, and $B_s^0 \rightarrow D_s^+ D_s^-$. ¹¹ Measured using a combined time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ and $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ decays. ¹² Assuming CPV phase $\phi_s = -0.04$.

- ¹³ Assuming CPV phase $\phi_s = 0$.

$\Delta \Gamma_{B_{\epsilon}^{0}}$

"OUR EVALUATION"	includes the measurements of Γ	B^0 and ΔI	B^0 listed
		S	S

in this section, as well as constraints from effective lifetimes with pure CP modes and flavor-specific modes.

VALUE (10^{12} s^{-1})	DOCUMENT ID	TECN	COMMENT
0.082 ±0.005 OUR EVALUAT	ION (Produced	d by HFLAV)	
0.080 \pm 0.005 OUR AVERAGE	Error includes	scale factor of	1.5. See the ideogram
below.	1		
$0.0845 \!\pm\! 0.0044 \!\pm\! 0.0024$	¹ AAIJ	24A LHCB	pp at 13 TeV
$0.087 \pm 0.012 \pm 0.009$	² AAIJ	240 LHCB	<i>pp</i> at 7, 8, 13 TeV
$0.0607 \pm 0.0047 \pm 0.0043$ 3	⁴ AAD	21AE ATLS	<i>pp</i> at 13 TeV
$0.115 \ \pm 0.045 \ \pm 0.011$	⁵ AAIJ	21AN LHCB	<i>pp</i> at 7, 8 TeV
$0.114 \pm 0.014 \pm 0.007$ 3	^{,6} SIRUNYAN	21E CMS	<i>pp</i> at 13 TeV
$0.066 \pm 0.018 \pm 0.010$	⁷ AAIJ	17V LHCB	<i>pp</i> at 7, 8 TeV
$0.101 \pm 0.013 \pm 0.007$ 3	^{,8} AAD	16AP ATLS	<i>pp</i> at 8 TeV
$0.066 \begin{array}{c} +0.041 \\ -0.044 \end{array} \pm 0.007$	⁹ AAIJ	16АК LHCB	<i>pp</i> at 7, 8 TeV
$0.095 \ \pm 0.013 \ \pm 0.007$	³ KHACHATRY	.16s CMS	<i>pp</i> at 8 TeV
$0.0805 \pm 0.0091 \pm 0.0032$	¹ AAIJ	15I LHCB	<i>pp</i> at 7, 8 TeV
$0.053 \ \pm 0.021 \ \pm 0.010$	³ AAD	14∪ ATLS	pp at 7 TeV
$0.068\ \pm 0.026\ \pm 0.009$	³ AALTONEN	12aj CDF	<i>рр</i> at 1.96 ТеV
$\begin{array}{ccc} 0.163 & +0.065 & & 3,1 \\ & -0.064 & & \end{array}$	^{.0} ABAZOV	12D D0	$p\overline{p}$ at 1.96 TeV
$\bullet \bullet \bullet$ We do not use the following	ng data for avera	ges, fits, limits	s, etc. ● ● ●
$0.077 \pm 0.008 \pm 0.003$	¹ AAIJ	19Q LHCB	Repl. by AAIJ 24A
$0.106 \pm 0.011 \pm 0.007$ 1	. ¹ AAIJ	13AR LHCB	Repl. by AAIJ 15
$0.053 \pm 0.021 \pm 0.010$	³ AAD	12cv ATLS	Repl. by AAD 140
$0.123\ \pm 0.029\ \pm 0.011$	³ AAIJ	12D LHCB	Repl. by AAIJ 13AR
$0.075 \pm 0.035 \pm 0.006$ 1	² AALTONEN	12D CDF	Repl. by AALTONEN 12AJ
$0.085 \begin{array}{c} +0.072 \\ -0.078 \end{array} \pm 0.001 \qquad 1$	³ ABAZOV	09E D0	Repl. by ABAZOV 08AM

0.076	$^{+0.059}_{-0.063}$	± 0.006	¹⁴ AALTONEN	08J CDF	Repl. by AALTONEN 12D
0.19	± 0.07	$^{+0.02}_{-0.01}$	^{3,15} ABAZOV	08AM D0	Repl. by ABAZOV 12D
0.12	$^{+0.08}_{-0.10}$	± 0.02	^{14,16} ABAZOV	07 D0	Repl. by ABAZOV 07N
0.13	± 0.09		¹⁷ ABAZOV	07N D0	Repl. by ABAZOV 09E
0.47	$^{+0.19}_{-0.24}$	± 0.01	¹⁴ ACOSTA	05 CDF	Repl. by AALTONEN 08J



¹ Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays. ² Measured using *CP* eigenstates $B_s^0 \rightarrow J/\psi \eta'$ and $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ (selected to be predominantly *CP*-odd). Negligible *CP* violation and $\Gamma_{B_s^0} = 0.6628 \pm 0.0035 \text{ ps}^{-1}$ are assumed.

³Measured using the time-dependent angular analysis of $B_S^0 o J/\psi \phi$ decays.

⁴ Reports a combination of 0.0657 \pm 0.0043 \pm 0.0037 ps⁻¹ with AAD 16AP ⁵ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays with $J/\psi \rightarrow$ e^+e^- .

 6 Reports a combination of 0.1032 \pm 0.0095 \pm 0.0048 ps⁻¹ with KHACHATRYAN 16S. 7 Measured using time-dependent angular analysis of $B_{s}^{0} \rightarrow J/\psi K^{+} K^{-}$ in the region m(KK) > 1.05 GeV.

 8 Reports a combination pf $0.066^{+0.041}_{-0.044}\pm0.007$ ps^-1 with AAD 14U.

⁹Measured using time-dependent angular analysis of $B_s^0 \rightarrow \psi(2S)\phi$ decays.

 10 The error includes both statistical and systematic uncertainties.

¹¹AAIJ 13AR result comes from a combined fit to $B_s^0 \rightarrow J/\psi K^+ K^-$ and $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ data sets. Also reports $\Delta\Gamma_s = 0.100 \pm 0.016 \pm 0.003 \text{ ps}^{-1}$ from a fit to $B_s^0 \rightarrow J/\psi K^+ K^-$ decays.

- ¹²Uses the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi \phi) = 0.02$.
- ¹³ Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B_d^0 \rightarrow J/\psi K^{*0}$ and $B_s^0 \rightarrow J/\psi \phi$.
- ¹⁴ Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays and assuming *CP*-violating phase $\phi_s = 0$.
- $^{15}\,\text{Obtaines}$ 90% CL interval $-0.06~<\Delta\Gamma_{s}<0.30.$
- $^{16}\,{\rm ABAZOV}$ 07 reports 0.17 \pm 0.09 \pm 0.02 with CP-violating phase ϕ_s as a free parameter.
- ¹⁷ Combines D^0 measurements of time-dependent angular distributions in $B_s^0 \rightarrow J/\psi \phi$ and charge asymmetry in semileptonic decays. There is a 4-fold ambiguity in the solution.

$$\Delta\Gamma_{B_s^0}/\Gamma_{B_s^0}$$

 $\begin{array}{l} \Gamma_{B^0_s} \text{ and } \Delta\Gamma_{B^0_s} \text{ are the decay rate average and difference between two } B^0_s \\ CP \text{ eigenstates (light - heavy). "OUR EVALUATION" is derived from the averages of } \Gamma_{B^0_s} \text{ and } \Delta\Gamma_{B^0_s} \text{ (and their correlation).} \end{array}$

VALUE	<u>CL%</u>	<u>DOCUMENT ID</u>		TECN	COMMENT
0.124±0.007 OUR E	VALUA	TION (Produce	d by ⊦	IFLAV)	
$\bullet \bullet \bullet$ We do not use the	e follov	ving data for avera	ges, fi	ts, limit	s, etc. ● ● ●
$0.090 \pm 0.009 \pm 0.023$		¹ ESEN ² _{AAIJ} ³ AALTONEN ⁴ ABAZOV	13 12D 12D 12D	BELL LHCB CDF D0	$e^+e^- \rightarrow \Upsilon(5S)$ pp at 7 TeV $p\overline{p}$ at 1.96 TeV $p\overline{p}$ at 1.96 TeV
$0.147 \substack{+0.036 + 0.042 \\ -0.030 - 0.041}$		¹ ESEN	10	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
0.072±0.021±0.022 >0.012	95	⁵ ABAZOV ⁵ AALTONEN	091 08f	D0 CDF	р р at 1.96 TeV <i>р</i> р at 1.96 TeV
$0.116^{+0.09}_{-0.10}\ \pm 0.010$		⁶ AALTONEN	180 L	CDF	Repl. by AALTONEN 12D
$0.079 {+0.038 + 0.031 \\ -0.035 - 0.030}$		⁵ ABAZOV	07Y	D0	Repl. by ABAZOV 091
$\begin{array}{rrrr} 0.24 & +0.28 & +0.03 \\ -0.38 & -0.04 \end{array}$	(^{6,7} ABAZOV	05W	D0	Repl. by ABAZOV 08AM
$0.65 \begin{array}{c} +0.25 \\ -0.33 \end{array} \pm 0.01$		⁶ ACOSTA	05	CDF	Repl. by AALTONEN 08J
<0.46	95	⁸ ABREU	00Y	DLPH	$e^+e^- \rightarrow Z$
<0.69	95	⁹ ABREU,P	00 G	DLPH	$e^+e^- \rightarrow Z$
$0.25 \begin{array}{c} +0.21 \\ -0.14 \end{array}$		¹⁰ BARATE	00K	ALEP	$e^+e^- \rightarrow Z$
<0.83	95	¹¹ ABE	99 D	CDF	<i>р<mark>р</mark></i> at 1.8 ТеV
<0.67	95	¹² ACCIARRI	98s	L3	$e^+e^- \rightarrow Z$

¹Assumes *CP* violation is negligible.

² Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

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Created: 5/30/2025 07:50

- 3 Uses the time-dependent angular analysis of $B^0_{{s}} \to ~J/\psi \phi$ decays and assuming CPviolating angle $\beta_{s}(B^{0} \rightarrow J/\psi \phi) = 0.02$.
- ⁴ Measured using fully reconstructed $B_{s} \rightarrow J/\psi \phi$ decays.

⁵Assumes 2 B($B_s^0 \to D_s^{(*)} D_s^{(*)}$) $\simeq \Delta \Gamma_s^{CP} / \Gamma_s$. ⁶Measured using the time-dependent angular analysis of $B_s^0 \to J/\psi \phi$ decays.

 $^7\,\text{Uses}\;|\text{A}_0|^2-|\text{A}_{||}|^2{=}0.355\pm0.066$ from ACOSTA 05.

⁸Uses $D_s^-\ell^+$, and $\phi\ell^+$ vertices.

⁹ Measured using D_s hadron vertices.

- ¹⁰ Uses $\phi \phi$ correlations from $B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}$.
- $^{11}\,{\rm ABE}$ 99D assumes $\tau_{B^0} = 1.55\,\pm\,0.05$ ps.

¹² ACCIARRI 985 assumes $\tau_{B_{a}^{0}} = 1.49 \pm 0.06$ ps and PDG 98 values of *b* production fraction.

B_{sH}^0 MEAN LIFE

 B_{sH}^{0} is the heavy mass state of two B_{s}^{0} CP eigenstates.

VALUE (10 ⁻¹² s)	DOCUMENT ID	TECN	COMMENT				
1.616±0.009 OUR EVALUATION (Produced by HFLAV)							
$\bullet \bullet \bullet$ We do not use the follow	wing data for avera	ges, fits, limit	s, etc. ● ● ●				
$1.59 \ \pm 0.07 \ \pm 0.03$	¹ HAYRAPETY	.24AX CMS	<i>pp</i> at 13 TeV				
$\begin{array}{ccc} 0.99 & +0.42 \\ -0.07 & \pm 0.17 \end{array}$	² AAD	23BY ATLS	<i>pp</i> at 13 TeV				
$1.83 \begin{array}{c} +0.23 \\ -0.20 \end{array} \pm 0.04$	² TUMASYAN	23A CMS	<i>pp</i> at 13 TeV				
$2.07 \ \pm 0.29 \ \pm 0.03$	² AAIJ	22 LHCB	<i>pp</i> at 7, 8, 13 TeV				
$1.70 \begin{array}{c} +0.60 \\ -0.43 \end{array} \pm 0.09$	² SIRUNYAN	20AG CMS	<i>pp</i> at 7, 8, 13 TeV				
$1.677 \!\pm\! 0.034 \!\pm\! 0.011$	³ SIRUNYAN	18BY CMS	<i>pp</i> at 8 TeV				
$2.04 \pm 0.44 \pm 0.05$	² AAIJ	17AI LHCB	<i>pp</i> at 7, 8, 13 TeV				
$1.70 \pm 0.14 \pm 0.05$	⁴ ABAZOV	16C D0	<i>р</i> рат 1.96 ТеV				
$1.75 \pm 0.12 \pm 0.07$	¹ AAIJ	13AB LHCB	рраt 7 TeV				
$1.652\!\pm\!0.024\!\pm\!0.024$	⁵ AAIJ	13AR LHCB	рраt 7 TeV				
$1.700\!\pm\!0.040\!\pm\!0.026$	⁶ AAIJ	12AN LHCB	рраt 7 TeV				
	⁷ AALTONEN	12D CDF	<i>pp</i> at 1.96 TeV				
$1.70 \begin{array}{c} +0.12 \\ -0.11 \end{array} \pm 0.03$	⁶ AALTONEN	11AB CDF	p p at 1.96 TeV				
$1.613^{+0.123}_{-0.113}$	^{8,9} AALTONEN	08J CDF	Repl. by AALTONEN 12D				
$1.58 \begin{array}{c} +0.39 \\ -0.42 \end{array} \begin{array}{c} +0.01 \\ -0.02 \end{array}$	⁹ ABAZOV	05W D0	Repl. by ABAZOV 08AM				
$2.07 \begin{array}{c} +0.58 \\ -0.46 \end{array} \pm 0.03$	⁹ ACOSTA	05 CDF	Repl. by AALTONEN 08J				

1 Measured using a pure $C\!P\text{-}\mathsf{odd}$ final state $J/\psi\, K^0_{\mathcal{S}}$ with the assumption that contributions from penguin diagrams are small.

² Measured using $B_s \rightarrow \mu^+ \mu^-$ decays which, in the Standard Model, correspond to B_{sH}^0

decays. Assumes $-2 \operatorname{Re}(\lambda)/(1 + |\lambda|^2) = 1$. ³ Measured using $B_s^0 \to J/\psi \pi^+ \pi^-$ decays with 0.9240 < m($\pi\pi$) < 1.0204 GeV, which is dominated by the $f_0(980)$ resonance, making it a *CP*-odd state.

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- ⁴ Measured using $J/\psi \pi^+ \pi^-$ mode with 0.880 < $m(\pi \pi)$ < 1.080 GeV/c², which is mostly $J/\psi f(0)(980)$ mode, a pure *CP*-odd final state.
- ⁵ Measured using $B_s \rightarrow J/\psi \pi^+ \pi^-$ decays which, in the limit of $\phi_s = 0$ and $|\lambda| = 1$, correspond to B_{sH}^0 decays.
- ⁶ Measured using a pure *CP*-odd final state $J/\psi f_0(980)$.

⁷ Uses the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi \phi) = 0.02$.

 8 Obtained from $\Delta\Gamma_{s}$ and Γ_{s} fit with a correlation of 0.6.

⁹ Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

B_{sL}^0 MEAN LIFE

 B_{sL}^0 is the light mass state of two B_s^0 CP eigenstates.

<i>VALUE</i> (10^{-12} s)	DOCUMENT ID	TECN	COMMENT			
1.427±0.007 OUR EVALUATION (Produced by HFLAV)						
1.452 ± 0.016 OUR AVERAGE						
$1.445 \!\pm\! 0.016 \!\pm\! 0.008$	^{1,2} AAIJ	23P LHCB	<i>pp</i> at 7, 8, 13 TeV			
$1.479\!\pm\!0.034\!\pm\!0.011$	¹ AAIJ	16AL LHCB	<i>pp</i> at 7, 8 TeV			
$\bullet \bullet \bullet$ We do not use the follow	wing data for avera	ges, fits, limit	s, etc. ● ● ●			
1.40 ± 0.02	³ SIRUNYAN	18BY CMS	<i>pp</i> at 8 TeV			
$1.379 \!\pm\! 0.026 \!\pm\! 0.017$	⁴ AAIJ	14F LHCB	<i>pp</i> at 7, 8 TeV			
$1.407 \!\pm\! 0.016 \!\pm\! 0.007$	⁵ AAIJ	14R LHCB	<i>pp</i> at 7 TeV			
$1.440 \!\pm\! 0.096 \!\pm\! 0.009$	⁵ AAIJ	12 LHCB	рраt 7 TeV			
$1.455 \!\pm\! 0.046 \!\pm\! 0.006$	⁵ AAIJ	12R LHCB	Repl. by AAIJ 14R			
	⁶ AALTONEN	12D CDF	<i>р р</i> ат 1.96 ТеV			
$1.437^{+0.054}_{-0.047}$	^{7,8} AALTONEN	08J CDF	Repl. by AALTONEN 12D			
$1.24 \begin{array}{r} +0.14 \\ -0.11 \end{array} \begin{array}{r} +0.01 \\ -0.02 \end{array}$	⁸ ABAZOV	05W D0	Repl. by ABAZOV 08AM			
$1.05 \begin{array}{c} +0.16 \\ -0.13 \end{array} \pm 0.02$	⁸ ACOSTA	05 CDF	Repl. by AALTONEN 08J			
$1.27 \ \pm 0.33 \ \pm 0.08$	⁹ BARATE	00K ALEP	$e^+ e^- \rightarrow Z$			

¹Uses $B_s^0 \rightarrow J/\psi \eta$ decays.

- 2 AAIJ 23P reports a τ_L value combined with AAIJ 16AL result as $\tau_L = 1.452 \pm 0.014 \pm 0.007$ ps.
- ³Measured using results in SIRUNYAN 18BY for the heavy B_s^0 lifetime obtained from $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ decays and the average effective $B_s^0 \rightarrow J/\psi \phi$ lifetime, and magnitude squared of the *CP*-odd amplitude $|A_{\perp}|^2 = 0.250 \pm 0.006$. The uncertainty includes all statistical and systematic contributions.
- ⁴ Measured using $B_s^0 \rightarrow D_s^- D_s^+$. The effective lifetime is translated into a decay width of $\Gamma_L = 0.725 \pm 0.014 \pm 0.009 \text{ ps}^{-1}$.

⁵ Measured using $B_s^0 \rightarrow K^+ K^-$ decays. There may still be CPV in the decay.

⁶ Uses the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays and assuming *CP*-violating angle $\beta_s(B^0 \rightarrow J/\psi\phi) = 0.02$.

 $^7\,{\rm Obtained}$ from $\Delta\Gamma_s$ and Γ_s fit with a correlation of 0.6.

⁸ Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

⁹Uses $\phi\phi$ correlations from $B_s^0 \rightarrow D_s^{(*)+}D_s^{(*)-}$.

B_s^0 MEAN LIFE (Flavor specific)



² Measured using $B_s^0 \to D_s^- \mu^+ \nu_\mu X$ decays. ³ Measured using the $B_s^0 \to D_s^- \pi^+$ decays. ⁴ Measured using $B_s^0 \to D^+ D_s^-$. ⁵ Measured using $B_s^0 \to \pi^+ K^-$ decays. ⁶ AALTONEN 11AP combines the fully reconstructed $B_s^0 \to D_s^- \pi^+$ decays and partially reconstructed $B_s^0 \to D_s X$ decays. ⁷ Uses $D_s^- \ell^+$, and $\phi \ell^+$ vertices. ⁸ Measured using $D_s^- \ell^+$ vertices. ⁹ Measured using $D_s^- \mu^+$ vertices.

B_s^0 MEAN LIFE (partial)

5			-	
B_s^0 mean life $(B_s \rightarrow D_s^+ D_s^-)$)			
VALUE (10^{-12} s)	DOCUMENT ID		TECN	COMMENT
1.379±0.031 OUR EVALUATION	(Produced by	HFLA	√)	
$1.379 \pm 0.026 \pm 0.017$	¹ AAIJ	14F	LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured using $B_s^0 \rightarrow D_s^- D_s^-$	+. The effective	lifetim	e is tran	slated into a decay width
of $\Gamma_L=0.725\pm0.014\pm0.00$	9 ps $^{-1}$.			
B_s^0 mean life $(B_s \rightarrow J/\psi \phi)$				
$VALUE (10^{-12} s)$	DOCUMENT ID		TECN	COMMENT
1.480 ± 0.007 OUR EVALUATION 1.480 ± 0.007 OUR AVERAGE				
$1.481 \!\pm\! 0.007 \!\pm\! 0.005$	¹ SIRUNYAN	18BY	′ CMS	<i>pp</i> at 8 TeV
$1.480 \pm 0.011 \pm 0.005$	¹ AAIJ	14E	LHCB	<i>pp</i> at 7 TeV
$1.444^{+0.098}_{-0.090}\!\pm\!0.020$	¹ ABAZOV	05 B	D0	<i>р</i> р at 1.96 ТеV
$\begin{array}{ccc} 1.34 & +0.23 \\ -0.19 & \pm 0.05 \end{array}$	² ABE	98 B	CDF	<i>pp</i> at 1.8 TeV
\bullet \bullet \bullet We do not use the following	data for average	s, fits,	limits, e	etc. • • •
$1.39 \begin{array}{c} +0.13 \\ -0.16 \end{array} \begin{array}{c} +0.01 \\ -0.02 \end{array}$	² ABAZOV	05W	D0	<i>р р</i> ат 1.96 ТеV
$\begin{array}{rrr} 1.34 & +0.23 \\ -0.19 & \pm 0.05 \end{array}$	³ ABE	96N	CDF	Repl. by ABE 98B
1 Measured using fully reconstruct 2 Measured using the time-deper 3 ABE 96N uses 58 \pm 12 exclusion	cted $B_{ m s} ightarrow J/\psi \phi$ ndent angular ana ve $B_{ m s} ightarrow J/\psi \phi$ e	∮ deca Iysis o events.	ys. f $B^0_s ightarrow$	$J/\psi \phi$ decays.
B^{0}_{s} mean life ($B_{s} \rightarrow J/\psi \eta$)				
VALUE (10 ⁻¹² s)	DOCUMENT ID		TECN	COMMENT
1.452 ± 0.016 OUR EVALUATION	(Produced by	HFLA	V)	
1.452 ± 0.016 OUR AVERAGE	2			
$1.445 \pm 0.016 \pm 0.008$ 1	-, ² AAIJ	23P	LHCB	<i>pp</i> at 7, 8, 13 TeV
$1.479 \!\pm\! 0.034 \!\pm\! 0.011$	¹ AAIJ	16L	LHCB	<i>pp</i> at 7, 8 TeV

 $\frac{1}{2}$ Uses $B^0_s o J/\psi\eta$ decays.

 2 AAIJ 23P reports a τ_L value combined with AAIJ 16AL result as $\tau_L = 1.452 \pm 0.014 \pm 0.007$ ps.

B_s^0 mean life $(B_s \rightarrow J/\psi K_S^0)$.)		
VALUE (10 ⁻¹² s)	DOCUMENT ID	TECN	COMMENT
1.63±0.07 OUR EVALUATION 1.63±0.07 OUR AVERAGE	(Produced by HI	FLAV)	
$1.59\!\pm\!0.07\!\pm\!0.03$	¹ HAYRAPETY	24AX CMS	<i>pp</i> at 13 TeV
$1.75 \pm 0.12 \pm 0.07$	¹ AAIJ	13AB LHCB	pp at 7 TeV
¹ Measured using a pure <i>CP</i> -odd from penguin diagrams are sma	final state $J/\psi K_{S}^{0}$) with the assu S	mption that contributions
B_s^0 mean life $(B_s \rightarrow J/\psi \pi^+)$	π-)		
VALUE (10 ⁻¹² s)	DOCUMENT ID	TECN	COMMENT
1.646 ± 0.013 OUR EVALUATION	(Produced by	HFLAV)	
1.660 ± 0.022 OUR AVERAGE	1		
$1.632 \pm 0.013 \pm 0.05$	¹ AAIJ	19AF LHCB	pp at 13 TeV
$1.677 \pm 0.034 \pm 0.011$	² SIRUNYAN	18BY CMS	pp at 8 TeV
$1.70 \pm 0.14 \pm 0.05$	³ ABAZOV	16C D0	$p\overline{p}$ at 1.96 TeV
$1.652 \pm 0.024 \pm 0.024$	T AAIJ	13AR LHCB	pp at 7 IeV
$1.70 \ \begin{array}{c} +0.12 \\ -0.11 \end{array} \pm 0.03$	⁵ AALTONEN	11AB CDF	<i>рр</i> at 1.96 ТеV
• • • We do not use the following	data for average	s, fits, limits, e	etc. • • •
$1.700\!\pm\!0.040\!\pm\!0.026$	⁵ AAIJ	12AN LHCB	Repl. by AAIJ 13AR
1 Based on $\Delta\Gamma = \Gamma_{H} - \Gamma_{B^{0}} =$	-0.05 ± 0.004 \pm	\pm 0.004 ps $^{-1}$ a	and ${ au}_{m{R}0}=1.517\pm0.004$
ps. The first error is due to th	e combined ΔΓ ι	uncertainty and	the second is from τ_{R0}
uncertainty.			
² Measured using $B_c^0 \rightarrow J/\psi \pi^+$	$^{-}\pi^{-}$ decays with	$0.9240 < m(\pi$	$(\pi\pi) < 1.0204$ GeV, which
is dominated by the $f_0(980)$ re	sonance, making	it a <i>CP</i> -odd st	ate.
³ Measured using $J/\psi \pi^+ \pi^-$ mo	de with 0.880 < 1	$m(\pi\pi) < 1.080$) GeV/c ² , which is mostly
$J/\psi f(0)(980)$ mode, a pure C	P-odd final state		
⁴ Measured using $B_c \rightarrow J/\psi \pi^-$	$^+\pi^-$ decays which	ch, in the limit	t of $\phi_{c} = 0$ and $ \lambda = 1$,
correspond to B^{0} , decays	-		
5 Massured using a pure CP add	final state 1/a/1 f	(080)	
Measured using a pure CF-oud	That state J/ψ	0(980).	
B_s^0 mean life $(B_s \rightarrow K^+ K^-)$)		
VALUE (10^{-12} s)	DOCUMENT ID	TECN	COMMENT
1.408 ± 0.017 OUR EVALUATION	(Produced by	HFLAV)	
1.408 \pm 0.017 OUR AVERAGE			
$1.407 \!\pm\! 0.016 \!\pm\! 0.007$	¹ AAIJ	14R LHCB	pp at 7 TeV
$1.440 \pm 0.096 \pm 0.009$	¹ AAIJ	12 LHCB	pp at 7 TeV
1 Measured using ${\it B}^0_{m s} o ~{\it K}^+{\it K}^+$	[–] decays. There	may still be Cl	PV in the decay.
B^0_s mean life ($B_s o \ \mu \mu$)			
<u>VALUE (10⁻¹² s)</u> 1.79±0.17 OUR EVALUATION	DOCUMENT ID (Produced by HI	<u>TECN</u> <u>CC</u> FLAV)	DMMENT
1.80+0.24 OUR AVERAGE Erro	r includes scale fa	actor of 1.4. S	ee the ideogram below.
$0.99^{+0.42}_{-0.07}\pm 0.17$ 1,	AAD 23	Звү ATLS р	o at 13 TeV
$1.83^{+0.23}_{-0.20} \pm 0.04$ 1.	TUMASYAN 2	3A CMS pj	o at 13 TeV
$2.07 \pm 0.29 \pm 0.03$ 1	AAIJ 2	2 LHCB DI	o at 7, 8, 13 TeV
		Pr	· · · · · · · · · · · ·
https://pdg.lbl.gov	Page 12	Creat	ed: 5/30/2025 07:50

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

$1.70^{+0.60}_{-0.43}\pm0.09$	¹ SIRUNYAN	20AG CMS	Repl. by TUMASYAN 23A
$2.04 \pm 0.44 \pm 0.05$	¹ AAIJ	17AI LHCB	Repl. by AAIJ 22
1 Management water P	y + y = decenser which	in the Standar	d Madal correspond to P^0

¹ Measured using $B_s \rightarrow \mu^+ \mu^-$ decays which, in the Standard Model, correspond to B_{sH}° decays. Assumes $-2 \operatorname{Re}(\lambda)/(1 + |\lambda|^2) = 1$.



¹Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \, K^+ \, K^-$ decays.

$\Gamma_{B^0_{sH}} - \Gamma_{B^0}$			
<u>VALUE (10¹² s⁻¹)</u>	DOCUMENT ID	TECN	COMMENT
$-0.050\pm0.004\pm0.004$	¹ AAIJ	19AF LHCB	<i>pp</i> at 7, 8, 13 TeV
¹ Measured in $B_s^0 ightarrow J/\psi \pi^+$	π^- decays.		

B⁰_s DECAY MODES

These branching fractions all scale with $B(\overline{b} \rightarrow B_{S}^{0})$.

The branching fraction $B(B_s^0 \to D_s^- \ell^+ \nu_\ell \text{ anything})$ is not a pure measurement since the measured product branching fraction $B(\overline{b} \to B_s^0) \times B(B_s^0 \to D_s^- \ell^+ \nu_\ell \text{ anything})$ was used to determine $B(\overline{b} \to B_s^0)$, as described in the note on " $B^0 - \overline{B}^0$ Mixing"

For inclusive branching fractions, e.g., $B \rightarrow D^{\pm}$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Г1	D_{s}^{-} anything	$(62 \pm 6) \%$	
Г2	D_{s}^{\pm} anything	(92 ± 11) %	
Γ ₃	D^{0}/\overline{D}^{0} anything	(38 ±10)%	
Γ ₄	$\ell \nu_{\ell} X$	(9.6 \pm 0.8) %	
Γ ₅	$e^+ \nu X^-$	(9.1 \pm 0.8) %	
Г ₆	$\mu^+ \nu X^-$	(10.2 \pm 1.0) %	
Γ ₇	$D_{s}^{-}\ell^{+} u_{\ell}$ anything	[a] (8.1 \pm 1.3)%	
Г ₈	$D^{*-}_{m{s}}\ell^+ u_\ell$ anything	(5.4 \pm 1.1) %	
Г9	$D_s^- \mu^+ \nu_\mu$	$(2.29\pm~0.21)~\%$	
Γ ₁₀	$D_{s}^{*-}\mu^{+}\nu_{\mu}$	(5.2 \pm 0.5) %	
Г ₁₁	$D_{s1}(2536)^{-} \mu^{+} \nu_{\mu}, D_{s1}^{-} \rightarrow D^{*-} K_{S}^{0}$	(2.7 \pm 0.7) $ imes$ 1	0 ⁻³
Γ ₁₂	$D_{s1}(2536)^{-} X \mu^{+} \nu, D_{s1}^{-} \rightarrow \overline{D}^{0} \kappa^{+}$	(4.4 \pm 1.3) $ imes$ 1	0 ⁻³
Г ₁₃	$D_{s2}(2573)^- X \mu^+ \nu, D_{s2}^- \rightarrow \overline{D}^0 \kappa^+$	(2.7 \pm 1.0) \times 1	0-3
Γ ₁₄	$K^{-\mu^+\nu_{\mu}}$	($1.06\pm$ 0.09) $ imes$ 1	0 ⁻⁴
Γ ₁₅	$D_{s}^{-}\pi^{+}$	$(2.98\pm~0.14) imes 1$	0-3
Γ ₁₆	$D_{s}^{-}\rho^{+}$	(6.8 \pm 1.4) $ imes$ 1	0-3
Γ ₁₇	$D_{-}^{3}\pi^{+}\pi^{+}\pi^{-}$	$(6.1 \pm 1.0) \times 1$	0-3
Γ ₁₈	$D_{c1}(2536)^{-}\pi^{+}, D_{-1}^{-} \rightarrow$	$(2.4 \pm 0.8) \times 1$	0-5
10	$D_s^- \pi^+ \pi^-$	()	

$$\begin{array}{rcl} \Gamma_{19} & D_s^{\mp} K^{\pm} & (2.25 \pm 0.12) \times 10^{-4} \\ \hline \Gamma_{20} & D_{s1} (2536)^{\mp} K^{\pm}, \ D_{s1}^{-} \rightarrow & (2.48 \pm 0.28) \times 10^{-5} \\ \hline D_* (2007)^0 K^- & (3.2 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{22} & D_s^{+} D_s^{-} & (3.2 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{22} & D_s^{+} D_s^{-} & (3.1 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{24} & D^{+} D^- & (2.2 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{26} & D^{*-} D^+ & (2.2 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{28} & D^0 \overline{D}^0 & (1.9 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{28} & D^0 \overline{D}^0 & (1.9 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{29} & D_s^{+-} \pi^+ & (1.9 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{29} & D_s^{+-} \pi^+ & (1.9 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{29} & D_s^{+-} \pi^+ & (1.9 \pm 0.5) \times 10^{-4} \\ \hline \Gamma_{29} & D_s^{+-} \pi^+ & (1.9 \pm 0.5) \times 10^{-3} \\ \hline \Gamma_{31} & D_s^{+-} \rho^+ & (9.5 \pm 2.0) \times 10^{-3} \\ \hline \Gamma_{32} & D_s^{++} D_s^{--} D_s^{+-} & (1.51 \pm 0.13) \% \\ \hline \Gamma_{33} & D_s^{++} D_s^{--} & (1.58 \pm 0.20) \% & 5 = 1.3 \\ \hline \Gamma_{34} & D_s^{--} \rho^+ & (4.0 \pm 0.7) \times 10^{-4} \\ \hline \Gamma_{36} & \overline{D}^0 K^0 & (2.8 \pm 1.1) \times 10^{-4} \\ \hline \Gamma_{37} & \overline{D}^0 K^0 & (3.4 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{38} & \overline{D}^0 K^{--} \pi^+ & (1.04 \pm 0.13) \times 10^{-3} \\ \hline \Gamma_{38} & \overline{D}^0 K^{--} \pi^+ & (7.3 \pm 2.6) \times 10^{-4} \\ \hline \Gamma_{41} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{45} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{44} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{45} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{44} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{44} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{44} & \overline{D}^0 \overline{K}^* (1680) & <7.8 \times 10^{-5} \\ \hline \Gamma_{45} & \overline{D}^0 \overline{K}^* (1280) & (4.4 \pm 0.6) \times 10^{-4} \\ \hline \Gamma_{44} & \overline{D}^0 \overline{K}^* (1280) & <2.6 \times 10^{-5} \\ \hline \Gamma_{47} & \overline{D}^0 \overline{K}^* (892)^0 \\ \hline \Gamma_{52} & [K^+ \pi^-]_D \overline{K}^* (892)^0 \\ \hline \Gamma_{52} & [K^+ \pi^-]_T \overline{D} \overline{K}^* (892)^0 \\ \hline \Gamma_{55} & [K^+ \pi^- \pi^+ \pi^-]_D \overline{K}^* (892)^0 \\ \hline \Gamma_{56} & [K^+ \pi^- \pi^+ \pi^-]_D \overline{K}^* (892)^0 \\ \hline \Gamma_{56} & D_{52}^* \\ \hline \end{array}$$

Г ₅₇	$D^*_{s1}(2700)^- \pi^+, \ D^*_{s1} \to \overline{D^0} \ \kappa^-$	(1.6 \pm 0.8) $\times10^{-5}$	
Г ₅₈	$D^{*} \tilde{K}$ $D^{*}_{s1}(2860)^{-} \pi^{+}, D^{*}_{s1} \rightarrow \overline{D}^{0} \kappa^{-}$	$(5 \pm 4) \times 10^{-5}$	
Г ₅₉	$D^{\circ}K$ $D^{*}_{s3}(2860)^{-}\pi^{+}, D^{*}_{s3} \rightarrow$ $\overline{D}^{0}K^{-}$	(2.2 \pm 0.6) $\times10^{-5}$	
Г ₆₀	$\overline{D}^{0} K^{+} K^{-}$	(5.6 \pm 0.9) $ imes$ 10 $^{-5}$	
Γ ₆₁	$\overline{D}^0 f_0(980)$	$< 3.1 \times 10^{-6}$	CL=90%
Γ_{62}	$\overline{D}^0 \phi$	(2.30 \pm 0.25) $ imes$ 10 $^{-5}$	
Γ ₆₃	$\overline{D}^{*0}\phi$	$(3.2 \pm 0.4) \times 10^{-5}$	
Γ ₆₄	$D^{*\mp}\pi^{\pm}$	$< 6.1 \times 10^{-6}$	CL=90%
Γ ₆₅	$\eta_{c}\phi$	(5.0 \pm 0.9) $ imes$ 10 $^{-4}$	
Г ₆₆	$\eta' X_{s\overline{s}}$	× , ,	
Γ ₆₇	$\eta_c \pi^+ \pi^-$	(1.8 \pm 0.7) $ imes$ 10 $^{-4}$	
Γ ₆₈	$\widetilde{J/\psi(1S)}\phi$	$(1.03\pm 0.04) \times 10^{-3}$	
Г ₆₉	$J/\psi(1S)\phi\phi$	$(1.18 + 0.14) \times 10^{-5}$	
Γ	$I/a/(1S)\pi^{0}$	$< 1.21 \times 10^{-5}$	CI90%
· 70 Γ ₇₁	$I/\psi(1S)n$	$(40 + 07) \times 10^{-4}$	S=1.4
Γ ₇₀	$I/\psi(1.5)K_{0}^{0}$	$(1.92 \pm 0.14) \times 10^{-5}$	0 1.1
· 72 Γ=ο	$I/q/(15)K^*(802)^0$	$(1.52 \pm 0.11) \times 10^{-5}$	
г 73 Г-7	$J/\psi(1S)n'$	$(4.1 \pm 0.4) \times 10^{-4}$	
г 74 Г	$J/\psi(1S)\eta$ $I/\psi(1S)\pi^{+}\pi^{-}$	$(3.3 \pm 0.4) \times 10^{-4}$	S_1 7
г 75 Г-с	$J/\psi(1S) = \frac{1}{2} \int \frac{1}$	$(2.02 \pm 0.17) \times 10^{-6}$	S=1.7
176	$J/\psi(13)/0(500), \ n_0 \to \pi^+\pi^-$	< 4 × 10 -	CL=90%
Γ77	$J/\psi(1S)\rho, \rho \to \pi^+\pi^-$	$< 3.4 \times 10^{-6}$	CL=90%
Γ ₇₈	$J/\psi(1S) f_0(980), f_0 \to$	(1.24 \pm 0.15) \times 10 ⁻⁴	S=2.1
Г ₇₉	$^{\pi^{+}\pi^{-}}_{J/\psi(1S)f_{2}(1270), f_{2} ightarrow f_{2} ightarrow$	(1.0 \pm 0.4) $\times10^{-6}$	
_	$\pi^+\pi^-$	-	
I ₈₀	$J/\psi(1S) t_2(1270)_0, t_2 \rightarrow \pi^+ \pi^-$	$(7.3 \pm 1.7) \times 10^{-7}$	
Γ ₈₁	$J/\psi(1S) f_2(1270)_{\parallel}, f_2 \rightarrow$	($1.05\pm~0.33) \times 10^{-6}$	
Г ₈₂	$J/\psi(1S)f_2(1270)_{\perp}, f_2 \rightarrow \pi^+\pi^-$	(1.3 \pm 0.7) $\times10^{-6}$	
Г ₈₃	$J/\psi(1S) f_0(1370), \ f_0 \to \pi^+ \pi^-$	(4.4 $\stackrel{+}{}$ $\stackrel{0.6}{_{4.0}}$) $ imes$ 10 $^{-5}$	
Г ₈₄	$J/\psi(1S) f_0(1500), f_0 \rightarrow$	($2.04 \stackrel{+}{_{-}} \stackrel{0.32}{_{-}} \times 10^{-5}$	
Г ₈₅	$J/\psi(1S)f_2'(1525)_0, \ f_2' ightarrow \pi^+\pi^-$	($1.03\pm~0.22$) $ imes 10^{-6}$	
Г ₈₆	$J/\psi(1S) f_2'(1525)_{\parallel}, \ f_2' \to \pi^+ \pi^-$	(1.2 $\stackrel{+}{_{-}} \begin{array}{c} 2.6 \\ 0.8 \end{array}$) $ imes$ 10 ⁻⁷	

Г ₈₇	$J/\psi(1S)f'_{2}(1525)_{\perp}, f'_{2} \rightarrow \pi^{+}\pi^{-}$	$(5 \pm 4) \times 10^{-7}$	
Г ₈₈	$J/\psi(1S)f_0(1790), \ \ f_0 ightarrow \pi^+\pi^-$	(4.9 $^{+10.0}_{-1.0}$) $\times10^{-6}$	
Г ₈₉	$J/\psi(1S)\pi^+\pi^-$ (nonresonant)	(1.74^+_{-} $\stackrel{1.10}{_{0.34}}$) $ imes 10^{-5}$	
Г ₉₀	$J/\psi(1S)\overline{K}{}^0\pi^+\pi^-$	$<$ 4.4 $\times 10^{-5}$	CL=90%
Г ₉₁	$J/\psi(1S)K^+K^-$	(7.9 \pm 0.7) $ imes$ 10 $^{-4}$	
Г ₉₂	$J/\psi(1S) \frac{K^0}{K^0} K^- \pi^+ + \text{c.c.}$	(9.5 \pm 1.3) $ imes$ 10 ⁻⁴	
Γ ₉₃	$J/\psi(1S)K^0K^+K^-$	$< 1.2 \times 10^{-5}$	CL=90%
Г ₉₄	$J/\psi K^*(892)^0 K^*(892)^0$	$(1.08\pm0.09) imes10^{-4}$	
l ₉₅	$J/\psi(15) f'_2(1525)$	$(2.6 \pm 0.6) \times 10^{-4}$	
l ₉₆	$J/\psi(1S)p\overline{p}$	$(3.6 \pm 0.4) \times 10^{-0}$	
l ₉₇	$J/\psi(1S)\gamma$	$< 7.3 \times 10^{-0}$	CL=90%
I 98	$J/\psi \mu^+ \mu^-$, $J/\psi \rightarrow \mu^+ \mu^-$	$< 2.6 \times 10^{-9}$	CL=95%
199 F	$J/\psi(1S)\pi'\pi'\pi'\pi'$	$(7.5 \pm 0.8) \times 10^{-5}$	
1 100	$J/\psi(15) I_1(1205)$ $J/\psi(15) \overline{D}^0$	$(7.2 \pm 1.4) \times 10^{-6}$	CI _00%
ч 101 Глас	$\psi(2S)n$	$< 1.0 \times 10^{-4}$	CL=90 /0
г 102 Гаор	$\psi(25)\eta'$	$(3.3 \pm 0.3) \times 10^{-4}$	
Γ ₁₀₄	$\psi(2S)\pi^{+}\pi^{-}$	$(6.9 \pm 1.2) \times 10^{-5}$	
Γ ₁₀₅	$\psi(2S)\phi$	$(5.2 \pm 0.4) \times 10^{-4}$	
Γ_{106}	$\psi(2S)K^0$	$(1.9 \pm 0.5) \times 10^{-5}$	
Γ ₁₀₇	$\psi(2S) K^{-} \pi^{+}$	$(3.1 \pm 0.4) \times 10^{-5}$	
Γ ₁₀₈	$\psi(2S)\overline{K}^*(892)^0$	$(3.3 \pm 0.5) \times 10^{-5}$	
Γ ₁₀₉	$\chi_{c1}\phi$	($1.95\pm~0.25) imes10^{-4}$	
Γ_{110}	χ_{c1} K ⁺ K ⁻		
Γ_{111}	$\chi_{c2} K^+ K^-$		
Γ ₁₁₂	$\chi_{c1}(3872)\phi$	(9.7 \pm 3.3) $ imes$ 10 ⁻⁵	
Γ ₁₁₃	$\chi_{c1}(3872)(K^+K^-)_{non-\phi}$	$(7.6 \pm 3.0) \times 10^{-5}$	
Γ ₁₁₄	$\chi_{c1}(3872)\pi^{+}\pi^{-}$	(3.7 \pm 1.5) $ imes$ 10 ⁻⁵	
Γ_{115}	$\pi^{+}\pi^{-}$	$(7.2 \pm 1.0) \times 10^{-7}$	
1 ₁₁₆	$\pi^{0}\pi^{0}$	$< 7.7 \times 10^{-0}$	CL=90%
I ₁₁₇	$\eta \pi^{0}$	$< 1.0 \times 10^{-3}$	CL=90%
I 118	$\eta \eta$	$< 1.43 \times 10^{-4}$	CL=90%
г 119 Г	$\rho^{\circ} \rho^{\circ}$	$< 3.20 \times 10^{-6}$	CL=90%
1 ₁₂₀	$\eta \wedge s$	$< 8.16 \times 10^{-5}$	CL=90%
¹ 121 Г	$\eta \eta \eta \eta \eta \eta \eta$	$< 6.5 \times 10^{-5}$	CL=90%
122 L	$\eta' \eta' \eta$	$(3.5 \pm 0.7) \times 10^{-7}$	CI
т 123 Г124	$\frac{7}{6} \frac{9}{6} (980) = f_0(980) \rightarrow \pi^+ \pi^-$	$(112+021) \times 10^{-6}$	CL-90/0
· 124	4f(1070) f(1070)	$(1.12 \pm 0.21) \land 10$	
125	$\varphi_{I_2(1210)}, I_2(1210) \rightarrow \pi^+ \pi^-$	$(0.1 - 1.5) \times 10^{-7}$	
Г ₁₂₆	$\phi \rho^0$	($2.7~\pm~0.8$) $\times10^{-7}$	

Γ ₁₂₇	$\phi \pi^+ \pi^-$	(3.5 \pm 0.5) $ imes$ 10 $^{-6}$	
Γ ₁₂₈	$\phi \phi$	(1.84 \pm 0.14) $ imes$ 10 $^{-5}$	
Γ ₁₂₉	$\phi \phi \phi$	(2.2 \pm 0.6) $ imes$ 10 $^{-6}$	
Γ ₁₃₀	$\pi^+ K^-$	(5.9 \pm 0.7) $ imes$ 10 $^{-6}$	
Г ₁₃₁	$K^+ K^-$	(2.72 \pm 0.23) $ imes$ 10 $^{-5}$	
Γ ₁₃₂	$K^0 \overline{K}^0$	(1.76 \pm 0.31) $ imes$ 10 $^{-5}$	
Γ ₁₃₃	$\mathcal{K}^0 \pi^+ \pi^-$	(9.5 \pm 2.1) $ imes$ 10 $^{-6}$	
Г ₁₃₄	$K^0 K^{\pm} \pi^{\mp}$	(8.4 \pm 0.9) $ imes$ 10 $^{-5}$	
Γ ₁₃₅	$K^{*}(892)^{-}\pi^{+}$	(2.9 \pm 1.1) $ imes$ 10 $^{-6}$	
Γ ₁₃₆	$K^{*}(892)^{\pm}K^{\mp}$	(1.9 \pm 0.5) $ imes$ 10 $^{-5}$	
Γ ₁₃₇	$K_0^*(1430)^{\pm} K^{\mp}$	(3.1 \pm 2.5) $ imes$ 10 $^{-5}$	
Γ ₁₃₈	$K_2^*(1430)^\pm K^\mp$	(1.0 \pm 1.7) $ imes$ 10 $^{-5}$	
Γ ₁₃₉	$K^{\bar{*}}(892)^{0}\overline{K}^{0}+$ c.c.	(2.0 \pm 0.6) $ imes$ 10 $^{-5}$	
Γ ₁₄₀	$K_0^*(1430)\overline{K}^0 + \text{c.c.}$	(3.3 \pm 1.0) $ imes$ 10 $^{-5}$	
Γ_{141}	$K_{2}^{*}(1430)^{0}\overline{K}^{0}+$ c.c.	(1.7 \pm 2.2) $ imes$ 10 $^{-5}$	
Γ ₁₄₂	$K_{5}^{\bar{0}}\overline{K}^{*}(892)^{0}$ + c.c.	(1.6 \pm 0.4) $\times10^{-5}$	
Γ ₁₄₃	$K^{0}K^{+}K^{-}$	(1.3 \pm 0.6) $ imes$ 10 $^{-6}$	
Γ ₁₄₄	$\overline{K}^{*}(892)^{0} \rho^{0}$	$< 7.67 \times 10^{-4}$	CL=90%
Γ ₁₄₅	$\overline{K}^{*}(892)^{0} K^{*}(892)^{0}$	$(1.11\pm~0.27) imes10^{-5}$	
Γ ₁₄₆	$K^*(892)^0 \overline{K}_2^*(1430)^0$		
Γ ₁₄₇	$K_{2}^{*}(1430)^{0}\overline{K}^{*}(892)^{0}$		
Г ₁₄₈	$K_{2}^{+}(1430)^{0}\overline{K}_{2}^{*}(1430)^{0}$		
Г ₁₄₉	$\phi \bar{K}^*(892)^0$	(1.14 \pm 0.30) $ imes$ 10 $^{-6}$	
Γ ₁₅₀	p p	$<$ 4.4 $\times 10^{-9}$	CL=90%
Γ ₁₅₁	$p \overline{p} K^+ K^-$	(4.5 \pm 0.5) $ imes$ 10 $^{-6}$	
Γ ₁₅₂	$p \overline{p} K^+ \pi^-$	($1.39\pm~0.26) imes10^{-6}$	
Γ ₁₅₃	$p\overline{p}\pi^+\pi^-$	(4.3 \pm 2.0) $ imes$ 10 $^{-7}$	
Γ ₁₅₄	p <u>p</u> pp	(2.3 \pm 1.0) $ imes$ 10 ⁻⁸	
Γ_{155}	$p\Lambda K^{-}$ + c.c.	(5.5 \pm 1.0) $ imes$ 10 $^{-6}$	
Γ ₁₅₆	$\Lambda_c^- \Lambda \pi^+$	(3.6 \pm 1.6) $ imes$ 10 ⁻⁴	
Γ ₁₅₇	$\Lambda_{c}^{-}\Lambda_{c}^{+}$	$< 8.0 \times 10^{-5}$	CL=95%

Lepton family (*LF*), lepton (*L*), baryon (*B*) number violating modes or $\Delta B = 1$ weak neutral current (*B1*) modes

Γ ₁₅₈	$\gamma \gamma$	B1	< 3.1	imes 10 ⁻⁶	CL=90%
Г ₁₅₉	$\phi\gamma$	B1	(3.4 ± 0.4)	1) $ imes$ 10 $^{-5}$	
Γ ₁₆₀	$f_2(1270)\gamma$	B1	(9 + 4) - 5) × 10 ⁻⁶	
Г ₁₆₁	$f'_{2}(1525)\gamma$	B1	(6.6 + 0.9 - 0.8)	$\frac{9}{3}$) $ imes$ 10 $^{-6}$	
Γ ₁₆₂	ϕ (1680) γ , $\phi \rightarrow K^+K^-$	B1	(9.2 \pm 2.4	+) $ imes$ 10 $^{-7}$	
Г ₁₆₃	$\phi_3(1850)\gamma, \hspace{0.1in} \phi_3 ightarrow K^+ K^-$	В1	(7 + 6) - 5) × 10 ⁻⁸	
Г ₁₆₄	$f_2(2010)\gamma, f_2 \rightarrow K^+K^-$	B1	(1.0 + 0.7 - 0.5)	5) $ imes$ 10 $^{-7}$	
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Γ ₁₆₅	$\mu^+\mu^-$	B1	($3.34\pm$	$0.27) imes 10^{-9}$	
Γ ₁₆₆	e ⁺ e ⁻	B1	<	9.4	imes 10 ⁻⁹	CL=90%
Γ ₁₆₇	$\tau^+ \tau^-$	B1	<	6.8	imes 10 ⁻³	CL=95%
Γ ₁₆₈	$\mu^+\mu^-\gamma$	B1	<	4.2	imes 10 ⁻⁸	CL=95%
Γ ₁₆₉	$\mu^+\mu^-\mu^+\mu^-$	B1	<	8.6	$ imes$ 10 $^{-10}$	CL=95%
Γ ₁₇₀	SP, S $ ightarrow$ $\mu^+\mu^-$,	B1	[b] <	2.2	imes 10 ⁻⁹	CL=95%
	$P ightarrow \ \mu^+ \mu^-$					
Γ ₁₇₁	aa, a $ ightarrow \mu^+ \mu^-$	B1	<	5.8	$ imes$ 10 $^{-10}$	CL=95%
Γ ₁₇₂	ϕ (1020) $\mu^+\mu^-$	B1	($8.3\ \pm$	0.4) $ imes$ 10 $^{-7}$	
Γ ₁₇₃	$f_2'(1525)\mu^+\mu^-$	B1	($1.60\pm$	$0.22) \times 10^{-7}$	
Γ ₁₇₄	$\overline{K}^{*}(892)^{0} \mu^{+} \mu^{-}$	B1	($2.9\ \pm$	1.1) $ imes$ 10 $^{-8}$	
Γ_{175}	$\pi^{+}\pi^{-}\mu^{+}\mu^{-}$	B1	(8.4 ±	1.7) $ imes$ 10 $^{-8}$	
Γ ₁₇₆	$\overline{D}^0 \mu^+ \mu^-$	B1	<	1.2	$\times 10^{-7}$	CL=90%
Γ ₁₇₇	$\phi u \overline{ u}$	B1	<	5.4	imes 10 ⁻³	CL=90%
Γ ₁₇₈	invisible	B1				
Γ ₁₇₉	$e^{\pm}\mu^{\mp}$	LF	[c] <	5.4	imes 10 ⁻⁹	CL=90%
Γ ₁₈₀	$e^{\pm} au^{\mp}$	LF	<	1.4	imes 10 ⁻³	CL=90%
Γ ₁₈₁	$\mu^{\pm} \tau^{\mp}$	LF	<	4.2	imes 10 ⁻⁵	CL=95%
Γ ₁₈₂	$\phi \mu^{\pm} e^{\mp}$	LF	<	1.6	imes 10 ⁻⁸	CL=90%
Γ ₁₈₃	$\phi \mu^{\pm} \tau^{\mp}$	LF	<	1.0	imes 10 ⁻⁵	CL=90%
Γ ₁₈₄	$p\mu^-$	L,B	<	1.21	imes 10 ⁻⁸	CL=90%

- [a] Not a pure measurement. See note at head of B_s^0 Decay Modes.
- [b] Here S and P are the hypothetical scalar and pseudoscalar particles with masses of 2.5 GeV/c² and 214.3 MeV/c², respectively.
- [c] The value is for the sum of the charge states or particle/antiparticle states indicated.

FIT INFORMATION

An overall fit to 12 branching ratios uses 20 measurements to determine 7 parameters. The overall fit has a $\chi^2=$ 27.1 for 13 degrees of freedom.

The following off-diagonal array elements are the correlation coefficients $\langle \delta x_i \delta x_j \rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i / \Gamma_{\text{total}}$.

×17	17						
×19	82	14					
×68	0	0	0				
×75	0	0	0	43			
×78	0	0	0	31	52		
×128	0	0	0	15	6	5	
	×15	×17	×19	×68	×75	×78	

B⁰ BRANCHING RATIOS

$\Gamma(D_s^- \text{ anything})/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
0.62 \pm 0.06 OUR AVE	RAGE				
$0.602\!\pm\!0.058\!\pm\!0.023$		¹ WANG	22	BELL	$e^+e^- ightarrow ~\Upsilon(5S)$
$0.91 \ \pm 0.18 \ \pm 0.41$		² DRUTSKOY	07	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
$0.81 \ \pm 0.24 \ \pm 0.22$	90	³ BUSKULIC	96E	ALEP	$e^+e^- \rightarrow Z$
$1.56\ \pm 0.58\ \pm 0.44$	147	⁴ ACTON	92N	OPAL	$e^+e^- \rightarrow Z$

¹WANG 22 selects the B_s events by tagging the accompanying B_s via partial reconstruction of the semileptonic decays $B_s \rightarrow D_s X \ell^+ \nu$.

² The extraction of this result takes into account the correlation between the measurements of B($\Upsilon(5S) \rightarrow D_S X$) and B($\Upsilon(5S) \rightarrow D^0 X$).

³ BUSKULIC 96E separate $c\overline{c}$ and $b\overline{b}$ sources of D_s^+ mesons using a lifetime tag, subtract generic $\overline{b} \to W^+ \to D_s^+$ events, and obtain $B(\overline{b} \to B_s^0) \times B(B_s^0 \to D_s^-$ anything) = 0.088 ± 0.020 ± 0.020 assuming $B(D_s \to \phi\pi) = (3.5 \pm 0.4) \times 10^{-2}$ and PDG 1994 values for the relative partial widths to other D_s channels. We evaluate using our current values $B(\overline{b} \to B_s^0) = 0.107 \pm 0.014$ and $B(D_s \to \phi\pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \to B_s^0)$ and $B(D_s \to \phi\pi)$.

⁴ ACTON 92N assume that excess of 147 ± 48 D_s^0 events over that expected from B^0 , B^+ , and $c\overline{c}$ is all from B_s^0 decay. The product branching fraction is measured to be $B(\overline{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \text{ anything}) \times B(D_s^- \rightarrow \phi \pi^-) = (5.9 \pm 1.9 \pm 1.1) \times 10^{-3}$. We evaluate using our current values $B(\overline{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ and $B(D_s \rightarrow \phi \pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi \pi)$.

$\Gamma(D_s^{\pm} \text{ anything}) / \Gamma_{\text{total}}$					Г2/Г
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>	
0.92±0.11	ZHUKOVA	23	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$\Gamma(D^0/\overline{D}^0 \text{ anything})/\Gamma(D_s^2)$	[±] anything)				Γ_3/Γ_2
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>	
$0.416 \pm 0.018 \pm 0.092$	ZHUKOVA	23	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$\Gamma(\ell u_{\ell} X) / \Gamma_{\text{total}}$					Γ ₄ /Γ
VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT	
9.6±0.8 OUR AVERAGE					
$9.6 \pm 0.4 \pm 0.7$	¹ OSWALD	13	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$9.5^{+2.5+1.1}_{-2.0-1.9}$	² LEES	12A	BABR	e^+e^-	

 1 The measurement corresponds to the average of the electron and muon branching fractions.

² The measurement corresponds to a branching fraction where the lepton originates from bottom decay and is the average between the electron and muon branching fractions. LEES 12A uses the correlation of the production of ϕ mesons in association with a lepton in e^+e^- data taken at center-of-mass energies between 10.54 and 11.2 GeV.

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 Γ_1/Γ

$\Gamma(e^+\nu X^-)/\Gamma_{\text{total}}$					Г ₅ /Г
VALUE (units 10^{-2})	DOCUMENT ID)	TECN	COMMENT	
$9.1 {\pm} 0.5 {\pm} 0.6$	OSWALD	13	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$\Gamma(\mu^+ \nu X^-) / \Gamma_{total}$					Г _б /Г
VALUE (units 10^{-2})	DOCUMENT ID)	TECN	COMMENT	
$10.2 \pm 0.6 \pm 0.8$	OSWALD	13	BELL	$e^+e^- ightarrow$	$\Upsilon(5S)$

$\Gamma(D_s^-\ell^+\nu_\ell \text{ anything})/\Gamma_{\text{total}}$

Γ₇/Γ

The values and averages in this section serve only to show what values result if one assumes our $B(\overline{b} \rightarrow B_{S}^{0})$. They cannot be thought of as measurements since the underlying product branching fractions were also used to determine $B(\overline{b} \rightarrow B_{S}^{0})$ as described in the note on "Production and Decay of *b*-Flavored Hadrons."

VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT	
8.1 ± 1.3 OUR AVERA	GE					
$8.2 \pm 0.2 \pm 1.5$		¹ OSWALD	15	BELL	$e^+ e^- ightarrow ~\Upsilon(5S)$	
$7.6 \pm 1.2 \pm 2.1$	134	² BUSKULIC	95 0	ALEP	$e^+e^- \rightarrow Z$	
$10.7\!\pm\!4.3\!\pm\!2.9$		³ ABREU	92M	DLPH	$e^+e^- \rightarrow Z$	
$10.3\!\pm\!3.6\!\pm\!2.8$	18	⁴ ACTON	92N	OPAL	$e^+e^- \rightarrow Z$	
ullet $ullet$ $ullet$ We do not use the following data for averages, fits, limits, etc. $ullet$ $ullet$						
		-				

13
$$\pm 4 \pm 4$$
 27 SBUSKULIC 92E ALEP $e^+e^- \rightarrow Z$
¹Obtains $B_s \rightarrow D_s X e\nu$, and $D_s X \mu\nu$ separately, then combines them by assuming
systematic uncertainties are fully correlated, except for the one on lepton identification.

systematic uncertainties are fully correlated, except for the one on lepton identification. The third uncertainty adds in quadrature systematic uncertainties from external sources (number of B_s events, and $D_s^{(*)}$ branching fractions). OSWALD 15 also measures the cross-section $\sigma(e^+e^- \rightarrow B_s^{(*)}\overline{B}_s^{(*)}) = 53.8 \pm 1.4 \pm 5.3$ pb at $\sqrt{s} = 10.86$ GeV. ² BUSKULIC 950 use $D_s \ell$ correlations. The measured product branching ratio is $B(\overline{b} \rightarrow B_s) \times B(B_s \rightarrow D_s^-\ell^+ \nu_\ell$ anything) = $(0.82 \pm 0.09^{+0.13}_{-0.14})$ % assuming $B(D_s \rightarrow \phi\pi) = (3.5 \pm 0.4) \times 10^{-2}$ and PDG 1994 values for the relative partial widths to the six other D_s channels used in this analysis. Combined with results from $\Upsilon(4S)$ experiments this can be used to extract $B(\overline{b} \rightarrow B_s) = (11.0 \pm 1.2^{+2.5}_{-2.6})$ %. We evaluate using our current values $B(\overline{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ and $B(D_s \rightarrow \phi\pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi\pi)$.

³ABREU 92M measured muons only and obtained product branching ratio $B(Z \rightarrow bor \overline{b}) \times B(\overline{b} \rightarrow B_s) \times B(B_s \rightarrow D_s \mu^+ \nu_{\mu} \text{ anything}) \times B(D_s \rightarrow \phi \pi) = (18 \pm 8) \times 10^{-5}$. We evaluate using our current values $B(\overline{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ and $B(D_s \rightarrow \phi \pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi \pi)$. We use $B(Z \rightarrow bor \overline{b}) = 2B(Z \rightarrow b\overline{b}) = 2 \times (0.2212 \pm 0.0019)$.

⁴ ACTON 92N is measured using $D_s \rightarrow \phi \pi^+$ and $K^*(892)^0 K^+$ events. The product branching fraction measured is measured to be $B(\overline{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything})$ $\times B(D_s^- \rightarrow \phi \pi^-) = (3.9 \pm 1.1 \pm 0.8) \times 10^{-4}$. We evaluate using our current values $B(\overline{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ and $B(D_s \rightarrow \phi \pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi \pi)$.

⁵ BUSKULIC 92E is measured using $D_s \rightarrow \phi \pi^+$ and $K^*(892)^0 K^+$ events. They use 2.7 ± 0.7% for the $\phi \pi^+$ branching fraction. The average product branching fraction is measured to be $B(\overline{b} \rightarrow B_s^0)B(B_s^0 \rightarrow D_s^- \ell^+ \nu_\ell \text{ anything}) = 0.020 \pm 0.0055 + 0.0056 - 0.0066$. We evaluate using our current values $B(\overline{b} \rightarrow B_s^0) = 0.107 \pm 0.014$ and $B(D_s \rightarrow \phi \pi) = 0.036 \pm 0.009$. Our first error is their experiment's and our second error is that due to $B(\overline{b} \rightarrow B_s^0)$ and $B(D_s \rightarrow \phi \pi)$. Superseded by BUSKULIC 950.

$\Gamma(D_s^{*-}\ell^+\nu_\ell \text{ anything})/\Gamma_{\text{total}}$

VALUE (units 10^{-2})	DOCUMENT ID		TECN	COMMENT
5.4±0.4±1.0	¹ OSWALD	15	BELL	$e^+e^- ightarrow ~\Upsilon(5S)$

¹Obtains $B_s \rightarrow D_s^* X e\nu$, and $D_s^* X \mu\nu$ separately, then combines them by assuming systematic uncertainties are fully correlated, except for the one on lepton identification. The third uncertainty adds in quadrature systematic uncertainties from external sources (number of B_s events, and $D_s^{(*)}$ branching fractions). OSWALD 15 also measures the cross-section $\sigma(e^+e^- \rightarrow B_s^{(*)}\overline{B}_s^{(*)}) = 53.8 \pm 1.4 \pm 5.3$ pb at $\sqrt{s} = 10.86$ GeV.

$\Gamma(D_s^-\mu^+\nu_\mu)/\Gamma_{total}$

 $\begin{array}{c|c} \hline \underline{VALUE \ (\text{units } 10^{-2})} \\ \hline \textbf{2.29 \pm 0.19 \pm 0.08} \\ \hline 1 \\ \hline AAIJ \\ \hline 20E \\ \hline 1 \\ \hline AAIJ \\ \hline 20E \\ \hline LHCB \\ \hline pp \ at 7, 8 \\ \hline Pp \ at 7, 8 \\ \hline TeV \\ \hline pp \ at 7, 8 \\ \hline TeV \\ \hline 1 \\ \hline AAIJ \\ 20E \\ \hline 1 \\ \hline AAIJ \\ 20E \\ \hline LHCB \\ \hline pp \ at 7, 8 \\ \hline TeV \\ \hline pp \ at 7, 8 \\ \hline TeV \\ \hline 1 \\ \hline AAIJ \\ 20E \\ \hline 1 \\ \hline AAIJ \\ 20E \\ \hline reports \\ \hline [\Gamma(B_s^0 \rightarrow D^- \ell^+ \nu_{\ell})] = 1.09 \\ \pm \\ 0.05 \\ \pm 0.06 \\ \pm 0.05 \\ which we multiply by our best value \\ \hline B(B^0 \rightarrow D^- \ell^+ \nu_{\ell}) = (2.10 \\ \pm \\ 0.07) \\ \times 10^{-2}. \\ Our \ first \ error \ is \ their \ experiment's \ error \ and \ our \ second \ error \ is \ the systematic \ error \ from \ using \ our \ best \ value. \\ \end{array}$

$$\Gamma (D_{s}^{*-} \mu^{+} \nu_{\mu}) / \Gamma_{\text{total}}$$

 Γ_{10}/Γ

Γα/Γ

 $\begin{array}{c|c} \hline & \underline{VALUE\ (units\ 10^{-2})} \\ \hline \textbf{5.2\pm0.5\pm0.1} \\ \hline 1 \\ \hline AAIJ \\ \hline 20E \\ \hline LHCB \\ \hline De \\ LHCB \\ \hline pp\ at\ 7,\ 8\ TeV \\ \hline pp\ at\ 7,\ 8\ TeV \\ \hline 1 \\ \hline AAIJ \\ 20E \\ \hline reports \\ \hline [\Gamma(B_s^0 \rightarrow D_s^{*-}\mu^+\nu_{\mu})/\Gamma_{total}] \\ \hline = 1.06 \\ \pm 0.05 \\ \pm 0.07 \\ \pm 0.05 \\ \hline which we multiply by our best value \\ \hline B(B^0 \rightarrow D^*(2010)^-\ell^+\nu_{\ell})] \\ \hline = 1.06 \\ \pm 0.05 \\ \pm 0.07 \\ \pm 0.09) \\ \times 10^{-2}. \\ Our\ first\ error\ is\ their\ experiment's\ error\ and\ our\ second\ error\ is\ the\ systematic\ error\ from\ using\ our\ best\ value. \\ \hline \end{array}$

DOCUMENT ID

$$\Gamma(D_s^-\mu^+\nu_\mu)/\Gamma(D_s^{*-}\mu^+\nu_\mu)$$

 Γ_9/Γ_{10}

• • • We do not use the following data for averages, fits, limits, etc. • • • $0.464 \pm 0.013 \pm 0.043$ ¹ AAIJ 20E LHCB *pp* at 7, 8 TeV

¹AAIJ 20E value is not independent of other reported measurements.

$I(D_{s1}(2536)^{-}\mu^{+}\nu_{\mu}, D_{s1})$	$\rightarrow D^{+-}K^{\circ}_{S})/I_{to}$	otal			l 11/l
VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT	
$2.7 \pm 0.7 \pm 0.2$	1 ABAZOV	09 G	D0	<i>р<mark>р</mark> аt 1.96 Те</i>	V
¹ ABAZOV 09G reports [$\Gamma(B B(\overline{b} \rightarrow B_s^0)$] = (2.66 ± 0.8 B_s^0) = (10.0 ± 0.8) × 10 error is the systematic error	$B_s^0 ightarrow D_{s1}(2536)^{-1}$ $52 \pm 0.45) imes 10^{-4}$ D_s^2 . Our first error is from using our bes	$\frac{1}{\mu} \mu^+ \nu_{\mu}$ which v their end their end	, D _{s1} ve divide experime	$ ightarrow D^{*-} K^0_S)/2$ by our best valent's error and o	$[\Gamma_{total}] imes$ ue $B(\overline{b} o$ our second

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TECN COMMENT

Γ₈/Γ

$\Gamma(D_{s1}(2536)^- X \mu^+ \nu, D)$	$_{s1}^{-} \rightarrow \overline{D}{}^{0}K^{+})/\Gamma($	$(D_s^-\ell^+)$	$ u_{\ell}$ anyt	hing)	Γ_{12}/Γ_7
VALUE (units 10^{-2})	DOCUMENT I	D	TECN	COMMENT	
$5.4 \pm 1.2 \pm 0.5$	AAIJ	11A	LHCB	<i>pp</i> at 7 TeV	
$\Gamma(D_{s2}(2573)^- X \mu^+ \nu, D)$	$\overline{s_2} \to \overline{D}{}^0 K^+) / \Gamma ($	$(D_s^-\ell^+)$	<i>v</i> ℓanyt	hing)	Г ₁₃ /Г ₇
VALUE (units 10^{-2})	DOCUMENT I	D	TECN	COMMENT	
$3.3 \pm 1.0 \pm 0.4$	AAIJ	11A	LHCB	pp at 7 TeV	
$\Gamma(D_{s1}(2536)^- X \mu^+ \nu, D)$ $\overline{D}^0 K^+)$	$\overline{s_1} \to \overline{D}{}^0 K^+) / \Gamma($	(<i>D_{s2}</i> (25	73) ⁻)	ζμ ⁺ ν, D _{s2} -	→ Г12/Г13
VALUE	DOCUMENT I	D	TECN	COMMENT	12, 13
• • • We do not use the follo	wing data for average	ges, fits,	limits, e	etc. • • •	
$0.61\!\pm\!0.14\!\pm\!0.05$	1 AAIJ	11A	LHCB	<i>pp</i> at 7 TeV	
$^1{ m Not}$ independent of other	AAIJ 11A measurem	nents.			
$\Gamma(K^-\mu^+\nu_\mu)/\Gamma(D_s^-\mu^+\nu_s)$	·μ)				Γ ₁₄ /Γ ₉
VALUE (units 10^{-3})	DOCUMENT I	D	TECN	COMMENT	
4.89±0.21±0.25	1,2 AAIJ	21G	LHCB	<i>pp</i> at 8 TeV	
¹ AAIJ 21G measures $B(B_s^0)$	$\rightarrow K^- \mu^+ \nu_\mu)/B(E$	$B_s^0 \rightarrow D_s^2$	$\frac{1}{5}\mu^{+}\nu_{\mu}$	(4.89 ± 0.2)	$21^{+0.20}_{-0.21}\pm$
0.14) $ imes$ 10 $^{-3}$ over the wł	nole q ² range, where	the last	uncerta	inty is due to	the $D_{s}^{-} \rightarrow$
$K + K = \pi$ branching fra ² AAIJ 21G reports this bran 10^{-3} and for q ² > 7 Ge	ction. Inching ratio for q ² $<$ V ² as (3.25 \pm 0.21	$^{< 7~GeV^2}_{+ 0.16} \pm ^{- 0.17}$	as (1.6 0.09) ×	$6 \pm 0.08 \pm 0.03$ $\pm 10^{-3}$.	$7\pm0.05) imes$
$\Gamma(\kappa^-\mu^+ u_\mu)/\Gamma_{ m total}$					Γ_{14}/Γ
VALUE (units 10 ⁻⁴)	<u>DOCUMENT I</u>	D	TECN	COMMENT	
$1.06 \pm 0.05 \pm 0.08$	¹ AAIJ	21G	LHCB	pp at 8 TeV	
1 The total systematic erro	or includes D_s^- brar	nching fra	actions,	В <mark>0</mark> lifetime,	$ V_{cb} $, and
$B^0_{m{s}} o \ D^{m{s}}$ form factor in	ntegral uncertainties.				
$\Gamma(D_s^-\pi^+)/\Gamma_{\text{total}}$					Г ₁₅ /Г
VALUE (units 10^{-3}) EVTS	DOCUMENT ID	TE	CN C	OMMENT	
2.98±0.14 OUR FIT					
2.97 ± 0.13 OUR AVERA		011/			- \ /
$2.96 \pm 0.10 \pm 0.09$		21Y LF		p at 7, 8, 13 I + $ \sim \gamma$	ev c)
$3.0 \pm 0.5 \pm 0.3$ 28 ± 0.6 ± 0.1	3 ABULENCIA		SE n	$e \rightarrow I(5)$	5)
• • We do not use the follo	wing data for average	ges. fits.	limits. e	etc. $\bullet \bullet \bullet$	
2 OF 1 O OF +0.25	4	104611			111
$2.95 \pm 0.05 - 0.28$	AAIJ	IZAG LF		epi. by AAIJ 2	. Ц Ү
$6.8 \pm 2.2 \pm 1.6$		07A BE	ELL R	epl. by LOUV	
$3.3 \pm 1.1 \pm 0.1$	6 ABULENCIA			epi. by ABULE $+ a^{-}$ $\sqrt{7}$	ENCIA U/C
<150 0			FD o	$+e \rightarrow Z$	
	$D = \pm 1/c$			$z \rightarrow z$	0.04
• AAIJ 21Y reports [I (B_s^0 – we multiply by our best v	$ ightarrow \left[D_{s}^{\pi +} \right] / \left[_{ ext{total}} \right] / _{ ext{total}}$ value B($B^{0} ightarrow D^{-}$	π^+ (B_{e} - (π^+) = ($\rightarrow D^{-2}$	$^{\pi +}$)] = 1.18 \pm 0.08) $ imes$ 10 $^{-3}$	0.04 which . Our first
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error is their experiment's error and our second error is the systematic error from using our best value.

- ²LOUVOT 09 reports $(3.67^{+0.35}_{-0.33} + 0.65_{-0.645}) \times 10^{-3}$ from a measurement of $[\Gamma(B_s^0 \rightarrow D_s^- \pi^+)/\Gamma_{\text{total}}] \times [B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)})]$ assuming $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)})] = (19.5 \pm 2.6) \times 10^{-2}$, which we rescale to our best value $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)})] = (20.1 \pm 3.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ³ABULENCIA 07C reports $[\Gamma(B_s^0 \rightarrow D_s^- \pi^+)/\Gamma_{total}] / [B(B^0 \rightarrow D^- \pi^+)] = 1.13 \pm 0.08 \pm 0.23$ which we multiply by our best value $B(B^0 \rightarrow D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ⁴ AAIJ 12AG reports $(2.95 \pm 0.05 \pm 0.17 \substack{+0.18 \\ -0.22}) \times 10^{-3}$ where the last uncertainty comes from the semileptonic f_s/f_d measurement. We combined the systematics in quadrature. ⁵ ABULENCIA 06J reports $[\Gamma(B_s^0 \rightarrow D_s^- \pi^+)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow D^- \pi^+)] = 1.32 \pm 0.18 \pm 0.38$ which we multiply by our best value $B(B^0 \rightarrow D^- \pi^+) = (2.51 \pm 0.08) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ⁶AKERS 94J sees \leq 6 events and measures the limit on the product branching fraction $f(\overline{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow D_s^- \pi^+) < 1.3\%$ at CL = 90%. We divide by our current value $B(\overline{b} \rightarrow B_s^0) = 0.105$.

$\Gamma(D_s^- ho^+)/\Gamma(D_s^-\pi^+)$					Γ_{16}/Γ_{15}
VALUE	DOCUMENT ID		TECN	COMMENT	
2.3±0.4±0.2	LOUVOT	10	BELL	$e^+e^- \rightarrow c$	$\Upsilon(5S)$
$\Gamma(D_{s}^{-}\pi^{+}\pi^{+}\pi^{-})/\Gamma_{total}$					Г ₁₇ /Г
VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT	
6.1±1.0 OUR FIT	1				
$6.3 \pm 1.4 \pm 0.6$	¹ ABULENCIA	07 C	CDF	p p at 1.96 ⁻	ГеV
¹ ABULENCIA 07C reports $D^{-}\pi^{+}\pi^{+}\pi^{-})$] = 1.05 ± 0.1 $D^{-}\pi^{+}\pi^{+}\pi^{-})$ = (6.0 ± 0.6) our second error is the systema	$[\Gamma(B_s^0 \rightarrow D)] \\ 0 \pm 0.22 \text{ which } \\ 0 \times 10^{-3}. \text{ Our fi} \\ \text{stic error from usi} $	$s^{-}\pi^{+}$ we mu rst err ng ou	$\pi^+\pi^-$) Itiply by for is the r best va)/F _{total}] / / our best val eir experiment alue.	$[{\sf B}(B^0 ightarrow] ightarrow$ ue ${\sf B}(B^0 ightarrow$ t's error and
$\Gamma(D_s^-\pi^+\pi^+\pi^-)/\Gamma(D_s^-\pi^+)$	DOCUMENT ID		TECN	COMMENT	Γ ₁₇ /Γ ₁₅
2.05±0.33 OUR FIT 2.01±0.37±0.20	AAIJ	11E	LHCB	pp at 7 TeV	/
$\Gamma(D_{s1}(2536)^{-}\pi^{+}, D_{s1}^{-} \rightarrow D_{s1}^{-})$	$\frac{1}{s}\pi^{+}\pi^{-})/\Gamma(D)$	$s^{-}\pi^{+}$	$\pi^+\pi^-$)	Γ ₁₈ /Γ ₁₇
VALUE (units 10 ⁻³)	DOCUMENT ID		TECN	COMMENT	
$4.0 \pm 1.0 \pm 0.4$	AAIJ	12A>	LHCB	<i>pp</i> at 7 TeV	/
$\Gamma(D^{\mp}_{s} K^{\pm}) / \Gamma_{\text{total}}$					Г ₁₉ /Г
VALUE (units 10 ⁻⁴)	DOCUMENT ID		TECN	COMMENT	
2.25±0.12 OUR FIT					
$2.3 \begin{array}{c} +1.2 \\ -1.0 \end{array} \begin{array}{c} +0.4 \\ -0.3 \end{array}$	¹ LOUVOT	09	BELL	$e^+e^- \rightarrow f$	r(5 <i>S</i>)
https://pdg.lbl.gov	Page 24		Creat	ed: 5/30/2	025 07:50

¹LOUVOT 09 reports $(2.4^{+1.2}_{-1.0} \pm 0.42) \times 10^{-4}$ from a measurement of $[\Gamma(B^0_s \rightarrow D^{\mp}_s K^{\pm})/\Gamma_{total}] \times [B(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s)]$ assuming $B(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s)$ = $(19.5 \pm 2.6) \times 10^{-2}$, which we rescale to our best value $B(\Upsilon(10860) \rightarrow B^{(*)}_s \overline{B}^{(*)}_s)$ = $(20.1 \pm 3.1) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. $\Gamma(D_{s1}(2536)^{\mp} K^{\pm}, D^{-}_{s1} \rightarrow \overline{D}^{*}(2007)^{0} K^{-})/\Gamma_{total}$ Γ_{20}/Γ

DOCUMENT IDTECNCOMMENT1 AAIJ23AYLHCBpp at 7, 8 VALUE (units 10^{-5}) 23AY LHCB pp at 7, 8, 13 TeV $2.48 \pm 0.18 \pm 0.22$ ¹ AAIJ 23AY reports $[\Gamma(B_s^0 \rightarrow D_{s1}(2536)^{\mp}\kappa^{\pm}, D_{s1}^{-} \rightarrow \overline{D}^*(2007)^0\kappa^{-})/\Gamma_{total}]/\Gamma_{total}$ $[B(B^0 \rightarrow \overline{D}{}^0 \kappa^+ \kappa^-)] = 0.409 \pm 0.019 \pm 0.022$ which we multiply by our best value $B(B^0 \rightarrow \overline{D}{}^0 \kappa^+ \kappa^-) = (6.1 \pm 0.5) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. $\Gamma(D_{s}^{\mp}K^{\pm})/\Gamma(D_{s}^{-}\pi^{+})$ Γ_{19}/Γ_{15} *VALUE* (units 10^{-2}) DOCUMENT ID TECN COMMENT 7.55±0.24 OUR FIT 7.55 ± 0.24 OUR AVERAGE $7.52\!\pm\!0.15\!\pm\!0.19$ AAIJ 15AC LHCB pp at 7, 8 TeV $9.7 \ \pm 1.8 \ \pm 0.9$ AALTONEN 09AQ CDF pp at 1.96 TeV • • • We do not use the following data for averages, fits, limits, etc. • • • AAIJ $6.46 \pm 0.43 \pm 0.25$ 12AG LHCB Repl. by AAIJ 15AC $\Gamma(D_{\epsilon}^{-}K^{+}\pi^{+}\pi^{-})/\Gamma(D_{\epsilon}^{-}\pi^{+}\pi^{+}\pi^{-})$ Γ_{21}/Γ_{17} VALUE (units 10^{-2}) DOCUMENT ID TECN COMMENT $5.2 \pm 0.5 \pm 0.3$ 12AX LHCB pp at 7 TeV AAIJ $\Gamma(D_{\epsilon}^{+}D_{\epsilon}^{-})/\Gamma_{\text{total}}$ Γ_{22}/Γ VALUE (units 10^{-3}) DOCUMENT ID TECN COMMENT CL% **4.5±0.6 OUR AVERAGE** Error includes scale factor of 1.3. See the ideogram below. ¹ AAIJ $4.0\pm0.2\pm0.5$ 13AP LHCB pp at 7 TeV $5.8^{+1.1}_{-0.9}{\pm}1.3$ ² ESEN 13 BELL $e^+e^- \rightarrow \Upsilon(5S)$ $6.1 \pm 0.9 \pm 0.7$ ³ AALTONEN 12C CDF *pp* at 1.96 TeV • • • We do not use the following data for averages, fits, limits, etc. • • • $10.3^{+3.9}_{-3.2}{}^{+2.6}_{-2.5}$ ⁴ ESEN 10 BELL Repl. by ESEN 13 ⁵ AALTONEN 08F CDF $12 \pm 4 \pm 1$ Repl. by AALTONEN 12C DRUTSKOY <67 90 07A BELL Repl. by ESEN 10 ¹Uses B($B^0 \rightarrow D^- D_c^+$) = (7.2 ± 0.8) × 10⁻³. ²Use $\Upsilon(5S) \rightarrow B_{S}^{*}\overline{B}_{S}^{*}$ decays assuming B($\Upsilon(5S) \rightarrow B_{S}^{*}\overline{B}_{S}^{*}$) = (17.1 ± 3.0)% and $\Gamma(\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%.$ ³AALTONEN 12C reports $(f_s/f_d) (B(B_s^0 \rightarrow D_s^+ D_s^-) / B(B^0 \rightarrow D^- D_s^+)) = 0.183 \pm$ 0.021 \pm 0.017. We multiply this result by our best value of B($B^0 \rightarrow D^- D_s^+$) = (8.1 \pm 0.6) × 10⁻³ and divide by our best value of f_s/f_d , where 1/2 $f_s/f_d = 0.1230 \pm 0.0115$.

Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.





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¹Uses B($B^0 \rightarrow D^- D^+$) = (2.11 ± 0.31) × 10⁻⁴ and B($B^+ \rightarrow \overline{D}{}^0 D_s^+$) = (10.1 ± 1.7) × 10⁻³.

$\Gamma (D^0 \overline{D}{}^0) / \Gamma_{\text{total}}$

Г₂₈/Г

VALUE (units 10 ⁻⁴)	DOCUMENT ID	· · · · · · · · · · · · · · · · · · ·	TECN	COMMENT
$1.9 \pm 0.3 \pm 0.4$	¹ AAIJ	13ap	LHCB	<i>pp</i> at 7 TeV
¹ Uses B(B^0 → D^-D^+) = 1.7) × 10 ⁻³ .	$=$ (2.11 \pm 0.31) $ imes$ 10	$^{-4}$ and	B(<i>B</i> +	$\rightarrow \overline{D}{}^0 D_s^+) = (10.1 \pm$
$\Gamma(D^{*+}D^{*-})/\Gamma_{total}$				Г ₂₇ /Г

VALUE (units 10 ⁻⁴)	DOCUMENT	ID	TECN	COMMENT	
$2.14 \pm 0.28 \substack{+0.17 \\ -0.16}$	1,2 AAIJ	23J	LHCB	<i>pp</i> at 7, 8, 13 TeV	
1 AAIJ 23J reports [Г($B^0_s ightarrow$	$\rightarrow D^{*+}D^{*-})/\Gamma_{to}$	_{tal}] / [B($B^0 \rightarrow 0$	$D^*(2010)^+ D^*(2010)^-$	-)]
$=$ 0.269 \pm 0.032 \pm 0.01	$1~\pm~0.008$ which	we multi	iply by o	our best value $B(B^0)$	\rightarrow
$D^{*}(2010)^{+}D^{*}(2010)^{-}) =$	= (8.0 \pm 0.6) $ imes$ 1	0 ⁻⁴ . Οι	ur first e	rror is their experimen	t's
error and our second error	is the systematic e	error from	ı using o	ur best value.	

²Uses average B_s^0 lifetime of 1.5215 ps.

$\Gamma(D_s^{*-}\pi^+)/\Gamma(D_s^-\pi^+)$	⊦)					Γ ₂₉ /Γ ₁₅
VALUE		DOCUMENT ID		TECN	COMMENT	
$0.65^{+0.15}_{-0.13}{\pm}0.07$		LOUVOT	10	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$\frac{\Gamma(D_s^{*\mp}K^{\pm})}{\Gamma(D_s^{*-}\eta)}$	r ⁺)	DOCUMENT ID		TECN	COMMENT	Г ₃₀ /Г ₂₉
$0.068 \pm 0.005 \substack{+0.003 \\ -0.002}$		AAIJ	15AD	LHCB	<i>pp</i> at 7, 8	TeV
$\frac{\Gamma(D_{s}^{*-}\rho^{+})}{VALUE}/\Gamma(D_{s}^{-}\pi^{+})$	-)	DOCUMENT ID		TECN	<u>COMMENT</u>	Γ_{31}/Γ_{15}
$3.2 \pm 0.6 \pm 0.3$		LOUVOT	10	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
$\frac{\Gamma(D_s^{*-}\rho^+)}{\Gamma(D_s^-\rho^+)}$)	DOCUMENT ID		TECN	COMMENT	Γ_{31}/Γ_{16}
• • • We do not use the	following	data for averages	. fits.	limits.	etc. • • •	
$1.4 \pm 0.3 \pm 0.1$	0	¹ LOUVOT	10	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
1 Not independent of c	ther LOU	VOT 10 measurer	nents			
$\left[\Gamma\left(D_{s}^{*+}D_{s}^{-}\right)+\Gamma\left(D_{s}^{*}\right)\right]$	$^{-}D_{s}^{+})]/$	΄Γ _{total}				Г ₃₂ /Г
<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
15.1±1.3 OUR AVER 15.3±1.2±1.1	RAGE	¹ AAIJ	16P	LHCB	pp at 7 Te	V
$17.6^{+2.3}_{-2.2}\pm4.0$		² ESEN	13	BELL	$e^+e^- \rightarrow$	$\Upsilon(5S)$
14.0±1.9±1.6 • • • We do not use the	following	³ AALTONEN data for averages	12C 5, fits,	CDF limits, e	<i>pp</i> at 1.96 etc. ● ● ●	TeV
$27.5^{+8.3}_{-7.1}{\pm}6.9$		⁴ ESEN	10	BELL	Repl. by E	SEN 13
<121	90	DRUTSKOY	07A	BELL	Repl. by E	SEN 10

¹AAIJ 16P reports [$\left[\Gamma(B_s^0 \rightarrow D_s^{*+}D_s^-) + \Gamma(D_s^{*-}D_s^+) \right] / \Gamma_{\text{total}}$] / [B($B^0 \rightarrow D^-D_s^+$)] = 1.88 \pm 0.08 \pm 0.12 which we multiply by our best value B($B^0 \rightarrow D^- D_c^+$) = $(8.1 \pm 0.6) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. ²Use $\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*$ decays assuming B($\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*$) = (17.1 ± 3.0)% and $\Gamma(\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%.$ ³AALTONEN 12C reports $(f_s/f_d) (B(B_s^0 \rightarrow D_s^{*+} D_s^- + D_s^{*-} D_s^+) / B(B^0 \rightarrow D_s^{*+} D_s^-)$ $D^-D_s^+$)) = 0.424 \pm 0.046 \pm 0.035. We multiply this result by our best value of $B(B^0 \rightarrow D^- D_s^+) = (8.1 \pm 0.6) \times 10^{-3}$ and divide by our best value of f_s/f_d , where $1/2 f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values. ⁴ Uses $\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$ assuming $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \rightarrow B_{S}^{*}\overline{B}_{S}^{*}) / \Gamma(\Upsilon(10860) \rightarrow B_{S}^{(*)}\overline{B}_{S}^{(*)}) = (90.1 + 3.8)\%$ $\Gamma(D_{\epsilon}^{*+}D_{\epsilon}^{*-})/\Gamma_{\text{total}}$ Γ_{33}/Γ VALUE (units 10^{-3}) CL% DOCUMENT ID TECN COMMENT 15.8± 2.0 OUR AVERAGE Error includes scale factor of 1.3. See the ideogram below. ¹ AAIJ $14.3 \pm 1.4 \pm 1.0$ 16P LHCB pp at 7 TeV 19.8^+ 3.3+5.2- 3.1-5.0² ESEN BELL $e^+e^- \rightarrow \Upsilon(5S)$ 13 ³ AALTONEN $21.6 \pm 3.2 \pm 2.5$ 12C CDF pp at 1.96 TeV • • We do not use the following data for averages, fits, limits, etc. • • • $30.8^{+12.2}_{-10.4}{}^{+8.5}_{-8.6}$ ⁴ ESEN BELL Repl. by ESEN 13 10 <257 90 DRUTSKOY 07A BELL Repl. by ESEN 10 WEIGHTED AVERAGE 15.8±2.0 (Error scaled by 1.3) 16P AAIJ LHCB ESEN 13 BELL 0.5 12C CDF AALTONEN 2.1 3.2 (Confidence Level = 0.202) 20 0 10 30 40 50 $\Gamma(D_{\epsilon}^{*+}D_{\epsilon}^{*-})/\Gamma_{\text{total}} \text{ (units } 10^{-3})$

¹AAIJ 16P reports $[\Gamma(B_s^0 \rightarrow D_s^{*+}D_s^{*-})/\Gamma_{total}] / [B(B^0 \rightarrow D^-D_s^+)] = 1.76 \pm 0.11 \pm$ 0.14 which we multiply by our best value $B(B^0 \rightarrow D^- D_s^+) = (8.1 \pm 0.6) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value

²Use $\Upsilon(5S) \rightarrow B_{S}^{*}\overline{B}_{S}^{*}$ decays assuming B($\Upsilon(5S) \rightarrow B_{S}^{*}\overline{B}_{S}^{*}$) = (17.1 ± 3.0)% and $\Gamma(\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%.$ ³AALTONEN 12C reports $(f_s/f_d) (B(B_s^0 \rightarrow D_s^{*+} D_s^{*-}) / B(B^0 \rightarrow D^- D_s^+)) = 0.654 \pm$ 0.072 \pm 0.065. We multiply this result by our best value of B($B^0 \rightarrow D^- D_s^+$) = (8.1 \pm 0.6) × 10⁻³ and divide by our best value of f_s/f_d , where 1/2 $f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

⁴ Uses $\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$ assuming B($\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}$) = (19.3 ± 2.9)% and $\Gamma(\Upsilon(10860) \rightarrow B_{s}^{*}\overline{B}_{s}^{*}) / \Gamma(\Upsilon(10860) \rightarrow B_{s}^{(*)}\overline{B}_{s}^{(*)}) = (90.1^{+}3.8)_{-4.0})\%.$

$\Gamma(D_s^{(*)+}D_s^{(*)-})/\Gamma_{\text{total}}$				Г ₃₄ /Г
VALUE (%)	DOCUMENT ID		TECN	COMMENT
4.5 \pm 1.4 OUR EVALUA	TION (Produced by H	HFLAV)	
3.66 ± 0.29 OUR AVERAG	SE .			
$3.45\!\pm\!0.25\!\pm\!0.24$	1 AAIJ	16P	LHCB	pp at 7 TeV
$4.32^{+0.42}_{-0.39}{}^{+1.04}_{-1.03}$	² ESEN	13	BELL	$e^+e^- ightarrow ~\Upsilon(5S)$
$4.2 \pm 0.5 \pm 0.5$	³ AALTONEN	12C	CDF	<i>р</i> рат 1.96 ТеV
$3.5 \pm 1.0 \pm 1.1$	⁴ ABAZOV	091	D0	<i>р</i> р ат 1.96 ТеV
$14 \pm 6 \pm 3$	^{5,6} BARATE	00 K	ALEP	$e^+e^- \rightarrow Z$
$\bullet \bullet \bullet$ We do not use the fo	ollowing data for average	es, fits,	limits, e	etc. ● ● ●
$6.85 \substack{+1.53 + 1.79 \\ -1.30 - 1.80}$	^{7,8} ESEN	10	BELL	Repl. by ESEN 13
$3.9 \ \begin{array}{c} +1.9 \ +1.6 \\ -1.7 \ -1.5 \end{array}$	⁴ ABAZOV	07Y	D0	Repl. by ABAZOV 09

98Q ALEP $e^+e^- \rightarrow Z$ BARATE < 0.218 90 ¹AAIJ 16P reports $[\Gamma(B_s^0 \to D_s^{(*)+} D_s^{(*)-})/\Gamma_{\text{total}}] / [B(B^0 \to D^- D_s^+)] = 4.24 \pm 2$ 0.14 ± 0.27 which we multiply by our best value $B(B^0 \rightarrow D^- D_s^+) = (8.1 \pm 0.6) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best value

²Use $\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*$ decays assuming B($\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*$) = (17.1 ± 3.0)% and $\Gamma(\Upsilon(5S) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(5S) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (87.0 \pm 1.7)\%.$ ³AALTONEN 12C reports $(f_s/f_d) (B(B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}) / B(B^0 \rightarrow D^- D_s^+)) =$

 $1.261 \pm 0.095 \pm 0.112$. We multiply this result by our best value of B($B^0 \rightarrow D^- D_s^+$) = $(8.1 \pm 0.6) \times 10^{-3}$ and divide by our best value of f_s/f_d , where $1/2 f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

⁴ Uses the final states where $D_s^+ \rightarrow \phi \pi^+$ and $D_s^- \rightarrow \phi \mu^- \overline{\nu}_{\mu}$. ⁵ Reports $B(B_s^0(\text{short}) \rightarrow D_s^{(*)}D_s^{(*)}) = (0.23 \pm 0.10 \pm 0.05) \cdot [0.17/B(D_s \rightarrow \phi \chi)]^2$ assuming $B(B_s^0 \rightarrow B_s^0(\text{short})) = 50\%$. We use our best value of $B(D_s \rightarrow \phi \chi) = 15.7 \pm 1.0\%$ to obtain the quoted result.

⁶ Uses $\phi\phi$ correlations from B_s^0 (short) $\rightarrow D_s^{(*)+} D_s^{(*)-}$

⁷Sum of exclusive $B_s \rightarrow D_s^+ D_s^-$, $B_s \rightarrow D_s^{*\pm} D_s^{\mp}$ and $B_s \rightarrow D_s^{*+} D_s^{*-}$. ⁸Uses $\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$ assuming $\mathbb{B}(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (90.1^{+3.8}_{-4.0})\%.$

$\Gamma(D^{*-}D_s^+)/\Gamma_{total}$				Г ₃₅	/Г
VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT	
4.0±0.6±0.4	¹ AAIJ	21s	LHCB	<i>pp</i> at 13 TeV	
1 AAIJ 21S reports [Г $(B^0_{m{s}} o$	$D^{*-}D_s^+)/\Gamma_{total}]/$	[B(<i>B</i>	$D \rightarrow D^*$	$(2010)^{-}D_{s}^{+})] = 0.049$)±
0.006 \pm 0.0036 which we	multiply by our bes	st valu	e B(<i>B</i> ⁰	$\rightarrow D^{*}(2010)^{-}D_{s}^{+})$	=
$(8.2\pm0.8) imes10^{-3}.$ Our the systematic error from L	first error is their expusing our best value.	perime	nt's erro	or and our second error	r is

$\left[\Gamma(D^{*+}D^{-})+\Gamma(D^{*-}D^{+})\right]/\Gamma_{total}$				(Γ ₂₅ +Γ ₂₆)/Γ
VALUE (units 10 ⁻⁵)	DOCUMENT I	D	TECN	COMMENT
8.4±1.1±0.8	¹ AAIJ	21N	LHCB	<i>pp</i> at 7, 8, 13 TeV
¹ AAIJ 21N reports [$[\Gamma(B_s^0 - $	$\rightarrow D^{*+}D^{-}) + \Gamma$	$(B_s^0 \rightarrow$	D*- D	$(\mathrm{P}^{+})]/\Gamma_{total}]$ / $[\mathrm{B}(B^{0} \rightarrow$
$D^{\pm} D^{*\mp} (CP$ -averaged))] = B($B^0 \rightarrow D^{\pm} D^{*\mp} (CP$ -av	$0.137\pm0.017\pm0.017\pm0.017\pm0.017\pm0.017\pm0.017\pm0.001$	0.006 wł \pm 0.6) >	hich we it 10^{-4} .	multiply by our best value Our first error is their
experiment's error and our se	econd error is the s	systemat	ic error f	from using our best value.

$\Gamma(\overline{D}^{*0}\overline{K}^{0})/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	DOCUMENT I	D	TECN	COMMENT
$2.8 \pm 1.0 \pm 0.5$	¹ AAIJ	16 C	LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured and normalized - Signal significance is 4.4 st	to the $B_s^0 \rightarrow \overline{D}^{*0}$	K_S^0 de	cay with	$f_s/f_d = 0.259 \pm 0.015.$

$\Gamma(\overline{D}^{0}\overline{K}^{0})/\Gamma_{\text{total}}$

()					
VALUE (units 10 ⁻⁴)	DOCUMENT ID)	TECN	COMMENT	
4.3±0.5±0.7	¹ AAIJ	16C	LHCB	<i>pp</i> at 7, 8 TeV	
1 Measured and normalized to	o the $B^0 ightarrow \overline{D}{}^0 \kappa_{ m c}^0$	0 S decay	with f _s	$/f_d = 0.259 \pm 0.019$	5.

$\Gamma(\overline{D}{}^0 \, K^- \pi^+) / \Gamma_{\rm total}$

VALUE (units 10 ⁻⁴)	DOCUMENT ID	TECN	COMMENT
$10.4 \pm 1.1 \pm 0.5$	¹ AAIJ	13AQ LHCB	pp at 7 TeV
¹ AAIJ 13AQ reports [$\Gamma(B_s^0 -$	$\rightarrow \overline{D}^0 \kappa^- \pi^+) / \Gamma_{\rm tot}$	_{al}] / [B(<i>B</i> ⁰ –	$\rightarrow \overline{D}^0 \pi^+ \pi^-)] = 1.18 \pm$
0.05 ± 0.12 which we multi	ply by our best value	$B(B^0 \rightarrow \overline{D}^0)$	$\pi^+\pi^-$) = (8.8 ± 0.5) ×
10^{-4} . Our first error is the	eir experiment's error	and our seco	nd error is the systematic
error from using our best va	alue.		

$\Gamma(\overline{D}^*(2007)^0 K^- \pi^+)/\Gamma_{\text{total}}$					Г ₃₉ /Г
VALUE (units 10 ⁻⁴)	DOCUMENT	- ID	TECN	COMMENT	
7.3±0.6±2.5	¹ AAIJ	22N	LHCB	<i>pp</i> at 13 TeV	
¹ AAIJ 22N reports	$[\Gamma(B_s^0$	\rightarrow	\overline{D}^*	$(2007)^0 K^- \pi^+)$	/Γ _{total}]
/ $[B(B^0 \rightarrow \overline{D}^*(2007)^0 \pi^+]$ tiply by our best value $B(B^0)$	$[\pi^{-})] = 1.178$ $\rightarrow \overline{D}^{*}(2007)$	± 0.029 $0_{\pi^+\pi^-)$	± 0.091 = (6.2 :	\pm 0.037 which \pm 2.2) $ imes$ 10 $^{-4}$.	we mul- Our first

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 Γ_{36}/Γ

 Γ_{37}/Γ

Γ₃₈/Γ

error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\overline{D}^{0}\overline{K}^{*}(892)^{0})/\Gamma_{to}$	tal				Г ₄₀ /Г
VALUE (units 10^{-4})		DOCUMENT ID	TECN	COMMENT	
4.4 ± 0.6 OUR AVERA	GE				
$4.29\!\pm\!0.09\!\pm\!0.65$		¹ AAIJ	14вн LHCB	<i>pp</i> at 7, 8 TeV	,
$4.7 \ \pm 1.2 \ \pm 0.3$		² AAIJ	11D LHCB	pp at 7 TeV	
• • • We do not use the	e following	g data for average	s, fits, limits,	etc. • • •	
$3.5 \pm 0.4 \pm 0.4$		³ AAIJ	13BX LHCB	Repl. by AAIJ	14BH
¹ Uses Dalitz plot anal	ysis of B_{i}^{0}	$D \to \overline{D}^0 K^- \pi^+ d$	lecays.		
² AAIJ 11D reports [Γ ($B_{s}^{0} \rightarrow \overline{D}^{0}$	$\sqrt[0]{K}^*(892)^0)/\Gamma_{tot}$	a] / [B(<i>B</i> ⁰ –	$\rightarrow \overline{D}^0 \rho^0)] = 1.48$	\pm 0.34 \pm
0.19 which we multi	ply by ou	r best value B(<i>B</i> ⁰	$\rightarrow \overline{D}^0 \rho^0$	$= (3.21 \pm 0.21)$	$\times 10^{-4}$.
Our first error is the	eir experin	ment's error and c	our second er	ror is the system	atic error
from using our best	value.	<u> </u>		0 -0	0
³ AAIJ 13BX reports [$\Gamma(B_s^0 \rightarrow$	$D^{0}K^{*}(892)^{0})/r$	_{total}] / [B($B^0 \rightarrow D^0 K^*(8)$	$(92)^{0})] =$
$7.8 \pm 0.7 \pm 0.3 \pm 0$.6 which \	we multiply by our	best value E	$B(B^0 \rightarrow \overline{D}{}^0 K^*)$	$(892)^0) =$
$(4.5 \pm 0.6) \times 10^{-5}$.	Our first	t error is their exp	periment's err	or and our secon	d error is
the systematic error	from using	g our best value.			
$\Gamma(\overline{D}^{0}\overline{K}^{*}(1410))/\Gamma_{to}$	tal				Г ₄₁ /Г
VALUE (units 10^{-5})		DOCUMENT ID	TECN	COMMENT	
38.6±11.4±33.3		¹ AAIJ	14BH LHCB	<i>pp</i> at 7, 8 TeV	,
¹ Uses Dalitz plot anal	ysis of B_{i}^{0}	$D \to \overline{D}^0 K^- \pi^+ d$	lecays.		
$\Gamma(\overline{D}^0\overline{K}_{*}^{*}(1430))/\Gamma_{*}$	- +-1	2			Γας/Γ
$V_{AI, IJF}$ (units 10^{-5})	Ldi	DOCUMENT ID	TECN	COMMENT	- 42/ -
30.0+2.4+6.8			14BH I HCB	pp at 7, 8 TeV	,
¹ Uses Dalitz plot and	lysis of F	$3^0 \rightarrow \overline{D}^0 \kappa^- \pi^+$	decays. Co	presponds to the	resonant
$K_{o}^{*}(1430)$ part of LA	SS param	s petrization.			
	·				
$\Gamma(D^0 K_2^*(1430)) / \Gamma_{to}$	tal				Г ₄₃ /Г
VALUE (units 10^{-5})		DOCUMENT ID	TECN	COMMENT	
$11.1 \pm 1.8 \pm 3.8$		¹ AAIJ	14вн LHCB	<i>pp</i> at 7, 8 TeV	,
1 Uses Dalitz plot anal	ysis of B_{g}^{0}	$G \to \overline{D}^0 K^- \pi^+ d$	decays.		
$\Gamma(\overline{D}^0\overline{K}^*(1680))/\Gamma_{+\infty}$	tal				ΓΔΔ /Γ
$VALUE (units 10^{-5})$		DOCUMENT ID	TECN	COMMENT	- ++/ -
<pre>//AEOE (units 10)</pre>	<u> </u>			$\frac{\text{comment}}{\text{nn}}$ at 7 8 TeV	,
¹ Uses Dalitz plot anal	ysis of B ⁽	$D \rightarrow \overline{D}^0 K^- \pi^+ q$	lecavs.	ppat r, o rev	
	,, <u>.</u>	5			
$\Gamma(\overline{D}^0 \overline{K}_0^*(1950))/\Gamma_{to}$	tal				Г ₄₅ /Г
VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT	
<11	90	¹ AAIJ	14BH LHCB	<i>pp</i> at 7, 8 TeV	

 $\begin{array}{cccc} \underline{ALUE (units 10^{-5})} & \underline{CL\%} & \underline{DOCUMENT ID} & \underline{TECN} & \underline{COMMENT} \\ \hline \mathbf{ALUE (units 10^{-5})} & \underline{90} & 1 \\ \hline \mathbf{ALJ} & \mathbf{14BH LHCB} & pp \text{ at 7, 8 TeV} \\ \hline \mathbf{1} \\ \underline{1} \\ \underline{1$

$\Gamma(\overline{D}^{0}\overline{K}_{3}^{*}(1780))/l$	T total					Г ₄₆ /Г
VALUE (units 10^{-5})	CL%	DOCUMENT IL)	TECN	COMMENT	
<2.6	90	¹ AAIJ	14BH	I LHCB	<i>pp</i> at 7, 8 TeV	
1 Uses Dalitz plot a	analysis of B_s^0	$c_{s}^{0} \rightarrow \overline{D}^{0} K^{-} \pi^{+}$	decays			
$\Gamma(\overline{D}{}^{0}\overline{K}_{4}^{*}(2045))/l$	「total					Г ₄₇ /Г
VALUE (units 10^{-5})	CL%	DOCUMENT IL	0	TECN	COMMENT	
<3.1	90	¹ AAIJ	14BH	LHCB	<i>pp</i> at 7, 8 TeV	
1 Uses Dalitz plot a	analysis of B_s^0	$c_{s}^{0} \rightarrow \overline{D}^{0} K^{-} \pi^{+}$	decays			
$\Gamma(\overline{D}^0 K^- \pi^+ (\text{non-}$	resonant))	/Γ _{total}				Г ₄₈ /Г
VALUE (units 10^{-5})		DOCUMENT IL)	TECN	COMMENT	
20.6±3.8±7.3		¹ AAIJ	14 BH	LHCB	<i>pp</i> at 7, 8 TeV	
¹ Uses Dalitz plot a part of the LASS	nalysis of B ⁰ s	$\rightarrow \overline{D}^0 K^- \pi^+$ tion.	decays.	Corres	oonds to the non-	resonant
$\Gamma([K^+K^-]_D\overline{K}^*($	892) ⁰)/Г(7	[─] ⁰ <i>K</i> *(892) ⁰)			Г	- 49/Γ40
VALUE		DOCUMENT IL)	TECN	COMMENT	<u> </u>
$1.000 \pm 0.034 \pm 0.016$		AAIJ	24M	LHCB	<i>pp</i> at 7, 8, 13	TeV
$\Gamma([\pi^+\pi^-]_D\overline{K}^*(8$	92) ⁰)/Г(<u></u> Д	¹⁰ K *(892) ⁰)	2	TECN		¯ ₅₀ /Γ ₄₀
$\frac{VALUE}{0.006 \pm 0.057 \pm 0.023}$			2414		COMMENT	
0.990±0.097±0.025			24101	LITCD	<i>pp</i> at <i>1</i> , 0, 15	lev
$\Gamma([\pi^+\pi^-\pi^+\pi^-])$	D K*(892) ⁰) /Γ(<u></u>D⁰ K *(8)	92)⁰)	TECN	COMMENT	¯ ₅₃ /Γ ₄₀
$1.010 \pm 0.048 \pm 0.033$		AAIJ	24M	LHCB	<i>pp</i> at 7. 8. 13	TeV
$\Gamma(D^*, (2573)^-, \pi^+)$	$D^* \rightarrow \overline{D}$	0 <i>κ</i> -)/г				- Гсе /Г
$V_{s2}(2510)$ "	' s2 / D		r	TECN	COMMENT	· 50/ ·
$25.7\pm0.7\pm1.0$			2 1/pu			
¹ Uses Dalitz plot a	analysis of B^0_{ℓ}	$2 \rightarrow \overline{D}^0 K^- \pi^+$	decays		pp at r, o lev	
$\Gamma(D*(2700) - \pi^+)$	$D^* \rightarrow \overline{D}$, 0 к =)/г	2			Γ /Γ
$V_{s1}(2700)$ %	, ^o sl ^{, o}		۲	TECN	COMMENT	' 5//'
VALUE (units 10 °)			1400		COMMENT	
¹ Uses Dalitz plot a	analysis of $B_{\ell}^{(}$	$Q \rightarrow \overline{D}^0 K^- \pi^+$	decays		pp at 1, 8 lev	
$\Gamma(D_{s1}^{*}(2860)^{-}\pi^{+}$, $D^*_{\epsilon 1} \rightarrow \overline{D}$	$\int^{0} K^{-})/\Gamma_{\text{total}}$				Г ₅₈ /Г
VALUE (units 10^{-5})		DOCUMENT IL	0	TECN	COMMENT	-
5.0±1.2±3.4		¹ AAIJ	14BH	LHCB	<i>pp</i> at 7, 8 TeV	
1 Uses Dalitz plot a	analysis of B_s^0	$\frac{D}{S} \rightarrow \overline{D}^0 K^- \pi^+$	decays			
$\Gamma(D_{s3}^*(2860)^-\pi^+$, $D^*_{s3} \to \overline{D}$	^{j0} K ⁻)/Γ _{total}				Г ₅₉ /Г
VALUE (units 10^{-5})		DOCUMENT IL)	TECN	COMMENT	
$2.2 \pm 0.1 \pm 0.6$	-	¹ AAIJ	14BH	I LHCB	<i>pp</i> at 7, 8 TeV	
¹ Uses Dalitz plot a	analysis of B_{s}^{0}	$S \to \overline{D}^0 K^- \pi^+$	decays			
https://pdg.lbl.go	v	Page 32		Creat	ed: 5/30/202	5 07:50

		DOCUMENT ID	TECN	COMMENT	
.6+0.7+0.5			18A7 LHCB	nn at 7 8 TeV	
• • We do not use th	ne followin	g data for average	s, fits, limits,	etc. $\bullet \bullet \bullet$	
$5.5 \pm 2.0 \pm 0.5$		^{2,3} AAIJ	12AM LHCB	Repl. by AAIJ 1	18az
¹ AAIJ 18AZ reports [$\Gamma(B^0 \rightarrow D^0)$	$\overline{D}^0 \kappa^+ \kappa^-) / \Gamma_{tot}$	$_{\rm al}$ / [B($B^0 \rightarrow$	$\overline{D}^0 K^+ K^-$] =	0.930 ±
0.089 ± 0.069 which	∖ <i>s</i> i we multin	lv bv our best valu	$B(B^0 \rightarrow \overline{D}^0)$	$K^{+}K^{-}) = (6.1)$	±0.5)>
10^{-5} . Our first err	or is their	experiment's error	r and our seco	nd error is the sy	stemati
error from using our	r best valu	$\overline{=}0$	1 (1 - (- 0	=0	
² AAIJ 12AM reports	$[\Gamma(B^0_s \rightarrow$	$D^{\circ}K^{+}K^{-})/\Gamma_{tot}$	_{:al}] / [B(<i>B</i> ° –	$\rightarrow D^{\circ}K^{+}K^{-}$] =	= 0.90 ±
0.27 ± 0.20 which w	ve multiply	by our best value	$B(B^{0} \rightarrow D^{0})$	$K^+K^-) = (6.1)$	± 0.5) >
error from using ou	or is their r best valu	experiment's error e.	r and our secc	nd error is the sy	stemation
³ Uses B($b \rightarrow B_{c}^{0}$)/F	$B(b \rightarrow B)$	(0) = 0.267 + 0.023	3 measured by	the same author	s.
—		-0.020	J		
$\left(D^{0} f_{0}(980)\right) / \Gamma_{tota}$	l.				Г ₆₁ /Г
ALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
<3.1 × 10 ^{—0}	90	AAIJ	15AG LHCB	<i>pp</i> at 7, 8 TeV	
$\left(\overline{D}^{0}\phi\right)/\Gamma_{\text{total}}$					Г ₆₂ /Г
ALUE (units 10 ⁻⁵)		DOCUMENT ID	TECN	COMMENT	
.30±0.10±0.23		¹ AAIJ	23AZ LHCB	<i>pp</i> at 7, 8, 13 ⁻	TeV
• • We do not use th	ne followin	g data for average	s, fits, limits,	etc. ● ● ●	
$.0 \pm 0.4 \pm 0.2$		² AAIJ	18AY LHCB	Repl. by AAIJ 2	23AZ
¹ AAIJ 23AZ result's I	last uncert	ainty includes the	uncertainty of	the branching fr	action o
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$	last uncert	ainty includes the f_s/f_d ratio.	uncertainty of $\overline{a}0 + \overline{a}0 + \overline{a}0$	the branching fr	action o
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [[last uncert $(-)$ and of $(B_s^0 o \overline{L})$	ainty includes the f_s/f_d ratio. $\int \phi \phi / \Gamma_{total}] / [B(0)]$	uncertainty of $B^0 \rightarrow \overline{D}{}^0 \pi^+$	the branching fr π^{-}] = $(3.4 \pm 0.4$	action o 1±0.3)×
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [F 10 ⁻² which we mul Our first error is th	last uncert () and of $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$ here expering $(B_s^0 \rightarrow \overline{L})$	ainty includes the f_s/f_d ratio. $f_0^{(0)}\phi)/\Gamma_{total}]/[B(0)]$ In the best value $B(B^{(0)})$ ment's error and $f_0^{(0)}$	uncertainty of $B^0 \rightarrow \overline{D}{}^0 \pi^+$ $0 \rightarrow \overline{D}{}^0 \pi^+ \pi^-$ pur second err	π^{-} the branching fr π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systema	action o ± 0.3)× $\times 10^{-4}$ atic erro
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [F 10 ⁻² which we mul Our first error is th from using our best	last uncert (D_s^{-}) and of $(B_s^{0} ightarrow \overline{D})$ Itiply by oun neir experiment value.	ainty includes the f_s/f_d ratio. $\int \phi/\Gamma_{total} / [B($ or best value $B(B^0)$ ment's error and ϕ	uncertainty of $B^0 \rightarrow \overline{D}{}^0 \pi^+$ $0 \rightarrow \overline{D}{}^0 \pi^+ \pi$ pur second err	The branching fr (π^{-})] = (3.4 ± 0.4) $(\pi^{-}) = (8.8\pm0.5)$ or is the systematical systema	action o $1\pm0.3) imes$ $1\pm0.3) imes$ 10^{-4} otic erro
¹ AAIJ 23AZ result's I $B(B^0 \rightarrow \overline{D}{}^0 K^+ K^-)^2$ AAIJ 18AY reports [F 10^{-2} which we mul Our first error is th from using our best C ($\overline{D}{}^0 A$) / F ($\overline{D}{}^0 \overline{K}^*$ (8)	last uncert (\overline{C}) and of $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$	ainty includes the f_s/f_d ratio. $(50^{\circ}\phi)/\Gamma_{\rm total}] / [B(0)^{\circ})$ in best value $B(B^{\circ})$ ment's error and c	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0}\pi^{+}$ $D \rightarrow \overline{D}{}^{0}\pi^{+}\pi^{+}$ pur second err	$[\pi^{-})] = (3.4 \pm 0.4)$ $[\pi^{-}) = (8.8 \pm 0.5)$ or is the systematic	action of 4 ± 0.3)× × 10 ⁻⁴ atic error
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [Γ 10 ⁻² which we mul Our first error is th from using our best - ($\overline{D}{}^0 \phi$)/ $\Gamma(\overline{D}{}^0 \overline{K}^*(8))$	last uncert (\overline{B}^{-}) and of $(B^{0}_{s} \rightarrow \overline{L})$ Itiply by out their experimeter of $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ value.	ainty includes the f_s/f_d ratio. $\int \phi / \Gamma_{total}] / [B($ ur best value $B(B^0)$ ment's error and ϕ DOCUMENT ID	uncertainty of $B^0 \rightarrow \overline{D}^0 \pi^+$ $0 \rightarrow \overline{D}^0 \pi^+ \pi$ pur second err <i>TECN</i>	The branching fr. π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systematic <i>COMMENT</i>	action o 1 ± 0.3)× 10^{-4} atic erro
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K^{-1} K^{-1$	last uncert $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ $(B^{0}_{s} \rightarrow \overline{L})$ $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ $(\overline{B}^{0}$	ainty includes the $\int f_s / f_d$ ratio. $\int \phi / \Gamma_{total}] / [B(0)]$ In best value $B(B^0)$ ment's error and control D <u>DOCUMENT ID</u> g data for average	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0}\pi^{+}$ $D \rightarrow \overline{D}{}^{0}\pi^{+}\pi^{-}$ pur second err <u>TECN</u> s. fits. limits.	The branching fraction π^{-})] = (3.4±0.4) π^{-}) = (8.8±0.5) or is the systematic of the syste	4 ± 0.3)× 10^{-4} atic erro
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [F 10 ⁻² which we mul Our first error is th from using our best ($\overline{D}{}^0 \phi$)/F($\overline{D}{}^0 \overline{K}^*(8)$ <u>(ALUE</u> •• We do not use th 069+0.013+0.007	last uncert $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$	ainty includes the f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B(0)]$ in best value $B(B^{0})$ ment's error and c_{0} <u>DOCUMENT ID</u> g data for average AALL	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0} \pi^{+}$ $D \rightarrow \overline{D}{}^{0} \pi^{+} \pi^{-}$ pur second err <u>TECN</u> s, fits, limits, 13BX LHCB	The branching fr. π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systematic Γ <u>COMMENT</u> etc. •••	action o 4 ± 0.3)× $\times 10^{-4}$ atic erro 62/Г40 184Y
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [f 10 ⁻² which we mul Our first error is th from using our best ($\overline{D}{}^0 \phi$)/$\Gamma(\overline{D}{}^0 \overline{K}^*(8))$ (ALUE •• We do not use th 0.069±0.013±0.007	last uncert (\overline{B}^{-}_{s}) and of $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ Itiply by out their experiment of $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ value. (392) ⁰	ainty includes the f_s/f_d ratio. $\int \phi / \Gamma_{total}] / [B($ ur best value $B(B^0)$ ment's error and ϕ <u>DOCUMENT ID</u> g data for average AAIJ	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0}\pi^{+}$ $D \rightarrow \overline{D}{}^{0}\pi^{+}\pi^{-}$ pur second err <u>TECN</u> s, fits, limits, 13BX LHCB	The branching fraction π^{-})] = (3.4 \pm 0.4 π^{-}) = (8.8 \pm 0.5) or is the systema Γ <u>COMMENT</u> etc. ••• Repl. by AAIJ :	action o 4 ± 0.3)× $\times 10^{-4}$ atic erro 62/Г40 18AY
¹ AAIJ 23AZ result's I B($B^0 \rightarrow \overline{D}{}^0 K^+ K$ ² AAIJ 18AY reports [Γ 10 ⁻² which we mul Our first error is th from using our best $\overline{(D^0 \phi)}/\Gamma(\overline{D^0 K^*}(8))$ (<u>ALUE</u>) •• We do not use th 0.069±0.013±0.007 $\overline{(D^{*0} \phi)}/\Gamma_{total}$	last uncert (\overline{B}^{-}) and of $(B^{0}_{s} \rightarrow \overline{L})$ Itiply by outer experine value. 392)⁰	ainty includes the f_s/f_d ratio. $f_0^0 \phi)/\Gamma_{total}] / [B($ ur best value $B(B^0)$ ment's error and of <u>DOCUMENT ID</u> g data for average AAIJ	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0} \pi^{+}$ $D \rightarrow \overline{D}{}^{0} \pi^{+} \pi^{-}$ pur second err <u>TECN</u> s, fits, limits, 13BX LHCB	The branching fr. π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systemation Γ <u>COMMENT</u> etc. ••• Repl. by AAIJ :	action o 1 ± 0.3)× $\times 10^{-4}$ atic erro $\overline{62/\Gamma_{40}}$ 18AY Γ_{63}/Γ
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K)$ ² AAIJ 18AY reports [F 10 ⁻² which we muld Our first error is the from using our best ($\overline{D}^{0} \phi$)/F($\overline{D}^{0} \overline{K}^{*}$(8) (ALUE) ••• We do not use the 0.069±0.013±0.007 ($\overline{D}^{*0} \phi$)/F_{total} (ALUE (units 10⁻⁵)	last uncert $(\overline{B}^{\circ}_{s} \rightarrow \overline{D})$ $(B^{\circ}_{s} \rightarrow \overline{D})$ Itiply by oun- neir experimentation of the second sec	ainty includes the f_s/f_d ratio. $\int \phi / \Gamma_{total}] / [B($ in best value $B(B^0)$ ment's error and ϕ <u>DOCUMENT ID</u> g data for average AAIJ <u>DOCUMENT ID</u>	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0}\pi^{+}$ $D \rightarrow \overline{D}{}^{0}\pi^{+}\pi^{-}$ pur second err <u>TECN</u> 13BX LHCB <u>TECN</u>	The branching fraction π^{-})] = (3.4 \pm 0.4 π^{-}) = (8.8 \pm 0.5) or is the systematic of the sy	action o 1 ± 0.3)× $\times 10^{-4}$ atic erro 62/Г40 18AY Г63/Г
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K)$ ² AAIJ 18AY reports [Γ 10 ⁻² which we muld Our first error is the from using our best $-(\overline{D}^{0}\phi)/\Gamma(\overline{D}^{0}\overline{K}^{*}(8))$ <u>(ALUE</u>) •• We do not use the 0.069±0.013±0.007 $-(\overline{D}^{*0}\phi)/\Gamma_{total}$ <u>(ALUE (units 10⁻⁵)</u>) 3.17±0.16±0.32	last uncert (\overline{B}^{-}) and of $(B^{0}_{s} \rightarrow \overline{L})$ Itiply by out their experimentation $(\overline{B}^{0}_{s} \rightarrow \overline{L})$ value. 392)⁰) the following	ainty includes the f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B(0)]$ in best value $B(B^{(0)})$ ment's error and $c_{(0)}$ $\frac{DOCUMENT \ ID}{C}$ g data for average AAIJ $\frac{DOCUMENT \ ID}{1}$ AAIJ	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0}\pi^{+}$ $D \rightarrow \overline{D}{}^{0}\pi^{+}\pi^{-}$ pur second err s, fits, limits, 13BX LHCB <u>TECN</u> 23AZ LHCB	The branching fr. π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systema Γ <u>COMMENT</u> etc. ••• Repl. by AAIJ : $\frac{COMMENT}{pp}$ at 7, 8, 13	action o 1 ± 0.3)× $\times 10^{-4}$ atic erro $\overline{62/\Gamma_{40}}$ 18AY Γ_{63}/Γ $\overline{\Gamma_{6V}}$
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K)$ ² AAIJ 18AY reports [F 10 ⁻² which we muld Our first error is the from using our best ($\overline{D}^{0} \phi$)/F($\overline{D}^{0} \overline{K}^{*}(8)$ (ALUE ••• We do not use the 0.069±0.013±0.007 ($\overline{D}^{*0} \phi$)/F_{total} (ALUE (units 10 ⁻⁵) (17±0.16±0.32 ••• We do not use the	last uncert $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$ Itiply by oun neir experiment value. $(392)^0$ me followin me followin	ainty includes the f_s/f_d ratio. $\int \phi / \Gamma_{total}] / [B($ ur best value $B(B^0$ ment's error and ϕ <u>DOCUMENT ID</u> g data for average AAIJ $\frac{DOCUMENT ID}{1}$ g data for average	uncertainty of $B^{0} \rightarrow \overline{D}^{0} \pi^{+}$ $D \rightarrow \overline{D}^{0} \pi^{+} \pi^{-}$ pur second err s, fits, limits, 13BX LHCB <u>TECN</u> 23AZ LHCB s, fits, limits,	The branching from π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systema Γ <u>COMMENT</u> etc. ••• Repl. by AAIJ = <u>COMMENT</u> p at 7, 8, 13 π^{-} etc. •••	action o 1 ± 0.3)× $\times 10^{-4}$ atic erro 62/Г40 18AY Г63/Г TeV
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K^{2} AAIJ 18AY reports [\Gamma 10^{-2} which we muld Our first error is the from using our best (D^{0} \phi)/\Gamma(\overline{D^{0} K^{*}(8)}) (ALUE) ••We do not use the b.069 ± 0.013 ± 0.007 (D^{*0} \phi)/\Gamma_{total}$ (ALUE (units 10 ⁻⁵) 3.17±0.16±0.32 ••We do not use the b.7 ± 0.6 ± 0.2	last uncert (T_{s}^{0}) and of $(B_{s}^{0} \rightarrow \overline{L})$ Itiply by out value. $(S92)^{0}$ me following me following	ainty includes the f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B(0)]$ In best value $B(B^{(0)})$ ment's error and of DOCUMENT ID g data for average AAIJ $1 \frac{DOCUMENT ID}{1 AAIJ}$ g data for average $^2 AAIJ$	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0} \pi^{+}$ $D \rightarrow \overline{D}{}^{0} \pi^{+} \pi^{-}$ pur second err \overline{P} s, fits, limits, 13BX LHCB \overline{PECN} 23AZ LHCB s, fits, limits, 18AY LHCB	The branching fr. $\pi^{-})] = (3.4 \pm 0.4)$ $\pi^{-}) = (8.8 \pm 0.5)$ or is the systema Γ $\frac{COMMENT}{PP \text{ at 7, 8, 13}}$ etc. • • Repl. by AAIJ 2	action o 1 ± 0.3)× $\times 10^{-4}$ atic erro $\overline{62}/\Gamma_{40}$ 18AY Γ_{63}/Γ $\overline{\Gamma_{63}}/\Gamma$ $\overline{\Gamma_{63}}/\Gamma$
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0}K^{+}K)$ ² AAIJ 18AY reports [F 10^{-2} which we muld Our first error is the from using our best ($\overline{D}^{0}\phi$)/F(\overline{D}^{0}\overline{K}^{*}(8)) (ALUE •• We do not use the $0.069 \pm 0.013 \pm 0.007$ ($\overline{D}^{*0}\phi$)/Ftotal (ALUE (units 10^{-5}) 5.17 \pm 0.16 \pm 0.32 •• We do not use the $0.7 \pm 0.6 \pm 0.2$ ¹ AAIJ 23AZ result's	last uncert $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$ Itiply by oun neir experiment value. $(392)^0)$ me followin he followin last uncert	ainty includes the f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B($ f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B($ $f_0(\phi)/\Gamma_{total}] / [B($ $f_0(\phi)/\Gamma_{total}]$	uncertainty of $B^{0} \rightarrow \overline{D}^{0} \pi^{+}$ $D \rightarrow \overline{D}^{0} \pi^{+} \pi^{-}$ pur second err $\overline{D}^{0} \pi^{+} \pi^{-}$ pur second err $\overline{D}^{0} \pi^{+} \pi^{-}$ $\overline{D}^{0} \pi^{-} \pi^{-}$	The branching from π^{-})] = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systema Γ <u>COMMENT</u> etc. ••• Repl. by AAIJ π^{-} etc. ••• Repl. by AAIJ π^{-} etc. •••	action o 1±0.3)× × 10 ⁻⁴ atic erro 62/Г40 18AY Г63/Г 763/Г 76V 23AZ ; fraction
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0}K^{+}K)$ ² AAIJ 18AY reports [Γ 10^{-2} which we muld Our first error is the from using our best ($\overline{D}^{0}\phi$)/Γ($\overline{D}^{0}\overline{K}^{*}(8)$ (ALUE) •• We do not use the $0.069\pm0.013\pm0.007$ ($\overline{D}^{*0}\phi$)/Γ_{total} (ALUE (units 10^{-5}) 3.17±0.16±0.32 •• We do not use the $1.7\pm0.6\pm0.2$ ¹ AAIJ 23AZ result's of $B(B^{0} \rightarrow \overline{D}^{0}K^{+})$	last uncert $(B_s^0 \rightarrow \overline{L})$ ltiply by oun reir experiment value. 392)⁰ me following he following last uncert (K^-) and $(S^0)^0$	ainty includes the f_s/f_d ratio. $f_0(\phi)/\Gamma_{total}] / [B(0)]$ in best value $B(B^{(0)})$ ment's error and control <u>DOCUMENT ID</u> g data for average AAIJ <u>DOCUMENT ID</u> 1 AAIJ g data for average 2 AAIJ tainty includes the l of f_s/f_d ratio. $\overline{D} \approx 0$	uncertainty of $B^{0} \rightarrow \overline{D}{}^{0} \pi^{+}$ $D \rightarrow \overline{D}{}^{0} \pi^{+} \pi^{-}$ pur second err <u>TECN</u> s, fits, limits, 13BX LHCB <u>TECN</u> 23AZ LHCB s, fits, limits, 18AY LHCB e uncertainties	The branching fr. $\pi^{-})] = (3.4 \pm 0.4)$ $\pi^{-}) = (8.8 \pm 0.5)$ or is the systema Γ $COMMENT$ etc. • • Repl. by AAIJ : $\frac{COMMENT}{pp \text{ at } 7, 8, 13}$ etc. • • Repl. by AAIJ : π^{-} of the branching	action o 1 ± 0.3)> $\times 10^{-4}$ atic erro $\overline{62/\Gamma_{40}}$ 18AY Γ_{63}/I $\overline{\Gamma_{63}}$ $\overline{\Gamma_{63}}$
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0}K^{+}K)$ ² AAIJ 18AY reports [F 10^{-2} which we muld Our first error is the from using our best ($\overline{D}^{0}\phi$)/F(\overline{D}^{0}\overline{K}^{*}(8)) (ALUE •• We do not use the $0.069 \pm 0.013 \pm 0.007$ ($\overline{D}^{*0}\phi$)/Ftotal (ALUE (units 10^{-5}) 5.17 \pm 0.16 \pm 0.32 •• We do not use the $3.7 \pm 0.6 \pm 0.2$ ¹ AAIJ 23AZ result's of $B(B^{0} \rightarrow \overline{D}^{0}K^{+})$ ² AAIJ 18AY reports [last uncert $(B_s^0 \rightarrow \overline{L})$ $(B_s^0 \rightarrow \overline{L})$ Itiply by oun neir experiment value. 392)⁰ me followin he followin last uncert (K^-) and $(\Gamma(B_s^0 \rightarrow K^-))$	ainty includes the f_s/f_d ratio. $f_0\phi)/\Gamma_{total}] / [B($ f_s/f_d ratio. $f_0\phi)/\Gamma_{total}] / [B($ $f_0\phi)/\Gamma_{total}] / [B($ $f_0\phi)/\Gamma_{total}] / [B($ f_s/f_d ratio. DOCUMENT ID $f_0OCUMENT ID$ $f_0OCUMENT ID$ f_s/f_d ratio. $\overline{D^{*0}\phi})/\Gamma_{total}] / [B($	uncertainty of $B^{0} \rightarrow \overline{D}^{0} \pi^{+}$ $D \rightarrow \overline{D}^{0} \pi^{+} \pi^{-}$ pur second err $\overline{D}^{0} \pi^{+} \pi^{-}$ pur second err $\overline{D}^{0} \pi^{+} \pi^{-}$ $\overline{D}^{0} \pi^{+} \pi^{-}$ $\overline{D}^{0} \pi^{-} \overline{D}^{0}$ $\overline{D}^{0} \pi^{-} \overline{D}^{0}$	the branching fr $\pi^{-})] = (3.4 \pm 0.4$ $\overline{}) = (8.8 \pm 0.5)$ or is the systema Γ $\underline{COMMENT}$ etc. • • • Repl. by AAIJ : $\underline{COMMENT}$ p at 7, 8, 13 $\overline{}$ etc. • • Repl. by AAIJ : and the branching	action o 1 ± 0.3)> $\times 10^{-4}$ atic erro 62/Г4C 18AY Г63/Г Г eV 23AZ ; fraction $\pm 0.5 \pm$
¹ AAIJ 23AZ result's I $B(B^{0} \rightarrow \overline{D}^{0} K^{+} K)$ ² AAIJ 18AY reports [Γ 10 ⁻² which we muld Our first error is the from using our best ($\overline{D}^{0}\phi$)/$\Gamma(\overline{D}^{0}\overline{K}^{*}(8))$ (ALUE •• We do not use the 0.069±0.013±0.007 ($\overline{D}^{*0}\phi$)/Γ_{total} (ALUE (units 10 ⁻⁵) 3.17±0.16±0.32 •• We do not use the 3.7±0.6±0.2 1 AAIJ 23AZ result's of B($B^{0} \rightarrow \overline{D}^{0} K^{+}$ ² AAIJ 18AY reports [0.4) × 10 ⁻² which we have 10 ⁻⁴ 0 for the total t	last uncert (-) and of $(B_s^0 \rightarrow \overline{L})$ Itiply by oun reir experiment value. 392)⁰ me following he following last uncert K^-) and $\Gamma(B_s^0 \rightarrow -)$ we multipl	ainty includes the f_s/f_d ratio. $\int_{0}^{0} \phi / \Gamma_{total}] / [B($ ir best value $B(B^0)$ ment's error and c DOCUMENT ID g data for average AAIJ $\frac{DOCUMENT ID}{1 AAIJ}$ g data for average $^2 AAIJ$ tainty includes the l of f_s/f_d ratio. $\overline{D}^{*0} \phi / \Gamma_{total}] /$ y by our best value	uncertainty of $B^{0} \rightarrow \overline{D}^{0} \pi^{+}$ $D \rightarrow \overline{D}^{0} \pi^{+} \pi^{-}$ pour second err \underline{TECN} s, fits, limits, 13BX LHCB \underline{TECN} 23AZ LHCB s, fits, limits, 18AY LHCB e uncertainties $[B(B^{0} \rightarrow \overline{D}^{0})]$ e $B(B^{0} \rightarrow \overline{D}^{0})$	The branching from π^{-})] = (3.4±0.4 π^{-}) = (3.4±0.4 π^{-}) = (8.8±0.5) or is the systema COMMENT etc. ••• Repl. by AAIJ : $\frac{COMMENT}{p p \text{ at 7, 8, 13}}$ etc. ••• Repl. by AAIJ : of the branching $\pi^{+}\pi^{-}$)] = (4.2 $\pi^{+}\pi^{-}$) = (8.8	action o 1 ± 0.3 > $\times 10^{-4}$ atic erro 62/Г4(18 AY Г63/Г 18 AY Г63/Г 23 AZ ; fraction $\pm 0.5 \pm$ ± 0.5 >

Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D 110, 030001 (2024) and 2025 update

$\Gamma(D^{*\mp}\pi^{\pm})/\Gamma_{total}$						Г ₆₄ /Г
VALUE	CL%	DOCUMENT	ID	TECN	COMMENT	
<6.1 × 10 ⁻⁶	90	¹ AAIJ	13AL	LHCB	рр at 7 TeV	
1 Uses f $_s/{ m f}_d=$ 0.256	± 0.020	and B($B^0 ightarrow L$	$O^{*-}\pi^+)$	= (2.76	\pm 0.13) \times 10 ⁻²	3.
$\Gamma(\eta_c \phi) / \Gamma_{ ext{total}}$						Г ₆₅ /Г

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
$5.01 \pm 0.53 \pm 0.68$	¹ AAIJ	17 U	LHCB	<i>pp</i> at 7, 8 TeV

¹The last uncertainty includes the limited knowledge of the external branching fractions where the η_c is reconstructed in the $p\overline{p}$, $K^+K^-\pi^+\pi^-$, $\pi^+\pi^-\pi^+\pi^-$, and $K^+K^-K^+K^-$ decays and $\phi(1020) \rightarrow K^+K^-$.

Γ	$(\eta_c$	π^+	π^{-}	·)/ſ	- total
				4	

Г₆₇/Г

VALUE (units 10 ⁻⁴)	DOCUMENT ID		TECN	COMMENT	
$1.76 \pm 0.59 \pm 0.31$	¹ AAIJ	17 U	LHCB	<i>pp</i> at 7, 8 TeV	

¹The last uncertainty includes the limited knowledge of the external branching fractions where the η_c is reconstructed in the $p\overline{p}$, $K^+K^-\pi^+\pi^-$, $\pi^+\pi^-\pi^+\pi^-$, and $K^+K^-K^+K^-$ decays. The significance of the signal, including systematic uncertainties, is 4.6 standard deviations.

$\Gamma(J/\psi(1S)\phi)/\Gamma_{\text{total}}$					Г ₆₈ /Г	
VALUE (units 10^{-3})	EVTS	DOCUMENT ID		TECN	COMMENT	
1.03 \pm 0.04 OUR FI	Т					
1.03 \pm 0.04 OUR AV	/ERAGE	1				
$1.021\!\pm\!0.032\!\pm\!0.022$			21Y	LHCB	pp at 7, 8, 13 TeV	
$1.25 \pm 0.07 \pm 0.23$		² THORNE	13	BELL	$e^+ e^- ightarrow ~ \Upsilon(5S)$	
$1.5 \pm 0.5 \pm 0.1$		³ ABE	96Q	CDF	p p	
• • • We do not use the	e following	g data for averages	s, fits,	limits, e	etc. • • •	
$1.050\!\pm\!0.013\!\pm\!0.104$		⁴ AAIJ	13AN	LHCB	Repl. by AAIJ 21Y	
<6	1	⁵ AKERS	94J	OPAL	$e^+e^- \rightarrow Z$	
seen	14	⁶ ABE	93F	CDF	<i>р</i> р ат 1.8 ТеV	
seen	1	⁷ ACTON	92N	OPAL	Sup. by AKERS 94J	
1 AAIJ 21Y reports [$\Gamma(B_s^0 \rightarrow$	$J/\psi(1S)\phiig)/\Gamma_{\sf tc}$	tal]	× [Β(φ(1020) $\rightarrow K^+K^-)] =$	
$(5.01\pm 0.16\pm 0.17$	$) \times 10^{-4}$	from a measurem	ent of	$[\Gamma(B_s^0 -$	$\rightarrow J/\psi(1S)\phi)/\Gamma_{\text{total}}] \times$	
$[B(\phi(1020) \rightarrow K^+ K^-)] / [B(B^+ \rightarrow J/\psi(1S)K^+)]$ assuming $B(B^+ \rightarrow J/\psi(1S)K^+)$						
$= (1.003 \pm 0.035) \times 10^{-3}$, which we rescale to our best values $B(\phi(1020) \rightarrow K^+ K^-)$						
$= (49.9 \pm 0.5) \times 10^{-2}$, B(B ⁺ $\rightarrow J/\psi(1S)K^+$) = (1.020 ± 0.019) $\times 10^{-3}$. Our first						
error is their experiment's error and our second error is the systematic error from using						
our best values. $(*) - (*)$						
² THORNE 13 uses $f_s = (17.2 \pm 3.0)\%$ as the fraction of $\Upsilon(5S)$ decaying to $B_s^{(*)} B_s^{(*)}$.						
³ ABE 96Q reports $[\Gamma(B_s^0 \to J/\psi(1S)\phi)/\Gamma_{\text{total}}] \times [\Gamma(\overline{b} \to B_s^0)/[\Gamma(\overline{b} \to B^+) + \Gamma(\overline{b} \to B^+)]$						
B^{0}] = (0.185 ± 0.055 ± 0.020) × 10 ⁻³ which we divide by our best value $\Gamma(\overline{b} \rightarrow B_{s}^{0})/$						
$\left \Gamma(\overline{b} \rightarrow B^+) + \Gamma(\overline{b} \rightarrow B^0) \right = 0.1230 \pm 0.0115$. Our first error is their experiment's						
error and our second error is the systematic error from using our best value.						
⁴ AAIJ 13AN uses $f_s/f_d = 0.256 \pm 0.020$ and $B(B^+ \rightarrow J/\psi K^+) = (10.18 \pm 0.42) \times 10^{-4}$.						

- ⁵AKERS 94J sees one event and measures the limit on the product branching fraction $f(\overline{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow J/\psi(1S)\phi) < 7 \times 10^{-4}$ at CL = 90%. We divide by $B(\overline{b} \rightarrow B_s^0) = 0.112$.
- ⁶ ABE 93F measured using $J/\psi(1S) \rightarrow \mu^+ \mu^-$ and $\phi \rightarrow K^+ K^-$. ⁷ In ACTON 92N a limit on the product branching fraction is measured to be $f(\overline{b} \rightarrow B_s^0) \cdot B(B_s^0 \rightarrow J/\psi(1S)\phi) \leq 0.22 \times 10^{-2}$.

$\Gamma(J/\psi(1S)\phi\phi)/\Gamma(J/\psi(1S)\phi) \qquad \qquad \Gamma_{69}/\Gamma_{68}$							
VALUE (units 10^{-2})	EVTS	DOCUMENT ID		TECN	COMMENT		
$1.15 {\pm} 0.12 {+} 0.05 {-} 0.09$	128	¹ AAIJ	16 U	LHCB	<i>pp</i> at 7, 8 Te	V	
¹ Uses $J/\psi \rightarrow \mu^+ \mu^-$, $\phi \rightarrow \kappa^+ \kappa^-$ decays, and observes 128 ± 13 events of $B_s^0 \rightarrow J/\psi \phi \phi$.							
$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$ Γ_{70}/Γ							
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT		
<1.21 × 10 ⁻⁵	90	¹ KUMAR	24	BELL	$e^+e^- ightarrow$ γ	(5 <i>S</i>)	
• • We do not use the following data for averages, fits, limits, etc. • •							
$< 1.2 \times 10^{-3}$	90	² ACCIARRI	97 C	L3			
¹ KUMAR 24 uses f _s = (22.0 $^{+2.0}_{-2.1}$)% as the fraction of $\Upsilon(5S)$ decaying to $B_s^{(*)}\overline{B}_s^{(*)}$.							

² ACCIARRI 97C assumes B^0 production fraction (39.5 ± 4.0%) and B_s (12.0 ± 3.0%).

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$

 Γ_{71}/Γ

VALUE (units 10 ⁻⁴) CL%	DOCUMENT ID		TECN	COMMENT
4.0 \pm 0.7 OUR AVERAGE	Error includes sca	le factor	of 1.4	
$3.6 \begin{array}{c} +0.5 \\ -0.6 \end{array} \begin{array}{c} +0.3 \\ -0.2 \end{array}$	¹ AAIJ	13A	LHCB	<i>pp</i> at 7 TeV
$5.10\!\pm\!0.50\!+\!1.17_{-0.83}$	² LI	12 I	BELL	$e^+e^- ightarrow ~\Upsilon(4S)$
		<i>c</i>		

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

 $\begin{array}{rrrr} <\!\!38 & 90 & {}^3\operatorname{ACCIARRI} & 97\mathrm{C}\ \mathrm{L3} \\ {}^1\operatorname{AAIJ}\ 13\mathrm{A}\ \mathrm{reports}\ [\Gamma(B_{s}^{0}\rightarrow J/\psi(1S)\eta)/\Gamma_{\mathrm{total}}] & / \ [\mathrm{B}(B^{0}\rightarrow J/\psi(1S)\rho^{0})] = \\ 14.0\pm1.2^{+1.1}_{-1.5}^{+1.1}_{-1.0} \ \mathrm{which}\ \mathrm{we}\ \mathrm{multiply}\ \mathrm{by}\ \mathrm{our}\ \mathrm{best}\ \mathrm{value}\ \mathrm{B}(B^{0}\rightarrow J/\psi(1S)\rho^{0}) = \\ (2.55^{+0.18}_{-0.16})\times10^{-5}. \ \mathrm{Our}\ \mathrm{first}\ \mathrm{error}\ \mathrm{is}\ \mathrm{their}\ \mathrm{experiment's}\ \mathrm{error}\ \mathrm{and}\ \mathrm{our}\ \mathrm{second}\ \mathrm{error}\ \mathrm{is} \\ \mathrm{th}\ \mathrm{systematic}\ \mathrm{error}\ \mathrm{from}\ \mathrm{using}\ \mathrm{our}\ \mathrm{best}\ \mathrm{value}. \end{array}$

²Observed for the first time with significances over 10 σ . The second error are total systematic uncertainties including the error on N($B_{s}^{(*)}\overline{B}_{s}^{(*)}$).

³ACCIARRI 97C assumes B^0 production fraction (39.5 ± 4.0%) and B_s (12.0 ± 3.0%).

$\Gamma(J/\psi(1S) \kappa_S^0) / \Gamma_{ ext{total}}$					Г ₇₂ /Г		
VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT			
1.92 ± 0.14 OUR AVERAGE							
$1.92\!\pm\!0.14\!\pm\!0.05$	¹ AAIJ	15AL	LHCB	<i>pp</i> at 7, 8 TeV			
$2.0 \pm 0.4 \pm 0.2$	² AALTONEN	11A	CDF	<i>р<mark>р</mark> аt 1.96 ТеV</i>			
ullet $ullet$ $ullet$ We do not use the following data for averages, fits, limits, etc. $ullet$ $ullet$							
$2.03 \pm 0.16 \pm 0.20$	³ AAIJ	13 AB	LHCB	Repl. by AAIJ 1	5AL		
$2.03\!\pm\!0.26\!\pm\!0.20$	⁴ AAIJ	120	LHCB	Repl. by AAIJ 1	3 AB		
https://pdg.lbl.gov	Page 35		Creat	ed: 5/30/2025	07:50		

- ¹ AAIJ 15AL reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S) \kappa_S^0)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S) \kappa_S^0)] = (4.31 \pm 0.17 \pm 0.12 \pm 0.25) \times 10^{-2}$ which we multiply by our best value $B(B^0 \rightarrow J/\psi(1S) \kappa_S^0)$ $= (4.45 \pm 0.11) \times 10^{-4}$. Our first error is their experiment's error and our second error
- is the systematic error from using our best value. ²AALTONEN 11A reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S) \kappa_S^0)/\Gamma_{\text{total}}] \times [B(\overline{b} \rightarrow B_s^0)] / [B(\overline{b} \rightarrow B^0)] / [B(B^0 \rightarrow J/\psi(1S) \kappa_S^0)] = (1.09 \pm 0.19 \pm 0.11) \times 10^{-2}$ which we multiply or divide by our best values $\tilde{B}(\overline{b} \rightarrow B_s^0) = (10.0 \pm 0.8) \times 10^{-2}$, $B(\overline{b} \rightarrow B^0) =$ $(40.8 \pm 0.7) \times 10^{-2}$, $\mathsf{B}(B^0 \to J/\psi(1S) \tilde{K}^0_S) = 1/2 \times \mathsf{B}(B^0 \to J/\psi(1S) \tilde{K}^0) = 1/2$ \times (8.91 \pm 0.21) \times 10⁻⁴. Our firs t error is their experiment's error and our second error is the systematic error from using our best values.
- ³AAIJ 13AB reports $(1.97 \pm 0.14 \pm 0.07 \pm 0.15 \pm 0.08) \times 10^{-5}$ from a measurement of $[\Gamma(B_s^0 \rightarrow J/\psi(1S) K_s^0)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow J/\psi(1S) K^0)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma(\overline{b} \rightarrow B^0)]$ assuming $B(B^0 \rightarrow J/\psi(1S) K^0) = (8.98 \pm 0.35) \times 10^{-4}$, $\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma(\overline{b} \rightarrow B^0)$ $(B^0)=0.256\pm 0.020$, which we rescale to our best values ${\sf B}(B^0 o J/\psi(1S){\it K}^0)=0.256\pm 0.020$ $(8.91 \pm 0.21) \times 10^{-4}$, $\Gamma(\overline{b} \rightarrow B_s^0) / \Gamma(\overline{b} \rightarrow B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.
- 4 AAIJ 120 reports (1.83 \pm 0.21 \pm 0.10 \pm 0.14 \pm 0.07) \times 10 $^{-5}$ from a measurement of $\begin{bmatrix} \Gamma(B_s^0 \to J/\psi(1S) \kappa_s^0) / \Gamma_{\text{total}} \end{bmatrix} / \begin{bmatrix} B(B^0 \to J/\psi(1S) \kappa^0) \end{bmatrix} \times \begin{bmatrix} \Gamma(\overline{b} \to B_s^0) / \Gamma(\overline{b} \to B^0) \\ B^0 \end{bmatrix} \text{ assuming } B(B^0 \to J/\psi(1S) \kappa^0) = (8.71 \pm 0.32) \times 10^{-4}, \Gamma(\overline{b} \to B_s^0) / \Gamma(\overline{b} \to B^0)$ $(B^0)=0.267{+0.021\over -0.02}$, which we rescale to our best values B $(B^0
 ightarrow J/\psi(1S)\kappa^0)=0.267{+0.021\over -0.02}$, which we rescale to our best values B $(B^0
 ightarrow J/\psi(1S)\kappa^0)=0.267{+0.021\over -0.02}$, which we rescale to our best values B $(B^0
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 ightarrow J/\psi(1S)\kappa^0)=0.267{+0.021\over -0.02}$, which we rescale to our best values B $(B^0
 ightarrow J/\psi(1S)\kappa^0)=0.267{+0.021\over -0.02}$ $(8.91 \pm 0.21) \times 10^{-4}$, $\Gamma(\overline{b} \rightarrow B_s^0) / \Gamma(\overline{b} \rightarrow B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\Gamma(J/\psi(1S)\overline{K}^*(892)^0)/\Gamma_{\text{total}}$

 Γ_{73}/Γ

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT		
4.14±0.18±0.35	¹ AAIJ	15AV	LHCB	<i>pp</i> at 7, 8 TeV		
ullet $ullet$ $ullet$ We do not use the following data for averages, fits, limits, etc. $ullet$ $ullet$						
$4.4 \begin{array}{c} +0.5 \\ -0.4 \end{array} \pm 0.8$	² AAIJ	12AP	LHCB	Repl. by AAIJ 15AV		
$9 \pm 4 \pm 1$	³ AALTONEN	11A	CDF	<i>р</i> рат 1.96 ТеV		
1 A ALL 15 M/ result combines two measurements with different normalizing modes of P_{0}^{0}						

- ² AAIJ 15AV result combines two measurements with different normalizing modes of $B^{0} \rightarrow J/\psi K^{*}(892)^{0}$ and $B_{s}^{0} \rightarrow J/\psi \phi$. ² AAIJ 12AP reports $B(B_{s}^{0} \rightarrow J/\psi(1S)\overline{K}^{*}(892)^{0})/B(B^{0} \rightarrow J/\psi(1S)K^{*}(892)^{0}) = (3.43^{+0.34}_{-0.36} \pm 0.50) \times 10^{-2}$ and $B(B^{0} \rightarrow J/\psi(1S)K^{*}(892)^{0}) = (1.29 \pm 0.05 \pm 0.05) \times 10^{-2}$ $0.13) \times 10^{-3}$ after correcting for the contribution from $K\pi$ S-wave beneath the K^* peak.
- ³AALTONEN 11A reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S)\overline{K}^*(892)^0)/\Gamma_{total}] \times [B(\overline{b} \rightarrow B_s^0)] / [B(\overline{b} \rightarrow B^0)] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] = 0.0168 \pm 0.0024 \pm 0.0068$ which we multiply or divide by our best values $B(\overline{b} \rightarrow B_s^0) = (10.0 \pm 0.8) \times 10^{-2}$, $B(\overline{b} \rightarrow B^0)$ $= (40.8 \pm 0.7) \times 10^{-2}, B(B^0 \rightarrow J/\psi(1S) K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}.$ Our first error is their experiment's error and our second error is the systematic error from using our best values.
| $\Gamma(J/\psi(1S)\eta')/\Gamma_{	ext{total}}$ | | | | | Г ₇₄ /Г |
|---|----------------------------------|------------------------|----------------|------------------------------|--------------------|
| $VALUE$ (units 10^{-4}) | DOCUMENT | ID | TECN | COMMENT | |
| 3.3 \pm 0.4 OUR AVERAGE | _ | | | | |
| $3.2 \ {}^{+0.4}_{-0.5} \ \pm 0.2$ | ¹ AAIJ | 13A | LHCB | <i>pp</i> at 7 TeV | |
| $3.71 \!\pm\! 0.61 \!+\! 0.85 \\ -\! 0.60$ | ² LI | 12 | BELL | $e^+e^- ightarrow ~\gamma($ | (4 <i>S</i>) |
| ¹ AAIJ 13A reports [$\Gamma(B_s^0)$ | $D \rightarrow J/\psi(1S) \eta'$ |)/Γ _{total}] | / [B(<i>E</i> | $B^0 \rightarrow J/\psi(1)$ | $(S) \rho^0)] =$ |
| $12.7 \pm 1.1 {+0.5 + 1.0 \atop -1.3 - 0.9}$ wh | ich we multiply by | our best | value E | $B(B^0 \rightarrow J/\psi)$ | $(1S) \rho^0) =$ |
| $(2.55^{+0.18}_{-0.16}) \times 10^{-5}$. Or | ır first error is their | experime | ent's err | or and our seco | nd error is |
| , the systematic error from | using our best valu | e. | | | |

 2 Observed for the first time with significances over 10 σ . The second error are total systematic uncertainties including the error on N($B_{\varsigma}^{(*)}\overline{B}_{\varsigma}^{(*)}$).

$\Gamma(J/\psi(1S)\eta')/\Gamma(J/\psi(1S)\eta)$

VALUE	DOCUMENT ID		TECN	COMMENT
0.87 \pm 0.06 OUR AVERAGE				
$0.902\!\pm\!0.072\!\pm\!0.045$	¹ AAIJ	15 D	LHCB	<i>pp</i> at 7, 8 TeV
$\begin{array}{ccc} 0.90 & \pm 0.09 & +0.06 \\ & -0.02 \end{array}$	² AAIJ	13A	LHCB	<i>pp</i> at 7 TeV
$0.73\ \pm 0.14\ \pm 0.02$	² LI	12	BELL	$e^+e^- \rightarrow \Upsilon(4S)$
-	•			

¹Uses $J/\psi \rightarrow \mu^+ \mu^-$, $\eta' \rightarrow \rho^0 \gamma$, and $\eta' \rightarrow \eta \pi^+ \pi^-$ decays. ²Strongly correlated with measurements of $\Gamma(J/\psi(1S)\eta)/\Gamma$ and $\Gamma(J/\psi(1S)\eta')/\Gamma$ reported in the same reference.

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$

VALUE (units 10^{-2})DOCUMENT IDTECNCOMMENT**19.7±1.5 OUR FIT**Error includes scale factor of 2.2.COMMENT 12A0 LHCB pp at 7 TeV 1 aaij $20.2\pm0.7\pm0.2$ 1 AAIJ 12AO reports (19.79 \pm 0.47 \pm 0.52) \times 10 $^{-2}$ from a measurement of [Г($B_s^0 \rightarrow$ $J/\psi(1S)\pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)] / [B(\phi(1020) \rightarrow K^+K^-)]$ assuming $B(\phi(1020) \rightarrow K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(J/\psi(1S) f_0(500), f$	$f_0 \rightarrow \pi^+$	$(\pi^{-})/\Gamma(J/\psi(1S))$	5)f ₀ (980),f	$ar{b} ightarrow \pi^+\pi^-)$ Г $_7$	_{′6} /Γ ₇₈
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<0.034	90	¹ AAIJ	14BR LHCB	<i>pp</i> at 7, 8 TeV	

 1 Reported first of two solutions using the full Dalitz analysis.

$\Gamma(J/\psi(1S) ho, ho ightarrow$	$\pi^{+}\pi^{-})/$	$/\Gamma(J/\psi(1S)\pi^+\pi)$	·-)	Г	77/Г75
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
<0.017	90	¹ AAIJ	14BR LHCB	<i>pp</i> at 7, 8 TeV	
1 Reported first of tw	vo solution	ns using the full Dal	itz analysis.		
$\Gamma(J/\psi(1S) f_0(980),$	$f_0 \rightarrow \pi$	$^{+}\pi^{-})/\Gamma_{total}$			Г ₇₈ /Г

$(0, \psi(10), 0, 0, 0, 0)$	'U ' '' '')/' total		·/8/·
VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
1.24±0.15 OUR FIT	Error includes scale factor of 2.1.		
$1.16^{+0.31}_{-0.19}{}^{+0.30}_{-0.25}$	¹ LI 11	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
https://pdg.lbl.gov	Page 37	Creat	

 Γ_{75}/Γ_{68}

 Γ_{74}/Γ_{71}

¹ The second error includes both the detector systematic and the uncertainty in the number of produced $Y(5S) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}$ pairs.



assuming $B(\phi(1020) \rightarrow K^+K^-) = (48.9 \pm 0.5) \times 10^{-2}$, which we rescale to our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $^3\,{\rm Measured}$ in Dalitz plot like analysis of ${\it B_S} \rightarrow ~J/\psi\,\pi^+\,\pi^-$ decays.

⁴ABAZOV 12C reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S) \phi)]$ / $[B(\phi(1020) \rightarrow K^+K^-)] = 0.275 \pm 0.041 \pm 0.061$ which we multiply by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁵ AALTONEN 11AB reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)] / [B(\phi(1020) \rightarrow K^+K^-)] = 0.257 \pm 0.020 \pm 0.014$ which we multiply by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁶AAIJ 11 reports $[\Gamma(B_s^0 \rightarrow J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)] / [B(\phi(1020) \rightarrow K^+K^-)] = 0.252^{+0.046}_{-0.032} + 0.027_{-0.033}$ which we multiply by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 $\begin{array}{c} \Gamma(J/\psi(1S) f_0(980), f_0 \rightarrow \pi^+ \pi^-) / \Gamma(J/\psi(1S) \pi^+ \pi^-) & \Gamma_{78}/\Gamma_{75} \\ \hline \\ \underline{VALUE} & \underline{DOCUMENT \ ID} & \underline{TECN} & \underline{COMMENT} \\ 0.61 \begin{array}{c} +0.06 \\ -0.07 \end{array} \text{ OUR FIT} & \text{Error includes scale factor of 2.1.} \end{array}$

0.703±0.015+0.004 ¹ AAIJ 14BR LHCB *pp* at 7, 8 TeV

¹Reported first of two solutions using the full Dalitz analysis.

 $\Gamma(J/\psi(1S)f_2(1270), f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\phi)$ Γ_{79}/Γ_{68} DOCUMENT ID TECN VALUE (units 10^{-4}) COMMENT $10.0^{+3.4}_{-3.7}\pm0.1$ 1,2 ΔΔΙΙ 12A0 LHCB pp at 7 TeV $^1\,{\sf AAIJ}$ 12AO reports (0.098 \pm 0.033 $^{+0.006}_{-0.015}) \times 10^{-2}$ from a measurement of [F(B_s^0 \rightarrow $J/\psi(1S) f_2(1270), f_2 \rightarrow \pi^+\pi^-)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)] / [B(\phi(1020) \rightarrow \kappa^+\kappa^-)]$ assuming B($\phi(1020) \rightarrow K^+K^-$) = (48.9 ± 0.5) × 10⁻², which we rescale to our best value $B(\phi(1020) \rightarrow K^+ K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. ² Measured in Dalitz plot like analysis of $B_s \rightarrow J/\psi \pi^+ \pi^-$ decays for the f_2 helicity state $\lambda = 0.$ $\frac{\Gamma(J/\psi(1S) f_2(1270)_0, f_2 \rightarrow \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)}{\frac{VALUE (\%)}{0.36 \pm 0.07 \pm 0.03}} \frac{DOCUMENT ID}{1 \text{ AAIJ}} \frac{TECN}{14 \text{ BR LHCB}} \frac{COMMENT}{pp \text{ at } 7, 8 \text{ TeV}}$ Γ_{80}/Γ_{75} ¹ Reported first of two solutions using the full Dalitz analysis. $\Gamma(J/\psi(1S)f_2(1270)_{\parallel}, f_2 \to \pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{81}/Γ_{75} DOCUMENT ID TECN COMMENT VALUE (%) $0.52 \pm 0.15 \substack{+0.05 \\ -0.02}$ 1 AAIJ 14BR LHCB pp at 7, 8 TeV

¹Reported first of two solutions using the full Dalitz analysis.

Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D ${\bf 110},$ 030001 (2024) and 2025 update

VALUE (%)	DOCUMENT ID	TECN	COMMENT	
$0.63 \pm 0.34 \substack{+0.16 \\ -0.08}$	¹ AAIJ	14BR LHCB	<i>pp</i> at 7, 8 Te	eV
¹ Reported first of two solu	tions using the full Dali	itz analysis.		
$\Gamma(J/\psi(1S)f_0(1370), f_0 -$	$ \rightarrow \pi^{+}\pi^{-})/\Gamma_{total}$			Г ₈₃ /Г
VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT	
• • • We do not use the follo	owing data for averages	s, fits, limits, e	etc. • • •	
$0.34 \substack{+0.11 + 0.085 \\ -0.14 - 0.054}$	¹ LI	11 BELL	$e^+e^- ightarrow \gamma$	^(5 <i>S</i>)
1 The second error includes of produced $Y(5S) o ~B$	both the detector syster $\binom{(*)}{s} \overline{B}_{s}^{(*)}$ pairs.	matic and the	uncertainty in	the number
$\Gamma(J/\psi(1S)f_0(1370), f_0 -$	$\rightarrow \pi^+\pi^-)/\Gamma(J/\psi(1))$. S)		Г ₈₃ /Г ₆₈
VALUE (units 10 ⁻²)	DOCUMENT ID	TECN	COMMENT	
4.27 ^{+0.55} ±0.05	^{1,2} AAIJ	12A0 LHCB	pp at 7 TeV	
assuming $B(\phi(1020) \rightarrow 1)$	(48.9 ± 0.5)) × 10 , WI	ich we rescale	to our best
value B($\phi(1020) \rightarrow K^+ F$ error and our second error ² Measured in Dalitz plot li	$(X + K^-) = (48.9 \pm 0.5) \times 10^{-1}$ $(X^-) = (49.9 \pm 0.5) \times 10^{-1}$ r is the systematic error ke analysis of $B_s \rightarrow J$	ψ^{-2} . Our first from using o $/\psi \pi^+ \pi^-$ dec	error is their e our best value. cays.	xperiment's
assuming $B(\phi(1020) \rightarrow H)$ value $B(\phi(1020) \rightarrow K^+ H)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - H)$ VALUE	$(\Lambda^+ \Lambda^-) = (48.9 \pm 0.5) \times 10$ $(\Lambda^-) = (49.9 \pm 0.5) \times 10$ r is the systematic error ke analysis of $B_s \rightarrow J$ $(\Lambda^+ \pi^-)/\Gamma(J/\psi(1))$ <u>DOCUMENT ID</u>	$(\psi \pi^+ \pi^-)$ dev $(\psi \pi^+ \pi^-)$ dev $(J) \pi^+ \pi^-)$ $(J) \pi^+ \pi^-)$	error is their e our best value. cays.	xperiment's Γ84/Γ75
assuming $B(\phi(1020) \rightarrow H)$ value $B(\phi(1020) \rightarrow K^+ H)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - V)$ VALUE D.101±0.008+0.011 0.003	$(\Lambda + \Lambda^{-}) = (48.9 \pm 0.5) \times 10$ $(\Lambda^{-}) = (49.9 \pm 0.5) \times 10$ r is the systematic error ke analysis of $B_s \rightarrow J$ $\rightarrow \pi^{+}\pi^{-})/\Gamma(J/\psi(1))$ $\frac{DOCUMENT ID}{1}$ 1 AAIJ	$(y \times 10^{-2})$. Our first r from using o $/\psi \pi^+ \pi^-$ dev $(s)\pi^+\pi^-)$ <u>TECN</u> 14BR LHCB	error is their e our best value. cays. <u>COMMENT</u> pp at 7, 8 Te	xperiment's Γ84/Γ75 eV
assuming $B(\phi(1020) \rightarrow H)$ value $B(\phi(1020) \rightarrow K^+ H)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - V)$ VALUE $D.101 \pm 0.008 \pm 0.011$ $D.101 \pm 0.008 \pm 0.011$ 1 Reported first of two solu	$(x + K^{-}) = (48.9 \pm 0.5) \times 10$ $(x^{-}) = (49.9 \pm 0.5) \times 10$ is the systematic error ke analysis of $B_{s} \rightarrow J^{-}$ $(x + \pi^{-})/\Gamma(J/\psi(1))$ $\int DOCUMENT ID$ 1 AAIJ tions using the full Dali	$(\psi \pi^+ \pi^-)$ der $(\psi \pi^+ \pi^-)$ der $(f) \pi^+ \pi^-)$ $(f) \pi^$	error is their e our best value. cays. <u>COMMENT</u> pp at 7, 8 To	xperiment's Γ84/Γ75 eV
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ value $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - VALUE$ $D.101 \pm 0.008 \pm 0.011$ $D.101 \pm 0.008 $	$(x + x^{-}) = (48.9 \pm 0.5) \times 10$ $(x^{-}) = (49.9 \pm 0.5) \times 10$ is the systematic error ke analysis of $B_s \rightarrow J$ $(x^{+} \pi^{-})/\Gamma(J/\psi(1))$ $(y^{-} \mu \pi^{+} \pi^{-})/\Gamma(J/\psi)$ tions using the full Dali $(y^{-} \mu \pi^{+} \pi^{-})/\Gamma(J/\psi)$ $(y^{-} \mu \pi^{-} \pi^{-})/\Gamma(J/\psi)$	$\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ $\mu \pi^-$ 14BR LHCB $\psi (1S) \pi^+ \pi^-$ $\mu \pi^-$ μECN	error is their e- our best value. cays. <u>COMMENT</u> pp at 7, 8 To <u>COMMENT</u>	×periment's Γ₈₄/Γ₇₅ eV Γ₈₅/Γ₇₅
assuming $B(\phi(1020) \rightarrow K^{+} \mu)$ value $B(\phi(1020) \rightarrow K^{+} \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_{0}(1500), f_{0} - VALUE)$ $D.101 \pm 0.008 \pm 0.011$ $D.101 \pm 0.008 \pm 0.011$ $D.101 \pm 0.008 \pm 0.011$ $\Gamma(J/\psi(1S) f'_{2}(1525)_{0}, f'_{2}(1525)_$	$ (48.9 \pm 0.5) \times 10 $ (C) = $(49.9 \pm 0.5) \times 10 $	$\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ developm	<i>COMMENT</i> <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To	Γ₈₄/Γ₇₅ eV Γ₈₅/Γ₇₅
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ value $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - \mu)$ <u>VALUE</u> 0.101±0.008+0.011 0.101±0.008+0.011 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ <u>VALUE (%)</u> 0.51±0.09+0.05 ¹ Reported first of two solu	$(\mathbf{x} + \mathbf{x}^{-}) = (48.9 \pm 0.5) \times 10$ $(\mathbf{x}^{-}) = (49.9 \pm 0.5) \times 10$ \mathbf{x}^{-} is the systematic error $\mathbf{x}^{+} \pi^{-}) / \Gamma (J/\psi (1))$ $\mathbf{x}^{-} \pi^{+} \pi^{-}) / \Gamma (J/\psi (1))$ \mathbf{x}^{-} $\mathbf{x}^{+} \pi^{-}) / \Gamma (J/\psi (1))$ $\mathbf{x}^{+} \mathbf{x}^{-})$ $\mathbf{x}^{+} \mathbf{x}^{-}$ $\mathbf{x}^{+} \mathbf{x}^{-}) / \Gamma (J/\psi (1))$ $\mathbf{x}^{+} \mathbf{x}^{-})$	(ψ, π^+, π^-) (ψ, π^+) (ψ, π^+)	<i>COMMENT</i> <i>COMMENT</i> <i>COMMENT</i> <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i>	F84/F75 eV F85/F75
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ value $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - VALUE$ 0.101±0.008+0.011 0.101±0.008+0.011 1 Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2$ 0.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\parallel}, f'_2$ <i>VALUE</i> (%)	$ \begin{pmatrix} F & F \\ F & F \end{pmatrix} = (48.9 \pm 0.5) \times 10 $ r is the systematic error ke analysis of $B_s \rightarrow J$ $ \Rightarrow \pi^+\pi^-)/\Gamma(J/\psi(1) - \frac{DOCUMENT \ ID}{1} + AAIJ $ tions using the full Dali $ \begin{pmatrix} 2 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\$	$\psi \pi^+ \pi^-$ development $\psi \pi^+ \pi^-$ $\psi (1S) \pi^+ \pi^-$ $\psi (1S) \pi^+ \pi^-$ $\psi (1S) \pi^+ \pi^-$	<i>COMMENT</i> <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i>	×periment's ×periment's €V F85/F75 eV F86/F75
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ value $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - VALUE)$ 0.101±0.008+0.011 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ 0.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ 0.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ 0.51±0.09+0.05 ¹ Reported first of two solu	$ (48.9 \pm 0.5) \times 10 $ (C) = $(49.9 \pm 0.5) \times 10 $ (C) = $(40.9 \pm 0.5) \times 10 $	(ϕ, π^+, π^-) (ϕ, π^+) $(\phi, $	<i>COMMENT</i> <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To	×periment's ×periment's € √ F85/Γ75 e V F86/Γ75
assuming $B(\phi(1020) \rightarrow K^{+} \mu)$ value $B(\phi(1020) \rightarrow K^{+} \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_{0}(1500), f_{0} - VALUE)$ 0.101±0.008+0.011 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_{2}(1525)_{0}, f'_{2})$ 0.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_{2}(1525)_{\parallel}, f'_{2})$ ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_{2}(1525)_{\parallel}, f'_{2})$ 0.06+0.13±0.01 ¹ Reported first of two solu	$(\mathbf{x} + \mathbf{x}^{-}) = (48.9 \pm 0.5) \times 10^{-1}$ r is the systematic error ke analysis of $B_s \rightarrow J$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi(1))$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi(1))$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi(1))$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi(1))$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi)$ $\mathbf{x} + \pi^{-}$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi)$ $\mathbf{x} + \pi^{-}$ $\mathbf{x} + \pi^{-})/\Gamma(J/\psi)$ $\mathbf{x} + \pi^{-}$ $\mathbf{x} + \pi^{-}$	$\psi \pi^+ \pi^-$ dev from using o $\psi \pi^+ \pi^-$ dev $S \pi^+ \pi^-$) 14 BR LHCB itz analysis. $\psi(1S) \pi^+ \pi^-$ 14 BR LHCB itz analysis. $\psi(1S) \pi^+ \pi^-$ 14 BR LHCB itz analysis. $\psi(1S) \pi^+ \pi^-$ 14 BR LHCB 14 BR LHCB itz analysis.	<i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To	Γ84/Γ75 Γ84/Γ75 eV Γ85/Γ75 eV Γ86/Γ75 eV
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - VALUE$ D.101±0.008+0.011 D.101±0.008+0.011 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ D.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\parallel}, f'_2)$ D.51±0.01 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\parallel}, f'_2)$ D.51±0.01 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\perp}, f'_2)$ D.51±0.01 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\perp}, f'_2)$	$(x + \pi^{-}) = (48.9 \pm 0.5) \times 10$ $(x + \pi^{-}) = (49.9 \pm 0.5) \times 10$ $(x + \pi^{+}\pi^{-})/\Gamma(J/\psi(1))$ $(x + \pi^{+}\pi^{-})/\Gamma(J/\psi(1))$ $(x + \pi^{-})/\Gamma(J/\psi(1))$	$\psi_{\pi} + \pi^{-}$ dev from using of $\psi_{\pi} + \pi^{-}$ dev $\psi_{\pi} + \pi^{-}$ dev $(\psi_{\pi} + \pi^{-})$ $(\psi_{\pi} + \pi^{-})$ $(1S)\pi + \pi^{-}$ $(1S)\pi + \pi^{-}$	<i>COMMENT</i> <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To	×periment's ×periment's € € F 85/F75 e V F 86/F75 e V F86/F75
assuming $B(\phi(1020) \rightarrow K^+ \mu)$ error and our second error ² Measured in Dalitz plot li $\Gamma(J/\psi(1S) f_0(1500), f_0 - \frac{1}{2})$ VALUE 0.101±0.008+0.011 0.101±0.008+0.011 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_0, f'_2)$ VALUE (%) 0.51±0.09+0.05 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\parallel}, f'_2)$ VALUE (%) 0.06+0.13±0.01 ¹ Reported first of two solu $\Gamma(J/\psi(1S) f'_2(1525)_{\parallel}, f'_2)$ $\Gamma(J/\psi(1S) f'_2(1525)_{\perp}, f'_2)$	$ \begin{pmatrix} F & F \\ F$	f = 2. Our first from using of $/\psi \pi^+ \pi^-$ dev f = 1 f = 1 $(\psi \pi^+ \pi^-)$ $(\psi \pi^+)$ $(\psi \pi^+)$	<i>COMMENT</i> <i>pp</i> at 7, 8 To <i>COMMENT</i> <i>pp</i> at 7, 8 To	×periment': ×periment': × × × × × × × × × × × × ×

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Page 40

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Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D 110, 030001 (2024) and 2025 update

$\Gamma(J/\psi(1S) f_0(1790), f_0 \rightarrow$	$\pi^+\pi^-)/\Gamma(J/\psi(2))$	$(S)\pi^+\pi^-)$		Г ₈₈ /Г ₇₅
VALUE	DOCUMENT ID	TECN	COMMENT	
$0.024 \pm 0.004 \substack{+0.050 \\ -0.002}$	¹ AAIJ	14BR LHCB	<i>pp</i> at 7, 8 TeV	/

 $^1\,\mathrm{Reported}$ first of two solutions using the full Dalitz analysis.

VALUE (units 10)	DOCUMENT IE)	TECN	COMMENT	
$1.69^{+1.03}_{-0.33}\pm 0.02$	1,2 AAIJ	12A0	LHCB	pp at 7 TeV	
¹ AAIJ 12AO reports (1 $J/\psi(1S)\pi^+\pi^-$ (nonressuming B($\phi(1020) \rightarrow$ value B($\phi(1020) \rightarrow K^-$ error and our second en 2 Measured in Dalitz plo	$\begin{array}{l} .66 \ \pm \ 0.31 {+0.96 \atop -0.08}) \ \times \ 10 \\ {\rm sonant}) \big) / \Gamma \big(B_s^0 \ \rightarrow \ J/\psi \\ {\cal K}^+ \ {\cal K}^- \big) = (48.9 \ \pm \ 0.5) \\ {+ \ {\cal K}^- } \big) = (49.9 \pm 0.5) \\ {\rm rror} \ {\rm is \ the \ systematic \ err} \\ {\rm t \ like \ analysis \ of \ } B_s \ \rightarrow \end{array}$	0^{-2} fro $\psi(1S)\phi)$ $5) \times 10^{-1}$ 10^{-2} . Comparison of the transformed on transformed on the transformed on the transformed on the transformed on transformed on the transformed on transformed on the transformed on transforme	m a m $] / [B(\phi)]^{-2}$, whi Dur first using o π^{-} dec	easurement of $\phi(1020) \rightarrow K^+$ ich we rescale to error is their expour best value. cays.	$[\Gamma(B^0_s \rightarrow K^-)]$ associate our best periment's
$\Gamma(J/\psi(1S)\overline{K}^{0}\pi^{+}\pi^{-})$	/F _{total}				Γm/Γ
VALUE	<u>CL%DOCUMENT_IL</u>)	TECN	COMMENT	507
$<4.4 \times 10^{-5}$	90 ¹ AAIJ	14L	LHCB	pp at 7 TeV	
1 Measured with B(B_{s}^{0} - values for the involved	$\rightarrow J/\psi K^0_S \pi^+ \pi^-) / E$ branching fractions.	$B(B^0 \rightarrow$	J/ψ K	$S^{0}\pi^{+}\pi^{-}$) using	g PDG 12
$\Gamma(J/\psi(1S)K^+K^-)/\Gamma$	total				Г ₉₁ /Г
VALUE (units 10^{-4})	DOCUMENT IL)	TECN	COMMENT	
7.9 \pm 0.7 OUR AVERAG	GE				
$7.70\!\pm\!0.08\!\pm\!0.72$	¹ AAIJ	13AN	LHCB	pp at 7 TeV	
$101 \pm 00 \pm 21$	² THORNE	13	BELL	$e^+e^- ightarrow \ \Upsilon($	5 <i>S</i>)
10.1 ± 0.9 ± 2.1					
1 Uses f $_{s}$ /f $_{d}$ = 0.256 \pm	0.020 and B($B^+ \rightarrow J_/$	$/\psi K^+$)	= (10.1	$.8 \pm 0.42) \times 10$	<u> </u>
${}^{1}\text{Uses } f_{s}^{}/f_{d}^{} = 0.256 \pm {}^{2}\text{Uses } f_{s}^{} = (17.2 \pm 3.0)$	0.020 and B($B^+ o ~J_{_{I}}$)% as the fraction of $arPoi$	$/\psi { m K}^+)$ (5 ${ m S}$) dec	= (10.1 aying to	$.8 \pm 0.42) \times 10$ o $B_s^{(*)} \overline{B}_s^{(*)}$.	—4 _.
$\frac{1}{2} \text{ Uses } f_s / f_d = 0.256 \pm 2 \text{ Uses } f_s = (17.2 \pm 3.0)$ $\Gamma(J/\psi(1S) K^0 K^- \pi^+ - 5.0)$	0.020 and ${\sf B}(B^+ o J_f)$)% as the fraction of ${\cal T}(F_{ m total})$	/ψ <i>K</i> +) (5 <i>S</i>) dec	= (10.1 aying to	$B \pm 0.42) \times 10$ o $B_{s}^{(*)} \overline{B}_{s}^{(*)}.$	⁻⁴ . Г ₉₂ /Г
${}^{1} \text{ Uses } f_{s}/f_{d} = 0.256 \pm {}^{2} \text{ Uses } f_{s} = (17.2 \pm 3.0)$ $\Gamma(J/\psi(1S) K^{0} K^{-} \pi^{+} - {}^{VALUE} \text{ (units } 10^{-4})$	0.020 and $B(B^+ \rightarrow J_{f})$ % as the fraction of Υ (+ c.c.)/Γ_{total}	/ψ K ⁺) (5 <i>S</i>) dec	= (10.1 caying to <u>TECN</u>	$B \pm 0.42) \times 10$ $B_{s}^{(*)} \overline{B}_{s}^{(*)}.$ $\underline{COMMENT}$	^{_4} . Г92/Г
$\frac{1}{2} \text{ Uses } f_s / f_d = 0.256 \pm \frac{2}{2} \text{ Uses } f_s = (17.2 \pm 3.0)$ $\Gamma(J/\psi(1S) K^0 K^- \pi^+ - \frac{VALUE \text{ (units } 10^{-4})}{9.5 \pm 1.0 \pm 0.8}$	0.020 and $B(B^+ \rightarrow J_{f})$ % as the fraction of Υ (+ c.c.)/Γ_{total} 1 <u>DOCUMENT IE</u> 1 AAIJ	/ψ K ⁺) (5 <i>S</i>) dec <u>)</u> 14L	= (10.1 caying to <u>TECN</u> LHCB	$B \pm 0.42) \times 10$ $D B_{s}^{(*)} \overline{B}_{s}^{(*)}.$ $\frac{COMMENT}{pp \text{ at 7 TeV}}$	⁻⁴ . Г <u>92</u> /Г
¹ Uses $f_s/f_d = 0.256 \pm$ ² Uses $f_s = (17.2 \pm 3.0)$ $\Gamma(J/\psi(1S) K^0 K^- \pi^+ - \frac{VALUE (units 10^{-4})}{9.5 \pm 1.0 \pm 0.8}$ ¹ AAIJ 14L reports [Γ	0.020 and $B(B^+ \rightarrow J_{/})$ % as the fraction of T_{total} + c.c.)/ Γ_{total} $\frac{DOCUMENT IL}{1 \text{ AAIJ}}$ $T(B_c^0 \rightarrow J/\psi(1S) K^0$	$/\psi K^+)$ (5 <i>S</i>) dec $\frac{2}{14L}$	= (10.1 caying to <u>TECN</u> LHCB + c.c	$B \pm 0.42) \times 10$ $D B_{s}^{(*)} \overline{B}_{s}^{(*)}$ $\frac{COMMENT}{pp \text{ at 7 TeV}}$ $D F_{total} \int [$	⁻⁴ . Γ₉₂/Γ Β(<i>B</i> ⁰ →

 $J/\psi(1S) \kappa^0 \pi^+ \pi^-) = (4.5 \pm 0.4) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. This is an observation of $B_s^0 \to J/\psi \kappa_s^0 \kappa^{\pm} \pi^{\mp}$ with more than 10 standard deviations.

$\Gamma(J/\psi(1S)\overline{K}^0K^+K)$	([_])/Γ _{to}	otal				Г ₉₃ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<12 × 10 ⁻⁶	90	¹ AAIJ	14L	LHCB	pp at 7 TeV	
¹ Measured with B(<i>E</i> values for the involv	$S^0_{s} \rightarrow J^{o}_{s}$ J	$1/\psi K^0_S K^+ K^-)/B(E)$	$B_0 \rightarrow$	$J/\psi K$	$S^{0} \pi^{+} \pi^{-}$) using	PDG 12

$\Gamma(J/\psi(1S)f'_2(1525))/\Gamma_{\text{total}}$				Г ₉₅ /Г
VALUE (units 10 ⁻⁴)	DOCUMENT ID	TECN	COMMENT	
$2.61 \pm 0.20 \substack{+0.56 \\ -0.50}$	¹ AAIJ	13AN LHCB	pp at 7 TeV	
1 Uses f $_s/{ m f}_d=$ 0.256 \pm 0.020 ar	nd B($B^+ ightarrow J/v$	$\psi K^+) = (10.2)$	$18\pm0.42) imes10$	⁻⁴ .
$\Gamma(J/\psi(1S)f_2'(1525))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))/\Gamma(J/\psi(1525))))/\Gamma(J/\psi(1525)))/\Gamma(J/\psi(1525))))/\Gamma(J/\psi(1525))))/\Gamma(J/\psi(1525))))/\Gamma(J/\psi(1525)))))/\Gamma(J/\psi(1525)))))))))))))))))))))))))))))))))))$	$(1S)\phi$			Г ₉₅ /Г ₆₈
VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT	
21 \pm 4 OUR AVERAGE	_			
21.5±4.9±2.6	¹ THORNE	13 BELL	$e^+e^- ightarrow \gamma$	(5 <i>S</i>)
$21 \pm 7 \pm 1$ 2	^{,3} ABAZOV	12af D0	<i>р</i> рат 1.96 Те	V
• • • We do not use the following	data for average	s, fits, limits,	etc. • • •	
$27 \pm 4 \pm 1$	⁴ AAIJ	12s LHCB	Repl. by AAIJ	13AN
¹ Uses B($f'_2(1525) \rightarrow K^+ K^-$)	$= (44.4 \pm 1.1)$ %	6.		
² ABAZOV 12AF reports $[\Gamma(B^{0})]$	$D \rightarrow J/\psi(1S)$	$f'_{2}(1525))/\Gamma($	$B_{a}^{0} \rightarrow J/\psi($	$(1S)\phi)] \times$
$B(f'_{2}(1525) \rightarrow K^{+}K^{-}) / B(c)$	$\phi(1020) \rightarrow K^+$	$(K^{-}) = 0.19 +$	0.05 ± 0.04 wi	nich we di-
vide and multiply by our best ye	B(f'(1525))	$\rightarrow \kappa^+ \kappa^-$	$-\frac{1}{2}(88.8 \pm 2)$	$(x) > 10^{-2}$
$P(1/1000) \rightarrow K^+ K^-$	$2^{(1023)}$	-2 o c i	- 2 (00.0 ± 2.2	_) × 10 ,
$B(\phi(1020) \rightarrow K + K) = (49)$	9.9 \pm 0.5) \times 10 le systematic erro	Our first o	error is their ex our best values	periment s
³ ABAZOV 12AF fits the invari	ant masses of t	he K^+K^- p	air in the rang	ze 1.35 <
$M(K^+K^-) < 2 \text{ GeV}.$		- I		,,
⁴ AAIJ 12S reports [(26.4 \pm 2	$.7 \pm 2.4) \times 10^{-1}$	⁻² from a m	neasurement of	$\Gamma(B_{c}^{0} \rightarrow$
$J/\psi(1S)f'_{2}(1525))/\Gamma(B^{0} \rightarrow J)$	$J/\psi(1S)\phi) \propto B($	$f_{a}^{\prime}(1525) \rightarrow$	K^+K^-) / B(d	$(1020) \rightarrow$
K^+K^-) assuming B(f' (1525)	$) \rightarrow K^+ K^-$	× 2×	$) \times 10^{-2} B(d)$	$(1020) \rightarrow$
$K^+ K^-$ = (48.0 ± 0.5) × 10	-2 which we re-	- (11.1 ± 1.1	P(f')	(1525)
$(40.9 \pm 0.5) \times 10^{-1}$			est values B(72	$(1525) \rightarrow$
$K + K = \frac{1}{2}(88.8 \pm 2.2) \times 10^{-10}$	10 $-$, B($\phi(1020)$	$\rightarrow \kappa \cdot \kappa$	$0 = (49.9 \pm 0.5)$) × 10
from using our best values.	ent's error and o	our second err	or is the system	natic error
				- /-
$\Gamma(J/\psi(1S)p\overline{p})/\Gamma_{total}$				Г <u>96</u> /Г

VALUE (units 10^{-6})	CL%	DOCUMENT	ID	TECN	COMMENT	
$3.58 \pm 0.19 \pm 0.39$		¹ AAIJ	19 U	LHCB	<i>pp</i> at 7, 8, 3	13 TeV
\bullet \bullet \bullet We do not use t	he followin	g data for aver	ages, fits,	limits, e	etc. • • •	
<4.8	90	² AAIJ	13z	LHCB	Repl. by AA	IJ 19 ∪
1 Measured relative t	$\circ B_s^0 \rightarrow J$	$\psi/\psi\phi$ assuming	$B(B_s^0 \rightarrow$	$J/\psi \phi$)	$= (10.5 \pm 0.1)$	$.3\pm0.64) imes$
10^{-4} and taking in 2 Uses B($B^0_s o J/y$	nto account $\psi(1S)\pi^+\pi$	t small $K^+ K^-$ ·-) = (1.98 ±	<i>S</i> -wave o 0.20) × 1	contribu 0 ^{—4} .	tion.	
$\Gamma(J/\psi(1S)\gamma)/\Gamma_{tota}$	ıl					Г ₉₇ /Г
VALUE	CL%	DOCUMENT	ID	TECN	COMMENT	

<7.3 × 10 ⁻⁶	90	¹ AAIJ	15BB LHCB	<i>pp</i> at 7, 8 TeV	
1 Branching fractions o	f normaliz	zation modes B_s^0	$\rightarrow J/\psi\gamma X$	taken from PDG 14	. Uses
$f_{s}/f_{d} = 0.259 \pm 0.01$	l5.	5			

$\Gamma(J/\psi \mu^+ \mu^-, J/\psi ightarrow \mu^+ \mu^-)/\Gamma_{ m total}$					Г ₉₈ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
<2.6 × 10 ⁻⁹	95	AAIJ	22Q	LHCB	<i>pp</i> at 7, 8, 13 TeV
https://pdg.lbl.gov		Page 42		Creat	ed: 5/30/2025 07:50

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$\Gamma(J/\psi(1S)\pi^+\pi^-\pi^+\pi^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$				Г ₉₉ /Г ₇₅
VALUE	DOCUMENT I	0	TECN	COMMENT
$0.371 \pm 0.015 \pm 0.022$	¹ AAIJ	14Y	LHCB	<i>pp</i> at 7,8 TeV
		070)		+

¹ Excludes contributions from $\psi(2S)$ and $\chi_{c1}(3872)$ decaying to $J/\psi(1S)\pi^{+}\pi^{-}$.

$\Gamma(J/\psi(1S)f_1(1285))/\Gamma_{\text{total}}$

Г₁₀₀/Г

VALUE (units 10^{-5})	-	DOCUMENT ID		TECN	COMMENT
7.2±1.3±0.4		¹ AAIJ	14Y	LHCB	<i>pp</i> at 7, 8 TeV
1 AAIJ 14Y reports ($7.14 \pm 0.99 + $	$0.83 \pm 0.41) imes 1$	10-5	from a r	neasurement of [$\Gamma(B^0_{s} ightarrow$
$J/\psi(1S) f_1(1285)$	$/\Gamma_{total}] \times [$	$B(f_1(1285) \rightarrow$	$2\pi^+$	$(2\pi^{-})]$:	assuming $B(f_1(1285) \rightarrow$
$2\pi^+ 2\pi^-) = 0.11$	+0.007 -0.006 [,] whicl	h we rescale to o	ur best	t value E	$B(f_1(1285) \rightarrow 2\pi^+ 2\pi^-)$
$=(10.9\pm0.6) imes1$ is the systematic en	10^{-2} . Our fir	rst error is their o g our best value	experir	ment's e	rror and our second error
$\Gamma(J/\psi(1S)\overline{D}^{0})/\Gamma_{\text{total}}$ Γ_{101}/Γ					
$\Gamma(J/\psi(1S)\overline{D}^0)/\Gamma_{tc}$	otal				Г ₁₀₁ /Г
$\Gamma(J/\psi(1S)\overline{D}^0)/\Gamma_{tc}$	otal <u>CL%_</u>	DOCUMENT ID		TECN	Г ₁₀₁ /Г
$\frac{\Gamma(J/\psi(1S)\overline{D}^{0})/\Gamma_{tc}}{\sqrt{2}}$	otal <u>CL%</u> 90	<u>document id</u> AAIJ	24F	<u>TECN</u> LHCB	Γ₁₀₁/Γ <u>COMMENT</u> <i>pp</i> at 7, 8, 13 TeV
$\frac{\Gamma(J/\psi(1S)\overline{D}^{0})/\Gamma_{tc}}{\sqrt{ALUE}}$ $\frac{VALUE}{<1.0 \times 10^{-6}}$ $\Gamma(\psi(2S)\eta)/\Gamma(J/\psi(1S))$	otal <u>CL%</u> 90 (1 <i>S</i>)η)	<u>document id</u> AAIJ	24F	<u>TECN</u> LHCB	Γ ₁₀₁ /Γ <u>COMMENT</u> pp at 7, 8, 13 TeV Γ ₁₀₂ /Γ ₇₁
$\frac{\Gamma(J/\psi(1S)\overline{D}^{0})/\Gamma_{tc}}{\sqrt{2}}$ $\frac{VALUE}{<1.0 \times 10^{-6}}$ $\Gamma(\psi(2S)\eta)/\Gamma(J/\psi)$ $\frac{VALUE}{\sqrt{2}}$	otal <u>^{CL%}</u> 90 (1 <i>S</i>)η)	DOCUMENT ID AAIJ DOCUMENT ID	24F	<u>TECN</u> LHCB <u>TECN</u>	Γ ₁₀₁ /Γ <u>COMMENT</u> <i>pp</i> at 7, 8, 13 TeV Γ ₁₀₂ /Γ ₇₁ <u>COMMENT</u>
$\frac{\Gamma(J/\psi(1S)\overline{D}^{0})/\Gamma_{tc}}{\sqrt{ALUE}}$ $\frac{VALUE}{<1.0 \times 10^{-6}}$ $\frac{\Gamma(\psi(2S)\eta)/\Gamma(J/\psi)}{\sqrt{ALUE}}$ $0.83 \pm 0.14 \pm 0.12$	$\frac{CL\%}{90}$	<u>DOCUMENT ID</u> AAIJ <u>DOCUMENT ID</u> 1 AAIJ	24F 13AA	<u>TECN</u> LHCB <u>TECN</u> LHCB	Γ101/Γ <u>COMMENT</u> <i>pp</i> at 7, 8, 13 TeV Γ102/Γ71 <u>COMMENT</u> <i>pp</i> at 7 TeV

¹Assuming lepton universality for dimuon decay modes of J/ψ and $\psi(2S)$ mesons, the ratio $B(J/\psi \rightarrow \mu^+\mu^-)/B(\psi(2S) \rightarrow \mu^+\mu^-) = B(J/\psi \rightarrow e^+e^-)/B(\psi(2S) \rightarrow e^+e^-) = 7.69 \pm 0.19$ was used.

$\Gamma(\psi(2S)\eta')/\Gamma(J/\psi(1S)\eta')$				Г		
<u>VALUE (units 10^{-2})</u>	DOCUMENT ID		TECN	COMMENT		
38.7±9.0±1.6	¹ AAIJ	15 D	LHCB	<i>pp</i> at 7, 8 Te\	/	
¹ Uses $J/\psi ightarrow \ \mu^+\mu^-$, $\eta' ightarrow \ ho^0 \gamma$, and $\eta' ightarrow \ \eta \ \pi^+ \ \pi^-$ decays.						
$F(1/2C) \pm -) F(1/1/2C)$	•• ⊥ _\			-	- /	

$\Gamma(\psi(2S)\pi^+\pi^-)/\Gamma(J/\psi(1))$		Γ_{104}/Γ_{75}		
VALUE	DOCUMENT ID	TECN	COMMENT	
$0.34 \pm 0.04 \pm 0.03$	¹ AAIJ	13AA LHCB	<i>pp</i> at 7 TeV	

¹Assuming lepton universality for dimuon decay modes of J/ψ and $\psi(2S)$ mesons, the ratio $B(J/\psi \rightarrow \mu^+\mu^-)/B(\psi(2S) \rightarrow \mu^+\mu^-) = B(J/\psi \rightarrow e^+e^-)/B(\psi(2S) \rightarrow e^+e^-) = 7.69 \pm 0.19$ was used.

$\Gamma(\psi(2S)\phi)/\Gamma_{\text{total}}$

$(\varphi(-\varphi)\varphi)/\cdot$ total					• 105/ •
VALUE (units 10^{-4})	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use th	e following	data for averages	s, fits,	limits, e	etc. • • •
seen	1	BUSKULIC	93 G	ALEP	$e^+e^- \rightarrow Z$
$\Gamma(\psi(2S)\phi)/\Gamma(J/\psi($	1 <i>5</i>) <i> </i>				Γ ₁₀₅ /Γ ₆₈
VALUE		DOCUMENT ID		TECN	COMMENT
0.503±0.035 OUR AVE	RAGE				
$0.500 \!\pm\! 0.034 \!\pm\! 0.014$	1	^{,2} AAIJ	12L	LHCB	рраt 7 TeV
$0.53\ \pm 0.10\ \pm 0.09$		ABAZOV	09Y	D0	<i>р</i> рат 1.96 ТеV
https://pdg.lbl.gov		Page 43		Creat	ed: 5/30/2025 07:50

Γ_{105}/Γ

0.52 \pm 0.13 \pm 0.07 ABULENCIA 06N CDF $p\overline{p}$ at 1.96 TeV

- ¹AAIJ 12L reports $0.489 \pm 0.026 \pm 0.021 \pm 0.012$ from a measurement of $[\Gamma(B_s^0 \rightarrow \psi(2S)\phi)/\Gamma(B_s^0 \rightarrow J/\psi(1S)\phi)] \times [B(J/\psi(1S) \rightarrow e^+e^-)] / [B(\psi(2S) \rightarrow e^+e^-)]$ assuming $B(J/\psi(1S) \rightarrow e^+e^-) = (5.94 \pm 0.06) \times 10^{-2}$, $B(\psi(2S) \rightarrow e^+e^-) = (7.72 \pm 0.17) \times 10^{-3}$, which we rescale to our best values $B(J/\psi(1S) \rightarrow e^+e^-) = (5.971 \pm 0.032) \times 10^{-2}$, $B(\psi(2S) \rightarrow e^+e^-) = (7.94 \pm 0.22) \times 10^{-3}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.
- ²Assumes $B(J/\psi \to \mu^+ \mu^-) / B(\psi(2S) \to \mu^+ \mu^-) = B(J/\psi \to e^+ e^-) / B(\psi(2S) \to e^+ e^-) = 7.69 \pm 0.19.$

$\Gamma(\psi(2S)K^0)/\Gamma_{\text{total}}$

10	6/I
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VALUE (units 10 ⁻⁵)	DOCUMENT ID	TECN	COMMENT
$1.9 {\pm} 0.5 {\pm} 0.2$	¹ TUMASYAN 22	2AI CMS	<i>pp</i> at 13 TeV
¹ TUMASYAN 22AI reports	$ = [\Gamma(B_s^0 \rightarrow \psi(2S) \kappa^0))/$	Γ _{total}] / [$B(B^0 \to \psi(2S) K^0)] =$
$(3.33 \pm 0.69 \pm 0.11 \pm 0$.34) \times 10 ⁻² which we r	nultiply by	our best value ${\sf B}(B^0$ \rightarrow
$\psi(2S) K^0) = (5.8 \pm 0.5)$	$ imes 10^{-4}$. Our first error	r is their e>	periment's error and our
second error is the system	atic error from using our	best value.	

Г(ψ (25) <i>K</i> -	π^+)/[tota
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Γ₁₀₇/Γ

Γ₁₀₈/Γ

VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT
3.12±0.30±0.21	¹ AAIJ	15 U	LHCB	<i>pp</i> at 7, 8 TeV
1 AAIJ 15 \cup reports [Г($B^0_{m{s}} ightarrow$	$\psi(2S) K^{-} \pi^{+})/\Gamma_{1}$	_{total}]	/ [B(<i>B</i>	$\psi(2S) \kappa^+ \pi^-)] =$
$(5.38\pm0.36\pm0.22\pm0.31)$	$1 imes 10^{-2}$ which we	e mult	tiply by	our best value ${\sf B}(B^0 \rightarrow$
$\psi(2S) {\cal K}^+ \pi^-) = (5.8 \pm 0.4)$ second error is the systematic	$ imes 10^{-4}$. Our first error from using o	error i ur bes	s their e t value.	xperiment's error and our

$\Gamma(\psi(2S)\overline{K}^*(892)^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	 DOCUMENT ID		TECN	COMMENT
$3.3\pm0.5^{+0.2}_{-0.3}$	¹ AAIJ	150	LHCB	<i>pp</i> at 7, 8 TeV
1	 $(a, a) = \frac{1}{a} (a, a, b)$	_		-0

¹AAIJ 15U reports $[\Gamma(B_s^0 \rightarrow \psi(2S)\overline{K}^*(892)^0)/\Gamma_{total}] / [B(B^0 \rightarrow \psi(2S)K^*(892)^0)] = (5.58 \pm 0.57 \pm 0.40 \pm 0.32) \times 10^{-2}$ which we multiply by our best value $B(B^0 \rightarrow \psi(2S)K^*(892)^0) = (5.9 \pm 0.4) \times 10^{-4}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(\chi_{c1}\phi)/\Gamma(J/\psi(1S)\phi)$

Γ_{109}/Γ_{68}

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
$18.9 \pm 1.8 \pm 1.5$	¹ AAIJ	13AC LHCB	<i>pp</i> at 7 TeV
¹ Uses B($\chi_{c1} \rightarrow J/\psi\gamma$)	$=$ (34.4 \pm 1.5)%.		
$\Gamma(\chi_{c2}K^+K^-)/\Gamma(\chi_{c1}K^+K^-)$	K ⁺ K ⁻)		Γ ₁₁₁ /Γ ₁₁₀

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
17.1±3.1±1.0	¹ AAIJ	18AC LHCB	pp at 7, 8, 13 TeV
1			

¹ Measures the ratio for ± 15 MeV window around ϕ mass.

$\Gamma(\chi_{c1}(3872)\phi)/\Gamma(\psi(2S)\phi)$				$\Gamma_{112}/\Gamma_{105}$
VALUE	DOCUMENT ID	TECN	COMMENT	
0.19 ± 0.06 OUR AVERAGE	_			
$0.19\!\pm\!0.02\!\pm\!0.06$	¹ AAIJ	21C LHCE	8 <i>pp</i> at 7, 8	, 13 TeV
$0.18\!\pm\!0.03\!\pm\!0.06$	² SIRUNYAN	20BB CMS	<i>pp</i> at 13 7	ГеV
1 AAIJ 21C reports [Г($B^0_s ightarrow$	$\chi_{c1}(3872)\phi)/\Gamma(d$	$B_s^0 \rightarrow \psi(2)$	$(\mathbf{S})\phi$] × [B($\chi_{c1}(3872) \rightarrow$
$\pi^{+}\pi^{-}J/\psi(1S))] / [B(\psi(2S))]$	$\rightarrow J/\psi(1S)\pi^+$	π^{-})] = (2.4	$2\pm$ 0.23 \pm	$(0.07) \times 10^{-2}$
which we multiply or divide b	y our best values	$B(\chi_{c1}(3872$	2) $\rightarrow \pi^+\pi^-$	$J/\psi(1S) =$
$(4.3 \pm 1.4) \times 10^{-2}$, B($\psi(2S)$ error is their experiment's erro	$ ightarrow J/\psi(1S)\pi^+\pi$ r and our second	⁻) = (34.69 error is the s	$0\pm$ 0.34) $ imes$ 10 systematic err	0 ⁻² . Our first for from using
² SIRUNYAN 20BB reports [$\Gamma(B_s^0 \rightarrow \chi_c)$	_L (3872) <i>ф</i>)/Г	$(B_s^0 \rightarrow$	$\psi(2S)\phi)] \times$
$[B(\chi_{c1}(3872) \rightarrow \pi^+\pi^- J/\pi)]$	$\psi(1S))]$ / [B($\psi(2$	$(2S) \rightarrow J/\psi$	$\psi(1S) \pi^+ \pi^-)$)] = (2.21 \pm
$0.29 \pm 0.17) imes 10^{-2}$ which w	e multiply or divi	de by our be	est values B($\chi_{c1}(3872) \rightarrow$
$\pi^+\pi^- J/\psi(1S)) = (4.3 \pm 1.)$	4) × 10 ⁻² , B(ψ ($2S) \rightarrow J/v$	$\psi(1S) \pi^{+} \pi^{-1}$	$) = (34.69 \pm$
$(0.34) \times 10^{-2}$. Our first error	r is their experim	ent's error a	nd our secon	d error is the
systematic error from using ou	r best values.			
$\Gamma(\chi_{c1}(3872)\pi^{+}\pi^{-})/\Gamma(\psi(25))$	$(5)\pi^+\pi^-)$			$\Gamma_{114}/\Gamma_{104}$
VALUE	DOCUMENT ID	TECN	COMMENT	
$0.54 \pm 0.09 \pm 0.17$	¹ AAIJ	23AP LHCE	3 <i>pp</i> at 7, 8	, 13 TeV
1 ALL 22AD was set Γ (D)	(2070)	+ $-)$		(1 + -)

¹AAIJ 23AP reports $[\Gamma(B_s^0 \rightarrow \chi_{c1}(3872)\pi^+\pi^-)/\Gamma(B_s^0 \rightarrow \psi(2S)\pi^+\pi^-)] \times [B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S))] / [B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-)] = (6.8 \pm 1.1 \pm 0.2) \times 10^{-2}$ which we multiply or divide by our best values $B(\chi_{c1}(3872) \rightarrow \pi^+\pi^-J/\psi(1S)) = (4.3 \pm 1.4) \times 10^{-2}$, $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (34.69 \pm 0.34) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

$\frac{\Gamma(J/\psi K^*(892)^0 \overline{K}^*(892)^0)}{\Gamma(\psi(2S)\phi)}$

 Γ_{94}/Γ_{105}

VALUE	DOCUMENT ID	TECN	COMMENT
0.209±0.006±0.003	¹ AAIJ 2	21c LHCB	<i>pp</i> at 7, 8, 13 TeV
1 AAIJ 21C reports $\Gamma(B^0_{m{s}} o$	$J/\psi K^*(892)^0 \overline{K}^*(892)^0 \overline{K}^*(892)^0$	$(2)^0)/\Gamma(B_s^0)$	$\rightarrow \psi(2S)\phi) \ B^2(\kappa^{*0} \rightarrow$
$K^+\pi^-)/B(\psi(2S) \rightarrow J/\psi)$ we adjust with PDG 20 v	$\psi \pi^+ \pi^-) / B(\phi \to \kappa^-)$ alues of $B(\kappa^{*0} \to \kappa^-)$	$(+ K^{-}) = 1$ $(+ \pi^{-}) = (9)$	$.22 \pm 0.03 \pm 0.04$ which $.09.902 \pm 0.009) \times 10^{-2}$,
$B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-)$ 0.5) × 10 ⁻² . The first unit to the adjustment branching	$=$ (34.68 \pm 0.30) \times 10 ⁻ certainty is the total ex ng fractions.	⁻² , and B(q periment's c	$b \rightarrow K^+ K^-) = (49.2 \pm 0.2)$ one and the second is due

Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D ${\bf 110},$ 030001 (2024) and 2025 update

$\Gamma(\pi^+\pi^-)/\Gamma_{total}$					Г ₁₁₅ /
VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT
7.2±1.0 OUR	AVERAGE				
$7.5\!\pm\!0.9\!\pm\!0.7$			17G	LHCB	pp at 7 and 8 TeV
$6.5 \pm 1.8 \pm 0.6$		² AALTONEN	12L	CDF	<i>р</i> рат 1.96 ТеV
• • • We do not use	the followi	ng data for avera	ges, fit	s, limits	, etc. ● ● ●
$10.9^{+2.6}_{-2.2}{\pm}1.1$		³ AAIJ	12ar	LHCB	Repl. by AAIJ 17G
< 120	90	⁴ PENG	10	BELL	$e^+e^- ightarrow ~\Upsilon(5S)$
< 12	90	⁵ AALTONEN	09C	CDF	Repl. by AALTONEN 12
< 17	90	^o ABULENCIA, ^A	4 06D		Repl. by AALTONEN 09 $a^{\pm}a^{-}$ 7
<2320	90		000		$e^+e^- \rightarrow Z$
<1700	90 r= (= 0		900		$e^{+}e^{-} \rightarrow Z$
⁺ AAIJ 17G reports	$[\Gamma(B^0_s \rightarrow$	$\pi^+\pi^-)/\Gamma_{total}$	/ [B()	$B_0 \rightarrow$	$K^{+}\pi^{-})] \times [\Gamma(b \rightarrow B_{s}^{0})]$
$\Gamma(\overline{b} \rightarrow B^0)] = ($	(9.15 ± 0.7)	$(1 \pm 0.83) \times 10^{-1}$	³ whic	h we m	ultiply or divide by our be
values B(B^0 $ ightarrow$	$K^+\pi^-)$	$=$ (2.00 \pm 0.04)	\times 10 ⁻	⁻⁵ , Г(Б	$\rightarrow B_{s}^{0})/\Gamma(\overline{b} \rightarrow B^{0}) =$
$0.246 \pm 0.023.$	Our first er	ror is their exper	iment'	s error a	and our second error is th
systematic error f	rom using o	our best values.	-		-0 u^{\pm} $-v_{1}$ r_{-}/T
AALTONEN 12L	reports [I ($B_{s}^{0} \rightarrow \pi^{+}\pi^{-})/$	total] / [B(<i>E</i>	$B^{o} \rightarrow K^{+}\pi^{-})] \times [I(b - f)] \times [I(b $
$B_s^0)/\Gamma(b \to B^0)$	$] = 0.008 \pm$	$\pm 0.002 \pm 0.001$ wh	ich we	multiply	or divide by our best value
$B(B^0 \to K^+ \pi^-)$) = (2.00 ±	\pm 0.04) $ imes$ 10 $^{-5}$, Γ	$(\overline{b} \rightarrow$	$B_{s}^{0})/\Gamma($	$\overline{b} ightarrow B^{0} = 0.246 \pm 0.023$
Our first error is	their expen	riment's error and	l our s	second e	error is the systematic error
from using our be	est values.	_+) / r	1 / [D/	ر DO	$-+$ $$)1 \times (r (\overline{L}) $P(0)$
- AAIJ 12AR report	$s [I (D_s^* \rightarrow +0.0)]$	$\pi'\pi$ // total] / [Þ($D^{-} \rightarrow$	$\pi^{+}\pi^{-})] \times [I(D \to D_{S}^{*})]$
$\Gamma(b \rightarrow B^{0})] = 0$	0.050 - 0.00	$\frac{1}{09} \pm 0.004$ which	n we m	ultiply o	or divide by our best value
$B(B^0 \to \pi^+\pi^-)$	$) = (5.37 \pm$	= 0.20) × 10 ^{−6} , Г	$(\overline{b} \rightarrow$	$B_s^0)/\Gamma($	$\overline{b} ightarrow B^{0} = 0.246 \pm 0.023$
Our first error is	their expen	riment's error and	l our s	econd e	error is the systematic error
from using our be	est values.				(*) <u>-</u> (*), (**********************************
- Uses $T(10860) -$	$\rightarrow B_s^* B_s^* a$	and assumes $B(T)$	(10860	$) \rightarrow B$	$(s' B_s'') = (19.3 \pm 2.9)$
and $\Gamma(arTau(10860)$	$\rightarrow B_{s}^{*}\overline{B}_{s}^{*}$) / $\Gamma(\Upsilon(10860)$ –	$\rightarrow B_{s}^{(*)}$	$B_{s}^{(*)}$	$= (90.1^{+3.8}_{-4.0})\%.$
⁵ Obtains this resu	It from (f	$(f_d) \cdot B(B_c \rightarrow$	$\pi^+\pi^-$	⁻)/B(<i>B</i>	$R^0 \rightarrow K^+ \pi^-) = 0.007$
0.004 ± 0.005 . a	ssuming f	$f_{d} = 0.276 \pm 0$	0.034 a	and B(E	$K^{0} \rightarrow K^{+} \pi^{-}) = (19.4 \pm$
$0.6) \times 10^{-6}$.	8 g				
⁶ ABULENCIA,A 0	6D obtains	this from $B(B_c -$	$\rightarrow \pi^+$	$\pi^{-}) /$	$B(B_c \to K^+ K^-) < 0.0$
at 90% CL. assun	ning B(<i>B</i> _	$\rightarrow K^+ K^-) = ($	33 + 6	$5 + 7) \times$	(10^{-6})
⁷ ABE 00C assume	es B(Z \rightarrow	$(b\overline{b}) = (21.7 +)$	0.1)%	and th	B fractions $f_{=0} = f_{=1}$
(20.7 + 1.8)%	f = (-10)	(-1.0) (-1.0)			$B_0 B_+$
$(39.7 - 2.2)^{70}$ and	$^{1}B_{s}^{=(10.1)}$	$^{5}-2.2^{70.}$			0
° BUSKULIC 96V a	ssumes PD	G 96 production	fractio	ns for <i>B</i>	B^{o}, B^{+}, B_{s}, b baryons.
$\Gamma(\pi^0 \pi^0) / \Gamma_{}$					Г116/
	CI %	DOCUMENT I	D	TECN	• 110/
<u>~7 7 × 10-6</u>	00	1 PODALI	<u>v</u> 22		2 + 2 = 2
	90 the followi	- DURAN	∠J mes fit	DELL s limits	$e^+e^- \rightarrow I(55)$
$\sim \sim $			ges, m		+ $ -$
$<2.1 \times 10^{-4}$	90	- ACCIARRI	95	H L3	$e \cdot e \rightarrow Z$
¹ BORAH 23 assun	nes $f_{B_s} = 2$	$20.1 \pm 3.1\%$.			
² ACCIARRI 95H as	ssumes f_{R^0}	$=$ 39.5 \pm 4.0 an	d f _{Ba}	= 12.0	± 3.0%.
	D		5		

Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D 110, 030001 (2024) and 2025 update

$\Gamma(\eta \pi^0) / \Gamma_{total}$						Г ₁₁₇ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<1.0 × 10 ⁻³	90	¹ ACCIARRI	95H	L3	$e^+ e^- \rightarrow ~Z$	
¹ ACCIARRI 95н assu	mes f _{B0} =	= 39.5 \pm 4.0 and 3	$f_{B_s} =$	12.0 \pm	3.0%.	
$\Gamma(\eta\eta)/\Gamma_{total}$						Г ₁₁₈ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<1.43 × 10 ⁻⁴	90	BHUYAN	22	BELL	$e^+e^- \rightarrow \gamma$	(5 <i>S</i>)
• • • we do not use the 10^{-3}		1 A COLARDO	s, fits,	limits, e		
$<1.5 \times 10^{-5}$	90	* ACCIARRI	95H	L3	$e^+e^- \rightarrow Z$	
¹ ACCIARRI 95H assu	mes $f_{B^0} =$	= 39.5 \pm 4.0 and \pm	$f_{B_s} =$	12.0 \pm	3.0%.	
$\Gamma(ho^0 ho^0)/\Gamma_{ m total}$						Г ₁₁₉ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<3.20 × 10 ⁻⁴	90	¹ ABE	00C	SLD	$e^+ e^- \rightarrow ~Z$	
$^1 ABE$ 00C assumes	$B(Z \rightarrow$	$(b \overline{b}) = (21.7 \pm 0.1)$	1)% a	nd the	B fractions f	$_{R0} = f_{R^+} =$
$(39.7^{+1.8}_{-2.2})\%$ and f	$B_{s} = (10.5)$	$^{+1.8}_{-2.2})\%$.			1	
$\Gamma(n' K^0) / \Gamma$	5					Г100/Г
	CI %	DOCUMENT ID		TECN	COMMENT	· 120/ ·
<8.16 × 10 ⁻⁶	90	¹ PANG	22	BFII	$e^+e^- \rightarrow \gamma$	(5.5)
1 Uses $\Upsilon(10860) ightarrow E$ 3.1)%.	$B_s^{(*)}\overline{B}_s^{(*)}$	decays and assume	s Β(Υ	(10860)	$\rightarrow B_{s}^{(*)}\overline{B}_{s}^{(*)})$	= (20.1±
$\Gamma(\eta'\eta)/\Gamma_{total}$						Г ₁₂₁ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<6.5 × 10 ⁻⁵	90	¹ NISAR	21	BELL	$e^+e^- ightarrow \gamma$	(5 <i>S</i>)
1 Uses γ (10860) $ ightarrow$	$B_s^* \overline{B}_s^*$ dec	ays and assumes	B(<i>Υ</i> (1	- (0860)	$\rightarrow B_{s}^{(*)}\overline{B}_{s}^{(*)})$	= (20.1 \pm
$\Gamma(\eta'\eta')/\Gamma_{total}$						Г ₁₂₂ /Г
VALUE (units 10^{-5})		DOCUMENT ID		TECN	COMMENT	
$3.3 \pm 0.7 \pm 0.1$		¹ AAIJ	150	LHCB	<i>pp</i> at 7, 8 Te	V
1 AAIJ 150 reports [F	$(B_s^0 \rightarrow \eta$	$(\eta')/\Gamma_{\text{total}}] / [B($	B+ -	$\rightarrow \eta' K^-$	$^{+})] = 0.47 \pm 0.01$	09 ± 0.04
which we multiply b first error is their ex using our best value	y our best (periment's	value $B(B^+ \rightarrow s error and our se$	$\eta' K^+$ cond o	(7.2) = (7.2)	04 \pm 0.25) $ imes$ 1 the systematic	0 ^{—5} . Our error from
${\sf F}ig(\eta'\phiig)/{\sf F}_{\sf total}$						Г ₁₂₃ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
<0.82 × 10 ⁻⁰	90	¹ AAIJ	17ва	LHCB	<i>pp</i> at 7, 8 Te	V
¹ Corresponds to the	95% CL	upper limit 1.01 >	< 10 ⁻¹	⁶ . Uses	the normaliza	tion mode

 $B^+ \rightarrow \eta' K^+$ with branching fraction (70.6 ± 2.5) × 10⁻⁶ and the ratio of hadronisation fractions $f_s/f_d = 0.259 \pm 0.015$, which is assumed equal to f_s/f_u .

Citation: S. Navas et al. (Particle Data Group), Phys. Rev. D ${\bf 110},$ 030001 (2024) and 2025 update

$\Gamma(\eta' X_{s\overline{s}})/\Gamma_{total}$						Г ₆₆ /Г
VALUE (units 10^{-3})	<u>CL%</u>	DOCUMENT ID)	TECN	COMMENT	
<1.4	90	¹ DUBEY	21	BELL	$e^+e^- ightarrow~\Upsilon(4)$	4 <i>S</i>)
¹ DUBEY 21 result is	for m($X_{\overline{s}\overline{s}}$	$) < 2.85 ~{ m GeV/c}$	2.			
$\Gamma(\phi f_0(980), f_0(980))$	$\rightarrow \pi^+\pi^-$	⁻)/Γ _{total}				Г ₁₂₄ /Г
VALUE (units 10^{-6})		DOCUMENT ID)	TECN	COMMENT	
$1.12 {\pm} 0.16 {\pm} 0.14$		¹ AAIJ	17A	LHCB	<i>pp</i> at 7, 8 TeV	,
1 Signal is observed w	ith 8 stand	ard deviations s	ignifica	nce.		
$\Gamma(\phi f_2(1270), f_2(127))$	0) $\rightarrow \pi^+$	$\pi^{-})/\Gamma_{total}$				Γ ₁₂₅ /Γ
VALUE (units 10^{-6})		DOCUMENT ID)	TECN	COMMENT	
$0.61{\pm}0.13{+0.13\atop-0.08}$		1 AAIJ	17A	LHCB	<i>pp</i> at 7, 8 TeV	,
1 Signal is observed w	ith 5 stand	ard deviations s	ignifica	nce.		
$\Gamma(\phi \rho^0) / \Gamma_{\text{total}}$						Г ₁₂₆ /Г
VALUE (units 10^{-7})	CL%	DOCUMENT ID)	TECN	COMMENT	
$2.7 \pm 0.7 \pm 0.3$		¹ AAIJ	17A	LHCB	<i>рр</i> at 7, 8 ТеV	,
• • • We do not use the	e following	data for averag	es, fits,	limits, e	etc. • • •	
<6170	90	² ABE	00 C	SLD	$e^+e^- \rightarrow Z$	
¹ Signal evidence is 4 ² ABE 00C assumes	standard d $B(Z \rightarrow $	eviations. $b \overline{b} = (21.7 \pm 0.00)$).1)% a	and the	B fractions f_B	$_{0}=f_{B^{+}}=$
(39.7 ^{+1.6})% and f _l	$_{3_s} = (10.5^+)$	(2.2)%				
$\Gamma ig(\phi \pi^+ \pi^- ig) / \Gamma_{ ext{total}}$						Г ₁₂₇ /Г
VALUE (units 10^{-6})		DOCUMENT ID)	TECN	COMMENT	
3.48±0.23±0.39			17A	LHCB	<i>pp</i> at 7, 8 TeV	,
¹ Inclusive decays in m	ass range	$400 < m(\pi^+ \pi^-)$	$^{-}) < 10$	600 Me\	//c ² .	
$\Gamma(\phi\phi)/\Gamma_{ m total}$						Г ₁₂₈ /Г
VALUE (units 10^{-6}) CL	<u>%</u>	OCUMENT ID	TE	<u>CN CO</u>	MMENT	
18.4±1.4 OUR FIT	• 1.			6 5		
18.5±1.4±1.0	⁺ A e following	AIJ I.	5AS LH es fits	CB pp	etc • • •	
14 + 6 + 6	2 A					
$^{14} -5 \pm 0$	A 3 A			л ке D «+		
				ບ ອ່ ທະ*(໑ດຉ)	$e \rightarrow 2$	0E ⊥ 0 12
* AAIJ 15AS reports [I $(B_s^{\circ} \rightarrow \phi \phi)/\Gamma_{\text{total}}$] / [B $(B^{\circ} \rightarrow K^*(892)^{\circ} \phi)$] = 1.84±0.05±0.13 which we multiply by our best value B $(B^0 \rightarrow K^*(892)^0 \phi)$ = (1.00 ± 0.05) × 10 ⁻⁵ . Our first error is their experiment's error and our second error is the systematic error from using our best value						
² Uses B($B^{0} \rightarrow J/\psi$	$\phi) = (1.3)$	$8 \pm 0.49) \times 10^{-1}$	$^{-3}$ and	product	tion cross-sectio	n ratio of
$\sigma(B_{S})/\sigma(B^{\circ}) = 0.2$	$o \pm 0.04.$	(217 ± 0)	11)0/ -	and the	B fractions f	
$(39.7^{+1.8}_{-2.2})\%$ and f_{l}	$B_{lz} \rightarrow B_{s} = (10.5^+)$	$(1.8) = (21.7 \pm 0)$ (2.2) %.	,.⊥j/0 c	anu the	B fractions B	0-'B+-
https://pdg.lbl.gov		Page 48		Creat	ed: 5/30/202	5 07:50

$\Gamma(\phi\phi)/\Gamma(J/\psi(15))$	(ϕ)				Г ₁₂₈ /Г ₆₈		
VALUE (units 10^{-2})		DOCUMENT ID	TECN	COMMENT			
1.79±0.14 OUR FIT 1.78±0.14±0.20	F	AALTONEN	11AN CDF	<i>р</i> рат 1.96 Те	٧		
$\Gamma(\phi\phi\phi)/\Gamma(\phi\phi)$		DOCUMENT ID	TECN		129/Γ ₁₂₈		
$0.117 \pm 0.030 \pm 0.015$	5	AAIJ	17BB LHCE	<i>pp</i> at 7, 8 Te	V		
		, , , , , , ,		<i>pp</i> at 1, 6 16	•		
$\Gamma(\pi^+ K^-)/\Gamma_{\text{total}}$					Г ₁₃₀ /Г		
VALUE (units 10^{-6})	CL%	DOCUMENT ID	TECN	COMMENT			
5.9±0.7 OUR A	WERAGE	1					
$6.0 \pm 0.7 \pm 0.6$			12AR LHCB	<i>pp</i> at 7 TeV			
$5.8 \pm 1.0 \pm 0.5$		² AALTONEN	09C CDF	p p at 1.96 TeV			
• • • We do not use	e the follow	ving data for average	es, fits, limits,	etc. • • •			
< 26	90	³ PENG	10 BELL	$e^+e^- \rightarrow \Upsilon(5.$	<i>S</i>)		
< 5.6	90	⁴ ABULENCIA,A	06D CDF	Repl. by AALTO	ONEN 09C		
<261	90	⁵ ABE	00c SLD	$e^+e^- \rightarrow Z$			
<210	90	⁶ BUSKULIC	96∨ ALEP	$e^+e^- \rightarrow Z$			
<260	90	⁷ AKERS	94L OPAL	$e^+e^- \rightarrow Z$			
1 AAIJ 12AR repor	ts [Γ(<i>B</i> ⁰ _s –	$\rightarrow \pi^+ K^-) / \Gamma_{\text{total}}$	/ [B($B^0 \rightarrow $	$(K^+ \pi^-)] \times [\Gamma(\overline{k})]$	$\overline{b} \rightarrow B_{s}^{0})/$		
$\Gamma(b \to B^0) = 0.074 \pm 0.006 \pm 0.006 \text{ which we multiply or divide by our best values}$ $B(B^0 \to K^+ \pi^-) = (2.00 \pm 0.04) \times 10^{-5}, \ \Gamma(\overline{b} \to B_s^0) / \Gamma(\overline{b} \to B^0) = 0.246 \pm 0.023.$ Our first error is their experiment's error and our second error is the systematic error from using our best values. ${}^2AALTONEN \ 09C \ reports \ [\Gamma(B_s^0 \to \pi^+ K^-) / \Gamma_{total}] / \ [B(B^0 \to K^+ \pi^-)] \times \ [B(\overline{b} \to B_s^0)] / \ [B(\overline{b} \to B^0)] = 0.071 \pm 0.010 \pm 0.007 \text{ which we multiply or divide by our best values}$ $B(B^0 \to K^+ \pi^-) = (2.00 \pm 0.04) \times 10^{-5}, \ B(\overline{b} \to B_s^0) = (10.0 \pm 0.8) \times 10^{-2}, \ B(\overline{b} \to B^0) = (40.8 \pm 0.7) \times 10^{-2}.$ Our first error is their experiment's error and our second error is the systematic error from using our best values.							
and $\Gamma(\Upsilon(10860))$	$\rightarrow R^* \overline{R}^*$	() / $\Gamma(\Upsilon(10860) \rightarrow$	$B^{(*)}\overline{B}^{(*)}$	-(001+3.8)%			
⁴ ABULENCIA,A (< 0.08 at 90% C 0.7) × 10 ⁻⁶ . ⁵ ABE 00C assum (39.7 $^{+1.8}_{-2.2}$)% an	D6D obtains CL, assumining $B(Z - f_{B_s} = (10)$	s this from (f_s/f_d) ($\log f_s/f_d = 0.260 \pm b\overline{b} = (21.7 \pm 0.5 \pm 1.8)\%$.	$B_s \rightarrow \pi^+$ 0.039 and B(I	$ \begin{array}{c} (90.1 - 4.0)^{-0.0} \\ K^{-}) / B(B^{0} \rightarrow \\ B^{0} \rightarrow K^{+} \pi^{-}) \\ e B \text{ fractions } f \end{array} $	$\kappa^+ \pi^-))$ = (18.9 ± $B_{B0} = f_{B^+} =$		
⁶ BUSKULIC 96v	assumes P	DG 96 production fi	ractions for $B^{(}$	⁰ , B ⁺ , B _s , b ba	ryons.		
7 Assumes B(Z $ ightarrow$	$(b \overline{b}) = 0.$.217 and B^0_d (B^0_s) f	raction 39.5%	(12%).			
$\Gamma(K^+K^-)/\Gamma_{\text{total}}$	l				Г ₁₃₁ /Г		
VALUE (units 10^{-6})	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT			
$27.2 \pm 2.3 \text{ OUR}$	AVERAGE	1	10 11105	/			
		÷ /////		nn at (1a)/			

$25.7 \pm 1.7 \pm 2.5$	¹ AAIJ	12AR LHCB	pp at 7 TeV
$28.3\pm~2.4{\pm}2.7$	² AALTONEN	11N CDF	p p at 1.96 TeV
$38 \begin{array}{c} +10\\ -9 \end{array} \pm 7$	³ PENG	10 BELL	$e^+e^- \rightarrow \Upsilon(5S)$
https://pdg.lbl.gov	Page 49	Cre	eated: 5/30/2025 07:50

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

<310			90	DRUTSKOY	07A	BELL	$e^+e^- ightarrow~argamma(5S)$
33	\pm 6	± 7		⁴ ABULENCIA,	A 06D	CDF	Repl. by AALTONEN 11N
<283			90	⁵ ABE	00C	SLD	$e^+e^- \rightarrow Z$
< 59			90	⁶ BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$
<140			90	⁷ AKERS	94L	OPAL	$e^+e^- \rightarrow Z$
			-			_	-

¹AAIJ 12AR reports $[\Gamma(B_s^0 \rightarrow \kappa^+ \kappa^-)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow \kappa^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}] / [B(B^0 \rightarrow K^+ \pi^-)] \times [\Gamma(\overline{b} \rightarrow B_s^0)/\Gamma_{total}]$ $\Gamma(\overline{b} \rightarrow B^0)] = 0.316 \pm 0.009 \pm 0.019$ which we multiply or divide by our best values $B(B^0 \rightarrow K^+ \pi^-) = (2.00 \pm 0.04) \times 10^{-5}$, $\Gamma(\overline{b} \rightarrow B^0_s) / \Gamma(\overline{b} \rightarrow B^0) = 0.246 \pm 0.023$. Our first error is their experiment's error and our second error is the systematic error from using our best values.

²AALTONEN 11N reports (f_s/f_d) (B $(B_s^0 \rightarrow K^+K^-)$ / B $(B^0 \rightarrow K^+\pi^-)$) = 0.347 ± 0.020 \pm 0.021. We multiply this result by our best value of B($B^0 \rightarrow \ {\cal K}^+ \, \pi^-) =$ (2.00 \pm $(0.04) \times 10^{-5}$ and divide by our best value of f_s/f_d , where $1/2 f_s/f_d = 0.1230 \pm 0.0115$. Our first quoted uncertainty is the combined experiment's uncertainty and our second is the systematic uncertainty from using out best values.

³Uses
$$\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$$
 and assumes $\mathsf{B}(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$
and $\Gamma(\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*) / \Gamma(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (90.1 \substack{+3.8 \\ -4.0})\%.$

⁴ ABULENCIA, A 06D obtains this from (f_s/f_d) (B($B_s \to K^+ K^-$) / B($B^0 \to K^+ \pi^-$)) = 0.46 ± 0.08 ± 0.07, assuming f_s/f_d = 0.260 ± 0.039 and B($B^0 \to K^+ \pi^-$) = $(18.9 \pm 0.7) \times 10^{-6}$.

⁵ÅBE 00C assumes B(Z $\rightarrow b\overline{b}$)=(21.7 \pm 0.1)% and the B fractions $f_{B^0} = f_{B^+} =$ $(39.7^{+1.8}_{-2.2})\%$ and $f_{B_c} = (10.5^{+1.8}_{-2.2})\%$.

⁶ BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons. ⁷Assumes B($Z \rightarrow b\overline{b}$) = 0.217 and B^0_d (B^0_s) fraction 39.5% (12%).

$\Gamma(K^0\overline{K}^0)/\Gamma_{\text{total}}$

 Γ_{132}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT
1.76±0.31 OUR AVER	AGE				
$1.68 \!\pm\! 0.34 \! \substack{+0.16 \\ -0.15}$		¹ AAIJ	20F	LHCB	<i>pp</i> at 7, 8, 13 TeV
$1.96^{+0.58}_{-0.51}\pm0.10\pm0.20$)	² PAL	16	BELL	$e^+e^- \rightarrow \Upsilon(5S)$
• • • W/a da nat usa tha	following d	ata for averages	fite lie	mite oto	

We do not use the following data for averages, fits, limits, etc. $\bullet \bullet$

³ PFNG <6.6 90 10 BELL Repl. by PAL 16 $\label{eq:AAIJ 20F reports} \ [\Gamma \big(B^0_s \rightarrow \ \kappa^0 \, \overline{\kappa}^0 \big) / \Gamma_{\text{total}}] \ / \ [\text{B} (B^0 \rightarrow \ \kappa^0 \, \phi)] = 2.3 \pm 0.4 \pm 0.2 \pm 0.1 \pm$ which we multiply by our best value $B(B^0 \rightarrow K^0 \phi) = (7.3 \pm 0.7) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using

our best value. ²Observed in $B_s^0 \rightarrow K_S^0 K_S^0$ with significance of 5.1 σ . The last uncertainty is due to the uncertainty of the total number of $B_{S}^{0}\overline{B}_{S}^{0}$ pairs.

³Uses $\Upsilon(10860) \rightarrow B_s^* \overline{B}_s^*$ and assumes $B(\Upsilon(10860) \rightarrow B_s^{(*)} \overline{B}_s^{(*)}) = (19.3 \pm 2.9)\%$ and $\Gamma(\Upsilon(10860) \rightarrow B_{s}^{*}\overline{B}_{s}^{*}) / \Gamma(\Upsilon(10860) \rightarrow B_{s}^{(*)}\overline{B}_{s}^{(*)}) = (90.1 + 3.8)\%$

$\Gamma(K^0\pi^+\pi^-)/\Gamma_{total}$			Г ₁₃₃ /	/Γ
VALUE (units 10 ⁻⁶)	DOCUMENT ID	TECN	COMMENT	
9.5±2.1±0.3	^{1,2} AAIJ	17BP LHCB	<i>pp</i> at 7, 8 TeV	
https://pdg.lbl.gov	Page 50	Creat	ed: 5/30/2025 07:	50

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

- ³ AAIJ $14 \quad \pm 4 \quad \pm 1 \\$ 13BP LHCB Repl. by AAIJ 17BP ¹AAIJ 17BP reports [$\Gamma(B_s^0 \rightarrow \kappa^0 \pi^+ \pi^-)/\Gamma_{total}$] / [B($B^0 \rightarrow \kappa^0 \pi^+ \pi^-$)] = 0.191 ± 0.027 ± 0.033 which we multiply by our best value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.97 \pm 10^{-1})$ $0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
 - ² Used $f_s/f_d = 0.259 \pm 0.015$.
 - ³AAIJ ^{13BP} reports $[\Gamma(B_s^0 \rightarrow \kappa^0 \pi^+ \pi^-)/\Gamma_{\text{total}}] / [B(B^0 \rightarrow \kappa^0 \pi^+ \pi^-)] = 0.29 \pm 100$ 0.06 ± 0.04 which we multiply by our best value B($B^0 \rightarrow K^0 \pi^+ \pi^-$) = (4.97 ± 0.18)× 10^{-5} . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^0 K^{\pm} \pi^{\mp}) / \Gamma_{\text{total}}$

 Γ_{134}/Γ

VALUE (units 10 ⁻⁵)	DOCUMENT ID	TECN	COMMENT
8.4±0.8±0.3	1,2 AAIJ	17BP LHCB	<i>pp</i> at 7, 8 TeV
• • • We do not use the follow	ing data for averages	, fits, limits, e	etc. • • •

³ AAIJ 13BP LHCB Repl. by AAIJ 17BP $7.4 \pm 0.9 \pm 0.3$ ¹AAIJ 17BP reports $[\Gamma(B_s^0 \rightarrow \kappa^0 \kappa^{\pm} \pi^{\mp})/\Gamma_{\text{total}}] / [B(B^0 \rightarrow \kappa^0 \pi^{+} \pi^{-})] = 1.70 \pm 1.70$ 0.07 ± 0.15 which we multiply by our best value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = (4.97 \pm 0.18) \times$ 10^{-5} . Our first error is their experiment's error and our second error is the systematic error from using our best value.

² Used
$$f_s/f_d = 0.259 \pm 0.015$$
.

³AAIJ 13BP reports $[\Gamma(B_s^0 \rightarrow \kappa^0 \kappa^{\pm} \pi^{\mp})/\Gamma_{\text{total}}] / [B(B^0 \rightarrow \kappa^0 \pi^{+} \pi^{-})] = 1.48 \pm$ 0.12 ± 0.14 which we multiply by our best value B($B^0 \rightarrow K^0 \pi^+ \pi^-$) = (4.97 ± 0.18)× 10^{-5} . Our first error is their experiment's error and our second error is the systematic error from using our best value.

$\Gamma(K^*(892)^-\pi^+)/\Gamma_{total}$

Γ_{135}/Γ

 Γ_{136}/Γ

DOCUMENT IDTECNCOMMENT1,2AAIJ14BMI HCRDO 24 7 T VALUE (units 10^{-6}) 14BMLHCB pp at 7 TeV $2.9 \pm 1.0 \pm 0.2$ ¹AAIJ 14BM reports $[\Gamma(B_s^0 \to \kappa^*(892)^-\pi^+)/\Gamma_{total}] / [B(B^0 \to \kappa^*(892)^+\pi^-)] =$ $0.39 \pm 0.13 \pm 0.05$ which we multiply by our best value B($B^0 \rightarrow K^*(892)^+ \pi^-$) = $(7.5 \pm 0.4) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

 2 Uses f $_{s}$ /f $_{d}$ = 0.259 \pm 0.015.

$\Gamma(K^*(892)^{\pm}K^{\mp})/\Gamma_{\text{total}}$

VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT	
1.86±0.12±0.45	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV	
• • • We do not use the follo	wing data for average	s. fits.	limits, e	etc. • • •	

 $1.12 \pm 0.21 + 0.07$ ^{3,4} AAIJ 14BMLHCB Repl. by AAIJ 19K

 1 AAIJ 19K reports (18.6 \pm 1.2 \pm 0.8 \pm 4.0 \pm 2.0) imes 10 $^{-6}$ as the measured value. We

have combined in quadrature all systematic uncertainties into a single one. ² Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_s^0 K^{\pm} \pi^{\mp}$ decays. ³ AAIJ 14BM reports $[\Gamma(B_s^0 \rightarrow K^*(892)^{\pm} K^{\mp})/\Gamma_{\text{total}}] / [B(B_s^0 \rightarrow K^*(892)^{+} \pi^{-})] =$ 1.49 \pm 0.22 \pm 0.18 which we multiply by our best value B($B^0 \rightarrow K^*(892)^+\pi^-$) =

 $(7.5\pm0.4)\times10^{-6}.$ Our first error is their experiment's error and our second error is the systematic error from using our best value.

⁴ Uses $f_s/f_d = 0.259 \pm 0.015$.

Γ(<i>K</i> [*] ₀ (1430))± <i>K</i> ∓)	/Γ _{total}
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VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT
3.13±0.23±2.53	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV

$\Gamma(K_2^*(1430)^{\pm}K^{\mp})/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	DOCUMENT ID		TECN	COMMENT	
1.03±0.25±1.64	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV	
1		- >	6		

¹ AAIJ 19K reports $(10.3 \pm 2.5 \pm 1.1 \pm 16.3 \pm 1.1) \times 10^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one. ² Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_S^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma(K^*(892)^0\overline{K}^0+\text{c.c.})/\Gamma_{\text{total}}$

$VALUE$ (units 10^{-5})	DOCUMENT I	D	TECN	COMMENT	
1.98±0.28±0.50	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV	
1 ALL 10K reports (10.8 \pm	$29 \pm 12 \pm 14 \pm$	$(21) \vee 1$	0-6 -6	the measured value	۱۸/

AAIJ 19K reports (19.8 \pm 2.8 \pm 1.2 \pm 4.4 \pm 2.1) imes 10 $^$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one. ² Measured in Dalitz plot analysis of $B_s^0 \rightarrow K_s^0 K^{\pm} \pi^{\mp}$ decays.

$\Gamma(K_0^*(1430)\overline{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT
3.30±0.25±0.98	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV
_			~	

$\Gamma(K_2^*(1430)^0\overline{K}^0+\text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10 ⁻⁵)	DOCUMENT ID		TECN	COMMENT	
1.68±0.45±2.13	1,2 AAIJ	19ĸ	LHCB	<i>pp</i> at 7, 8 TeV	
			_		

 1 AAIJ 19K reports (16.8 \pm 4.5 \pm 1.7 \pm 21.2 \pm 1.8) imes 10 $^{-6}$ as the measured value. We have combined in quadrature all systematic uncertainties into a single one. ² Measured in Dalitz plot analysis of $B_s^0 \rightarrow \kappa_S^0 \kappa^{\pm} \pi^{\mp}$ decays.

$\Gamma(\kappa_S^0 \overline{\kappa}^* (892)^0 + \text{c.c.}) / \Gamma_{\text{total}}$

VALUE (units 10 ⁻⁰)	DOCUMENT ID		TECN	COMMENT	
16.4±3.4±2.3	¹ AAIJ	16	LHCB	pp at 7 T	ēV
1 Measured relative to $B^0 ightarrow$	$K_{S}^{0}\pi^{+}\pi^{-}$	using the	value of	$B(B^0 \rightarrow$	$\kappa^{0}\pi^{+}\pi^{-}) =$
$(4.96 \pm 0.2) \times 10^{-5}$.	C				

$\Gamma(K^0K^+K^-)/\Gamma_{total}$						Г ₁₄₃ /Г
VALUE (units 10^{-7})	CL%	DOCUMENT ID		TECN	COMMENT	
$12.9 \pm 6.5 \pm 0.5$		1,2,3 AAIJ	17 BP	LHCB	<i>pp</i> at 7, 8 TeV	
https://pdg.lbl.gov		Page 52		Creat	ed: 5/30/202	5 07:50

Γ_{139}/Γ

Γ_{140}/Γ

 Γ_{141}/Γ

 Γ_{142}/Γ

 Γ_{138}/Γ

 Γ_{137}/Γ

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

- 13BP LHCB Repl. by AAIJ 17BP 90 ⁴ AAIJ <34 ¹AAIJ 17BP reports $[\Gamma(B_s^0 \rightarrow \kappa^0 \kappa^+ \kappa^-) / \Gamma_{total}] / [B(B^0 \rightarrow \kappa^0 \pi^+ \pi^-)] = 0.026 \pm 100 \text{ J}$ 0.011 \pm 0.007 which we multiply by our best value B($B^0 \rightarrow K^0 \pi^+ \pi^-$) = (4.97 \pm $0.18) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.
- ²AAIJ 17BP also set the limit range $4-25 \times 10^{-7}$ at 90% CL using the world average value B($B^0 \rightarrow K^0 \pi^+ \pi^-$) = (4.96 ± 0.20) × 10⁻⁵.
- ³Used $f_s/f_d = 0.259 \pm 0.015$.

⁴ AAIJ 13BP reports $[\Gamma(B_s^0 \rightarrow K^0 K^+ K^-)/\Gamma_{total}] / [B(B^0 \rightarrow K^0 \pi^+ \pi^-)] < 0.068$ which we multiply by our best value $B(B^0 \rightarrow K^0 \pi^+ \pi^-) = 4.97 \times 10^{-5}$.

 $\frac{\Gamma(\overline{K}^{*}(892)^{0}\rho^{0})/\Gamma_{\text{total}}}{\sqrt{ALUE}} \qquad \qquad \Gamma_{144}/\overline{C}$ $\frac{VALUE}{\sqrt{7.67} \times 10^{-4}} \qquad \begin{array}{c} CL\% \\ 90 \end{array} \qquad \begin{array}{c} DOCUMENT \ ID \\ 1 \ ABE \end{array} \qquad \begin{array}{c} TECN \\ OOC \end{array} \qquad \begin{array}{c} COMMENT \\ e^{+}e^{-} \rightarrow Z \end{array}$ Γ_{144}/Γ ¹ABE 00C assumes B(Z $\rightarrow b\overline{b}$)=(21.7 \pm 0.1)% and the B fractions $f_{B0}=f_{B+}=$ $(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$.

$\Gamma(\overline{K}^*(892)^0 K^*(892)^0) / \Gamma_{total}$

Γ_{145}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID		TECN	COMMENT	
$1.11 {\pm} 0.26 {\pm} 0.06$		¹ AAIJ	15AF	LHCB	pp at 7 TeV	
$\bullet~\bullet~$ We do not use the	following	data for averages	s, fits,	limits, e	tc. ● ● ●	
$2.81\!\pm\!0.46\!\pm\!0.56$		² AAIJ	12F	LHCB	Repl. by AAIJ 15AF	
<168.1	90	³ ABE	00C	SLD	$e^+e^- \rightarrow Z$	
1 AAIJ 15AF reports [F	$(B_s^0 \rightarrow \overline{P})$. ⁽⁸⁹²⁾⁰ К*(892	2) ⁰)/Г	total] /	$[B(B^0 \to K^*(892)^0 \phi)]$	
$= 1.11 \pm 0.22 \pm 0.12 \pm 0.06 \text{ which we multiply by our best value } B(B^0 \rightarrow K^*(892)^0 \phi) = (1.00 \pm 0.05) \times 10^{-5}$. Our first error is their experiment's error and our second error is the systematic error from using our best value. $= 2 \text{ Uses } B^0 \rightarrow J/\psi K^{*0} \text{ for normalization and assumes } B(B^0 \rightarrow J/\psi K^{*0}) B(J/\psi \rightarrow \mu^+ \mu^-) B(K^{*0} \rightarrow K^+ \pi^-) = (1.33 \pm 0.06) \times 10^{-3} \text{ and } f_s/f_d = 0.253 \pm 0.031. \text{ The second quoted error is total uncertainty including the error of 0.34 on } f_s/f_d.$ $= 3 \text{ ABE 00C assumes } B(Z \rightarrow b\overline{b}) = (21.7 \pm 0.1)\% \text{ and the } B \text{ fractions } f_{B^0} = f_{B^+} = (39.7^{+1.8}_{-2.2})\% \text{ and } f_{B_s} = (10.5^{+1.8}_{-2.2})\%.$						
$\Gamma(\phi K^*(892)^0)/\Gamma_{total}$					Г ₁₄₉ /Г	
VALUE (units 10 ⁻⁶)	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT	
$1.14 {\pm} 0.29 {\pm} 0.06$		¹ AAIJ	13BW	LHCB	pp at 7 TeV	
• • • We do not use the	following	data for average	s, fits,	limits, e	tc. ● ● ●	
<1013	90	² ABE	00C	SLD	$e^+e^- \rightarrow Z$	
1 AAIJ 13BW reports [F	$(B_s^0 \to \phi$	$\kappa^*(892)^0)/\Gamma_{tota}$	al] / [E	$B(B^0 \rightarrow$	$K^*(892)^0\phi)] = 0.113\pm$	
0.024 ± 0.016 which $0.05) \times 10^{-5}$. Our systematic error from ² ABE 00C assumes E	we multip first error using our $B(Z \rightarrow D)$	bly by our best values is their experime best value. $b\overline{b}$ = (21.7 ± 0.1	alue B ent's e 1)% a	$(B^0 ightarrow$ error and and the	$\mathcal{K}^*(892)^0 \phi) = (1.00 \pm 100 \text{ J})^0 \phi$ d our second error is the B fractions $f_{B0} = f_{B+} = 1000$	

 $(39.7^{+1.8}_{-2.2})\%$ and $f_{B_s} = (10.5^{+1.8}_{-2.2})\%$.

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$

Γ_{150}/Γ

Test for $\Delta B=1$ weak neutral current. Allowed by higher-order electroweak interactions.

VALU	<i>IE</i> (units 10 ⁻⁸)	CL%	DOCUMENT ID		TECN	COMMENT	
<	0.44	90	¹ AAIJ	23⊤	LHCB	<i>pp</i> at 13 TeV	
• •	• We do not use the	following	data for averages	, fits,	limits, e	tc. ● ● ●	
<	1.5	90	² AAIJ	17bj	LHCB	Repl. by AAIJ 23T	
	$2.84 \substack{+2.03 + 0.85 \\ -1.68 - 0.18}$		³ AAIJ	13bq	LHCB	Repl. by AAIJ 17BJ	
<59	000	90	⁴ BUSKULIC	96V	ALEP	$e^+e^- \rightarrow Z$	
¹ Uses normalization mode B($B^0 \rightarrow K^+\pi^-$) = (19.6 ± 0.5) × 10 ⁻⁶ and B production ratio f($\overline{b} \rightarrow B_c^0$)/f($\overline{b} \rightarrow B_d^0$) = 0.2539 ± 0.0079.							
² Uses normalization mode B($B^0 \rightarrow K^+\pi^-$) = (19.6 ± 0.5) × 10 ⁻⁶ and B production							
r	ratio f $(\overline{b} ightarrow B^0_s)/{ m f}(\overline{b}$	$\rightarrow B^0_d)$	$= 0.259 \pm 0.015.$				

³Uses normalization mode B($B^0 \rightarrow K^+ \pi^-$) = (19.55 ± 0.54)×10⁻⁶ and B production ratio f($\overline{b} \rightarrow B_{s}^{0}$)/f($\overline{b} \rightarrow B_{d}^{0}$) = 0.256 ± 0.020.

⁴ BUSKULIC 96V assumes PDG 96 production fractions for B^0 , B^+ , B_s , b baryons.

$\Gamma(p\overline{p}K^+K^-)/\Gamma_{total}$

 Γ_{151}/Γ

DOCUMENT IDTECNCOMMENT1,2AAIJ17BD LHCBpp at 7, 8 TeV VALUE (units 10^{-6}) $4.5 \pm 0.4 \pm 0.2$ ¹AAIJ 17BD reports $[\Gamma(B_s^0 \rightarrow p\overline{p}K^+K^-)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] /$ $[B(J/\psi(1S) \to p\overline{p})] / [B(K^*(892) \to (K\pi)^{\pm})] = 1.67 \pm 0.12 \pm 0.11$ which we multiply by our best values $B(B^0 \rightarrow J/\psi(1S) K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$, $B(J/\psi(1S) \rightarrow 0.0$ $p\overline{p}$) = (2.120 ± 0.029) × 10⁻³, B(K*(892) \rightarrow (K π)[±]) = (99.902 ± 0.009) × 10⁻². Our first error is their experiment's error and our second error is the systematic error from using our best values. Reported value assumes $f_S/f_d = 0.259 \pm 0.015$.

² The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

$\Gamma(p\overline{p}K^+\pi^-)/\Gamma_{\text{total}}$

Γ_{152}/Γ

DOCUMENT IDTECNCOMMENT1,2AAIJ17BD LHCBpp at 7, 8 TeV VALUE (units 10^{-7}) $13.9 \pm 2.5 \pm 0.5$ ¹AAIJ 17BD reports $[\Gamma(B_s^0 \rightarrow p\overline{p}K^+\pi^-)/\Gamma_{total}] / [B(B^0 \rightarrow J/\psi(1S)K^*(892)^0)] /$ $[B(J/\psi(1S) \to p\overline{p})] / [B(K^*(892) \to (K\pi)^{\pm})] = 0.52 \pm 0.08 \pm 0.05$ which we multiply by our best values $B(B^0 \rightarrow J/\psi(1S) K^*(892)^0) = (1.27 \pm 0.05) \times 10^{-3}$, $B(J/\psi(1S) \rightarrow 0.05) \times 10^{-3}$ $p\overline{p}$) = (2.120 ± 0.029) × 10⁻³, B(K*(892) \rightarrow (K π)[±]) = (99.902 ± 0.009) × 10⁻². Our first error is their experiment's error and our second error is the systematic error from using our best values. Reported value assumes $f_S/f_d = 0.259 \pm 0.015$.

² The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

$\Gamma(p\overline{p}K^{+}\pi^{-})/\Gamma(p\overline{p}K^{+}K^{-})$ $\Gamma_{152}/\Gamma_{151}$ <u>DOCUMENT ID</u><u>TECN</u><u>COMMENT</u> 1,2 AAIJ 17BD LHCB pp at 7, 8 TeV <u>VAL</u>UE $0.31 \pm 0.05 \pm 0.02$ ¹Reports B($B_{S}^{0} \rightarrow p\overline{p}K^{+}\pi^{-}$) / B($B^{0} \rightarrow p\overline{p}K^{+}\pi^{-}$) = 0.22 ± 0.04 ± 0.02 ± 0.01, where the third error is due to f_s/f_d .

² The ratio is given for $m_{p\overline{p}}$ <2.85 GeV and assuming $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(ho \overline{ ho} \pi^+ \pi^-) / \Gamma_{ m total}$			Г ₁₅₃ /Г
VALUE (units 10^{-7})	DOCUMENT ID	TECN	COMMENT
4.3±2.0±0.2	1,2 AAIJ	17BD LHCB	<i>pp</i> at 7, 8 TeV
¹ AAIJ 17BD reports [$\Gamma(B_s^0)$	$\rightarrow p \overline{p} \pi^+ \pi^-) / \Gamma_{\text{total}}$	al] / [B(<i>B</i> ⁰ –	$\rightarrow J/\psi(1S) K^*(892)^0)] /$
$\begin{array}{l} [B(J/\psi(1S) \to \ p\overline{\rho})] \ / \ [B(J)] \\ \text{by our best values } B(B^0 \to p\overline{\rho}) = (2.120 \pm 0.029) \times 10^{-10} \\ \text{Our first error is their exp} \\ \text{from using our best values} \end{array}$	$\mathcal{K}^*(892) \rightarrow (\mathcal{K}\pi)^{\pm})$ $J/\psi(1S) \mathcal{K}^*(892)^0)$ 10^{-3} , $\mathcal{B}(\mathcal{K}^*(892) \rightarrow$ eriment's error and construction. Reported value assumed to the second secon	$\begin{array}{l} = 0.16 \pm 0.07 \\ = (1.27 \pm 0.0 \\ (\kappa \pi)^{\pm}) = (0.07 \\ \kappa \pi)^{\pm}) = (0.07 \\ \kappa \pi)^{\pm} = (0.07 \\ \kappa \pi)^{\pm} = 0.07 \\ \kappa \pi =$	7 \pm 0.02 which we multiply 5) \times 10 ⁻³ , B($J/\psi(1S) \rightarrow$ 99.902 \pm 0.009) \times 10 ⁻² . or is the systematic error 0.259 \pm 0.015.

² The branching ratio is given for $m_{p\overline{p}} < 2.85$ GeV.

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

Γ_{154}/Γ

<u>VALUE</u> (units 10 ⁻⁸)	DOCUMENT ID	TECN	COMMENT
$2.3 \pm 1.0 \pm 0.1$	¹ AAIJ	23AD LHCB	<i>pp</i> at 7, 8, 13 TeV
1 AAIJ 23AD reports (2.3 \pm	$1.0\pm0.2\pm0.1)\times1$	0^{-8} from a n	neasurement of $[\Gamma(B_s^0 \rightarrow$
$p \overline{p} p \overline{p}) / \Gamma_{total}] / [B(B_s^0 \rightarrow$	$\rightarrow J/\psi(1S)\phi)] / [B(\phi)]$	$(1020) \rightarrow K^{-1}$	$^+ K^-)] / [B(J/\psi(1S) \rightarrow$
$p \overline{p})$] assuming $B(B^0_s o J)$	$/\psi(1S)\phi)=(1.04~\pm$	$0.04) \times 10^{-3}$	$B(\phi(1020) \rightarrow K^+ K^-)$
$=$ 0.491 \pm 0.005,B(J/ψ (1.	$(S) \rightarrow p\overline{p}) = (2.120)$	\pm 0.029) $ imes$ 10	$)^{-3}$, which we rescale to
our best values $B(B_s^0 ightarrow J)$	$V/\psi(1S)\phi) = (1.03 \pm$	$0.04) \times 10^{-3}$	$B(\phi(1020) \rightarrow K^+ K^-)$
= $(49.9 \pm 0.5) \times 10^{-2}$, B(is their experiment's error best values.	$(J/\psi(1S) ightarrow p\overline{p})=(M_{ m and} \ { m our} \ { m second} \ { m error}$	2.120 ± 0.029 is the system	$0) \times 10^{-3}$. Our first error atic error from using our

$\Gamma(p\overline{\Lambda}K^- + c.c.)/\Gamma_{total}$

Γ_{155}/Γ

VALUE (units 10 ⁻⁰)	DOCUMENT ID	TECN	COMMENT
5.5±0.9±0.4	^{1,2} AAIJ	17AL LHCB	<i>pp</i> at 7, 8 TeV
¹ AAIJ 17AL reports (5.46	\pm 0.61 \pm 0.82) \times 10 ⁻	⁻⁶ from a m	easurement of $[\Gamma(B^0)]$

¹AAIJ 17AL reports $(5.46 \pm 0.61 \pm 0.82) \times 10^{-6}$ from a measurement of $[\Gamma(B_s^0 \rightarrow p\overline{\Lambda}K^- + \text{c.c.})/\Gamma_{\text{total}}] / [B(B^0 \rightarrow p\overline{\Lambda}\pi^-)]$ assuming $B(B^0 \rightarrow p\overline{\Lambda}\pi^-) = (3.14 \pm 0.29) \times 10^{-6}$, which we rescale to our best value $B(B^0 \rightarrow p\overline{\Lambda}\pi^-) = (3.16 \pm 0.24) \times 10^{-6}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.

error from using our best value. ²AAIJ 17AL value represents the sum of $B_s^0 \rightarrow p \overline{\Lambda} K^-$ and $B_s^0 \rightarrow \overline{p} \Lambda K^+$ and assumes the fraction $f_s/f_d = 0.259 \pm 0.015$.

$\Gamma(\Lambda_c^- \Lambda \pi^+) / \Gamma_{\text{total}}$

Γ₁₅₆/Γ

VALUE (units 10^{-4})	DOCUMENT ID		TECN	COMMENT
3.6±1.1±1.2	¹ SOLOVIEVA	13	BELL	$e^+e^- ightarrow \Upsilon(4S)$

 1 The second error is the total systematic uncertainty including the Λ_c absolute branching fractions and the normalizion number of B_s events.

$\Gamma(\Lambda_c^- \Lambda_c^+) / \Gamma_{\text{total}}$					Г ₁₅₇ /Г
VALUE	CL%	DOCUMENT ID	TECN	COMMENT	
$< 8.0 \times 10^{-5}$	95	¹ AAIJ	14AA LHCB	<i>pp</i> at 7 TeV	
1 Uses B($\overline{B}{}^0 o D^+ I$	$(7^{-}) = (7^{-})$	$.2 \pm 0.8) imes 10^{-3}$			

Γ_{158}/Γ $\Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ Test for $\Delta B = 1$ weak neutral current. <u>VALUE</u> (units 10^{-6}) CL% DOCUMENT ID TECN COMMENT ¹ DUTTA $e^+e^- \rightarrow \Upsilon(5S)$ < 3.1 90 15 BELL • • • We do not use the following data for averages, fits, limits, etc. ² WICHT < 8.7 90 08A BELL Repl. by DUTTA 15 07A BELL DRUTSKOY Repl. by WICHT 08A < 53 90 ³ ACCIARRI 951 L3 $e^+e^- \rightarrow Z$ <148 90 ¹Assumes the fraction of $B_s^{(*)}\overline{B}_s^{(*)}$ in $b\overline{b}$ events is $f_s = (17.2 \pm 3.0)\%$. ²Assumes $\Upsilon(5S) \rightarrow B_{s}^{*}\overline{B}_{s}^{*} = (19.5 + 3.0)/(19.5 + 3.0)$ ³ACCIARRI 951 assumes $f_{B^0} = 39.5 \pm 4.0$ and $f_{B_s} = (12.0 \pm 3.0)\%$. $\Gamma(\phi\gamma)/\Gamma_{\rm total}$ Γ_{159}/Γ VALUE (units 10^{-6}) DOCUMENT ID CL% TECN COMMENT 34 \pm 4 OUR AVERAGE ¹ DUTTA $36 \pm 5 \pm 7$ BELL $e^+e^- \rightarrow \Upsilon(5S)$ 15 ² AAIJ $33.8 \pm 3.4 \pm 2.0$ 13 LHCB pp at 7 TeV • • We do not use the following data for averages, fits, limits, etc. • ³ AAIJ \pm 5 12AE LHCB Repl. by AAIJ 13 39 $+18 +12 \\ -15 -11$ ⁴ WICHT Repl. by DUTTA 15 57 08A BELL $e^+e^- \rightarrow \Upsilon(5S)$ <390 90 DRUTSKOY 07A BELL 90 ACOSTA 02G CDF $p\overline{p}$ at 1.8 TeV <120 ⁵ ADAM 96D DLPH $e^+e^- \rightarrow Z$ <700 90 ¹Assumes the fraction of $B_s^{(*)}\overline{B}_s^{(*)}$ in $b\overline{b}$ events is $f_s = (17.2 \pm 3.0)\%$. The systematic uncertainty from f_s is 0.6×10^{-5} ²AAIJ 13 reports $[\Gamma(B_s^0 \to \phi \gamma) / \Gamma_{total}] / [B(B^0 \to K^*(892)^0 \gamma)] = 0.81 \pm 0.04 \pm 0.07$ which we multiply by our best value $B(B^0 \rightarrow K^*(892)^0 \gamma) = (4.18 \pm 0.25) \times 10^{-5}$ Our first error is their experiment's error and our second error is the systematic error from using our best value. ³ Measures B($B^0 \rightarrow K^{*0}\gamma$)/B($B_s \rightarrow \phi\gamma$) = 1.12 ± 0.08(stat) $^{+0.06}_{-0.04}$ (sys) $^{+0.09}_{-0.08}$ (f_s/f_d) and uses current world-average value of B($B^0 \rightarrow K^{*0}\gamma$) = (4.33 ± 0.15) × 10⁻⁵ ⁴Assumes $\Upsilon(5S) \rightarrow B_{S}^{*}\overline{B}_{S}^{*} = (19.5 \substack{+3.0 \\ -2.3})\%.$ ⁵ ADAM 96D assumes $f_{B^0} = f_{B^-} = 0.39$ and $f_{B_s} = 0.12$. $\Gamma(f_2(1270)\gamma)/\Gamma(\phi\gamma)$ $\Gamma_{160}/\Gamma_{159}$ VALUE (%) DOCUMENT ID TECN COMMENT $26^{+11}_{-13}^{+2}_{-3}$ 1 4411 245 LHCB pp at 7, 8, 13 TeV ¹AAIJ 24S reports $[\Gamma(B_s^0 \rightarrow f_2(1270)\gamma)/\Gamma(B_s^0 \rightarrow \phi\gamma)] \times B(f_2(1270) \rightarrow \kappa^+ \kappa^-) /$ $B(\phi(1020) \rightarrow K^+K^-) = 1.2^{+0.4+0.3}_{-0.3-0.5}$ which we divide and multiply by our best values $B(f_2(1270) \rightarrow K^+ K^-) = \frac{1}{2} (4.6 \pm 0.4) \times 10^{-2}$, $B(\phi(1020) \rightarrow K^+ K^-) =$ $(49.9\pm0.5)\times10^{-2}.$ Our first error is their experiment's error and our second error is the systematic error from using our best values.

Γ(f'₂(1525)γ)/Γ(φγ) VALUE (%)	DOCUME	NT ID		TECN	COMMENT	Г ₁₆₁ /Г ₁₅₉		
$19.4^{+1.7}_{-1.0}\pm0.5$	¹ AAIJ		24s	LHCB	<i>pp</i> at 7, 8,	13 TeV		
¹ AAIJ 24S reports $[\Gamma(B_s^0 \rightarrow f'_2(1525)\gamma)/\Gamma(B_s^0 \rightarrow \phi\gamma)] \times B(f'_2(1525) \rightarrow K^+K^-) / B(\phi(1020) \rightarrow K^+K^-) = 17.3^{+0.8}_{-0.7} + 1.3_{-0.7}^{-0.5}\%$ which we divide and multiply by our best values $B(f'_2(1525) \rightarrow K^+K^-) = \frac{1}{2} (88.8 \pm 2.2) \times 10^{-2}$, $B(\phi(1020) \rightarrow K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best values.								
$\frac{\Gamma(\phi(1680)\gamma, \phi \rightarrow K^+K^-)}{\frac{VALUE(\%)}{2}}$) /Γ(φγ) <u>DOCUME</u>	NT ID		TECN	COMMENT	Γ ₁₆₂ /Γ ₁₅₉		
$2.69^{+0.67}_{-0.63}\pm0.03$	1 AAIJ		24s	LHCB	<i>pp</i> at 7, 8,	13 TeV		
¹ AAIJ 24S reports $[\Gamma(B_s^0 \to \phi(1680)\gamma, \phi \to K^+K^-)/\Gamma(B_s^0 \to \phi\gamma)] / [B(\phi(1020) \to K^+K^-)] = 5.4^{+0.9+1.0}_{-0.6-1.1}$ % which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.								
$\Gamma(\phi_3(1850)\gamma, \phi_3 \rightarrow K^+ K)$ VALUE (%)	⁻)/Γ(φγ) <u>DOCUME</u>	NT ID		TECN	COMMENT	Г ₁₆₃ /Г ₁₅₉		
$0.200^{+0.180}_{-0.141} \pm 0.002$	¹ AAIJ		24S	LHCB	<i>pp</i> at 7, 8,	13 TeV		
$\begin{array}{r} \text{AAIJ} 24\text{S reports } [\text{I} (B_{S}^{\circ} \rightarrow [B(\phi(1020) \rightarrow K^{+}K^{-})] \\ B(\phi(1020) \rightarrow K^{+}K^{-}) = \\ \text{error and our second error is} \end{array}$		$\gamma, \phi \\ 0.2 \ \% \\ 0.2 \ \times 10^{-2}$ ic error	$\dot{P}_3 \rightarrow$ which \dot{P}_2 . Our from t	K⊤n wem r first e using o	K [—])/I (B ⁰ _S ultiply by o error is their our best valu	$ ightarrow \phi \gamma)] /$ ur best value experiment's e.		
$\Gamma(f_2(2010)\gamma, f_2 \rightarrow K^+ K^-)$ VALUE (%)	')/Γ(φ γ) <u>DOCUME</u>	NT ID		TECN	COMMENT	Γ ₁₆₄ /Γ ₁₅₉		
$0.299^{+0.212}_{-0.141} \pm 0.003$	¹ AAIJ		24s	LHCB	<i>pp</i> at 7, 8,	13 TeV		
¹ AAIJ 24S reports $[\Gamma(B_s^0 \to f_2(2010)\gamma, f_2 \to K^+K^-)/\Gamma(B_s^0 \to \phi\gamma)] / [B(\phi(1020) \to K^+K^-)] = 0.6^{+0.3}_{-0.2} + 0.3 \%$ which we multiply by our best value $B(\phi(1020) \to K^+K^-) = (49.9 \pm 0.5) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.								
$\frac{\Gamma(\mu^+\mu^-)}{\Gamma_{\text{total}}}$ Test for $\Delta B = 1$ weak ne <u>VALUE (units 10^9)</u> <u>CL%</u>	utral current. DOCUMENT ID		TECN	<u>COMI</u>	MENT	Г ₁₆₅ /Г		
3.34 ± 0.27 OUR AVERAGE 3.83 + 0.38 + 0.24 1 + $3.83 - 0.36 - 0.21$	TUMASYAN	23A	CMS	pp a	t 13 TeV			
3.00 + 0.46 + 0.15								
-0.43 - 0.11	AAIJ	22	LHCB	pp a	t 7, 8, 13 To	eV		

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

3.0	± 0.6	$^{+0.3}_{-0.2}$		AAIJ	17AI	LHCB	Repl. by AAIJ 22
0.9	$^{+1.1}_{-0.8}$			⁴ AABOUD	16L	ATLS	Repl. by AABOUD 19L
2.8	$^{+0.7}_{-0.6}$			⁵ KHACHATRY.	. 15 BE	LHC	<i>pp</i> at 7, 8 TeV
3.2	$^{+1.4}_{-1.2}$	$^{+0.5}_{-0.3}$		⁶ AAIJ	13 B	LHCB	Repl. by AAIJ 13BA
2.9	$^{+1.1}_{-1.0}$	$^{+0.3}_{-0.1}$		⁷ AAIJ	13ba	LHCB	Repl. by KHACHA- TRYAN 15BE
13	$^{+9}_{-7}$			⁸ AALTONEN	13F	CDF	<i>р</i> р at 1.96 ТеV
<12			90	⁹ ABAZOV	13C	D0	<i>р</i> р at 1.96 ТеV
3.0	$+1.0 \\ -0.9$			¹⁰ CHATRCHYAN	13AW	/CMS	Repl. by SIRUNYAN 20AG
<19 <12 < 3.8 < 6.4 <43 <35 <16			90 90 90 90 90 90 90 90	¹¹ AAD ¹² AAIJ ¹³ AAIJ ¹⁴ CHATRCHYAN ¹⁵ AAIJ ¹⁶ AALTONEN ¹⁷ CHATRCHYAN ¹⁸ ABAZOV	12AE 12A 12W 12A 11B 11AG 11T	ATLS LHCB LHCB CMS LHCB CDF CMS	<i>pp</i> at 7 TeV Repl. by AAIJ 12W Repl. by AAIJ 13B <i>pp</i> at 7 TeV Repl. by AAIJ 12A $p\overline{p}$ at 1.96 TeV Repl. by CHATRCHYAN 12A
<42			90	ADAZUV	102	00	pp at 1.90 TeV

¹Uses normalization mode $B(B^+ \rightarrow J/\psi K^+) = (1.020 \pm 0.019) \times 10^{-3}$, $B(J/\psi \rightarrow \mu^+ \mu^-) = (5.961 \pm 0.033) \times 10^{-2}$ and *B* production ratio $f(b \rightarrow B_s^0)/f(b \rightarrow B^+) = 0.231 \pm 0.008$.

² Uses normalization mode B($B^+ \rightarrow J/\psi K^+$) = (1.01 ± 0.03)×10⁻³ and B production ratio f($b \rightarrow B_s^0$)/f($b \rightarrow B^+$) = 0.252 ± 0.012 ± 0.015.

³Uses normalization mode B($B^+ \rightarrow J/\psi K^+$) = (1.010 ± 0.029) × 10⁻³ and B production ratio f($b \rightarrow B_s^0$)/f($b \rightarrow B^0$) = 0.256 ± 0.013.

⁴ This value corresponds to an upper limit of $< 3.0 \times 10^{-9}$ at 95% C.L. It uses $f_s/f_d = 0.24 \pm 0.02$.

⁵ Determined from the joint fit to CMS and LHCb data. Uncertainty includes both statistical and systematic component.

⁶ Uses *B* production ratio $f(\overline{b} \rightarrow B_s^0)/f(\overline{b} \rightarrow B_d^0) = 0.256 \pm 0.020$ and two normalization modes: $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$ and $B(B^0 \rightarrow K^+ \pi^-) = (1.94 \pm 0.06) \times 10^{-5}$.

⁷ Uses B production ratio $f(\overline{b} \rightarrow B_s^0)/f(\overline{b} \rightarrow B_d^0) = 0.259 \pm 0.015$ and normalization modes $B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+$ and $B^0 \rightarrow K^+ \pi^-$.

- ⁸ Uses normalization mode B($B^+ \rightarrow J/\psi K^+$) = (10.22±0.35)×10⁻⁴ and B production ratio f($\overline{b} \rightarrow B_s^0$)/f($\overline{b} \rightarrow B_d^0$) = 0.28±0.04.
- ⁹ Uses normalization mode $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$ and *B* production ratio $f(\overline{b} \rightarrow B_s^0)/f(\overline{b} \rightarrow B_d^0) = 0.263 \pm 0.017.$
- ¹⁰ Uses *B* production ratio $f(\overline{b} \rightarrow B_s^0)/f(\overline{b} \rightarrow B_d^0) = 0.256 \pm 0.020$ and $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$ for normalization.

¹¹ Uses *B* production ratio $f(\overline{b} \rightarrow B^+)/f(\overline{b} \rightarrow B^0_s) = 3.75 \pm 0.29$ and $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$.

 12 Uses B production ratio f($\overline{b} \rightarrow \ B_s^0)/f(\overline{b} \rightarrow \ B_d^0) = 0.267 \substack{+0.021 \\ -0.020}$ and three normalization modes $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.207 - 0.020$ and three normalization modes $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.01 \pm 0.21) \times 10^{-5}$, $B(B^0 \rightarrow K^+ \pi^-) = (1.94 \pm 0.06) \times 10^{-5}$, and $B(B_s^0 \rightarrow J/\psi \phi \rightarrow \mu^+ \mu^- K^+ K^-) = (3.4 \pm 0.9) \times 10^{-5}$. ¹³ Uses *B* production ratio $f(\overline{b} \rightarrow B_s^0)/f(\overline{b} \rightarrow B_d^0) = 0.267^{+0.021}_{-0.020}$ and three normalization modes of $B^+ \rightarrow J/\psi K^+$, $B^0 \rightarrow K^+ \pi^-$, and $B_s^0 \rightarrow J/\psi \phi$. ¹⁴ Uses $f_s/f_u = 0.267 \pm 0.021$ and $B(B^+ \rightarrow J/\psi K^+ \rightarrow \mu^+ \mu^- K^+) = (6.0 \pm 0.2) \times 10^{-5}$. ¹⁵ Uses *B* production ratio $f(\overline{b} \rightarrow B^+)/f(\overline{b} \rightarrow B_s^0) = 3.71 \pm 0.47$ and three normalization modes

- modes. 16 Uses *B* production ratio f($\overline{b} \rightarrow B^+$)/f($\overline{b} \rightarrow B_s^0$) = 3.55 ± 0.47 and B($B^+ \rightarrow J/\psi K^+ \rightarrow B_s^0$) $\mu^+\mu^-K^+$) = (6.01 ± 0.21) × 10⁻⁵.
- ¹⁷ Uses *B* production ratio $f(\overline{b} \rightarrow B^+)/f(\overline{b} \rightarrow B_s^0) = 3.55 \pm 0.42$ and $B(B^+ \rightarrow J/\psi K^+ \rightarrow B_s^0) = 3.55 \pm 0.42$ $\mu^+ \mu^- K^+$) = (6.0 ± 0.2) × 10⁻⁵. ¹⁸ Uses *B* production ratio f($\overline{b} \rightarrow B^+$)/f($\overline{b} \rightarrow B_s^0$) = 3.86 ± 0.59, and the number of
- $B^+ \rightarrow J/\psi K^+$ decays.

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$

 Γ_{166}/Γ

Test for $\Delta B = 1$ w	eak neutra	al current.			
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
<9.4 × 10 ⁻⁹	90	¹ AAIJ	20W	LHCB	<i>pp</i> at 7, 8, 13 TeV
$\bullet \bullet \bullet$ We do not use the	following	data for averages	, fits,	limits, e	tc. • • •
$< 2.8 \times 10^{-7}$	90	AALTONEN	09 P	CDF	<i>р<mark>р</mark> at 1.96 ТеV</i>
$< 5.4 \times 10^{-5}$	90	² ACCIARRI	97 B	L3	$e^+e^- \rightarrow Z$

¹Assumes no contribution from $B^0 \rightarrow e^+e^-$ decays.

²ACCIARRI 97B assume PDG 96 production fractions for B^+ , B^0 , B_s , and Λ_h .

$\Gamma(au^+ au^-)/\Gamma_{ ext{total}}$					Г ₁₆₇ /Г
VALUE	<u>CL%</u>	DOCUMENT ID	TECN	COMMENT	
$< 6.8 \times 10^{-3}$	95	¹ AAIJ	17AJ LHCB	<i>pp</i> at 7, 8 TeV	
1		-0			

¹Assuming no contribution from $B^0 \rightarrow \tau^+ \tau^-$.

$\Gamma(\mu^+\mu^-\gamma)/\Gamma_{\text{total}}$						Г ₁₆₈ /Г
VALUE	CL%	DOCUMENT	ID	TECN	COMMENT	
<4.2 × 10 ⁻⁸	95	¹ AAIJ	24Q	LHCB	<i>pp</i> at 13 TeV	
\bullet \bullet \bullet We do not use	the followi	ng data for avera	ages, fits,	limits, e	etc. ● ● ●	
$<\!\!2.0 imes 10^{-9}$	95	^{2,3} AAIJ	22	LHCB	<i>pp</i> at 7, 8, 13	TeV
$^1{ m The}$ exclusion lim	it is quote	ed at 95% CL fo	or the dir	nuon m	ass region [3.92	$(2 - m_{B^0})$
GeV/c 2 . The limit $[2m_\mu - 1.7]$ GeV	its are also /c ² ; < 7.7 excluding o	reported for oth $7 imes 10^{-8}$ in [1.70 ϕ mass.	ier dimuo)–2.88] G	n mass eV/c ² ;	regions: < 4.2 < 2.8 × 10 ⁻⁸ i	imes 10 ⁻⁸ in n [2 m_{μ} -
² The exclusion is li	mited to t	he range m $_{\mu\mu}>$	4.9 GeV/	′c ² .		
³ For the mass region	on 4.9 – m	$c_{B_s^0}$ GeV/ c^2 .				
$\Gamma(\mu^{+}\mu^{-}\mu^{+}\mu^{-})/I$	total					Г ₁₆₉ /Г

$(\mu^{\prime}\mu^{\prime}\mu^{\prime}\mu^{\prime}\mu^{\prime})/(t_{c})$	otal				169/1
VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$< 8.6 \times 10^{-10}$	95	AAIJ	22Q	LHCB	<i>pp</i> at 7, 8, 13 TeV
https://pdg.lbl.gov		Page 59		Creat	ed: 5/30/2025 07:50

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

$<2.5 \times 10^{-9}$	95	AAIJ	17N LHCB	<i>pp</i> at 7, 8 TeV
$< 1.6 \times 10^{-8}$	95	¹ AAIJ	13AW LHCB	Repl. by AAIJ 17N
-		•		

 $^1\,\text{Also}$ reports a limit of $< 1.2 \times 10^{-8}$ at 90% CL.

$\Gamma(\overline{D}^0 \mu^+ \mu^-) / \Gamma_{\text{total}}$	al ar tr		_		Г ₁₇₆ /Г
$\frac{VALUE}{<1.2 \times 10^{-7}}$	<u> </u>	DOCUMENT I	<u>D</u>		$\frac{COMMENT}{2} = 12 \text{ TeV}$
$\Gamma(SP, S \rightarrow \mu^+ \mu^-)$ Here S and P a 2.5 GeV/c ² and	${}^{-}, P \rightarrow \mu$ are the hyp	$\mu^+\mu^-)/\Gamma_{\text{total}}$	and pseu	doscala	Γ₁₇₀/Γ r particles with masses of
VALUE	<u>CL%</u>	DOCUMENT II	у. D	TECN	COMMENT
<2.2 × 10 ⁻⁹	95	AAIJ	17N	LHCB	<i>pp</i> at 7, 8 TeV
• • • We do not use \cdot	the followi	ng data for avera	ges, fits,	limits, o	etc. • • •
$< \! 1.2 imes 10^{-8}$	90	¹ AAIJ	13AW	/LHCB	Repl. by AAIJ 17N
¹ Also reports a limi	it of < 1.6	$ imes 10^{-8}$ at 95%	CL.		
$\Gamma(aa, a \rightarrow \mu^+ \mu^-)$ Here particle <i>a</i> i)/ F_{total} is a scalar y	with a mass of 1	GeV/c ² .		Γ ₁₇₁ /Γ
VALUE	<u>CL%</u>	DOCUMENT II	D	TECN	COMMENT
$< 5.8 \times 10^{-10}$	95	AAIJ	22Q	LHCB	<i>pp</i> at 7, 8, 13 TeV
$\Gamma(\phi(1020)\mu^+\mu^-),$ Test for $\Delta B = VALUE$ (units 10^{-7})	/ F_{total} 1 weak neu <u>CL%</u>	itral current. <u>DOCUMENT II</u>	D	TECN	Г₁₇₂/Г
• • • We do not use	the followin	ng data for avera	ges, fits,	limits, e	etc. • • •
<32	90	¹ ABAZOV	06 G	D0	р <u>р</u> at 1.96 ТеV
$< 4.7 \times 10^{2}$	90	ACOSTA	02 D	CDF	<i>р</i> рат 1.8 ТеV
¹ Uses B($B^0_s ightarrow J/$	$\psi\phi$) = 9.3	3×10^{-4} .			
$\Gamma(\phi(1020)\mu^+\mu^-))$	/Γ(<i>J/ψ</i> (1	LS)			Γ ₁₇₂ /Γ ₆₈
$\frac{VALUE \text{ (units } 10^{-3})}{0.006 \text{ (units } 0.006 \text{ (units } 10^{-3}))}$	<u>CL%</u>	DOCUMENT ID	TE	<u>CN</u> CC	OMMENT
0.800 ± 0.026 COR At $0.800 \pm 0.021 \pm 0.016$ $1.13 \pm 0.19 \pm 0.07$ ••• We do not use	the followi	AAIJ AALTONEN ng data for avera	21AG LH 11AI CE ges, fits,	ICB p DF p limits, c	p at 7, 8, 13 TeV ₱ at 1.96 TeV etc. ● ● ●
$0.741^{+0.042}_{-0.040}\!\pm\!0.029$		AAIJ	15AQ LH	ICB R	epl. by AAIJ 21AG
$0.674^{+0.061}_{-0.056}\pm 0.016$		AAIJ	13X LH	ICB R	epl. by AAIJ 15AQ
$1.11 \pm 0.25 \pm 0.09$		AALTONEN	11L CE	DF R	epl. by AALTONEN 11AI
< 2.3	90	AALTONEN	09B CE	DF R	epl. by AALTONEN 11L
Γ(K *(892) ⁰ μ ⁺ μ ⁻)/Γ _{total}				Γ ₁₇₄ /Γ
VALUE (units 10 ⁻⁰)		<u>DOCUMENT I</u>	10	<u>IECN</u>	
2.9±1.0±0.4	- 0	+ AAIJ	18AB	LHCB	pp at 7, 8, 13 TeV
¹ Normalizes to B(E 5.96 ± 0.03%, and	$3^{\circ} \rightarrow J/\psi$ d uses f_{s}/f_{s}	$(K^{*0}) = 1.19 \pm 0.02$ $d = 0.259 \pm 0.02$	0.01 ± 0.01).08% a	nd B $(J/\psi \rightarrow \mu^+ \mu^-) =$

VALUE (units 10^{-4})		TECN	COMMENT
1.55±0.19±0.08		21AG LHCB	<i>pp</i> at 7, 8, 13 TeV
1 Measured by combining t	the q ² regions [0.1, 0.98	8], [1.1, 8.0], a	and [11.0, 12.5] GeV^2/c^4
$\Gamma(\pi^+\pi^-\mu^+\mu^-)/\Gamma_{total}$			Г ₁₇₅ /Г
VALUE (units 10 ⁻⁸)	DOCUMENT ID	TECN	COMMENT
8.4±1.6±0.3	¹ AAIJ	15s LHCB	<i>pp</i> at 7, 8 TeV
$ \begin{bmatrix} \Gamma(B_{s}^{0} \to \pi^{+}\pi^{-}\mu^{+}\mu^{-} \\ J/\psi(1S) K^{*}(892)^{0} \end{bmatrix} = (3) \\ J/\psi(1S) K^{*}(892)^{0} = (3) \\ \text{and our second error is t} \end{bmatrix} $	$\Gamma(\Gamma)/\Gamma_{total}] / [B(B^0 \rightarrow 1.3 \pm 0.1) \times 10^{-3}$, which $1.27 \pm 0.05) \times 10^{-3}$. Che systematic error from	$J/\psi(1S)K^*(8)$ ch we rescale t Dur first error n using our be	(92) ⁰)] assuming $B(B^0 \rightarrow 0)$ to our best value $B(B^0 \rightarrow 0)$ is their experiment's error est value.
$\frac{\Gamma(\phi\nu\overline{\nu})/\Gamma_{\text{total}}}{\text{Test for }\Delta B = 1 \text{ weak}}$ $\frac{VALUE}{<54 \times 10^{-3}}$ 90	neutral current. <u>DOCUMENT ID</u> 1 ADAM	<u>7ECN</u>	$\frac{\Gamma_{177}}{\Gamma_{177}}$
¹ ADAM 96D assumes f_{B^0}	$= f_{B^-} = 0.39 \text{ and } f_{B_1}$	$s_{s} = 0.12.$	

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the	following d	ata for averages, fits,	limits, e	tc. ● ● ●
${<}5.6 imes 10^{-4}$	90 1	ALONSO-ALV24	THEO	$e^+e^- \rightarrow Z$

 $^1\,{\rm A}$ reinterpretation of an old inclusive ALEPH search for b-hadron decays with large missing energy reported in BARATE 01E.

$\Gamma(e^{\pm}\mu^{\mp})/\Gamma_{\text{total}}$ Test of lepton	family n	umber conservation.			Г ₁₇₉ /Г
VALUE	<u>CL%</u>	DOCUMENT ID		TECN	COMMENT
<5.4 × 10 ⁻⁹	90	¹ AAIJ	18T	LHCB	<i>pp</i> at 7, 8 TeV
\bullet \bullet \bullet We do not us	e the follo	owing data for avera	ages, fi	ts, limit	s, etc. ● ● ●
$< 1.1 \times 10^{-8}$	90	² AAIJ	13 BM	LHCB	Repl. by AAIJ 18⊤
$< 2.0 \times 10^{-7}$	90	AALTONEN	09 P	CDF	<i>р<mark>р</mark> аt 1.96 ТеV</i>
$< 6.1 imes 10^{-6}$	90	ABE	98v	CDF	Repl. by AALTONEN 09P
$< 4.1 imes 10^{-5}$	90	³ ACCIARRI	97 B	L3	$e^+e^- \rightarrow Z$
¹ AAIJ 18⊤ uses ı	normaliza	tion modes $B(B^0$ -	$\rightarrow K^+$	$^{+}\pi^{-}) =$	= (19.6 \pm 0.5) \times 10 $^{-6}$ and
$B(B^+ o J/\psi K)$	$(1.1)^{+}$	$026 \pm 0.031) \times 10^{-3}$	with E	ý Produc	ction ratio $f(\overline{b} \rightarrow B_{s}^{0})/f(\overline{b} \rightarrow B_{s}^{0})$
$B_{d}^{0}) = 0.259 \pm$	0.015. T	he upper limit incre	eases to	o $6 imes 1$	0^{-9} with the assumption of
$B_L^{\rm d}$ -dominated d	ecay amp	litude.			
² Uses normalizati	on mode	$B(B^0 \rightarrow K^+ \pi^-)$	= (19	$.4 \pm 0.6$	$5) \times 10^{-6}$ and B production
ratio f($\overline{b} \rightarrow B_{c}^{0}$	$)/f(\overline{b} \rightarrow$	B_d^0 = 0.256 ± 0.0	020.		

³ACCIARRI 97B assume PDG 96 production fractions for B^+ , B^0 , B_s , and Λ_b .

$\Gamma(e^{\pm} au^{\mp})/\Gamma_{ ext{total}}$				Г ₁₈₀ /Г
VALUE	CL%	DOCUMENT ID	COMMENT	
<1.4 × 10 ⁻³	90	¹ NAYAK 23	$e^+e^- ightarrow ~\Upsilon(4S)$	
1		0		

 $^1\,\mathrm{Reconstructs}$ the accompanying B^0_s meson in the semileptonic decay modes.

https://pdg.lbl.govPage 61 Created: 5/30/2025 07:50



POLARIZATION IN B⁰_s DECAY

In decays involving two vector mesons, one can distinguish among the states in which meson polarizations are both longitudinal (*L*), or both are transverse and parallel (||), or perpendicular (\perp) to each other with the parameters Γ_L/Γ , Γ_\perp/Γ , and the relative phases ϕ_{\parallel} and ϕ_\perp . In decays involving two tensor mesons, the transverse polarization states are described by parameters $\Gamma_{\parallel 1}$, $\Gamma_{\parallel 2}$, $\Gamma_{\perp 1}$, $\Gamma_{\perp 2}$ and their relative phases $\phi_{\parallel 1}$, $\phi_{\parallel 2}$, $\phi_{\perp 1}$, $\phi_{\perp 2}$. See also the review on "Polarization in *B* Decays."

Γ_L/Γ in $B^0_s \to D^*_s \rho^+$			
VALUE	DOCUMENT	ID TECI	<u>COMMENT</u>
$1.05 \substack{+0.08 + 0.03 \\ -0.10 - 0.04}$	LOUVOT	10 BEL	L $e^+e^- ightarrow ~\Upsilon(5S)$
$\frac{\Gamma_L}{\Gamma_{LLUE}} H_s^0 \to J/\psi(1S)$	ϕ	TECN	COMMENT
0.5194±0.0034 OUR AVERA below.	GE Error includes	scale factor o	1.5. See the ideogram
$0.5179 \!\pm\! 0.0017 \!\pm\! 0.0032$	¹ AAIJ	24A LHCB	<i>pp</i> at 13 TeV
$0.5152\!\pm\!0.0012\!\pm\!0.0034$	² AAD	21AE ATLS	<i>pp</i> at 7, 8, 13 TeV
$0.5289 \!\pm\! 0.0038 \!\pm\! 0.0041$	³ SIRUNYAN	21E CMS	<i>pp</i> at 8, 13 TeV
$0.524\ \pm 0.013\ \pm 0.015$	³ AALTONEN	12D CDF	<i>р</i> рат 1.96 ТеV
$\begin{array}{r} 0.558 \hspace{0.2cm} +0.017 \\ -0.019 \end{array}$	^{3,4} ABAZOV	12D D0	<i>р</i> рат 1.96 ТеV
$0.61 \pm 0.14 \pm 0.02$	⁵ AFFOLDER	00N CDF	<i>р</i> рат 1.8 ТеV
$\begin{array}{rrr} 0.56 & \pm 0.21 & +0.02 \\ & -0.04 \end{array}$	ABE	95z CDF	p p at 1.8 TeV
https://pdg.lbl.gov	Page 62	Cre	eated: 5/30/2025 07:50

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

$0.5350 \!\pm\! 0.0047 \!\pm\! 0.0049$	³ SIRUNYAN	21E CMS	<i>pp</i> at 13 TeV
$0.5186 \!\pm\! 0.0029 \!\pm\! 0.0023$	AAIJ	19Q LHC	B Repl. by AAIJ 24A
$0.522 \ \pm 0.003 \ \pm 0.007$	² AAD	16AP ATLS	6 Repl. by AAD 21AE
$0.510 \ \pm 0.005 \ \pm 0.011$	³ KHACHATRY	.165 CMS	pp at 8 TeV
$0.5241 \!\pm\! 0.0034 \!\pm\! 0.0067$	AAIJ	15I LHCE	B Repl. by AAIJ 19Q
$0.529\ \pm 0.006\ \pm 0.012$	² AAD	14U ATLS	6 Repl. by AAD 16AP
$0.539\ \pm 0.014\ \pm 0.016$	³ AAD	12CV ATLS	S Repl. by AAD 14∪
$0.555 \ \pm 0.027 \ \pm 0.006$	⁶ ABAZOV	09E D0	Repl. by ABAZOV 12D
$0.531 \ \pm 0.020 \ \pm 0.007$	³ AALTONEN	08J CDF	Repl. by AALTONEN 12D
$0.62 \pm 0.06 \pm 0.01$	ACOSTA	05 CDF	Repl. by AALTONEN 08J

¹ Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays.

 2 Measured using the flavor tagged, time-dependent angular analysis of $B_s^0 \rightarrow ~J/\psi \, \phi$ decays.

³Measured using the time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

- ⁴ The error includes both statistical and systematic uncertainties. ⁵ AFFOLDER 00N measurements are based on 40 B_s^0 candidates obtained from a data sample of 89 pb $^{-1}$. The *P*-wave fraction is found to be 0.23 \pm 0.19 \pm 0.04.
- ⁶ Measured the angular and lifetime parameters for the time-dependent angular untagged decays $B_d^0 \rightarrow J/\psi K^{*0}$ and $B_s^0 \rightarrow J/\psi \phi$.



$\Gamma_{\parallel}/\Gamma$ in $B^0_s o J/\psi(1S)\phi$				
VALUE	DOCUMENT ID		TECN	COMMENT
0.2222 ± 0.0027 OUR AVERAGE				
$0.2220 \pm 0.0017 \pm 0.0021$ 1	AAD	21AE .	ATLS	<i>pp</i> at 7, 8, 13 TeV
$0.231 \pm 0.014 \pm 0.015$ 2	AALTONEN	12D	CDF	<i>р</i> рат 1.96 ТеV
$\begin{array}{ccc} 0.231 & +0.024 & & 2,3 \\ -0.030 & & \end{array}$	ABAZOV	12D	D0	<i>р</i> рат 1.96 ТеV
• • • We do not use the following	g data for averag	es, fits	s, limits,	etc. • • •
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	AAD AAD AAD ABAZOV AALTONEN ACOSTA e-dependent ang ndent angular ar ical and systema ime parameters	16AP . 14U . 12CV . 09E . 08J . 05 . ular an nalysis . for the	ATLS ATLS D0 CDF CDF alysis of of B ⁰ _S - certainti e time-do	Repl. by AAD 21AE Repl. by AAD 16AP Repl. by AAD 14U Repl. by ABAZOV 12D Repl. by AALTONEN 12D Repl. by AALTONEN 08J $B_s^0 \rightarrow J/\psi \phi$ decays. $A = J/\psi \phi$ decays. es. ependent angular untagged
$\Gamma_{\perp}/\Gamma \text{ in } B_s^0 \rightarrow J/\psi(1S)\phi$ $\frac{VALUE}{VALUE}$	$S_s \rightarrow J/\psi \psi.$ <u>DOCUMENT IL</u>)	TECN	COMMENT
0.2447 ± 0.0029 UUR AVERAGE	1	244		12 T
$0.2403 \pm 0.0023 \pm 0.0024$ 0.2303 ± 0.0050 ± 0.0037		24A 21c		p p at 15 rev
$\bullet \bullet \bullet$ We do not use the following	data for average	ZIC Cos fito	limite	etc
		,cs, mts		
$0.2337 \pm 0.0003 \pm 0.0045$		21E		pp at 13 lev
$0.2450 \pm 0.0040 \pm 0.0019$		19Q V 16c		Repl. by AAIJ 24A
$0.243 \pm 0.008 \pm 0.012$		1105		P at o lev P Doministration
0.2304±0.0049±0.0030	AAIJ	101		
¹ Measured using a time-depend	ent angular ana	ysis of	$B_s^0 \rightarrow$	$J/\psi K^+ K^-$ decays.
$\phi_{\parallel} { m in} B^0_{s} o J/\psi(1S) \phi$				
VALUE (rad)	DOCUMENT IL)	<u>TEC</u> N	COMMENT
3.22 ± 0.05 OUR AVERAGE				
$3.146\!\pm\!0.061\!\pm\!0.052$	¹ AAIJ	24A	LHCE	8 <i>pp</i> at 13 TeV
$3.36 \pm 0.05 \pm 0.09$	² AAD	21A	E ATLS	<i>pp</i> at 7, 8, 13 TeV

3.19	± 0.12	± 0.04	SIRUNYAN	21e	CMS	<i>pp</i> at 8, 13 TeV
3.15	± 0.22		³ ABAZOV	12D	D0	<i>р</i> рат 1.96 ТеV
• • •	We do	not use the following	data for averages	, fits,	limits, e	tc. ● ● ●
3.18	± 0.12	± 0.003	SIRUNYAN	21E	CMS	<i>pp</i> at 13 TeV
3.06	$^{+0.08}_{-0.07}$	± 0.04	AAIJ	19Q	LHCB	Repl. by AAIJ 24A
3.15	± 0.10	± 0.05	AAD	16 AP	ATLS	Repl. by AAD 21AE
3.48	$^{+0.07}_{-0.09}$	± 0.68	KHACHATRY	. 16 S	CMS	<i>pp</i> at 8 TeV
3.26	$^{+0.10}_{-0.17}$	$^{+0.06}_{-0.07}$	AAIJ	151	LHCB	Repl. by AAIJ 19Q
2.72	$^{+1.12}_{-0.27}$	± 0.26	ABAZOV	09E	D0	Repl. by ABAZOV 12D

 1 Measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \, {\rm K}^+ \, {\rm K}^-$ decays. 2 The fit found another solution with $\phi_{||} = 2.95 \pm 0.05 \pm 0.09$ rad. 3 The error includes both statistical and systematic uncertainties.

$\phi_{\perp} \text{ in } B^0_s \rightarrow J/\psi(1S)\phi$				
VALUE (rad)	DOCUMENT ID		TECN	COMMENT
2.99 \pm 0.12 OUR AVERAGE	Error includes scale	factor	of 1.9.	See the ideogram below.
$2.903^{+0.075}_{-0.074}\!\pm\!0.048$	¹ AAIJ	24A	LHCB	<i>pp</i> at 13 TeV
$3.22\ \pm 0.10\ \pm 0.05$	² AAD	21AE	ATLS	<i>pp</i> at 7, 8, 13 TeV
$2.78\ \pm 0.15\ \pm 0.06$	³ SIRUNYAN	21E	CMS	<i>pp</i> at 8, 13 TeV
\bullet \bullet We do not use the follow	ing data for averages	s, fits,	limits, e	etc. ● ● ●
$2.77 \ \pm 0.16 \ \pm 0.05$	³ SIRUNYAN	21E	CMS	<i>pp</i> at 13 TeV
$2.64\ \pm 0.13\ \pm 0.10$	AAIJ	19Q	LHCB	Repl. by AAIJ 24A
$4.15 \ \pm 0.32 \ \pm 0.16$	³ AAD	16 AP	ATLS	Repl. by AAD 21AE
$2.98 \pm 0.36 \pm 0.66$	³ KHACHATRY.	16 S	CMS	<i>pp</i> at 8 TeV
$3.08 \begin{array}{c} +0.14 \\ -0.15 \end{array} \pm 0.06$	AAIJ	151	LHCB	Repl. by AAIJ 19Q
$3.89 \ \pm 0.47 \ \pm 0.11$	³ AAD	1 4U	ATLS	Repl. by AAD 16AP
1 Measured using a time-depe	endent angular analys	is of E	$3^0 \rightarrow 1$	$J/\psi K^+ K^-$ decays.
2 The fit found another soluti	on with $\phi_{\perp} = 3.03$ -	+ 0.05	+ 0.09	rad.
³ Measured using a tagged, ti	me-dependent angula	ar anal	vsis of	$B^0 \rightarrow J/\psi \phi$ decays.
	. 0		-	5 , , , , , , ,



 $^1\,{\rm Measured}$ using time-dependent angular analysis of $B^0_{{\it S}} \rightarrow ~\psi(2S)\phi$ decays.

$\phi_{\parallel} \text{ in } B^{0}_{s} \rightarrow \psi(2S)\phi$			
VALUE (rad)	DOCUMENT ID	TECN	COMMENT
$3.67^{+0.13}_{-0.18} \pm 0.03$	¹ AAIJ	16AK LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured using time-depende	nt angular analysi	is of $B^0_{m{s}} o \psi$	$(2S)\phi$ decays.
ϕ_{\perp} in $B_c^0 \rightarrow \psi(2S)\phi$			
VALUE (rad)	DOCUMENT ID	TECN	COMMENT
$3.29^{+0.43}_{-0.39}\pm0.04$	¹ AAIJ	16AK LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured using time-depende	nt angular analysi	is of $B^0_{m{s}} o \psi$	$(2S)\phi$ decays.
Γ_{I}/Γ for $B^{0} \rightarrow J/\psi(1S)\overline{K}^{*}$	*(892) ⁰		
Longitudinal polarization fr	action, equals to	f_L using nota	tion of "Polarization in B
decays" review.		_	
VALUE	DOCUMENT ID	TECN	COMMENT
$0.497 \pm 0.025 \pm 0.025$	AAIJ	15AV LHCB	<i>pp</i> at 7, 8 TeV
• • • We do not use the following	g data for average	es, fits, limits,	etc. • • •
$0.50 \pm 0.08 \pm 0.02$	¹ AAIJ	12AP LHCB	Repl. by AAIJ 15AV
1 The non-resonant $K\pi$ backgro	ound contribution	s are subtracte	ed. Also reports an S-wave
amplitude $ A_S ^2 = 0.07 \substack{+0.1\\-0.0}$	5 7		
$\Gamma_{\parallel}/\Gamma$ for $B_s^0 \rightarrow J/\psi(1S)\overline{K}$	*(892) ⁰		
Parallel polarization fraction	n, equals to $1-t$	$f_L - f_\perp$ using	g notation of "Polarization
in <i>B</i> decays" review.			
VALUE	DOCUMENT ID	<u>TECN</u>	COMMENT
$0.179 \pm 0.027 \pm 0.013$	AAIJ	15AV LHCB	pp at 7, 8 IeV
• • • We do not use the following	g data for average	es, fits, limits,	etc. • • •
$\begin{array}{ccc} 0.19 & +0.10 \\ -0.08 & \pm 0.02 \end{array}$	¹ AAIJ	12AP LHCB	Repl. by AAIJ 15AV
1 The non-resonant $K\pi$ backgro	ound contribution	s are subtracte	ed. Also reports an <i>S</i> -wave
amplitude $ A_S ^2 = 0.07 \substack{+0.1 \\ -0.0}$	5 7·		
	·	•	
$\Gamma_{\parallel} / \Gamma$ of $K^*(892)^0$ in $B^0_s \rightarrow$	$\psi(2S)\overline{K}^*(892)$	2) ⁰	
VALUE	DOCUMENT ID	TECN	COMMENT
$0.524 \pm 0.056 \pm 0.029$	AAIJ	15∪ LHCB	<i>pp</i> at 7, 8 TeV
$\Gamma_{-}/\Gamma := P^{0} \wedge A^{A}$			
$\Gamma_L/\Gamma \square D_s \rightarrow \psi \psi$			
	<u>DOCUMENT ID</u>	<u>TECN</u>	COMMENT
$0.384 \pm 0.007 \pm 0.003$			n.n. at 13 Ta\/
$0.364 \pm 0.007 \pm 0.003$		14AFTHCB	$p_{P} = 13 \text{ TeV}$
$0.348 \pm 0.041 \pm 0.021$	AALTONEN	11an CDF	$p\overline{p}$ at 1.96 TeV
• • We do not use the following	g data for average	es, fits, limits.	etc. • • •
$0.381 \pm 0.007 \pm 0.012$	^^!!		nn at 7 9 nautial 12 T-1/
$0.301 \pm 0.007 \pm 0.012$	AAIJ		<i>D D</i> at <i>L</i> , o. partial 13 IeV
	A A I I		P_{opl} by $AAII 14AF$
$0.305 \pm 0.022 \pm 0.012$	AAIJ	12P LHCB	Repl. by AAIJ 14AE

Γ_{\perp}/Γ in $B^{0}_{\mathbf{s}} \rightarrow \phi \phi$				
VALUE	DOCUMENT ID		TECN	COMMENT
0.310 ± 0.006 OUR AVERAGE				
$0.310\!\pm\!0.006\!\pm\!0.003$	AAIJ	23AT	LHCB	<i>pp</i> at 13 TeV
$0.305\!\pm\!0.013\!\pm\!0.005$	AAIJ	14AE	LHCB	<i>pp</i> at 7, 8 TeV
$0.365 \!\pm\! 0.044 \!\pm\! 0.027$	AALTONEN	11AN	CDF	<i>р</i> р at 1.96 ТеV
$\bullet~\bullet~\bullet$ We do not use the following	g data for averag	es, fits	s, limits,	etc. • • •
$0.290 \pm 0.008 \pm 0.005$ 1	AAIJ	19 AP	LHCB	pp at 7, 8, partial 13 TeV
$0.291\!\pm\!0.024\!\pm\!0.010$	AAIJ	12P	LHCB	Repl. by AAIJ 14AE

 $^1\,\rm Note:$ in the summary of AAIJ 19AP the systematic uncertainty is 0.007. We take the systematic uncertainty as given in Table 5 in the paper.

ϕ_{\parallel} in $B^0_s o \phi \phi$				
VALUE (rad)	DOCUMENT ID	7	TECN	COMMENT
2.469 \pm 0.029 OUR AVERAGE				
$2.463 \!\pm\! 0.029 \!\pm\! 0.009$	AAIJ	23at L	.HCB	<i>pp</i> at 13 TeV
$2.54 \pm 0.07 \pm 0.09$	¹ AAIJ	14ae L	HCB	<i>pp</i> at 7, 8 TeV
$2.71 \begin{array}{c} +0.31 \\ -0.36 \end{array} \pm 0.22 \qquad $	² AALTONEN	11AN (DF	<i>рр</i> at 1.96 ТеV
• • • We do not use the following	g data for averag	ges, fits,	, limits,	etc. • • •
$\begin{array}{c} 2.559 \pm 0.045 \pm 0.033 \\ 2.57 \ \pm 0.15 \ \pm 0.06 \end{array}$	AAIJ 3 AAIJ	19ap L 12p L	HCB HCB	pp at 7, 8, partial 13 TeV Repl. by AAIJ 14AE
1 AAIJ 14AE reports measureme	ent of ϕ_\perp and ϕ	$-\phi_{\parallel}$, whicl	h we convert into $\phi_{ }.$ Sta-
tistical uncertainty includes councertainties are assumed uncertainties are assumed uncertainti	prrelation betwee porrelated. $\phi_{\parallel} = -0.91 \stackrel{+0.}{-0.}$ $0.844 \pm 0.068 \pm$	in meas $rac{15}{13}\pm 0.$ 0.029 w	ured pa .09 whi /hich w	arameters, while systematic ch we convert to $\phi_{ }$ taking e convert to $\phi_{ }$, taking the
ϕ_{\perp} in $B_{\epsilon}^{0} \rightarrow \phi \phi$				
VALUE (rad)	DOCUMENT ID	7	TECN	COMMENT
2.75 \pm 0.10 OUR AVERAGE				
$2.769 \!\pm\! 0.105 \!\pm\! 0.011$	AAIJ	23at L	HCB	pp at 13 TeV
$2.67 \pm 0.23 \pm 0.07$	AAIJ	14ae L	HCB	<i>pp</i> at 7, 8 TeV
• • We do not use the following	g data for averag	ges, fits,	, limits,	etc. • • •
$2.818 \!\pm\! 0.178 \!\pm\! 0.073$	AAIJ	19ap L	HCB	pp at 7, 8, partial 13 TeV
$\Gamma_L/\Gamma \text{ in } B^0_s \to K^{*0}\overline{K}^{*0}$	DOCUMENT II	ר	TECN	COMMENT
$0.240 \pm 0.031 \pm 0.025$	1 1 1	10		$\frac{1}{2}$ pp at 7 and 8 TeV
• • • We do not use the following	g data for averag	res fits	limits	
		100		
$0.208 \pm 0.032 \pm 0.040$		105		$\begin{array}{c} Repl. by AAIJ 19L \\ Repl. by AAIJ 19c \end{array}$
$0.201 \pm 0.057 \pm 0.040$ 0.31 +0.12 +0.04		10A 12E		Repl. by AAIJ 105 Repl. by $\Delta \Delta I I 15^{1}$
¹ Untagged and time-integrated	analysis within	150 Me	V of th	The K^{*0} mass.

Measured in angular analysis, which takes into account S-, P- and D-wave. contributions.

 3 Measured in angular analysis, which takes into account S-wave contributions.

Γ_{\perp}/Γ in $B_{c}^{0} \rightarrow K^{*0}\overline{K}^{*0}$				
VALUE	DOCUMENT I	D	TECN	COMMENT
0.38±0.11±0.04	AAIJ	12F	LHCB	pp at 7 TeV
$\Gamma_{\parallel}/\Gamma$ in $B^0_s \to K^*(892)^0 \overline{K}^*$	*(892) ⁰			
VALUE	DOCUMENT I	D	TECN	COMMENT
0.297±0.029±0.042	¹ AAIJ	1 85	LHCB	<i>pp</i> at 7, 8 TeV
\bullet \bullet \bullet We do not use the followin	ng data for avera	ges, fits,	limits, e	etc. • • •
$0.215\!\pm\!0.046\!\pm\!0.015$	AAIJ	15AF	LHCB	Repl. by AAIJ 18S
1 Measured in angular analysis,	which takes into	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions.
$\Phi_{\parallel} \text{ in } B^0_s \rightarrow K^*(892)^0 \overline{K}^*(892)^0 \overline{K}^*(89$	892) ⁰			
VALUE	DOCUMENT I	D	TECN	COMMENT
$2.40 \pm 0.11 \pm 0.33$	¹ AAIJ	18 5	LHCB	<i>pp</i> at 7, 8 TeV
\bullet \bullet \bullet We do not use the followin	ng data for avera	ges, fits,	limits, e	etc. • • •
$5.31\!\pm\!0.24\!\pm\!0.14$	AAIJ	15AF	LHCB	Repl. by AAIJ 18S
1 Measured in angular analysis,	which takes into	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions.
Φ_{\perp} in $B_{\epsilon}^{0} \rightarrow K^{*}(892)^{0}\overline{K}^{*}(692)^{0}$	(892) ⁰			
VALUE (rad)	DOCUMENT I	D	TECN	COMMENT
2.62±0.26±0.64	¹ AAIJ	18S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analysis,	which takes into	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions.
Γ_L/Γ in $B^0_{-} \to \phi \overline{K}^{*0}$				
VALUE	DOCUMENT I	D	TECN	COMMENT
0.51±0.15±0.07	AAIJ	13BW	LHCB	pp at 7 TeV
$\Gamma_{\parallel} / \Gamma$ in $B^0_{-} \to \phi \overline{K}^{*0}$				
NALUE	DOCUMENT I	D	TECN	COMMENT
0.21±0.11±0.02	AAIJ	13BW	LHCB	pp at 7 TeV
ϕ_{\parallel} in $B^0 \to \phi \overline{K}^{*0}$				
$\begin{array}{c} \mathbf{v} \parallel \mathbf{u} = \mathbf{s} \mathbf{v} = \mathbf{s} \\ VALUE (rad) \end{array}$	DOCUMENT I	חי	TECN	COMMENT
1 75+0 53+0 29		13BW		nn at 7 TeV
$1 \text{ Moosures } \cos(\phi_{\rm H}) = -0.18 \pm$	-0.52 ± 0.20 wh		ence	ϕ_{μ} by taking the smaller
solution.	0.52 ± 0.29 , with			ϕ_{\parallel} by taking the smaller
Γ_L/Γ in $B^{o}_{s} \rightarrow D^{*o}\phi$				
VALUE	DOCUMENT I	D	TECN	COMMENT
$0.531 \pm 0.060 \pm 0.019$	AAIJ	23AZ	LHCB	<i>pp</i> at 7, 8, 13 TeV
• • Vve do not use the following	ig data for avera	ges, fits,	limits, e	etc. • • •
$0.73 \pm 0.15 \pm 0.04$	AAIJ	18AY	LHCB	Repl. by AAIJ 23AZ
Γ_L/Γ in $B^0_s \to K^*(892)^0 \overline{K}$	*(1430) ⁰			
VALUE	<u>DOCUMENT I</u>	D	TECN	COMMENT
$0.911 \pm 0.020 \pm 0.165$	¹ AAIJ	18S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analysis,	which takes into	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions.
1 // 1.111			C ·	
https://pdg.lbl.gov	Page 68		Creat	ea: 5/30/2025 07:50

$\Gamma_{\parallel}/\Gamma$ in $B^0_{\epsilon} \rightarrow K^*(892)^0$	⁰ <i>K</i> [*] ₂ (1430) ⁰			
VALUE	DOCUMENT ID)	TECN	COMMENT
$0.012 \pm 0.008 \pm 0.053$	1 AAIJ	18S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analy	sis, which takes into a	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions
Γ_L/Γ in $B_s^0 \rightarrow K_2^*(1430)$) ⁰ <i>K</i> *(892) ⁰			
VALUE	DOCUMENT ID)	TECN	COMMENT
$0.62 \pm 0.16 \pm 0.25$	¹ AAIJ	18 S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analy	sis, which takes into a	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions
$\Gamma_{\parallel}/\Gamma$ in $B_c^0 \rightarrow K_2^*(1430)$) ⁰ <i>K</i> *(892) ⁰			
VALUE	DOCUMENT IL)	TECN	COMMENT
$0.24 \pm 0.10 \pm 0.14$	¹ AAIJ	18 S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analy	sis, which takes into a	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions
Γ_{I}/Γ in $B^{0} \rightarrow K_{*}^{*}(1430)$) ⁰ K*(1430) ⁰			
VALUE	<u>DOCUMENT ID</u>)	TECN	<u>COMMENT</u>
0.25±0.14±0.18	¹ AAIJ	18 S	LHCB	<i>pp</i> at 7, 8 TeV
1 Measured in angular analy	sis, which takes into a	account	<i>S</i> -, <i>P</i> - a	nd <i>D</i> -wave. contributions
$\Gamma_{\rm W1}/\Gamma$ in $B^0 \rightarrow K^*_*(143)$	0) ⁰ K*(1430) ⁰			
VALUE	DOCUMENT I)	TECN	COMMENT
$0.17 \pm 0.11 \pm 0.14$		185	I HCB	pp at 7, 8 TeV
1 Measured in angular analy	sis, which takes into a	account	S P- a	nd <i>D</i> -wave. contributions
	$0.00 \frac{1}{10} \times (1.400)0$		-,	
$I_{\perp 1}/I$ in $B_s^{\circ} \rightarrow K_2^{\circ}(143)$	$(0)^{\circ} K_{2}^{*} (1430)^{\circ}$		TECH	
$\frac{VALUE}{0.20\pm0.19\pm0.21}$	<u>DOCUMENT IL</u>) 10c		
1 Mossured in angular analy	AAIJ		S P a	pp at r, o rev
	33, when takes into a	iccount	J-, I - a	
$\Gamma_{\parallel 2}/\Gamma$ in $B_s^0 \to K_2^*(1430)$	0) ^o K [*] ₂ (1430) ^o			
VALUE	<u>DOCUMENT ID</u>)	TECN	COMMENT
$0.015 \pm 0.033 \pm 0.107$	[±] AAIJ	185	LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured in angular analy	sis, which takes into a	ccount	<i>S</i> -, <i>P</i> - ar	nd <i>D</i> -wave . contributions
$F_L(B^0_s \to \phi \mu^+ \mu^-) (0.1)$	$10 < q^2 < 2.00 Ge$	eV²/c⁴)	
VALUE	DOCUMENT ID)	TECN	COMMENT
$0.20^{+0.08}_{-0.09} \pm 0.02$	AAIJ	15AG	LHCB	<i>pp</i> at 7, 8 TeV
 We do not use the following the fol	owing data for averag	es, fits,	limits, e	etc. ● ● ●
$0.37^{+0.19}_{-0.17} \pm 0.07$	AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
-0.17	-	• •		
$F_L(B_s^0 \to \phi \mu^+ \mu^-) (2.0)$	$00 < q^2 < 5.0 \text{ Ge}$	√²/c⁴)		
VALUE	<u>DOCUMENT IE</u>)	TECN	COMMENT
$0.68^{+0.16}_{-0.13}\pm0.03$	AAIJ	15AG	LHCB	<i>pp</i> at 7, 8 TeV
• • • We do not use the follo	owing data for averag	es, fits,	limits, e	etc. • • •
$0.53 + 0.25 \pm 0.10$	¹ AAIJ	13X	LHCB	Repl. by AAIJ 15AQ
-0.23 1 Measured in 2.0 $< a^2 < c$	$4.3 \text{ GeV}^2/c^4$			
https://pdg.lbl.gov	Page 69		Creat	ed: 5/30/2025 07:50

 $\frac{\mathsf{F}_{L}(B^{0}_{s} \rightarrow \phi \mu^{+} \mu^{-}) (5.0 < \mathsf{q}^{2} < 8.0 \text{ GeV}^{2}/\mathsf{c}^{4})}{\frac{DOCUMENT \ ID}{}}$ TECN COMMENT $0.54^{+0.10}_{-0.09}{\pm}0.02$ 15AQ LHCB pp at 7, 8 TeV AAIJ • • • We do not use the following data for averages, fits, limits, etc. • • • $0.81^{+0.11}_{-0.13}\!\pm\!0.05$ 1 AAIJ 13X LHCB Repl. by AAIJ 15AQ ¹ Measured in $4.3 < q^2 < 8.68 \text{ GeV}^2/c^4$. $\begin{array}{ccc} \mathsf{F}_{L}(B^{0}_{s} \rightarrow \phi \mu^{+} \mu^{-}) \text{ (11.0 } < \mathsf{q}^{2} < 12.5 \text{ GeV}^{2}/\mathsf{c}^{4}) \\ \hline \mathcal{V}_{ALUE} & \underline{\mathcal{D}_{OCUMENT \ ID}} & \underline{\mathsf{TECN}} & \underline{\mathcal{C}_{OMMENT}} \end{array}$ $0.29 \pm 0.11 \pm 0.04$ AALL 15AQ LHCB pp at 7, 8 TeV • • We do not use the following data for averages, fits, limits, etc. • • • $0.33^{+0.14}_{-0.12}{\pm}0.06$ 1 AAIJ 13X LHCB Repl. by AAIJ 15AQ ¹ Measured in $10.09 < q^2 < 12.90 \text{ GeV}^2/c^4$. $F_{L}(B_{s}^{0} \rightarrow \phi \mu^{+} \mu^{-}) (15.0 < q^{2} < 17.0 \text{ GeV}^{2}/c^{4})$ VALUE DOCUMENT ID TECN COMMENT $0.23^{+0.09}_{-0.08}{\pm}0.02$ 15AQ LHCB pp at 7, 8 TeV AAIJ • • We do not use the following data for averages, fits, limits, etc. • • • $0.34^{+0.18}_{-0.17}\pm0.07$ ¹ AAIJ 13X LHCB Repl. by AAIJ 15AQ ¹Measured in 14.18 $< q^2 < 16 \text{ GeV}^2/c^4$. $F_{L}(B_{s}^{0} \rightarrow \phi \mu^{+} \mu^{-}) (17.0 < q^{2} < 19.0 \text{ GeV}^{2}/c^{4})$ VALUE DOCUMENT ID TECN COMMENT $0.40^{+0.13}_{-0.15}{\pm}0.02$ 15AQ LHCB pp at 7, 8 TeV AAIJ • • • We do not use the following data for averages, fits, limits, etc. • • • $0.16^{+0.17}_{-0.10}\pm0.07$ 1 AAIJ 13X LHCB Repl. by AAIJ 15AQ ¹Measured in 16.0 < q^2 < 19.0 GeV²/c⁴. $F_{L}(B_{s}^{0} \rightarrow \phi \mu^{+} \mu^{-}) (15.0 < q^{2} < 18.9 \text{ GeV}^{2}/c^{4})$ VALUE <u>DOCUMENT ID</u> <u>TECN</u> <u>COMMENT</u> $0.359 \pm 0.031 \pm 0.019$ 21AK LHCB pp at 7, 8, 13 TeV AAIJ $F_L(B_s^0 \rightarrow \phi \mu^+ \mu^-)$ (1.00 < q² < 6.00 GeV²/c⁴) VALUE DOCUMENT ID TECN COMMENT 21AK LHCB pp at 7, 8, 13 TeV $0.715 \pm 0.036 \pm 0.013$ AALI • • We do not use the following data for averages, fits, limits, etc. • • • $0.63 \begin{array}{c} +0.09 \\ -0.09 \end{array} \pm 0.03$ AAIJ 15AQ LHCB Repl. by AAIJ 21AK $0.56 \begin{array}{c} +0.17 \\ -0.16 \end{array} \pm 0.09$ AAIJ 13X LHCB Repl. by AAIJ 15AQ

$B_s^0 - \overline{B}_s^0$ MIXING

For a discussion of $B_s^0 - \overline{B}_s^0$ mixing see the note on " $B^0 - \overline{B}^0$ Mixing" in the B^0 Particle Listings above.

 χ_s is a measure of the time-integrated $B_s^0 - \overline{B}_s^0$ mixing probability that produced $B_s^0 (\overline{B}_s^0)$ decays as a $\overline{B}_s^0 (B_s^0)$. Mixing violates $\Delta B \neq 2$ rule.

$$\chi_{\boldsymbol{s}} = \frac{x_{\boldsymbol{s}}^2}{2(1+x_{\boldsymbol{s}}^2)}$$

$$x_{s} = \frac{\Delta m_{B_{s}^{0}}}{\Gamma_{B_{s}^{0}}} = (m_{B_{sH}^{0}} - m_{B_{sL}^{0}}) \tau_{B_{s}^{0}},$$

where H, L stand for heavy and light states of two B_s^0 CP eigenstates and

$$\tau_{B_{s}^{0}} = \frac{1}{0.5(\Gamma_{B_{sH}^{0}} + \Gamma_{B_{sL}^{0}})}$$

 $\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0}$ $\Delta m_{B_s^0} \text{ is a measure of } 2\pi \text{ times the } B_s^0 - \overline{B}_s^0 \text{ oscillation frequency in time-dependent}$ mixing experiments.

VALUE (10 ¹²	$\hbar \text{ s}^{-1}$)	CL%	DOCUMENT ID		TECN	COMMENT
17.765 🗄	±0.006	OUR EVA	LUATION (Proc	luced	by HFL	AV)
17.765 ±0.005 OUR AVERAGE						
17.743 🗄	±0.033	± 0.009	¹ AAIJ	24A	LHCB	<i>pp</i> at 13 TeV
$17.7683 \pm$	±0.0051	± 0.0032	² AAIJ	22B	LHCB	<i>pp</i> at 13 TeV
17.757 🗄	±0.007	± 0.008	³ AAIJ	21M	LHCB	<i>pp</i> at 7, 8, 13 TeV
17.51 4	+0.10 -0.09	± 0.03	⁴ SIRUNYAN	21E	CMS	<i>pp</i> at 13 TeV
17.768 🗄	±0.023	± 0.006	² AAIJ	13BI	LHCB	pp at 7 TeV
17.93 🗄	±0.22	± 0.15	⁵ AAIJ	13CF	LHCB	pp at 7 TeV
17.77 🗄	± 0.10	± 0.07	⁶ ABULENCIA,A	06 G	CDF	<i>рр</i> at 1.96 ТеV
• • • We d	lo not u	se the follo	owing data for avera	ages, †	fits, limi	ts, etc. ● ● ●
17.703 🗄	±0.059	± 0.018	¹ AAIJ	19Q	LHCB	Repl. by AAIJ 24A
17.711 _	+0.055 -0.057	± 0.011	¹ AAIJ	151	LHCB	Repl. by AAIJ 19Q
17.63 🗄	± 0.11	± 0.02	⁷ AAIJ	121	LHCB	Repl. by AAIJ 21M
17–21		90	⁸ ABAZOV	06 B	D0	p p at 1.96 TeV
17.31 +	+0.33 -0.18	± 0.07	⁹ ABULENCIA	06Q	CDF	Repl. by ABULEN- CIA.A 06G
> 8.0		95	¹⁰ ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 4.9		95	¹¹ ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 8.5		95	¹² ABDALLAH	04J	DLPH	$e^+e^- \rightarrow Z^0$
> 5.0		95	¹³ ABDALLAH	03 B	DLPH	$e^+e^- \rightarrow Z$
>10.3		95	¹⁴ ABE	03	SLD	$e^+e^- \rightarrow Z$
>10.9		95	¹⁵ HEISTER	03E	ALEP	$e^+e^- \rightarrow Z$
> 5.3		95	¹⁶ ABE	02V	SLD	$e^+e^- \rightarrow Z$
> 1.0		95	¹⁷ ABBIENDI	01 D	OPAL	$e^+e^- \rightarrow Z$

> 7.4	95	¹⁸ ABREU	00Y	DLPH	Repl. by ABDALLAH 04J
> 4.0	95	¹⁹ ABREU,P	00 G	DLPH	$e^+e^- \rightarrow Z$
> 5.2	95	²⁰ ABBIENDI	99s	OPAL	$e^+e^- \rightarrow Z$
<96	95	²¹ ABE	99 D	CDF	<i>р</i> рат 1.8 ТеV
> 5.8	95	²² ABE	99J	CDF	$p \overline{p}$ at 1.8 TeV
> 9.6	95	²³ BARATE	99J	ALEP	$e^+e^- \rightarrow Z$
> 7.9	95	²⁴ BARATE	9 8C	ALEP	Repl. by BARATE 99J
> 3.1	95	²⁵ ACKERSTAFF	97 U	OPAL	Repl. by ABBIENDI 99S
> 2.2	95	²⁶ ACKERSTAFF	97v	OPAL	Repl. by ABBIENDI 99S
> 6.5	95	²⁷ ADAM	97	DLPH	Repl. by ABREU 00Y
> 6.6	95	²⁸ BUSKULIC	96M	ALEP	Repl. by BARATE 98C
> 2.2	95	²⁶ AKERS	95J	OPAL	Sup. by ACKERSTAFF 97
> 5.7	95	²⁹ BUSKULIC	95J	ALEP	$e^+e^- \rightarrow Z$
> 1.8	95	²⁶ BUSKULIC	94 B	ALEP	$e^+e^- \rightarrow Z$

¹Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays.

² Measured using $B_s^0 \rightarrow D_s^- \pi^+$ decays. ³ Measured using $B_s^0 \rightarrow D_s^- \pi^+ \pi^- \pi^+$ decays.

⁴ Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

⁵ Measured using $B_s^0 \rightarrow D_s^- \mu^+ \nu_\mu X$ decays.

⁶Significance of oscillation signal is 5.4 σ . Also reports $|V_{td}$ / $V_{ts}|$ = 0.2060 \pm $0.0007^{+0.0081}_{-0.0060}$.

⁷Measured using $B_s^0 \rightarrow D_s^- \pi^+$ and $D_s^- \pi^+ \pi^- \pi^+$ decays.

 8 A likelihood scan over the oscillation frequency, $\Delta m_{_S}$, gives a most probable value of 19 ps $^{-1}$ and a range of 17 < Δm_s <21 (ps $^{-1}$) at 90% C.L. assuming Gaussian uncertainties. Also excludes $\Delta m_s < 14.8 \text{ ps}^{-1}$ at 95% C.L

 9 Significance of oscillation signal is 0.2%. Also reported the value $\left|V_{td} \ / \ V_{ts}\right| = 0.208^{+0.001+0.008}_{-0.002-0.006}$

 10 Uses leptons emitted with large momentum transverse to a jet and improved techniques for vertexing and flavor-tagging.

¹¹ Updates of D_s -lepton analysis.

¹² Combined results from all Delphi analyses.

- 13 Events with a high transverse momentum lepton were removed and an inclusively reconstructed vertex was required.
- $^{14}\,\mathrm{ABE}$ 03 uses the novel "charge dipole" technique to reconstruct separate secondary and tertiary vertices originating from the $B \rightarrow D$ decay chain. The analysis excludes $\Delta m_s < 4.9 \text{ ps}^{-1}$ and $7.9 < \Delta m_s < 10.3 \text{ ps}^{-1}$.
- 15 Three analyses based on complementary event selections: (1) fully-reconstructed hadronic decays; (2) semileptonic decays with D_s exclusively reconstructed; (3) inclusive semileptonic decays.
- 16 ABE 02V uses exclusively reconstructed D_s^- mesons and excludes $\Delta m_s <$ 1.4 ps $^{-1}$ and $2.4 < \Delta m_s < 5.3 \, \mathrm{ps}^{-1}$ at 95%CL.
- 17 Uses fully or partially reconstructed $D_{_{S}}\ell$ vertices and a mixing tag as a flavor tagging.
- ¹⁸ Replaced by ABDALLAH 04A. Uses $D_s^-\ell^+$, and $\phi\ell^+$ vertices, and a multi-variable discriminant as a flavor tagging.
- ¹⁹Uses inclusive D_s vertices and fully reconstructed B_s decays and a multi-variable discriminant as a flavor tagging.

²⁰ Uses ℓ - Q_{hem} and ℓ - ℓ .
$^{21}\,{\rm ABE}$ 99D assumes $\tau_{B^0}^{}=1.55\pm0.05$ ps and $\Delta\Gamma/\Delta\mathit{m}=(5.6\pm2.6)\times10^{-3}.$

²²ABE 99J uses $\phi \ell - \ell$ correlation.

 23 BARATE 99J uses combination of an inclusive lepton and D_s^- -based analyses.

²⁴ BARATE 98C combines results from $D_s h-\ell/Q_{hem}$, $D_s h-K$ in the same side, $D_s \ell$ - ℓ/Q_{hem} and $D_s \ell$ -K in the same side.

25 Uses ℓ-Q_{hem}.

²⁶ Uses $\ell - \ell$. ²⁷ ADAM 97 combines results from $D_s \ell - Q_{hem}$, $\ell - Q_{hem}$, and $\ell - \ell$.

 28 BUSKULIC 96M uses D_s lepton correlations and lepton, kaon, and jet charge tags.

²⁹ BUSKULIC 95J uses ℓ - Q_{hem} . They find $\Delta m_s > 5.6$ [> 6.1] for f_s =10% [12%]. We interpolate to our central value f_s =10.5%.

$x_s = \Delta m_{B_s^0} / \Gamma_{B_s^0}$

Derived from the results on $\Delta m_{B_s^0}$ and "OUR EVALUATION" of the B_s^0 mean lifetime.

VALUE 26.93±0.10 OUR EVALUATION DOCUMENT ID (Produced by HFLAV)

χs

This is a $B_s^0 - \overline{B}_s^0$ integrated mixing parameter derived from x_s above and OUR EVAL-UATION of $\Delta \Gamma_{B_s^0} / \Gamma_{B_s^0}$.

VALUE DOCUMENT ID 0.499314±0.000005 OUR EVALUATION (Produced by HFLAV)

CP VIOLATION PARAMETERS in B_s^0

$$\operatorname{Re}(\epsilon_{B^0_s}) \ / \ (1 + \big| \epsilon_{B^0_s} \big|^2)$$

CP impurity in B_s^0 system.

"OUR EVALUATION" is the result of a fit to B_d and B_s CP asymmetries, which includes the B_s measurements listed below and the B_d measurements listed in the B_d section, and takes into account correlations between those measurements.

VALUE (units 10^{-3})	DOCUMENT ID		TECN	COMMENT
-0.15 ± 0.70 OUR EVALUATIO	N (Produced by	HFLA	/)	
0.0 \pm 1.1 OUR AVERAGE	Error includes scale	factor	of 1.6.	See the ideogram below.
$0.98\!\pm\!0.65\!\pm\!0.5$	¹ AAIJ	16G	LHCB	<i>pp</i> at 7, 8 TeV
-2.15 ± 1.85	² ABAZOV	14	D0	<i>р</i> рат 1.96 ТеV
$-2.8 \pm 1.9 \pm 0.4$	³ ABAZOV	13	D0	<i>р</i> рат 1.96 ТеV
\bullet \bullet \bullet We do not use the follow	ing data for average	s, fits,	limits, e	etc. • • •
$-0.15\pm1.25\pm0.90$	⁴ AAIJ	14D	LHCB	Repl. by AAIJ 16G
-4.5 ± 2.7	⁵ ABAZOV	110	D0	Repl. by ABAZOV 14
$-0.4 \pm 2.3 \pm 0.4$	⁶ ABAZOV	10E	D0	Repl. by ABAZOV 13
-3.6 ± 1.9	⁷ ABAZOV	10H	D0	Repl. by ABAZOV 110
$6.1\ \pm 4.8\ \pm 0.9$	⁸ ABAZOV	07A	D0	Repl. by ABAZOV 10E
1 AAIJ 16G reports a measure	ement of time-integr	ated fl	avor-spe	ecific asymmetry in $B^0_{m{s}} ightarrow$
$\mu^+ D_s^- X$ decays, $A_{SL}^s = ($	$0.39 \pm 0.26 \pm 0.20)$	%, wh	ich is ap	oproximately equal to 4 $ imes$
$\operatorname{Re}(\epsilon_{B_s^0}) / (1 + \epsilon_{B_s^0} ^2).$				

- ²ABAZOV 14 uses the dimuon charge asymmetry with different impact parameters from which it reports $A_{SL}^s = (-0.86 \pm 0.74) \times 10^{-2}$.
- ³ABAZOV 13 reports a measurement of time-integrated flavor-specific asymmetry in mixed semileptonic $B_s^0 \rightarrow \mu^+ D_s^- X$ decays $A_{SL}^s = (-1.12 \pm 0.74 \pm 0.17)\%$ which is approximately equal to $4 \times \operatorname{Re}(\epsilon_{B_s^0}) / (1 + |\epsilon_{B_s^0}|^2)$.
- ⁴ AAIJ 14D reports a measurement of time-integrated flavor-specific asymmetry in $B_s^0 \rightarrow \mu^+ D_s^- X$ decays, $A_{SL}^s = (-0.06 \pm 0.50 \pm 0.36)\%$, which is approximately equal to $X \operatorname{Re}(\epsilon_{B_s^0}) / (1 + |\epsilon_{B_s^0}|^2)$.
- ⁵ABAZOV 11U uses the dimuon charge asymmetry with different impact parameters from which it reports $A_{SL}^s = (-18.1 \pm 10.6) \times 10^{-3}$.
- ⁶ ABAZOV 10E reports a measurement of flavor-specific asymmetry in $B_{(s)}^0 \rightarrow \mu^+ D_{(s)}^{*-} X$ decays with a decay-time analysis including initial-state flavor tagging, $A_{SL}^s = (-1.7 \pm 9.1^{+1.4}_{-1.5}) \times 10^{-3}$ which is approximately equal to $4 \times \text{Re}(\epsilon_{B_s^0}) / (1 + |\epsilon_{B_s^0}|^2)$.
- ⁷ ABAZOV 10H reports a measurement of like-sign dimuon charge asymmetry of $A_{SL}^s = (-9.57 \pm 2.51 \pm 1.46) \times 10^{-3}$ in semileptonic *b*-hadron decays. Using the measured production ratio of B_d^0 and B_0^0 , and the asymmetry of $B_d^0 A_{SL}^s = (-4.7 \pm 4.6) \times 10^{-3}$ measured from *B*-factories, they obtain the asymmetry for B_c^0 .
- ⁸ The first direct measurement of the time integrated flavor untagged charge asymmetry in semileptonic B_s^0 decays is reported as $2 \times A_{SL}^s$ (untagged) = $A_{SL}^s = (2.45 \pm 1.93 \pm 0.35) \times 10^{-2}$.





$C_{KK}(B_s^0 \rightarrow K^+K^-)$					
	DOCUMENT ID		TECN	COMMENT	
0.102 ± 0.033 COR AVERAGE	AALI	210	I HCB	nn at 13 TeV	
$0.14 \pm 0.11 \pm 0.03$	AAIJ	13BO	LHCB	pp at 7 TeV	
$S_{KK}(B_s^{\circ} \rightarrow K^+K^-)$					
0.14 ±0.05 OUR AVERAGE E	Error includes scale	factor	r of 1.3	COMMENT	
$0.123 \pm 0.034 \pm 0.015$	AAIJ	210	LHCB	pp at 13 TeV	
$0.30 \ \pm 0.12 \ \pm 0.04$	AAIJ	13BO	LHCB	pp at 7 TeV	
$\mathbf{r}_{B}(B^{0}_{s} \rightarrow D^{\mp}_{s} K^{\pm})$ $\mathbf{r}_{B} \text{ and } \delta_{B} \text{ are the amplitu}$ of $A(B^{0}_{s} \rightarrow D^{+}_{s} K^{-})$ and	de ratio and relativ $A(B^0_s o D^s \kappa^+)$	ve stro),	ng phas	e between the amplitudes	
VALUE	DOCUMENT ID		TECN	COMMENT	
$0.37^{+0.10}_{-0.09}$	¹ AAIJ	18 U	LHCB	<i>pp</i> at 7, 8 TeV	
$\bullet~\bullet~\bullet$ We do not use the following	g data for average	s, fits,	limits, e	etc. • • •	
$0.53 \substack{+0.17 \\ -0.16}$	² AAIJ	14BF	LHCB	Repl. by AAIJ 180	
$ {}^{2}\text{Measured in } B_{s}^{0} \rightarrow D_{s}^{\mp}K^{\pm} $ $ {}^{0.01 \pm 0.07 \pm 0.0 \text{ from AAIJ}} $ $ {}^{r}B(B_{s}^{0} \rightarrow D_{s}^{\mp}K^{\pm}\pi^{\pm}\pi^{\mp}) $	decays, constraini 13AR. At 68% CL	ng — 2	β_s by t	he measurement of $\phi_{\mathbf{S}}$ =	
VALUE	DOCUMENT ID		TECN	<u>COMMENT</u>	
$0.47 \pm 0.08 \stackrel{+0.02}{-0.03}$	^{1,2} AAIJ	21M	LHCB	<i>pp</i> at 7, 8, 13 TeV	
¹ Measured in restricted phase space with $m(K^+\pi^+\pi^-) < 1950$ MeV, $m(K^+\pi^-) < 1200$ MeV and $m(\pi^+\pi^-) < 1200$ MeV. ² A model-independent coherence factor for the decay $B_s \rightarrow D_s K \pi \pi$ (in the restricted phase space region) is also reported.					
$O_B(D_s \rightarrow D_s \wedge)$	DOCUMENT ID		TECN	COMMENT	
value ()	1		TECN	COMMENT	
358-14	+ AAIJ	180	LHCB	<i>pp</i> at 7, 8 TeV	
• • We do not use the followin	g data for average	s, fits,	limits, e	etc. • • •	
3^{+19}_{-20}	² AAIJ	14BF	LHCB	Repl. by AAIJ 180	
¹ Measured in $B_s^0 \rightarrow D_s^{\mp} K^{\pm}$ 0.030 \pm 0.033 from HFLAV. ² Measured in $B_s^0 \rightarrow D_s^{\mp} K^{\pm}$ 0.01 \pm 0.07 \pm 0.0 from AAIJ	decays, constraini The value is modu decays, constraini 13AR. The value i	ng —2 lo 180° ng —2 s modi	β_s by the second se	he measurement of ϕ_{s} = he measurement of ϕ_{s} = ϕ_{s} at 68% CL.	
$\delta_B(B^0_a \rightarrow D^{\pm}_a K^{\mp} \pi^{\pm} \pi^{\mp})$					
✓ S S ····· /	<u>DO</u> CUMENT ID		TECN	COMMENT	
-6^{+10+2}_{-12-4}	1,2 AAIJ	21M	LHCB	<i>pp</i> at 7, 8, 13 TeV	
https://pdg.lbl.gov	Page 75		Creat	ed: 5/30/2025 07:50	

- ¹Measured in restricted phase space with m($K^+\pi^+\pi^-$) < 1950 MeV, m($K^+\pi^-$)
- < 1200 MeV and m($\pi^+\pi^-$) < 1200 MeV. The value is modulo 180°. ² A model-independent coherence factor for the decay $B_s \rightarrow D_s K \pi \pi$ (in the restricted phase space region) is also reported.

CP Violation phase β_s ($b \rightarrow c \overline{c} s$)

 $-2eta_s$ is the weak phase difference between B^0_s mixing amplitude and the $B^0_s o J/\psi \, \phi$ decay amplitude driven by the $b \rightarrow c \overline{c} s$ transition (such as $B_s \rightarrow J/\psi \phi$, $J/\psi K^+ K^-$, $J/\psi \pi^+ \pi^-$, and $D_s^+ D_s^-$). The Standard Model value of β_s is $\arg(-\frac{V_{ts}V_{tb}^*}{V_{cs}V_{cb}^*})$ if penguin contributions are neglected.

VALUE (10^{-2} rad)	DOCUMENT ID	TECN	COMMENT
2.0 \pm 0.8 OUR EVAL	UATION (Produce	d by HFLAV)	
1.9 \pm 0.8 OUR AVER	RAGE		
$4.3~\pm~5.3~\pm1.4$	¹ AAIJ	25A LHCB	<i>pp</i> at 13 TeV
$1.9~\pm~1.1~\pm0.3$	² AAIJ	24A LHCB	pp at 13 TeV
$4.05 \pm \ 2.05 \pm 1.10$	^{3,4} AAD	21AE ATLS	<i>pp</i> at 13 TeV
$0 \pm 14 \pm 4$	⁵ AAIJ	21AN LHCB	<i>pp</i> at 7, 8 TeV
$0.5~\pm~2.5~\pm0.5$	^{6,7} SIRUNYAN	21E CMS	<i>pp</i> at 13 TeV
$2.85 \pm \ 3.00 \pm 0.55$	^{8,9} AAIJ	19AF LHCB	<i>pp</i> at 13 TeV
$-5.95\pm5.35{\pm}1.70$	¹⁰ AAIJ	17∨ LHCB	<i>pp</i> at 7, 8 TeV
$5.05 \pm 4.10 \pm 2.10$	11,12 AAD	16AP ATLS	pp at 8 TeV
$-11.5 \ +14 \ -14.5 \ \pm 1$	¹³ AAIJ	16AK LHCB	<i>pp</i> at 7, 8 TeV
$3.75 \pm 4.85 \pm 1.55$	¹⁴ KHACHATRY.	16s CMS	<i>pp</i> at 8 TeV
$2.9~\pm~2.5~\pm0.3$	¹⁵ AAIJ	15I LHCB	<i>pp</i> at 7, 8 TeV
$- 6 \pm 13 \pm 3$	¹⁶ AAD	14∪ ATLS	<i>pp</i> at 7 TeV
$-$ 1 \pm 9 \pm 1	¹⁷ AAIJ	14AY LHCB	<i>pp</i> at 7, 8 TeV
$-$ 3.5 \pm 3.4 \pm 0.4	¹⁸ AAIJ	14s LHCB	<i>pp</i> at 7, 8 TeV
	¹⁹ AALTONEN	12aj CDF	p p at 1.96 TeV
$\begin{array}{cc} 28 & +18 \\ & -19 \end{array}$	²⁰ ABAZOV	12D D0	p p at 1.96 TeV
$\bullet \bullet \bullet$ We do not use the fo	ollowing data for avera	ges, fits, limit	s, etc. ● ● ●
$4.15 \pm \ 2.05 \pm 0.30$	²¹ AAIJ	19Q LHCB	Repl. by AAIJ 24A
$5.0~\pm~6.5~\pm7.0$	²² AAIJ	185 LHCB	<i>pp</i> at 7, 8 TeV
$6 + \frac{8}{7}$	^{23,24} AAIJ	15ĸ LHCB	<i>pp</i> at 7, 8 TeV
$-$ 0.5 \pm 3.5 \pm 0.5	²⁵ AAIJ	13AR LHCB	Repl. by AAIJ 15
$-11.0 \pm 20.5 \pm 5.0$	²⁶ AAD	12cv ATLS	Repl. by AAD 140
$22 \pm 22 \pm 1$	²⁷ AAIJ	12B LHCB	Repl. by AAIJ 12Q
$-8 \pm 9 \pm 3$	²⁸ AAIJ	12D LHCB	Repl. by AAIJ 13AR
0.95^+ $\begin{array}{r} 8.70+0.15\\ 8.65-0.20 \end{array}$	²⁹ AAIJ	12Q LHCB	Repl. by AAIJ 13AR
	³⁰ AALTONEN	12D CDF	Repl. by AALTONEN 12AJ
	³¹ AALTONEN	08G CDF	Repl. by AALTONEN 12D
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	^{20,32} ABAZOV	08AM D0	Repl. by ABAZOV 12D
$39.5 \ \pm 28.0 \ {}^{+0.5}_{-7.0}$	^{33,34} ABAZOV	07 D0	Repl. by ABAZOV 07N
$35 + 20 \\ -24$	^{34,35} ABAZOV	07N D0	Repl. by ABAZOV 08AM

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- 1 AAIJ 25A reports $\phi_{s}=-2~eta_{s}=-0.086\pm0.106\pm0.028$ rad. in a time-dependent fit to $B_s^0 \rightarrow D_s^+ D_s^-$, while allowing *CP* violation in decay.
- ²AAIJ 19Q reports $\phi_s = -2 \ \beta_s = -0.039 \pm 0.022 \pm 0.006$ rad. measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays.
- 3 Reports a combination of 0.0435 \pm 0.0180 \pm 0.0105 with AAD 16AP.
- 4 AAD 21AE measured $\phi_{s}=-2~eta_{s}=-0.087\pm0.036\pm0.021$ rad. using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.
- 5 AAIJ 21AN measured $\phi_{m{s}}=-2eta_{m{s}}=0.00\pm0.28\pm0.07$ rad, using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays with $J/\psi \rightarrow e^+e^-$.
- 6 Reports a combination of 0.0105 \pm 0.0220 \pm 0.0050 with KHACHATRYAN 16s.
- $^7 \, {\sf SIRUNYAN}$ 21E measured $\phi_s = -2 \; \beta_s = -0.021 \pm 0.044 \pm 0.010$ rad. using a timedependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.
- $^{8}\,\text{Reports}$ a combination of $-0.001\pm0.022\pm0.006$ with AAIJ 14s.
- ⁹ AAIJ 19AF reports $\phi_s = -2 \ \beta_s = 0.002 \pm 0.044 \pm 0.012$ rad. and $|\lambda| = 0.949 \pm 0.036 \pm 0.019$, when direct *CP* violation is allowed. Measured using a time-dependent fit to $B_{\rm s}^0 \rightarrow J/\psi \pi^+ \pi^-$ decays.
- ¹⁰ Measured $\phi_s = -2 \ \beta_s = 0.119 \pm 0.107 \pm 0.034$ rad using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ in the region m(KK) > 1.05 GeV.
- 11 Reports a combination of 0.0435 \pm 0.0180 \pm 0.0105 with AAD 14U.
- 12 AAD 16AP reports ϕ_s = -2 eta_s = -0.090 \pm 0.078 \pm 0.041 rad. that was measured
- using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi\phi$ decays. ¹³AAIJ 16AK reports $\phi_s = -2 \ \beta_s = 0.23 \substack{+0.29 \\ -0.28} \pm 0.02$ rad. that was measured using a time-dependent angular analysis of $B^0_{m{s}} o \ \psi(2S) \phi$ decays.
- ¹⁴ KHACHATRYAN 16S reports $\phi_s = -2 \ \beta_s = -0.075 \pm 0.097 \pm 0.031$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.
- ¹⁵ AAIJ 151 reports $\phi_s = -2 \ \beta_s = -0.058 \pm 0.049 \pm 0.006$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays. It also combines this result with that of AAIJ 14S and quotes $\phi_s = -2 \beta_s = -0.010 \pm 0.039$ rad.
- $^{16}{\rm AAD}$ 140 reports ϕ_s = -2 β_{s} = 0.12 \pm 0.25 \pm 0.05 rad. that was measured using a time-dependent angular analysis of $B^0_{s} \rightarrow J/\psi \phi$ decays.
- 17 AAIJ 14AY reports $\phi_{\pmb{s}}=-2$ $\beta_{\pmb{s}}=0.02\pm0.17\pm0.02$ rad. in a time-dependent fit to $B_s^0 \rightarrow D_s^+ D_s^-$, while allowing *CP* violation in decay.
- $^{18}\,{\rm AAIJ}$ 14S reports $\phi_{\rm S}=-2\,\beta_{\rm S}=0.070\pm0.068\pm0.008$ rad. and $\left|\lambda\right|=0.89\pm0.05\pm0.01$, when direct CP violation is allowed. Measured using a time-dependent fit to $B_c^0 \rightarrow$ $J/\psi \pi^+ \pi^-$ decays.
- ¹⁹AALTONEN 12AJ reports $-\pi/2 < \beta_s < -1.51$ or $-0.06 < \beta_s < 0.30$, or $1.26 < \beta_s < 0.30$ $\pi/2$ rad. at 68% CL. Measured using the time-dependent angular analysis of $B_s^0 \rightarrow$ $J/\psi\phi$ decays.
- 20 ABAZOV 12D reports ϕ_{s} = -2 β_{s} = $-0.55 \substack{+0.38 \\ -0.36}$ rad. that was measured using a time-dependent angular analysis of $B^0_s o J/\psi \phi$ decays. A single error includes both statistical and systematic uncertainties.
- $^{21}\,{\sf AAIJ}$ 19Q reports $\phi_{{\pmb s}}=-2~\beta_{{\pmb s}}=-0.083\pm0.041\pm0.006$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ decays.

- 22 AAIJ 185 reports ϕ_s = -2 β_s = -0.10 \pm 0.13 \pm 0.14 rad measured in $B_s^0 \rightarrow$ $(K^+\pi^-)(K^-\pi^+)$ in the region 0.75 < m $(K^\pm\pi^\mp)$ < 1.6 GeV. This is a $b \to d \overline{ds}$ transition with a decay amplitude phase different from that of $b \to c \overline{cs}$ transition.
- 23 AAIJ 15K reports $-2\beta_s=-0.12\substack{+0.14\\-0.16}$ rad. The value was obtained by measuring time-dependent *CP* asymmetry in $B_s^0 \rightarrow K^+ K^-$ and using a U-spin relation between $B_s^0 \rightarrow K^+ K^-$ and $B^0 \rightarrow \pi^+ \pi^-$.
- ²⁴ Results are also presented using additional inputs on $B^0 \rightarrow \pi^0 \pi^0$ and $B^+ \rightarrow \pi^+ \pi^0$ decays from other experiments and isospin symmetry assumptions. The dependence of the results on the maximum allowed amount of U-spin breaking up to 50% is also included.
- 25 AAIJ 13AR reports $\phi_{s}=-2\beta_{s}=0.01\pm0.07\pm0.01$ rad. obtained from combined fit to $B^0_s \rightarrow J/\psi K^+ K^-$ and $B^0_s \rightarrow J/\psi \pi^+ \pi^-$ data sets. Also reports separate results of $\phi_s = 0.07 \pm 0.09 \pm 0.01$ rad. from $B_s^0 \rightarrow J/\psi K^+ K^-$ decays and $\phi_s = -0.14 \substack{+0.17 \\ -0.16} \pm 0.01$ rad. from $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ decays.
- 26 AAD 12CV reports $\phi_{_S} = -2~\beta_{_S} = 0.22 \pm 0.41 \pm 0.10$ rad. that was measured using a time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.
- $^{27}\,{\rm Reports}\ \phi_{{\color{black} s}}\,=\,-2\ \beta_{{\color{black} s}}\,=\,-0.44\,\pm\,0.44\,\pm\,0.02$ rad. that was measured using a timedependent fit to $B_s^0 \rightarrow J/\psi f_0(980)$ decays.
- 28 Reports $\phi_{m{s}}$ = -2 $eta_{m{s}}$ = 0.15 \pm 0.18 \pm 0.06 rad. that was measured using a time-
- dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays. ²⁹ Reports $\phi_s = -2 \ \beta_s = -0.019 \stackrel{+0.173}{_{-0.174}} \stackrel{+0.004}{_{-0.003}}$ rad. which was measured using a time-dependent fit to $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ decays, with the $\pi^+ \pi^-$ mass within 775–1550 MeV. Searches for, but finds no evidence, for direct *CP* violation in $B_s^0 \rightarrow J/\psi \pi \pi$ decays.
- 30 Reports 0.02 < ϕ_s < 0.52 or 1.08 < ϕ_s < 1.55 rad. at 68% C.L. confidence regions in the two-dimensional space of ϕ_s and $\Delta \Gamma_{B_s^0}$ from $B_s^0 \rightarrow J/\psi \phi$ decays.
- $^{31}\,{\rm Reports}$ 0.32 < 2 β_{s} < 2.82 rad. at 68% C.L. and confidence regions in the twodimensional space of $2\beta_s$ and $\Delta\Gamma$ from the first measurement of $B_s^0 \rightarrow J/\psi \phi$ decays using flavor tagging. The probability of a deviation from SM prediction as large as the level of observed data is 15%.
- 32 Reports $\phi_s = -2 \beta_s$ and obtains 90% CL interval $-0.03 < \beta_s < 0.60$ rad.
- 33 The first direct measurement of the CP-violating mixing phase is reported from the time-dependent analysis of flavor untagged $B^0_s \rightarrow J/\psi \phi$ decays.
- ³⁴ Reports ϕ_s which equals to $-2\beta_s$.
- 35 Combines D0 collaboration measurements of time-dependent angular distributions in $B^0_{c}
 ightarrow J/\psi \phi$ and charge asymmetry in semileptonic decays. There is a 4-fold ambiguity in the solution.

CP Violation phase β_s ($b \rightarrow s\overline{s}s$)

VALUE (10^{-2} rad)	DOCUMENT	ID	TECN	COMMENT
3.7 ±3.5	1,2 AAIJ	23AT	LHCB	<i>pp</i> at 7, 8, 13 TeV
$\bullet~\bullet~\bullet$ We do not use the follow	ving data for avera	ages, fits,	limits, e	tc. ● ● ●
$2.1 \pm 3.8 \pm 0.5$	³ AAIJ	23AT	LHCB	<i>pp</i> at 13 TeV
$3.7 \pm 5.8 \pm 1.4$	^{4,5} AAIJ	19 AP	LHCB	Repl. by AAIJ 23AT
$8.5 \pm 7.5 \pm 1.5$	⁶ AAIJ	14AE	LHCB	Repl. by AAIJ 19AP
0.38 to 1.23	⁷ AAIJ	13AY	LHCB	Repl. by AAIJ 14AE

- $^1\,{\sf AAIJ}$ 23AT reports $\phi_s^{s\,\overline{s}\,s}=-0.074\pm0.069$ rad and $|\lambda|=1.009\pm0.030.\,$ Measured using a time-dependent fit to $B_s^0 \rightarrow \phi \phi$ decays, assuming independence of the helicity of the $\phi\phi$ decay.
- 2 AAIJ 23AT also reports polarisation-dependent results assuming that the longitudinal weak phase is CP-conserving and that there is no direct CP violation.
- ³ Measured using a time-dependent fit to $B_s^0 \rightarrow \phi \phi$ decays, assuming independence of the helicity of the $\phi\phi$ decay.
- ⁴ AAIJ 19AP reports $\phi_s^{s\overline{s}s} = -0.073 \pm 0.115 \pm 0.027$ rad and $|\lambda| = 0.99 \pm 0.05 \pm 0.01$. Measured using a time-dependent fit to $B_s^0 \rightarrow \phi \phi$ decays, assuming independence of the helicity of the $\phi\phi$ decay.
- $^5\,\mathsf{AAIJ}$ 19AP reports also polarisation-dependent results assuming that the longitudinal weak phase is CP-conserving and that there is no direct CP violation, giving $\phi_{s,||}^{s\overline{s}s} =$
- 0.014 \pm 0.055 \pm 0.011 rad and $\phi^{s\,\overline{s}\,s}_{s,\perp}=$ 0.044 \pm 0.059 \pm 0.019 rad.
- ⁶ AAIJ 14AE value measured in $B_s^0 \rightarrow \phi \phi$ decays. Also reports $\phi_s^{s\overline{s}s} = -0.17 \pm 0.15 \pm 0.03$
- rad. 7 AAIJ 13AY uses $B_s^0 \rightarrow \phi \phi$ mode, and reports the 68% CL interval of $\phi_s^{s\overline{s}s} = -2 \beta_s^{s\overline{s}s}$ as [-2.46, -0.76] rad.

$$\left|\lambda\right| (B_s^0 \rightarrow J/\psi(1S)\phi)$$

VALUE	<u>DOCUMENT ID</u>	<u> </u>
0.988±0.009 OUR AVERAGE		
0.990 ± 0.010	AAIJ	24A LHCB <i>pp</i> at 7, 8, 13 TeV
$0.972 \pm 0.026 \pm 0.008$	¹ SIRUNYAN	21E CMS <i>pp</i> at 13 TeV
$\bullet \bullet \bullet$ We do not use the following	ng data for average	es, fits, limits, etc. ● ● ●
$0.877^{+0.112}_{-0.116}{\pm}0.031$	AAIJ	21AN LHCB Repl. by AAIJ 24A
$1.012 \pm 0.016 \pm 0.006$	AAIJ	19Q LHCB Repl. by AAIJ 24A

151 LHCB Repl. by AAIJ 24A AAIJ $0.964 \pm 0.019 \pm 0.007$ AAIJ $0.93 \pm 0.03 \pm 0.02$ 13AR LHCB Repl. by AAIJ 15I

¹Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

$|\lambda| (b \rightarrow c \overline{c} s)$

 $\lambda = q/p \cdot A_f / \overline{A}_f$ is a phase-convention-independent observable quantity for the final state f. See the review on "CP Violation in the Quark Sector" for details.

VALUE	<u>DOCUMENT ID</u>		TECN	COMMENT
0.989 ± 0.008 OUR AVERAGE				
$1.145 \!\pm\! 0.126 \!\pm\! 0.031$	¹ AAIJ	25A	LHCB	<i>pp</i> at 13 TeV
0.990 ± 0.010	² AAIJ	24A	LHCB	<i>pp</i> at 7, 8, 13 TeV
$0.972\!\pm\!0.026\!\pm\!0.008$	³ SIRUNYAN	21e	CMS	<i>pp</i> at 13 TeV
$0.949 \!\pm\! 0.036 \!\pm\! 0.019$	⁴ AAIJ	19AF	LHCB	<i>pp</i> at 7, 8, 13 TeV
$0.994 \!\pm\! 0.018 \!\pm\! 0.006$	⁵ AAIJ	$17\vee$	LHCB	<i>pp</i> at 7, 8 TeV
$1.045^{+0.069}_{-0.050}\pm0.007$	6 _{AAIJ}	16ak	LHCB	<i>pp</i> at 7, 8 TeV
$\begin{array}{ccc} 0.91 & +0.18 \\ -0.15 & \pm 0.02 \end{array}$	¹ AAIJ	14AY	LHCB	<i>pp</i> at 7, 8 TeV
\bullet \bullet \bullet We do not use the following	data for averages	, fits,	limits, e	tc. ● ● ●
$1.004 \pm 0.030 \pm 0.009$	⁷ AAIJ	23AT	LHCB	<i>pp</i> at 13 TeV
1.009 ± 0.030	⁷ AAIJ	23AT	LHCB	<i>pp</i> at 7, 8 and 13 TeV
$0.877^{+0.112}_{-0.116}{\pm}0.031$	AAIJ	21AN	LHCB	Repl. by AAIJ 24A
$0.99\ \pm 0.05\ \pm 0.01$	⁷ AAIJ	19 AP	LHCB	Repl. by AAIJ 23AT
https://pdg.lbl.gov	Page 79		Creat	ed: 5/30/2025 07:50

$1.012\!\pm\!0.016\!\pm\!0.006$	AAIJ	19Q LHCB	Repl. by AAIJ 24A
$1.035 \!\pm\! 0.034 \!\pm\! 0.089$	⁸ AAIJ	18s LHCB	<i>pp</i> at 7, 8 TeV
$0.964 \!\pm\! 0.019 \!\pm\! 0.007$	AAIJ	15I LHCB	Repl. by AAIJ 24A
$1.04 \ \pm 0.07 \ \pm 0.03$	⁷ AAIJ	14AE LHCB	Repl. by AAIJ 19AP
$0.93 \pm 0.03 \pm 0.02$	AAIJ	13AR LHCB	Repl. by AAIJ 15

¹Measured in $B_s^0 \rightarrow D_s^+ D_s^-$ decays.

² Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ in the region m(KK) in the vicinity of the $\phi(1020)$ resonance.

³ Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi \phi$ decays.

⁴ Measured using time-dependent analysis of $B_s^0 \rightarrow J/\psi \pi^+ \pi^-$ decays.

⁵ Measured using time-dependent angular analysis of $B_s^0 \rightarrow J/\psi K^+ K^-$ in the region m(KK) > 1.05 GeV.

⁶ Measured using time-dependent angular analysis of $B_s^0 \rightarrow \psi(2S)\phi$ decays.

⁷ Measured in $B_s^0 \rightarrow \phi \phi$ decays. ⁸ Measured in $B_s^0 \rightarrow (K^+ \pi^-)(K^- \pi^+)$ in the region 0.75 < m($K^\pm \pi^\mp$) < 1.6 GeV.

A, *CP* violation parameter $2 P_2(Y) / (1 + |Y|^2)$

$A = -2 \operatorname{Re}(\lambda) / (1 + \lambda)$	(2)			
VALUE	DOCUMENT ID		TECN	COMMENT
-0.79 ± 0.08 OUR AVERAGE				
$-0.83\!\pm\!0.05\!\pm\!0.09$	¹ AAIJ	210	LHCB	<i>pp</i> at 13 TeV
$-0.79\!\pm\!0.07\!\pm\!0.10$	¹ AAIJ	180	LHCB	<i>pp</i> at 7, 8 TeV
$0.49^{+0.77}_{-0.65}{\pm}0.06$	² AAIJ	15al	LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured in $B_{a}^{0} \rightarrow K^{+}K^{+}$	decays.			
² Measured in $B_{s}^{0} \rightarrow J/\psi K$	$\frac{0}{S}$ decays.			
C, CP violation parameter				
$C = (1 - \lambda ^2) \ / \ (1 + \lambda ^2)$	$\lambda ^2$)			
VALUE	DOCUMENT ID		TECN	COMMENT
0.19 ± 0.06 OUR AVERAGE				
$0.20 \pm 0.06 \pm 0.02$	1 ^ ^ 1	190		n n at 7 8 TaV

$0.20 \pm 0.06 \pm 0.02$	⁺ AAIJ	180 LHCB	<i>pp</i> at 7, 8 TeV	
$-0.28 \pm 0.41 \pm 0.08$	² AAIJ	15AL LHCB	<i>pp</i> at 7, 8 TeV	
¹ Measured in $B^0_{-} \rightarrow k$	K^+K^- decays.			

²Measured in $B_{S}^{\circ} \rightarrow J/\psi K_{S}^{\circ}$ decays.

S, CP violation parameter $S = -2 \ln(\lambda) / (1 + |\lambda|^2)$

$S = -2 \operatorname{Im}(\lambda) / (1 + \lambda ^{-})$)		
VALUE	DOCUMENT ID	TECN	COMMENT
0.17 ± 0.06 OUR AVERAGE			
$0.18\!\pm\!0.06\!\pm\!0.02$	¹ AAIJ	180 LHCB	<i>pp</i> at 7, 8 TeV
$-0.08\!\pm\!0.40\!\pm\!0.08$	² AAIJ	15AL LHCB	<i>pp</i> at 7, 8 TeV
¹ Measured in $B_s^0 \rightarrow K^+ K^-$	decays.		
2 Measured in $B_{S}^{reve{0}} o J/\psi K_{S}^{reve{0}}$ of	decays.		



VALUE	DOCUMENT	ID	TECN	COMMENT
0.171±0.152±0.028	AAIJ	15AV	LHCB	<i>pp</i> at 7, 8 TeV
$A_{CP}^{\perp}(B_s \rightarrow J/\psi \overline{K}^*(892))$	2) ⁰)			
VALUE	DOCUMENT	ID	TECN	COMMENT
$-0.049\pm0.096\pm0.025$	AAIJ	15AV	LHCB	<i>pp</i> at 7, 8 TeV
$A_{CP}(B_s \rightarrow \pi^+ K^-)$ A_{CP} is defined as		-		
$\frac{B}{B}$	$\frac{(B_s^0 \to f) - B(B_s^0 - f)}{(\overline{B}_s^0 \to f) + B(B_s^0 - f)}$	$\frac{\overline{F}}{\overline{F}}$		
the CP-violation asymr	metry of exclusive E	B_s^0 and \overline{B}_s^0	decay.	
VALUE	DOCUMENT ID	TECN	<u> </u>	MMENT
).224±0.012 OUR AVERAG	E		-	
$0.236 \pm 0.013 \pm 0.011$	AAIJ	210 LHC	Врр	at 13 TeV
$0.213 \pm 0.015 \pm 0.007$		180 LHC	в рр) at 7, 8 leV
$0.22 \pm 0.07 \pm 0.02$		14P CDF	<i>p</i> p	at 1.90 leV
• • vve do not use the follo	owing data for aver	ages, tits, l	imits, e	
$0.27 \pm 0.04 \pm 0.01$	AAIJ	13AX LHC	B Re	pl. by AAIJ 180
$0.27 \pm 0.08 \pm 0.02$	AAIJ	12V LHC	B Re	pl. by AAIJ 13AX
$0.39 \pm 0.15 \pm 0.08$	AALTONEN	11N CDF	Re	pl. by AALTONEN 14P
$A_{CP}(B^0_s \rightarrow [K^+K^-]_D)$	K*(892)⁰)	. ID	<u>TECN</u>	<u>COMMENT</u>
$0.062 \pm 0.032 \pm 0.021$	AAIJ	24M	LHCB	<i>pp</i> at 7, 8, 13 TeV
• • We do not use the follow	owing data for aver	ages, fits, l	imits, e	etc. ● ● ●
$-0.04 \pm 0.07 \pm 0.02$	AAIJ	14bn	LHCB	Repl. by AAIJ 24M
$0.04\ \pm 0.16\ \pm 0.01$	AAIJ	13L	LHCB	Repl. by AAIJ 14BN
$A_{CP}(B^{0}_{\mathbf{s}} \to [\pi^{+} K^{-}]_{D})$	K*(892) ⁰)		TECN	COMMENT
$0.000 \pm 0.011 \pm 0.020$		<u></u> 24M		$\frac{COMMENT}{R} = 2 + 7 + 2 + 12 + 2 $
- 0.009 1 0.011 1 0.020	owing data for aver	∠4111 ares fite	imite /	pparr, 0, 15 rev
		1 4		
$-0.01 \pm 0.03 \pm 0.02$	AAIJ	14BN	гнсв	кері, ву ААІЈ 24М
$A_{CP}(B^0_s \rightarrow [K^+\pi^-]_D)$	K *(892) ⁰)			
$A_{CP}(B^0_s \to [\pi^+\pi^-]_D)$	K*(892) ⁰)			
	<u>DOCUMENT</u>			
- 0.001 ± 0.050 ± 0.021 ● ● ● We do not use the foll	AAIJ owing data for aver	24M ages, fits, l	LHCB imits, «	<i>pp</i> at 7, 8, 13 leV etc. ● ● ●
$0.06 \pm 0.13 \pm 0.02$	AAIJ	14BN	LHCB	Repl. by AAIJ 24M
$A_{CP}(B_s^{\cup} \rightarrow [K^+\pi^-\pi^+$	[·] π ⁻] _D K [*] (892) ⁰)		
VALUE	DOCUMENT	. ID	TECN	COMMENT
$-0.029 \pm 0.012 \pm 0.021$	AAIJ	24M	LHCB	<i>pp</i> at 7, 8, 13 TeV
https://pdg.lbl.gov	Page 81		Creat	ted: 5/30/2025 07.5
	1 496 01		Ci Cui	(1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,

 $A_{CP}(B^0_{\epsilon} \rightarrow [K^-\pi^+\pi^+\pi^-]_D \overline{K}^*(892)^0)$ $A_{CP}(B_s^0 \to [\pi^+ \pi^- \pi^+ \pi^-]_D \overline{K}^*(892)^0)$ DOCUMENT ID TECN COMMENT $0.017 \pm 0.044 \pm 0.022$ AAIJ 24M LHCB pp at 7, 8, 13 TeV $\begin{array}{c} R_{s}^{+} = \Gamma(B_{s}^{0} \rightarrow [\pi^{-}K^{+}]_{D}\overline{K}^{*0}) \ / \ \Gamma(B_{s}^{0} \rightarrow [\pi^{+}K^{-}]_{D}\overline{K}^{*0}) \\ \hline \\ \underline{VALUE} \\ 0.004 \pm 0.002 \pm 0.006 \end{array} \xrightarrow{DOCUMENT \ ID} \begin{array}{c} \underline{TECN} \\ AAIJ \\ 24M \end{array} \xrightarrow{TECN} \begin{array}{c} \underline{COMMENT} \\ pp \ \text{at } 7, \ 8, \ 13 \ \text{TeV} \end{array}$ $\begin{array}{c} R_{s}^{-} = \Gamma(\overline{B}_{s}^{0} \rightarrow [\pi^{+} K^{-}]_{D} K^{*0}) / \Gamma(\overline{B}_{s}^{0} \rightarrow [\pi^{-} K^{+}]_{D} K^{*0}) \\ \hline \\ \underline{VALUE} & \underline{DOCUMENT \ ID} & \underline{TECN} & \underline{COMMENT} \\ 0.004 \pm 0.002 \pm 0.006 & AAIJ & 24M & LHCB & pp \text{ at } 7, 8, 13 \text{ TeV} \end{array}$ $\begin{array}{c} R_{s}^{+} = \Gamma(B_{s}^{0} \rightarrow [\pi^{-} K^{+} \pi^{+} \pi^{-}]_{D} \overline{K}^{*0}) / \Gamma(B_{s}^{0} \rightarrow [\pi^{+} K^{-} \pi^{+} \pi^{-}]_{D} \overline{K}^{*0}) \\ \hline NALUE & DOCUMENT ID & TECN \\ \hline 0.019 \pm 0.004 \pm 0.007 & AAIJ & 24M & LHCB & COMMENT \\ \hline pp \text{ at } 7, 8, 13 \text{ TeV} \end{array}$ $\begin{array}{c} R_{s}^{-} = \Gamma(\overline{B}_{s}^{0} \rightarrow [\pi^{+} K^{-} \pi^{+} \pi^{-}]_{D} K^{*0}) / \Gamma(\overline{B}_{s}^{0} \rightarrow [\pi^{-} K^{+} \pi^{+} \pi^{-}]_{D} K^{*0}) \\ \hline \\ \underline{VALUE} & \underline{DOCUMENT \ ID} & \underline{TECN} & \underline{COMMENT} \end{array}$ $0.015 \pm 0.004 \pm 0.007$ AAIJ 24M LHCB pp at 7, 8, 13 TeV $S(B_s^0 \to \phi \gamma)$ DOCUMENT ID TECN COMMENT 19AE LHCB pp at 7.8 TeV $0.43 \pm 0.30 \pm 0.11$ ¹ Measured in flavor tagged time dependent analysis. $\begin{array}{ccc} C(B^0_s \rightarrow \phi \gamma) \\ \hline \\ \underline{VALUE} \end{array}$ DOCUMENT ID TECN COMMENT $1 \Delta \Delta \Pi$ $0.11 \pm 0.29 \pm 0.11$ 19AE LHCB pp at 7, 8 TeV ¹Measured in flavor tagged time dependent analysis. $A^{\Delta}(B^0_{\epsilon} \rightarrow \phi \gamma)$ $A^{\Delta}(B_s \rightarrow \phi \gamma)$ is the multiplicative coefficient of the sinh($\Delta \Gamma t/2$) term in the $B_s \rightarrow \Phi \gamma$ $\phi\gamma$ decay rate time dependence. DOCUMENT ID TECN COMMENT VALUE $-0.67^{+0.37}_{-0.41}\pm0.17$ ¹ AAIJ 19AE LHCB pp at 7, 8 TeV • • We do not use the following data for averages, fits, limits, etc. • • • $-0.98 \substack{+0.46 + 0.23 \\ -0.52 - 0.20}$ ² AAIJ 17B LHCB Repl. by AAIJ 19AE 1 Measured in flavor tagged time dependent analysis, using tagged and un-tagged events. This result updates AAIJ 17B with better selection efficiency and other analysis improvements. ² Measured in time dependent analysis without initial flavor tagging.

CPT VIOLATION PARAMETERS

In the B_s^0 mixing, propagating mass eigenstates can be written as

$$\begin{split} |B_{sL}\rangle &\propto ~ \mathsf{p} ~\sqrt{1-\xi} ~|B_s^0\rangle + \mathsf{q} ~\sqrt{1+\xi} ~|\overline{B}_s^0\rangle \\ |B_{sH}\rangle &\propto ~ \mathsf{p} ~\sqrt{1+\xi} ~|B_s^0\rangle - \mathsf{q} ~\sqrt{1-\xi} ~|\overline{B}_s^0\rangle \end{split}$$

where parameter ξ controls *CPT* violation. If ξ is zero, then *CPT* is conserved. The parameter ξ can be written as

$$\xi = \frac{2(M_{11}-M_{22})-i(\Gamma_{11}-\Gamma_{22})}{-2\Delta m_s+i\Delta\Gamma_s} \approx \frac{-2\beta^{\mu}\Delta a_{\mu}}{2\Delta m_s-i\Delta\Gamma_s},$$

where M_{ii} , Γ_{ii} , Δm_s , and $\Delta \Gamma_s$ are parameters of Hamiltonian governing B_s oscillations, β^{μ} is the B_s^0 meson velocity and Δa_{μ} characterizes Lorentz-invariance violation.

Δa_{\perp}

<i>VALUE</i> (10 ⁻¹² GeV)	CL%	DOCUMENT ID		TECN	COMMENT
$-0.47 \pm 0.39 \pm 0.08$		¹ AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
< 1.2	95	² ABAZOV	15L	D0	р <u>р</u> at 1.96 ТеV
¹ Uses $B^0_s \rightarrow J/\psi K^+$	K^- decay	/S.			
² Measured in semilept	conic B_s^0 -	$\rightarrow D_s^- \mu^+ X \mathrm{de}$	cays.	Also e×	tracts limit on time and
longitudinal compone	nts (-0.8	$B < \Delta a_T - 0.3$	96 <i>Δ</i> .	a _Z < 3	5.9) 10 ⁻¹³ GeV.

∆a_{ll}

<u>VALUE (10⁻¹⁴ GeV)</u>	DOCUMENT ID		TECN	COMMENT
$-0.89 \pm 1.41 \pm 0.36$	¹ AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
1 Uses $B^0_{s} ightarrow J/\psi K^+ K^-$ d	ecays.			
Δaχ				
VALUE (10^{-14} GeV)	DOCUMENT ID		TECN	COMMENT
$+1.01\pm2.08\pm0.71$	1 AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
1 Uses $B^0_{s} ightarrow J/\psi K^+ K^-$ d	ecays.			
Δaγ				
<i>VALUE</i> (10 ⁻¹⁴ GeV)	DOCUMENT ID		TECN	COMMENT
$-3.83{\pm}2.09{\pm}0.71$	¹ AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
1 Uses $B^0_{s} ightarrow J/\psi {\it K}^+ {\it K}^-$ d	ecays.			
Re(ξ)				
VALUE	DOCUMENT ID		TECN	COMMENT
$-0.022 \pm 0.033 \pm 0.003$	¹ AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
1 Uses $B^0_s ightarrow J/\psi K^+ K^-$ d	ecays.			
lm(ξ)				
VALUE	DOCUMENT ID		TECN	COMMENT
$0.004 \pm 0.011 \pm 0.002$	¹ AAIJ	16E	LHCB	<i>pp</i> at 7, 8 TeV
1 Uses $B^0_s ightarrow J/\psi K^+ K^-$ d	ecays.			

PARTIAL BRANCHING FRACTIONS IN $B_s \rightarrow \phi \ell^+ \ell^ B(B_s \rightarrow \phi \ell^+ \ell^-)$ (0.1 < q² < 2.0 GeV²/c⁴) VALUE (units 10^{-7}) DOCUMENT ID TECN COMMENT 1.14 ± 0.16 OUR AVERAGE $1.11 \begin{array}{c} +0.14 \\ -0.13 \end{array} \pm 0.09$ ¹ AAIJ 15AQ LHCB pp at 7, 8 TeV AALTONEN 11AI CDF $p\overline{p}$ at 1.96 TeV $2.78\ \pm 0.95\ \pm 0.89$ • • We do not use the following data for averages, fits, limits, etc. • • • $0.897^{+0.207}_{-0.186}{\pm}0.097$ 1 AAIJ 13X LHCB Repl. by AAIJ 15AQ ¹ Measured in $B_c^0 \rightarrow \phi \mu^+ \mu^-$ decays. ${\sf B}(B^0_c o \ \phi \ell^+ \ell^-)$ (0.1 < q² < 0.98 GeV²/c⁴) VALUE (units 10^{-8})DOCUMENT IDTECNCOMMENT6.81±0.47±0.341 AAIJ21AG LHCBpp at 7, 8, 13 TeV ¹Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays $B(B_s^0 \rightarrow \phi \ell^+ \ell^-) (1.1 < q^2 < 2.5 \text{ GeV}^2/c^4)$ VALUE (units 10⁻⁸) DOCUMENT IDTECNCOMMENT1 AAIJ21AG LHCBpp at 7, 8, 13 TeV $4.41 \pm 0.41 \pm 0.24$ ¹Measured in $B^0_s \rightarrow \ \phi \mu^+ \mu^-$ decays $B(B_s \rightarrow \phi \ell^+ \ell^-)$ (2.0 < q² < 5.0 GeV²/c⁴) $\frac{VALUE \text{ (units } 10^{-7}\text{)}}{0.77 \pm 0.12 \pm 0.06} \qquad \frac{DOCUMENT ID}{1} \text{ AAIJ} \qquad \frac{TECN}{15 \text{ AQ LHCB}} \frac{COMMENT}{pp \text{ at } 7, 8 \text{ TeV}}$ • • • We do not use the following data for averages, fits, limits, etc. • • • $0.529^{+0.182}_{-0.159} \pm 0.057$ ^{1,2} AAIJ 13X LHCB Repl. by AAIJ 15AQ $0.58 \pm 0.55 \pm 0.19$ ² AALTONEN 11AI CDF $p\overline{p}$ at 1.96 TeV ¹ Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays. ² Measured in 2<q² <4.3 GeV²/c⁴. ${\sf B}(B^0_s o \ \phi \ell^+ \ell^-) \ (2.5 < {\sf q}^2 < 4.0 \ {
m GeV}^2/{
m c}^4)$ DOCUMENT IDTECNCOMMENT1 AAIJ21AG LHCBpp at 7, 8, 13 TeV VALUE (units 10^{-8}) $3.51 \pm 0.39 \pm 0.18$ ¹Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays $B(B_e^0 \rightarrow \phi \ell^+ \ell^-)$ (4.0 < q² < 6.0 GeV²/c⁴) VALUE (units 10^{-8})DOCUMENT IDTECNCOMMENT6.22±0.48±0.321 AAIJ21AG LHCBpp at 7, 8, 13 TeV ¹Measured in $B_{\epsilon}^{0} \rightarrow \phi \mu^{+} \mu^{-}$ decays $B(B_s \rightarrow \phi \ell^+ \ell^-)$ (5.0 < q² < 8.0 GeV²/c⁴) VALUE (units 10^{-7}) DOCUMENT ID TECN COMMENT ¹ AAIJ $0.96 \pm 0.13 \pm 0.08$ 15AQ LHCB pp at 7, 8 TeV Created: 5/30/2025 07:50 https://pdg.lbl.gov Page 84

• • We do not use the following data for averages, fits, limits, etc. • • • $1.38^{+0.25}_{-0.23}\pm0.14$ 1,2 AAIJ 13X LHCB Repl. by AAIJ 15AQ ² AALTONEN 11AI CDF $1.34 \pm 0.83 \pm 0.43$ $p\overline{p}$ at 1.96 TeV $\begin{tabular}{ll} 1 Measured in B^0_s $\to $\phi\mu^+\mu^-$ decays. $$$ 2 Measured in $4.3<$q^2$ $<\!8.68 $ {\rm GeV^2/c^4}$. $$$ ${\sf B}(B^0_{f s} o \ \phi \ell^+ \ell^-)$ (6.0 < q² < 8.0 GeV²/c⁴)
 DOCUMENT ID
 TECN
 COMMENT

 1
 AAIJ
 21ACIHCP
 TECN
 VALUE (units 10^{-8}) $6.30 \pm 0.48 \pm 0.32$ 21AG LHCB pp at 7, 8, 13 TeV ¹ Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays $B(B_s \rightarrow \phi \ell^+ \ell^-)$ (11.0 < q² < 12.5 GeV²/c⁴) VALUE (units 10^{-7}) DOCUMENT ID _____ TECN _COMMENT ¹ AALI 21AG LHCB pp at 7, 8, 13 TeV $0.717 \pm 0.045 \pm 0.036$ • • We do not use the following data for averages, fits, limits, etc. • • • ¹ AAIJ $0.71 \pm 0.10 \pm 0.06$ 15AQ LHCB Repl. by AAIJ 21AG $1.18 \begin{array}{c} +0.22 \\ -0.21 \end{array} \pm 0.14$ 1,2 AAIJ 13X LHCB Repl. by AAIJ 15AQ ² AALTONEN 11AI CDF $2.98 \pm 0.95 \pm 0.95$ pp at 1.96 TeV ¹ Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays. ² Measured in 10.9<q² <12.86 GeV²/c⁴. $B(B_s^0 \rightarrow \phi \ell^+ \ell^-)$ (15.0 < q² < 19.0 GeV²/c⁴)
 DOCUMENT ID
 TECN
 COMMENT

 1
 AAIJ
 21AG LHCR
 PD pt 7 S
 VALUE (units 10^{-8}) 21AG LHCB pp at 7, 8, 13 TeV $18.52 \pm 0.80 \pm 1.00$ ¹ Measured in $B_s^0 \rightarrow \phi \mu^+ \mu^-$ decays $B(B_s \rightarrow \phi \ell^+ \ell^-)$ (15.0 < q² < 17.0 GeV²/c⁴) VALUE (units 10^{-7}) DOCUMENT ID TECN COMMENT 1 4411 $1.050 \pm 0.058 \pm 0.054$ 21AG LHCB pp at 7, 8, 13 TeV • • • We do not use the following data for averages, fits, limits, etc. • • • $0.90\ \pm 0.11\ \pm 0.07$ ¹ AAIJ 15AQ LHCB Repl. by AAIJ 21AG $0.760^{+0.189}_{-0.169}{\pm}0.087$ 1,2 AAIJ 13X LHCB Repl. by AAIJ 15AQ ² AALTONEN 11AI CDF $1.86\ \pm 0.66\ \pm 0.59$ *pp* at 1.96 TeV $\label{eq:alpha} \begin{array}{l} ^{1} \mbox{ Measured in } B^{0}_{s} \rightarrow \ \phi \mu^{+} \, \mu^{-} \mbox{ decays.} \\ ^{2} \mbox{ Measured in } 14.18 {<} q^{2} {<} 16 \ \mbox{GeV}^{2} / c^{4}. \end{array}$ $B(B_s \rightarrow \phi \ell^+ \ell^-)$ (17.0 < q² < 19.0 GeV²/c⁴) <u>VALUE</u> (units 10^{-7}) DOCUMENT ID TECN COMMENT ¹ AALL 21AG LHCB pp at 7, 8, 13 TeV $0.838 \pm 0.058 \pm 0.046$ • • • We do not use the following data for averages, fits, limits, etc. • • • 1 AAIJ $0.79 \pm 0.11 \pm 0.07$ 15AQ LHCB Repl. by AAIJ 21AG $1.06 \begin{array}{c} +0.23 \\ -0.21 \end{array} \pm 0.12$ 1,2 AAIJ 13X LHCB Repl. by AAIJ 15AQ ² AALTONEN 11AI CDF $2.32 \pm 0.76 \pm 0.74$ pp at 1.96 TeV

 $\label{eq:massred} \begin{array}{l} ^1 \, {\rm Measured \ in} \ B^0_s \to \ \phi \mu^+ \, \mu^- \ {\rm decays.} \\ ^2 \, {\rm Measured \ in} \ 16{<} {\rm q}^2 \, {<} 19 \ {\rm GeV}^2/{\rm c}^4. \end{array}$

$B(B_{\rm s}\to \phi\ell^+\ell^-) \ (1.0$	$0 < q^2 < 6.0 Ge$			
VALUE (units 10^{-7})	DOCUMENT ID	TECN	СОММ	1ENT
1.44 ±0.11 OUR AVER/	AGE			
$1.440\!\pm\!0.075\!\pm\!0.075$	¹ AAIJ	21AG LHCB	<i>pp</i> at	z 7, 8, 13 TeV
$1.14 \ \pm 0.79 \ \pm 0.36$	AALTONEN	11AI CDF	$p\overline{p}$ at	: 1.96 TeV
• • • We do not use the	following data for a	verages, fits,	imits,	etc. ● ● ●
$1.29 \ \pm 0.16 \ \pm 0.10$	¹ AAIJ	15AQ LHCB	Repl.	by AAIJ 21AG
$1.14 \begin{array}{c} +0.25 \\ -0.23 \end{array} \pm 0.13$	1 AAIJ	13X LHCB	Repl.	by AAIJ 15AQ
1 Measured in $B^0_{m{s}} o ~\phi$	$\mu^+\mu^-$ decays.			
$B(B_{s} \to \phi \ell^{+} \ell^{-}) (0.0)$	$0 < q^2 < 4.3 Ge$			
VALUE (units 10^{-7})	DOCUME	ENT ID	TECN	COMMENT
3.30±1.09±1.05	AALTO	NEN 11AI	CDF	p p at 1.96 TeV
	PRODUCTION	ASYMMET	RIES	
$A_P(B_s^0)$				
$A_P(B_c^0) = [\sigma(\overline{B}_c^0)]$	$-\sigma(B_c^0)] / [\sigma(\overline{B}_c^0)]$	$) + \sigma(B_{c}^{0})]$		
VALUE (units 10^{-2})	DOCUME	ENT ID	TECN	COMMENT
1.2 ±1.6 OUR AVERA	AGE			
$-0.65\!\pm\!2.88\!\pm\!0.59$	1 AAIJ	17BF	LHCB	рраt 7 TeV
$1.98\!\pm\!1.90\!\pm\!0.59$	1 AAIJ	17 BF	LHCB	<i>pp</i> at 8 TeV
\bullet \bullet \bullet We do not use the t	following data for a	verages, fits,	imits,	etc. • • •
$1.09\!\pm\!2.61\!\pm\!0.66$	² AAIJ	14BP	LHCB	Repl. by AAIJ 17BF, <i>pp</i> at 7 TeV
1 Based on time-depend	ent analysis of B_s^0	$\rightarrow D_{s}^{-}\pi^{+}$ in	n kinem	natic range 2 $< p_T < 30$
GeV/c and 2.1 $< \eta ~<$	(4.5. ³	5		
² Based on time-depend	ent analysis of B_s^0	$\rightarrow D_s^- \pi^+$ in	kinem	atic range 4 $< p_T < 30$
GeV/c and 2.5 $< \eta ~<$	(4.5.	5		
В	${}^0_s \rightarrow D^{*-}_s \ell^+ \nu_\ell$	FORM FAC	TOR	S

ρ^2 (form factor slope)			
VALUE	DOCUMENT ID	TECN	COMMENT
1.17 ± 0.08 OUR AVERAGE			
$1.16\!\pm\!0.05\!\pm\!0.07$	¹ AAIJ	20AW LHCB	<i>pp</i> at 13 TeV
$1.23\!\pm\!0.17\!\pm\!0.05$	² AAIJ	20E LHCB	<i>pp</i> at 7,8 TeV
1 The $B^0_{m{s}} o ~ D^{st -}_{m{s}} \mu^+ u_{\mu}$, decay is reconstructed	through the c	lecays of $D_{m{s}}^{*-} ightarrow D_{m{s}}^{-}\gamma$,
$D_s^- \rightarrow K^- K^+ \pi^-$.			
² The $B_s^0 \rightarrow D_s^{*-} \mu^+ \nu_\mu$	decay is reconstructed i	nclusively wit	hout γ from the decays of
$D_{\boldsymbol{s}}^{*-} ightarrow D_{\boldsymbol{s}}^{-} \gamma, D_{\boldsymbol{s}}^{-} ightarrow$	$K^- K^+ \pi^-$.		

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KHACHATRY	16Q	PL B756 84	V. Khachatryan <i>et al.</i>	(CMS Collab.)
KHACHATRY	16S	PL B757 97	V. Khachatrvan <i>et al.</i>	(CMS_Collab.)
ΡΔΙ	16	PRI 116 161801	B Polet of	(BELLE Collab.)
	10			
AAIJ	15AC	JHEP 1505 019	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	15AD	JHEP 1506 130	R. Aaij <i>et al.</i>	(LHCb Collab.)
ΔΔΙΙ	154F	IHEP 1507 166	R Apii et al	UHCh Collab)
	1540	JIEI 1507 100		
AAIJ	15AG	JHEP 1508 005	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	15AL	JHEP 1506 131	R. Aaji <i>et al.</i>	(LHCb Collab.)
ΔΔΙΙ	15AQ	IHEP 1509 179	R Aaii et al	(I HCh, Collab)
	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			
AAIJ	15A5	JHEP 1510 055	R. Aaij et al.	(LHCD Collab.)
AAIJ	15AV	JHEP 1511 082	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	15BB	PR D92 112002	R Aaii et al	(I HCb_Collab.)
	150	IUED 1501 004	P Apii at al	
	150		R. Aaij et al.	
AAIJ	151	PRL 114 041801	R. Aaıj <i>et al.</i>	(LHCb Collab.)
AAIJ	15K	PL B741 1	R. Aaii <i>et al.</i>	(LHCb Collab.)
A A I I	150	DDI 115 051801	R Apii at al	(I HCh Collab.)
	150			
AAIJ	155	PL B743 46	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	15U	PL B747 484	R. Aaij <i>et al.</i>	(LHCb Collab.)
ABAZOV	15Δ	PRI 114 062001	VM Abazov et al) (D0 Collab)
	1	DDL 11F 161601	VIM Abazar at al	
ABAZUV	15L	PRL 115 101001	V.IVI. Adazov et al.	(DU Collab.)
DUTTA	15	PR D91 011101	D. Dutta <i>et al.</i>	(BELLE Collab.)
KHACHATRY	15BF	NAT 522 68	V Khachatryan <i>et al</i>	(CMS and LHCh Collab.)
	15	DD D02 072012	C Opwold at al	(PELLE Collab.)
USWALD	15	FK D92 072013	C. Oswalu et al.	(BELLE COND.)
AAD	14U	PR D90 052007	G. Aad <i>et al.</i>	(ATLAS Collab.)
AAIJ	14AA	PRL 112 202001	R. Aaij <i>et al.</i>	(LHCb Collab.)
ΔΔΙΙ	144F	PR D90 052011	R Apii et al	(I HCh Collab.)
	1441	DDI 112 170001		
AAIJ	14AX	PKL 113 1/2001	к. Ааıj <i>et al.</i>	(LHCb Collab.)
AAIJ	14AY	PRL 113 211801	R. Aaij <i>et al.</i>	(LHCb Collab.)
ΔΑΠ	14RF	IHEP 1411 060	R Aaii et al	(1 HCh Collab)
A A I I	1/01	DD D00 070000	D As: at -1	
AAIJ	14BH	FR D90 012003	R. Aaij et al.	(LHCD Collab.)
AAIJ	14BM	NJP 16 123001	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	14RN	PR D90 112002	R Aaii et al	(I HCh Collab)
		DI 8720 010	R Apii at al	
	14DP		N. Adjetal.	(LITCD COLLAD.)
AAIJ	14BR	PR D89 092006	к. Ааıj <i>et al.</i>	(LHCb Collab.)
AAIJ	14D	PL B728 607	R. Aaij <i>et al.</i>	(LHCb_Collab.)
ΔΑΠ	14F	IHEP 1404 114	R Aaii et al	(I HCh Collab.)
		2EI TIVT TT4		(LITCD CONAD.)

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AAIJ	14F	PRL 112 111802	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14L	JHEP 1407 140	R. Aaii <i>et al.</i>	(LHCb_Collab.)
ΔΔΙΙ	1/R	PL B736 446	R Apii et al	Ì HCh Collab Ì
	140	DL D730 100		
AAIJ	145	PL B/30 180	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	14Y	PRL 112 091802	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	14P	PRI 113 242001	T Aaltonen et al	(CDF_Collab)
	1/	DD D90 012002	VM Abazay at al	(D0 Collab.)
ADALOV	14	FR D09 012002	V.IVI. ADAZOV EL AI.	(Do Collab.)
PDG	14	CP C38 070001	K. Olive <i>et al.</i>	(PDG Collab.)
AAIJ	13	NP B867 1	R. Aaij <i>et al.</i>	(LHCb Collab.)
ΔΔΠ	134	NP 8867 547	R Apii et al	(I HCh Collab)
	1244	ND D071 402		
AAIJ	13AA	NP B871 403	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AB	NP B873 275	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	13AC	NP B874 663	R Aaii et al	(I HCb_Collab.)
	1241	DD D07 071101		
AAIJ	ISAL	PR D07 071101	R. Aaij et al.	
AAIJ	13AN	PR D87 072004	R. Aaij <i>et al.</i>	(LHCb_Collab.)
AAIJ	13AP	PR D87 092007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	13AQ	PR D87 112009	R Aaii et al	(I HCb_Collab.)
	12AD	DD D97 112010	P Apii at al	
AAIJ	ISAN	FR D07 112010	R. Aalj et al.	(LITCD Collab.)
AAIJ	13AVV	PRL 110 211801	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13AX	PRL 110 221601	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	13AY	PRL 110 241802	R. Aaii et al.	(LHCb_Collab.)
A A I I	12R	DPI 110 021801	R Apii at al	(LHCh Collab)
	1204	DDL 111 101005		
AAIJ	13BA	PRL 111 101805	R. Aaij et al.	(LHCD Collab.)
AAIJ	13BI	NJP 15 053021	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13BM	PRL 111 141801	R. Aaij <i>et al.</i>	(LHCb Collab.)
ΔΔΠ	13RO	IHEP 1310 183	R Apii et al	(I HCh Collab)
A A I I	1200	IUED 1210 142	P Asii at al	(LHCh Callab.)
AAIJ	ISDP	JHEP 1310 145	R. Aaij et al.	(LHCD Collab.)
AAIJ	13BØ	JHEP 1310 005	R. Aaıj <i>et al.</i>	(LHCb Collab.)
AAIJ	13BW	JHEP 1311 092	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALI	13BX	PL B727 403	R Aaii et al	(I HCb_Collab.)
	13CE	EDI (73 2655	\mathbf{R} Apii at al	(LHCh Collab.)
	100			
AAIJ	13L	JHEP 1303 007	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13X	JHEP 1307 084	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	13Z	JHEP 1309 006	R. Aaij <i>et al.</i>	(LHCb_Collab.)
AALTONEN	13F	PR D87 072003	T Aaltonen et al	(CDE Collab)
	12	DDI 110 011901	VM Abarov et al	(D0 Collab.)
	100			
ABAZOV	13C	PR D87 072006	V.M. Abazov et al.	(DU Collab.)
CHAIRCHYAN	13AW	PRL 111 101804	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
ESEN	12	PR D87 031101	S. Esen <i>et al.</i>	(DELLE Collab)
	12		- · · · · ·	(DELEE CONAD.)
OSWALD	13 13	PR D87 072008	C Oswald et al	(BELLE Collab.)
OSWALD	13	PR D87 072008 PR D00 110001 (orrot)	C. Oswald <i>et al.</i>	(BELLE Collab.)
OSWALD Also	13	PR D87 072008 PR D90 119901 (errat.)	C. Oswald <i>et al.</i> C. Oswald <i>et al.</i>	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.)
OSWALD Also SOLOVIEVA	13 13 13	PR D87 072008 PR D90 119901 (errat.) PL B726 206	C. Oswald <i>et al.</i> C. Oswald <i>et al.</i> E. Solovieva <i>et al.</i>	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.)
OSWALD Also SOLOVIEVA THORNE	13 13 13 13	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006	 C. Oswald <i>et al.</i> C. Oswald <i>et al.</i> E. Solovieva <i>et al.</i> F. Thorne <i>et al.</i> 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.)
OSWALD Also SOLOVIEVA THORNE AAD	13 13 13 13 12AE	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387	 C. Oswald <i>et al.</i> C. Oswald <i>et al.</i> E. Solovieva <i>et al.</i> F. Thorne <i>et al.</i> G. Aad <i>et al.</i> 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD	13 13 13 13 12AE 12CV	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 IHEP 1212 072	C. Oswald <i>et al.</i> C. Oswald <i>et al.</i> E. Solovieva <i>et al.</i> F. Thorne <i>et al.</i> G. Aad <i>et al.</i> G. Aad <i>et al.</i>	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD	13 13 13 12AE 12CV	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL P707 240	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. P. Aai et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAJ	13 13 13 12AE 12CV 12	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ	13 13 13 12AE 12CV 12 12A	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aaij et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAIJ AAIJ AAIJ	13 13 13 12AE 12CV 12 12A 12AE	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aaij et al. R. Aaij et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ	13 13 13 12AE 12CV 12 12A 12AE 12AE 12AG	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aaij et al. R. Aaij et al. R. Aaij et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRI 109 131801	 C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. 	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ	13 13 13 12AE 12CV 12 12A 12AE 12AE 12AG 12AM	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PL 100 152002	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AN 12AO	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AN 12AO 12AP	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AN 12AO 12AP 12AR	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM 12AN 12AO 12AP 12AP	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PP D86 112005	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AC 12AP	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AX 12B	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AN 12AO 12AP 12AR 12AR 12AZ 12B 12D	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AZ 12B	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AA 12AA 12AA 12AA 12AA 12AA 1	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12AE 12AE 12AG 12AM 12AM 12AM 12AM 12AM 12AM 12AR 12AR 12B 12D 12E 12F 12I	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AN 12AO 12AP 12AR 12AC 12A 12B 12D 12E 12F 12I	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EDL 672 21120	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AD 12E 12F 12I 12L	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AZ 12B 12D 12E 12F 12I 12L 12O	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM 12AM 12AM 12AM 12AM 12AD 12E 12D 12E 12F 12I 12L 12O 12P	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172 PL B713 369	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
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OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AO 12AP 12A 12E 12F 12I 12L 12O 12P 12Q 12P	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172 PL B713 378 PL B713 378 PL B716 303	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12AE 12AE 12AE 12AG 12AM 12AN 12AN 12AN 12AN 12AN 12AP 12AR 12D 12E 12I 12L 12O 12P 12Q 12P	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172 PL B713 378 PL B716 393 PDL 100 151001	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM 12AM 12AM 12AO 12AP 12AR 12D 12E 12F 12I 12C 12P 12Q 12P 12Q	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 369 PL B713 378 PL B716 393 PRL 108 151801	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AN 12AO 12AP 12AR 12AO 12E 12F 12I 12E 12F 12I 12C 12P 12Q 12P 12Q 12S 12V	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 012005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172 PL B713 378 PL B713 378 PL B716 393 PRL 108 101801 PRL 108 201601	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AO 12AP 12AC 12A 12D 12E 12I 12L 12O 12P 12Q 12R 12S 12V 12W	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 378 PL B713 378 PL B716 393 PRL 108 201601 PRL 108 201601 PRL 108 231801	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM 12AM 12AM 12AM 12AM 12AM 12AM	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 172 PL B713 378 PL B716 393 PRL 108 151801 PRL 108 201601 PRL 108 231801 PRL 109 171802	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al.	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AM 12AM 12AM 12AM 12AM 12AM 12AP 12AR 12A 12E 12F 12I 12C 12F 12L 12O 12P 12Q 12R 12S 12V 12W 12AS	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 378 PL B713 378 PL B713 378 PL B716 393 PRL 108 151801 PRL 108 201801	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aa	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AA	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AO 12AP 12AO 12AP 12AC 12A 12B 12C 12F 12I 12C 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12Q 12P 12D 12D 12D 12D 12D 12D 12D 12D 12D 12D	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 012005 PL B707 497 PRL 108 101803 PL B708 241 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 378 PL B713 378 PL B713 378 PL B716 393 PRL 108 151801 PRL 108 201601 PRL 108 201801 PRL 109 171802 PRL 108 201801 PRL 108 201801	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aa	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (CDF Collab.) (CDF Collab.)
OSWALD Also SOLOVIEVA THORNE AAD AAD AAIJ AAIJ AAIJ AAIJ AAIJ AAIJ A	13 13 13 12AE 12CV 12 12A 12AE 12AG 12AM 12AO 12AP 12AR 12AO 12AP 12AR 12AO 12AP 12AC 12A 12D 12E 12I 12L 12O 12P 12Q 12R 12S 12V 12W 12AJ 12C 12D	PR D87 072008 PR D90 119901 (errat.) PL B726 206 PR D88 114006 PL B713 387 JHEP 1212 072 PL B707 349 PL B708 55 PR D85 112013 JHEP 1206 115 PRL 109 131801 PRL 109 152002 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 052006 PR D86 071102 JHEP 1210 037 PR D86 112005 PL B707 497 PRL 108 101803 PL B709 50 PL B709 177 EPJ C72 2118 PL B713 378 PL B713 378 PL B713 378 PL B716 393 PRL 108 151801 PRL 108 201601 PRL 108 201801 PRL 108 201801 PR D85 072002	C. Oswald et al. C. Oswald et al. E. Solovieva et al. F. Thorne et al. G. Aad et al. G. Aad et al. R. Aaij et al. R. Aa	(BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (BELLE Collab.) (ATLAS Collab.) (ATLAS Collab.) (ATLAS Collab.) (LHCb Collab.) (CDF Collab.)

Page 89 Created: 5/30/2025 07:50

	101	DDI 100 011002	T Astronom at al	(CDE Callah)
AALIONEN	12L	PRL 106 211605	T. Aaltonen et al.	(CDF Collab.)
ABAZOV	12AF	PR D86 092011	V.M. Abazov <i>et al.</i>	(DU Collab.)
ABAZOV	12C	PR D85 011103	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	12D	PR D85 032006	V.M. Abazov <i>et al.</i>	(D0 Collab.)
CHATRCHYAN	12A	JHEP 1204 033	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
LEES	12A	PR D85 011101	J.P. Lees <i>et al.</i>	(BÀBAR Collab.)
11	12	PRI 108 181808	l li et al	(BELLE Collab.)
PDG	12	PR D86 010001	l Beringer et al	(PDG Collab.)
	11	PL B608 115	R Apii et al	(LHCh Collab.)
	11 A	DI D609 14	P Apii at al	(LHCb Collab.)
AAU	110	FL D090 14		
AAIJ	IIB	PL B099 330	R. Aaij <i>et al.</i>	(LHCb Collab.)
AAIJ	11D	PL B706 32	R. Aaij	(LHCb Collab.)
AAIJ	11E	PR D84 092001	R. Aaij <i>et al.</i>	(LHCb Collab.)
Also		PR D85 039904 (errat.)	R. Aaij <i>et al.</i>	(LHCb Collab.)
AALTONEN	11A	PR D83 052012	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11AB	PR D84 052012	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11AG	PRL 107 191801	T. Aaltonen <i>et al.</i>	(CDF_Collab.)
Also		PRI 107 239903 (errat)	T Aaltonen <i>et al</i>	(CDF Collab.)
	11 A I	PRI 107 201802	T Astronen et $3/$	(CDF Collab.)
	11 A N	DDI 107 261902	T Asltonon et al	(CDE Collab.)
		PRL 107 201002	T. Aaltonen et al.	(CDF Collab.)
AALTONEN	114	PRL 107 272001	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	11L	PRL 106 161801	I. Aaltonen <i>et al.</i>	(CDF Collab.)
AALIONEN	11N	PRL 106 181802	I. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	11U	PR D84 052007	V.M. Abazov <i>et al.</i>	(D0 Collab.)
CHATRCHYAN	11T	PRL 107 191802	S. Chatrchyan <i>et al.</i>	(CMS Collab.)
LI	11	PRL 106 121802	J. Li <i>et al.</i>	(BELLE Collab.)
ABAZOV	10E	PR D82 012003	V.M. Abazov <i>et al.</i>) (D0 Collab.
ABAZOV	10H	PRI 105 081801	VM Abazov et al	(D0 Collab)
Also	10	PR D82 032001	V M Abazov et al	(D0 Collab.)
ABAZOV	105	PI 8603 530	VM Abazov et al	(D0 Collab.)
FSEN	105	PRI 105 201802	S Econ et al	(BELLE Collab.)
	10	PRI 104 231801	PLOUVOT at al	(BELLE Collab.)
DENC	10	DD D92 072007	C. C. Dang at al	(DELLE Collab.)
	10	DDI 102 072007	T Astenson et al	(CDE Collab.)
	09AQ	PRE 103 191002	T. Aaltonen et al.	(CDF Collab.)
AALTONEN	090	PR D79 011104		
AALTONEN	09C	PRL 103 031801	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	09P	PRL 102 201801	I. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	09E	PRL 102 032001	V.M. Abazov <i>et al.</i>	(DU Collab.)
ABAZOV	09G	PRL 102 051801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	091	PRL 102 091801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	09Y	PR D79 111102	V.M. Abazov <i>et al.</i>	(D0 Collab.)
LOUVOT	09	PRL 102 021801	R. Louvot <i>et al.</i>	(BELLE Collab.)
AALTONEN	08F	PRL 100 021803	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	08G	PRL 100 161802	T. Aaltonen <i>et al.</i>	(CDF Collab.)
AALTONEN	08J	PRL 100 121803	T. Aaltonen <i>et al.</i>	(CDF Collab.)
ABAZOV	08AM	PRL 101 241801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
WICHT	08A	PRL 100 121801	J. Wicht <i>et al.</i>	(BELLE Collab.)
ABAZOV	07	PRL 98 121801	V.M. Abazov et al.	(D0 Collab.)
ABAZOV	07A	PRI 98 151801	VM Abazov et al	(D0 Collab)
ABAZOV	07N	PR D76 057101	VM Abazov et al	(D0 Collab.)
ABAZOV	071	PRI 00 2/1801	VM Abazov et al	(D0 Collab.)
	070	PPI 08 061802	Λ Abulancia at al	(CDE Collab.)
	070	DDI 09 052001	Λ Drutckov at al	(PELLE Collab.)
	07	PRL 90 032001	A. Drutskov et al.	(DELLE Collab.)
		PR D70 012002	A. Druiskoy et al.	(DELLE Collab.)
ABAZOV	008	PRL 97 021802	V.IVI. ADAZOV <i>et al.</i>	(DU Collab.)
ABAZOV	00G	PR D/4 03110/	V.IVI. Abazov et al.	(DU Collab.)
ABAZOV	06V	PRL 97 241801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABULENCIA	06J	PRL 96 191801	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABULENCIA	06N	PRL 96 231801	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABULENCIA	06Q	PRL 97 062003	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABULENCIA,A	06D	PRL 97 211802	A. Abulencia <i>et al.</i>	(CDF Collab.)
ABULENCIA,A	06G	PRL 97 242003	A. Abulencia <i>et al.</i>	(CDF Collab.)
ACOSTA	06	PRL 96 202001	D. Acosta <i>et al.</i>	(CDF Collab.)
ABAZOV	05B	PRL 94 042001	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ABAZOV	05W	PRL 95 171801	V.M. Abazov <i>et al.</i>	(D0 Collab.)
ACOSTA	05	PRL 94 101803	D. Acosta <i>et al.</i>	(CDF Collab.)
ACOSTA	05J	PRL 95 031801	D. Acosta <i>et al.</i>	(CDF Collab.)
ABDALLAH	04A	PL B585 63	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABDALLAH	04J	EPJ C35 35	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABDALLAH	03B	EPJ C28 155	J. Abdallah <i>et al.</i>	(DELPHI Collab.)
ABE	03	PR D67 012006	K. Abe <i>et al.</i>	(SLD Collab.)
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Page 90

Created: 5/30/2025 07:50

	03E	EPJ C29 143	A. Heister <i>et al.</i> K. Abo <i>et al</i>	(ALEPH Collab.)
ΑΓΟΣΤΑ	020	PR D65 111101	P A costa et al	(CDE Collab.)
ΔΟΟΣΤΔ	020	PR D66 112002	D. Acosta et al.	(CDF Collab.)
ABBIENDI	01D	EP.J C19 241	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
BARATE	01E	EPJ C19 213	R. Barate <i>et al.</i>	(ALEPH Collab.)
ABE	00C	PR D62 071101	K. Abe <i>et al.</i>	`(SLD Collab.)
ABREU	00Y	EPJ C16 555	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU,P	00G	EPJ C18 229	P. Abreu <i>et al.</i>	(DELPHI Collab.)
AFFOLDER	00N	PRL 85 4668	T. Affolder <i>et al.</i>	(CDF Collab.)
BARATE	00K	PL B486 286	R. Barate <i>et al.</i>	(ALEPH Collab.)
ABBIENDI	995	EPJ C11 587	G. Abbiendi <i>et al.</i>	(OPAL Collab.)
ABE	99D	PR D59 032004	F. Abe et al.	(CDF Collab.)
ADE	00 I	PRL 82 3570 EDI C7 553	F. ADE et al. P. Barata et al	(CDF Collab.)
Also	991	EP (12, 181 (errat.)	R Barate et al	(ALEFTI Collab.)
ARE	98B	PR D57 5382	F Abe et al	(CDF Collab.)
ABE	98V	PRL 81 5742	F. Abe et al.	(CDF Collab.)
ACCIARRI	98S	PL B438 417	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	98F	EPJ C2 407	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	98G	PL B426 161	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
BARATE	98C	EPJ C4 367	R. Barate <i>et al.</i>	(ALEPH Collab.)
BARATE	98Q	EPJ C4 387	R. Barate <i>et al.</i>	(ALEPH Collab.)
PDG	98	EPJ C3 1	C. Caso <i>et al.</i>	(PDG Collab.)
ACCIARRI	97B	PL B391 474	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACCIARRI	97C	PL B391 481	M. Acciarri <i>et al.</i>	(L3 Collab.)
ACKERSTAFF	970	ZPHY C76 401	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ACKERSTAFF	97V 07	ZPHY C/0 41/ DL D414 202	K. Ackerstaff <i>et al.</i>	(UPAL Collab.)
	97 06R	PR D53 3406	F Abe et al.	(CDE Collab.)
ABE	96N	PRI 77 1945	F Abe et al	(CDF Collab.)
ABE	96Q	PR D54 6596	F. Abe et al.	(CDF Collab.)
ABREU	96F	ZPHY C71 11	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ADAM	96D	ZPHY C72 207	W. Adam <i>et al.</i>	(DELPHI Collab.)
BUSKULIC	96E	ZPHY C69 585	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	96M	PL B377 205	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	96V	PL B384 471	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
PDG	96	PR D54 1	R. M. Barnett <i>et al.</i>	(PDG Collab.)
ABE	95R	PRL 74 4988	F. Abe <i>et al.</i>	(CDF Collab.)
ABE	95Z	PRL 75 3068	F. Abe et al.	(CDF Collab.)
ACCIARRI	95H	PL B303 127	M. Acciarri et al.	(L3 Collab.)
	951	PL D303 137 PL B350 273	N. Acciarri el al. R. Akers et al	(OPAL Collab.)
AKERS	95 I	7PHY C66 555	R Akers et al	(OPAL Collab.)
BUSKULIC	95J	PL B356 409	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	95O	PL B361 221	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABREU	94D	PL B324 500	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ABREU	94E	ZPHY C61 407	P. Abreu <i>et al.</i>	(DELPHI Collab.)
Also		PL B289 199	P. Abreu <i>et al.</i>	(DELPHI Collab.)
AKERS	94 J	PL B337 196	R. Akers <i>et al.</i>	(OPAL Collab.)
AKERS	94L	PL B337 393	R. Akers <i>et al.</i>	(OPAL Collab.)
BUSKULIC	94B	PL B322 441	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
BUSKULIC	94C	PL B322 275	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
ABE	93F	PRL /1 1085	F. Abe et al.	(CDF Collab.)
RUSKUUC	03C 20L	PL B312 301	D. Buskulic at $2l$	(OFAL COND.)
ARREII	93G 92M	PI R289 199	P Abreu et al	(DELPHI Collab.)
ACTON	92N	PL B295 357	P.D. Acton <i>et al.</i>	(OPAL Collab.)
BUSKULIC	92E	PL B294 145	D. Buskulic <i>et al.</i>	(ALEPH Collab.)
LEE-FRANZINI	90	PRL 65 2947	J. Lee-Franzini <i>et al.</i>	(CUSB II Collab.)