Reference = AAIJ 14BI; EPJ C74 3092
Verifier code = LHCB

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PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vincenzo Vagnoni

EMAIL: vincenzo.vagnoni@bo.infn.it

July 21, 2016

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(1) Please check the results of your experiment carefully. They are marked.

(2) Please reply within one week.

(3) Please reply even if everything is correct.

(4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.

(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

$b\bar{b}$ MESONS

NODE=MXXX030

$\chi_{b1}(3P)$

NODE=M206

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

Observed in the radiative decay to $\Upsilon(1S, 2S, 3S)$, therefore $C = +$.
J needs confirmation.

NODE=M206

$\chi_{b1}(3P)$ MASS

NODE=M206M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
10512.1± 2.1± 0.9	351	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$

NODE=M206M

NODE=M206M

OCCUR=2

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

$10515.7^{+\ 2.2+\ 1.5}_{-\ 3.9-\ 2.1}$	169	[2] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
YOUR DATA 10511.3± 1.7± 2.5	182	[3] AAIJ	14BI	LHCB	$pp \to \gamma\mu^+\mu^- X$
10530 ± 5 ± 9		[4] AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$
10551 ±14 ±17		[4] ABAZOV	12Q	D0	$p\bar{p} \to \gamma\mu^+\mu^- X$

[1] The mass of the $\chi_{b1}(3P)$ state obtained by combining the results of AAIJ 14BG with that of AAIJ 14BI. The first uncertainty is experimental and the second attributable to the unknown mass splitting, assumed to be $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV.

NODE=M206M;LINKAGE=B

[2] From $\chi_{b1}(3P) \to \Upsilon(1S, 2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for ±30% variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$.

NODE=M206M;LINKAGE=A

YOUR NOTE [3] From $\chi_{b1}(3P) \to \Upsilon(3S)\gamma$ transition assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV.

NODE=M206M;LINKAGE=C

[4] The mass barycenter of the merged lineshapes from the $J = 1$ and 2 states.

NODE=M206M;LINKAGE=AA

$\chi_{b1}(3P)$ BRANCHING RATIOS

NODE=M206225

$\Gamma(\Upsilon(3S)\gamma)/\Gamma_{total}$ **Γ_3/Γ**

NODE=M206R03

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **seen**	182	AAIJ	14BI	LHCB	$pp \to \gamma\mu^+\mu^- X$

NODE=M206R03

$\chi_{b1}(3P)$ REFERENCES

NODE=M206

AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)	REFID=56199
YOUR PAPER AAIJ	14BI	EPJ C74 3092	R. Aaij *et al.*	(LHCb Collab.)	REFID=56235
AAD	12A	PRL 108 152001	G. Aad *et al.*	(ATLAS Collab.)	REFID=54037
ABAZOV	12Q	PR D86 031103	V.M. Abazov *et al.*	(D0 Collab.)	REFID=54264

Reference = AAIJ 15BI; EPJ C75 311
Verifier code = LHCB

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$c\bar{c}$ MESONS

NODE=MXXX025

NODE=M026

$\eta_c(1S)$

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

$\eta_c(1S)$ MASS

NODE=M026M

NODE=M026M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2983.4 ± 0.5 OUR AVERAGE		Error includes scale factor of 1.2.				
YOUR DATA 2982.2 ± 1.5 ± 0.1	2.0k	[1] AAIJ	15BI	LHCB	$pp \to \eta_c(1S)X$	
2983.5 ± 1.4 $^{+1.6}_{-3.6}$		[2] ANASHIN	14	KEDR	$J/\psi \to \gamma\eta_c$	
2979.8 ± 0.8 ± 3.5	4.5k	[3,4] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\pi^0$	
2984.1 ± 1.1 ± 2.1	900	[3,4,5] LEES	14E	BABR	$\gamma\gamma \to K^+K^-\eta$	OCCUR=2
2984.3 ± 0.6 ± 0.6		[6,7] ABLIKIM	12F	BES3	$\psi(2S) \to \gamma\eta_c$	
2984.49 ± 1.16 ± 0.52	832	[3] ABLIKIM	12N	BES3	$\psi(2S) \to \pi^0\gamma$ hadrons	
2982.7 ± 1.8 ± 2.2	486	ZHANG	12A	BELL	$e^+e^- \to e^+e^-\eta'\pi^+\pi^-$	
2984.5 ± 0.8 ± 3.1	11k	DEL-AMO-SA..	11M	BABR	$\gamma\gamma \to K^+K^-\pi^+\pi^-\pi^0$	
2985.4 ± 1.5 $^{+0.5}_{-2.0}$	920	[7] VINOKUROVA	11	BELL	$B^\pm \to K^\pm(K^0_S K^\pm\pi^\mp)$	
2982.2 ± 0.4 ± 1.6	14k	[8] LEES	10	BABR	10.6 $e^+e^- \to e^+e^-K^0_S K^\pm\pi^\mp$	
2985.8 ± 1.5 ± 3.1	0.9k	AUBERT	08AB	BABR	$B \to \eta_c(1S)K^{(*)} \to K\overline{K}\pi K^{(*)}$	
2986.1 ± 1.0 ± 2.5	7.5k	UEHARA	08	BELL	$\gamma\gamma \to \eta_c \to$ hadrons	
2970 ± 5 ± 6	501	[9] ABE	07	BELL	$e^+e^- \to J/\psi(c\bar{c})$	
2971 ± 3 $^{+2}_{-1}$	195	WU	06	BELL	$B^+ \to p\bar{p}K^+$	
2974 ± 7 $^{+2}_{-1}$	20	WU	06	BELL	$B^+ \to \Lambda\bar{\Lambda}K^+$	OCCUR=2
2981.8 ± 1.3 ± 1.5	592	ASNER	04	CLEO	$\gamma\gamma \to \eta_c \to K^0_S K^\pm\pi^\mp$	
2984.1 ± 2.1 ± 1.0	190	[10] AMBROGIANI	03	E835	$\bar{p}p \to \eta_c \to \gamma\gamma$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2982.5 ± 0.4 ± 1.4	12k	[11] DEL-AMO-SA..	11M	BABR	$\gamma\gamma \to K^0_S K^\pm\pi^\mp$	OCCUR=2
2982.2 ± 0.6		[12] MITCHELL	09	CLEO	$e^+e^- \to \gamma X$	
2982 ± 5	270	[13] AUBERT	06E	BABR	$B^\pm \to K^\pm X_{c\bar{c}}$	
2982.5 ± 1.1 ± 0.9	2.5k	[14] AUBERT	04D	BABR	$\gamma\gamma \to \eta_c(1S) \to K\overline{K}\pi$	
2977.5 ± 1.0 ± 1.2		[12,15] BAI	03	BES	$J/\psi \to \gamma\eta_c$	
2979.6 ± 2.3 ± 1.6	180	[16] FANG	03	BELL	$B \to \eta_c K$	
2976.3 ± 2.3 ± 1.2		[12,17] BAI	00F	BES	$J/\psi,\ \psi(2S) \to \gamma\eta_c$	
2976.6 ± 2.9 ± 1.3	140	[12,18] BAI	00F	BES	$J/\psi \to \gamma\eta_c$	OCCUR=2
2980.4 ± 2.3 ± 0.6		[19] BRANDENB...	00B	CLE2	$\gamma\gamma \to \eta_c \to K^\pm K^0_S\pi^\mp$	
2975.8 ± 3.9 ± 1.2		[18] BAI	99B	BES	Sup. by BAI 00F	
2999 ± 8	25	ABREU	98O	DLPH	$e^+e^- \to e^+e^-$ +hadrons	
2988.3 $^{+3.3}_{-3.1}$		ARMSTRONG	95F	E760	$\bar{p}p \to \gamma\gamma$	
2974.4 ± 1.9		[12,20] BISELLO	91	DM2	$J/\psi \to \eta_c\gamma$	
2969 ± 4 ± 4	80	[12] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^+K^-$	
2956 ±12 ±12		[12] BAI	90B	MRK3	$J/\psi \to \gamma K^+K^-K^0_S K^0_L$	OCCUR=3
2982.6 $^{+2.7}_{-2.3}$	12	BAGLIN	87B	SPEC	$\bar{p}p \to \gamma\gamma$	
2980.2 ± 1.6		[12,20] BALTRUSAIT..	86	MRK3	$J/\psi \to \eta_c\gamma$	
2984 ± 2.3 ± 4.0		[12] GAISER	86	CBAL	$J/\psi \to \gamma$X, $\psi(2S) \to \gamma$X	
2976 ± 8		[12,21] BALTRUSAIT..	84	MRK3	$J/\psi \to 2\phi\gamma$	
2982 ± 8	18	[22] HIMEL	80B	MRK2	e^+e^-	
2980 ± 9		[22] PARTRIDGE	80B	CBAL	e^+e^-	

YOUR NOTE

[1] AAIJ 15BI reports $m_{J/\psi} - m_{\eta_c(1S)} = 114.7 \pm 1.5 \pm 0.1$ MeV from a sample of $\eta_c(1S)$ and J/ψ produced in b-hadron decays. We have used current value of $m_{J/\psi} = 3096.900 \pm 0.006$ MeV to arrive at the quoted $m_{\eta_c(1S)}$ result. NODE=M026M;LINKAGE=D

[2] Taking into account an asymmetric photon lineshape. NODE=M026M;LINKAGE=E

[3] With floating width. NODE=M026M;LINKAGE=AL

[4] Ignoring possible interference with the non-resonant 0^- amplitude. NODE=M026M;LINKAGE=LS

[5] Using both, $\eta \to \gamma\gamma$ and $\eta \to \pi^+\pi^-\pi^0$ decays. NODE=M026M;LINKAGE=EL

[6] From a simultaneous fit to six decay modes of the η_c. NODE=M026M;LINKAGE=BL

[7] Accounts for interference with non-resonant continuum. NODE=M026M;LINKAGE=VA

[8] Taking into account interference with the non-resonant $J^P = 0^-$ amplitude. NODE=M026M;LINKAGE=LE

[9] From a fit of the J/ψ recoil mass spectrum. Supersedes ABE,K 02 and ABE 04G. NODE=M026M;LINKAGE=EB

[10] Using mass of $\psi(2S) = 3686.00$ MeV. NODE=M026M;LINKAGE=BG

[11] Not independent from the measurements reported by LEES 10. NODE=M026M;LINKAGE=DE

[12] MITCHELL 09 observes a significant asymmetry in the lineshapes of $\psi(2S) \to \gamma\eta_c$ and $J/\psi \to \gamma\eta_c$ transitions. If ignored, this asymmetry could lead to significant bias whenever the mass and width are measured in $\psi(2S)$ or J/ψ radiative decays. NODE=M026M;LINKAGE=MI

[13] From the fit of the kaon momentum spectrum. Systematic errors not evaluated. NODE=M026M;LINKAGE=AU

[14] Superseded by LEES 10. NODE=M026M;LINKAGE=UB

[15] From a simultaneous fit of five decay modes of the η_c. NODE=M026M;LINKAGE=AK

[16] Superseded by VINOKUROVA 11. NODE=M026M;LINKAGE=FA

[17] Weighted average of the $\psi(2S)$ and $J/\psi(1S)$ samples. Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=KZ

[18] Average of several decay modes. Using an η_c width of 13.2 MeV. NODE=M026M;LINKAGE=C1

[19] Superseded by ASNER 04. NODE=M026M;LINKAGE=NN

[20] Average of several decay modes. NODE=M026M;LINKAGE=A

[21] $\eta_c \to \phi\phi$. NODE=M026M;LINKAGE=B

[22] Mass adjusted by us to correspond to $J/\psi(1S)$ mass = 3097 MeV. NODE=M026M;LINKAGE=M

$\eta_c(1S)$ REFERENCES

NODE=M026

YOUR PAPER	AAIJ	15BI	EPJ C75 311	R. Aaij *et al.*	(LHCb Collab.)
	ANASHIN	14	PL B738 391	V.V. Anashin *et al.*	(KEDR Collab.)
	LEES	14E	PR D89 112004	J.P. Lees *et al.*	(BABAR Collab.)
	ABLIKIM	12F	PRL 108 222002	M. Ablikim *et al.*	(BES III Collab.)
	ABLIKIM	12N	PR D86 092009	M. Ablikim *et al.*	(BES III Collab.)
	ZHANG	12A	PR D86 052002	C.C. Zhang *et al.*	(BELLE Collab.)
	DEL-AMO-SA...	11M	PR D84 012004	P. del Amo Sanchez *et al.*	(BABAR Collab.)
	VINOKUROVA	11	PL B706 139	A. Vinokurova *et al.*	(BELLE Collab.)
	LEES	10	PR D81 052010	J.P. Lees *et al.*	(BABAR Collab.)
	MITCHELL	09	PRL 102 011801	R.E. Mitchell *et al.*	(CLEO Collab.)
	AUBERT	08AB	PR D78 012006	B. Aubert *et al.*	(BABAR Collab.)
	UEHARA	08	EPJ C53 1	S. Uehara *et al.*	(BELLE Collab.)
	ABE	07	PRL 98 082001	K. Abe *et al.*	(BELLE Collab.)
	AUBERT	06E	PRL 96 052002	B. Aubert *et al.*	(BABAR Collab.)
	WU	06	PRL 97 162003	C.-H. Wu *et al.*	(BELLE Collab.)
	ABE	04G	PR D70 071102	K. Abe *et al.*	(BELLE Collab.)
	ASNER	04	PRL 92 142001	D.M. Asner *et al.*	(CLEO Collab.)
	AUBERT	04D	PRL 92 142002	B. Aubert *et al.*	(BABAR Collab.)
	AMBROGIANI	03	PL B566 45	M. Ambrogiani *et al.*	(FNAL E835 Collab.)
	BAI	03	PL B555 174	J.Z. Bai *et al.*	(BES Collab.)
	FANG	03	PRL 90 071801	F. Fang *et al.*	(BELLE Collab.)
	ABE,K	02	PRL 89 142001	K. Abe *et al.*	(BELLE Collab.)
	BAI	00F	PR D62 072001	J.Z. Bai *et al.*	(BES Collab.)
	BRANDENB...	00B	PRL 85 3095	G. Brandenburg *et al.*	(CLEO Collab.)
	BAI	99B	PR D60 072001	J.Z. Bai *et al.*	(BES Collab.)
	ABREU	98O	PL B441 479	P. Abreu *et al.*	(DELPHI Collab.)
	ARMSTRONG	95F	PR D52 4839	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)
	BISELLO	91	NP B350 1	D. Bisello *et al.*	(DM2 Collab.)
	BAI	90B	PRL 65 1309	Z. Bai *et al.*	(Mark III Collab.)
	BAGLIN	87B	PL B187 191	C. Baglin *et al.*	(R704 Collab.)
	BALTRUSAIT...	86	PR D33 629	R.M. Baltrusaitis *et al.*	(Mark III Collab.)
	GAISER	86	PR D34 711	J. Gaiser *et al.*	(Crystal Ball Collab.)
	BALTRUSAIT...	84	PRL 52 2126	R.M. Baltrusaitis *et al.*	(CIT, UCSC+) JP
	HIMEL	80B	PRL 45 1146	T.M. Himel *et al.*	(SLAC, LBL, UCB)
	PARTRIDGE	80B	PRL 45 1150	R. Partridge *et al.*	(CIT, HARV, PRIN+)

REFID=57147 REFID=56130 REFID=55937 REFID=54271 REFID=54741 REFID=54763 REFID=16751 REFID=53927 REFID=53236 REFID=52676 REFID=52267 REFID=52064 REFID=51627 REFID=51059 REFID=51472 REFID=50182 REFID=49745 REFID=49746 REFID=49465 REFID=49185 REFID=49206 REFID=49188 REFID=48546 REFID=48553 REFID=47385 REFID=46553 REFID=44623 REFID=41668 REFID=41354 REFID=40018 REFID=22009 REFID=22012 REFID=22006 REFID=22003 REFID=22004

NODE=M070

$J/\psi(1S)$

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

$J/\psi(1S)$ MASS

NODE=M070M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
3096.900±0.006 OUR AVERAGE					
YOUR DATA 3096.66 ±0.19 ±0.02	6.1k	[1] AAIJ	15BI	LHCB	$pp \to J/\psi X$

NODE=M070M

3096.900 ± 0.002 ± 0.006			[2] ANASHIN	15	KEDR	$e^+e^- \to$ hadrons	
3096.89 ± 0.09		502	[3] ARTAMONOV	00	OLYA	$e^+e^- \to$ hadrons	
3096.91 ± 0.03 ± 0.01			[4] ARMSTRONG	93B	E760	$\overline{p}p \to e^+e^-$	
3096.95 ± 0.1 ± 0.3		193	BAGLIN	87	SPEC	$\overline{p}p \to e^+e^-$ X	
• • • We do not use the following data for averages, fits, limits, etc. • • •							
3096.917 ± 0.010 ± 0.007			AULCHENKO	03	KEDR	$e^+e^- \to$ hadrons	
3097.5 ± 0.3			GRIBUSHIN	96	FMPS	515 π^- Be $\to 2\mu X$	
3098.4 ± 2.0		38k	LEMOIGNE	82	GOLI	185 π^- Be $\to \gamma\mu^+\mu^-$ A	
3096.93 ± 0.09		502	[5] ZHOLENTZ	80	REDE	e^+e^-	
3097.0 ± 1			[6] BRANDELIK	79C	DASP	e^+e^-	

YOUR NOTE

[1] From a sample of $\eta_c(1S)$ and J/ψ produced in b-hadron decays. NODE=M070M;LINKAGE=B

[2] Supersedes AULCHENKO 03. NODE=M070M;LINKAGE=A

[3] Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85). NODE=M070M;LINKAGE=AR

[4] Mass central value and systematic error recalculated by us according to Eq. (16) in ARMSTRONG 93B, using the value for the $\psi(2S)$ mass from AULCHENKO 03. NODE=M070M;LINKAGE=NW

[5] Superseded by ARTAMONOV 00. NODE=M070M;LINKAGE=RZ

[6] From a simultaneous fit to e^+e^-, $\mu^+\mu^-$ and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$. NODE=M070M;LINKAGE=F

$J/\psi(1S)$ REFERENCES

NODE=M070

YOUR PAPER

AAIJ	15BI	EPJ C75 311	R. Aaij *et al.*	(LHCb Collab.)	REFID=57147
ANASHIN	15	PL B749 50	V.V. Anashin *et al.*	(KEDR Collab.)	REFID=56792
AULCHENKO	03	PL B573 63	V.M. Aulchenko *et al.*	(KEDR Collab.)	REFID=49579
ARTAMONOV	00	PL B474 427	A.S. Artamonov *et al.*		REFID=47424
GRIBUSHIN	96	PR D53 4723	A. Gribushin *et al.*	(E672 Collab., E706 Collab.)	REFID=44739
ARMSTRONG	93B	PR D47 772	T.A. Armstrong *et al.*	(FNAL E760 Collab.)	REFID=43307
BAGLIN	87	NP B286 592	C. Baglin *et al.*	(LAPP, CERN, GENO, LYON+)	REFID=40002
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)	REFID=11616
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)	REFID=40033
		Translated from YAF 41 733.			
LEMOIGNE	82	PL 113B 509	Y. Lemoigne *et al.*	(SACL, LOIC, SHMP+)	REFID=22084
ZHOLENTZ	80	PL 96B 214	A.A. Zholents *et al.*	(NOVO)	REFID=10320
Also		SJNP 34 814	A.A. Zholents *et al.*	(NOVO)	REFID=10321
		Translated from YAF 34 1471.			
BRANDELIK	79C	ZPHY C1 233	R. Brandelik *et al.*	(DASP Collab.)	REFID=22114

Reference = AAIJ 13CC; JHEP 1309 145
Verifier code = LHCB

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Russian Federation

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CHARMED MESONS ($C = \pm 1$)

NODE=MXXX035

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}\,u$, $D^- = \overline{c}\,d$, similarly for D^*'s

NODE=MXXX035

NODE=M097

$D_1(2420)^0$

$I(J^P) = \frac{1}{2}(1^+)$
I needs confirmation.

$D_1(2420)^0$ MASS

NODE=M097M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements.

NODE=M097M

NODE=M097M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2420.5±0.6 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
YOUR DATA 2419.6±0.1±0.7	210k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
2423.1±1.5$^{+0.4}_{-1.0}$	2.7k	[1] ABRAMOWICZ13		ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
2420.1±0.1±0.8	103k	DEL-AMO-SA..10P		BABR	$e^+e^- \to D^{*+}\pi^- X$
2426 ±3 ±1	151	ABE	05A	BELL	$B^- \to D^0\pi^+\pi^-\pi^-$
2421.4±1.5±0.9		[2] ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$
2421 $^{+1}_{-2}$ ±2	286	AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^- X$
2422 ±2 ±2	51	FRABETTI	94B	E687	γBe $\to D^{*+}\pi^- X$
2428 ±3 ±2	279	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^- X$
2414 ±2 ±5	171	ALBRECHT	89H	ARG	$e^+e^- \to D^{*+}\pi^- X$
2428 ±8 ±5	171	ANJOS	89C	TPS	$\gamma N \to D^{*+}\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2420.5±2.1±0.9	3110±340	[3] CHEKANOV	09	ZEUS	$e^\pm p \to D^{*+}\pi^- X$
2421.7±0.7±0.6	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+}\pi^- X$
2425 ±3	235	[4] ABREU	98M	DLPH	e^+e^-

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1.

NODE=M097M;LINKAGE=AR

[2] Fit includes the contribution from $D_1^*(2430)^0$.

NODE=M097M;LINKAGE=AB

[3] Calculated using the mass difference $m(D_1^0) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG} = 2010.27 \pm 0.17$ MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of 0.9 MeV.

NODE=M097M;LINKAGE=CH

[4] No systematic error given.

NODE=M097M;LINKAGE=K

$D_1(2420)^0$ WIDTH

NODE=M097W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
31.7± 2.5 OUR AVERAGE		Error includes scale factor of 3.5. See the ideogram below.			
YOUR DATA 35.2± 0.4± 0.9	210k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
38.8± 5.0$^{+\ 1.9}_{-\ 5.4}$	2.7k	[1] ABRAMOWICZ13		ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
31.4± 0.5± 1.3	103k	DEL-AMO-SA..10P		BABR	$e^+e^- \to D^{*+}\pi^- X$
20.0± 1.7± 1.3	7.5k	ABULENCIA	06A	CDF	1900 $p\overline{p} \to D^{*+}\pi^- X$
24 ± 7 ± 8	151	ABE	05A	BELL	$B^- \to D^0\pi^+\pi^-\pi^-$
23.7± 2.7± 4.0		[2] ABE	04D	BELL	$B^- \to D^{*+}\pi^-\pi^-$
20 $^{+\ 6}_{-\ 5}$ ± 3	286	AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^- X$
15 ± 8 ± 4	51	FRABETTI	94B	E687	γBe $\to D^{*+}\pi^- X$
23 $^{+\ 8}_{-\ 6}$ $^{+10}_{-\ 3}$	279	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^- X$
13 ± 6 $^{+10}_{-\ 5}$	171	ALBRECHT	89H	ARG	$e^+e^- \to D^{*+}\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
53.2± 7.2$^{+\ 3.3}_{-\ 4.9}$	3110±340	CHEKANOV	09	ZEUS	$e^\pm p \to D^{*+}\pi^- X$
58 ±14 ±10	171	ANJOS	89C	TPS	$\gamma N \to D^{*+}\pi^- X$

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M097W;LINKAGE=AR

[2] Fit includes the contribution from $D_1^*(2430)^0$. NODE=M097W;LINKAGE=AB

$D_1(2420)^0$ POLARIZATION AMPLITUDE A_{D_1} NODE=M097PAH

A polarization amplitude A_{D_1} is a parameter that depends on the initial polarization of the D_1 and is sensitive to a possible S-wave contribution to its decay. For D_1 decays the helicity angle, θ_h, distribution varies like $1 + A_{D_1}\cos^2\theta_h$, where θ_h is the angle in the D^* rest frame between the two pions emitted by the $D_1 \to D^*\pi$ and the $D^* \to D\pi$. NODE=M097PAH

Unpolarized D_1 decaying purely via D-wave is predicted to give $A_{D_1} = 3$.

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
5.73±0.25 OUR AVERAGE					NODE=M097PAH
$7.8\ ^{+6.7}_{-2.7}\ ^{+4.6}_{-1.8}$	2.7k	[1] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^- X$
5.72±0.25	103k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^{*+}\pi^- X$
$5.9\ ^{+3.0}_{-1.7}\ ^{+2.4}_{-1.0}$		CHEKANOV	09	ZEUS	$e^\pm p \to D^{*+}\pi^- X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 3.30±0.48	210k	[2] AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$
3.8 ±0.6 ±0.8		[3] AUBERT	09Y	BABR	$B^+ \to D_1^0\ell^+\nu_\ell$
$2.74^{+1.40}_{-0.93}$		[4] AVERY	94C	CLE2	$e^+e^- \to D^{*+}\pi^- X$

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. A pure D-wave not excluded although some S-wave mixing possible. NODE=M097PAH;LINKAGE=AR

YOUR NOTE [2] Systematic uncertainty not estimated. Resonance parameters fixed. NODE=M097PAH;LINKAGE=A

[3] Assuming $\Gamma(\Upsilon(4S) \to B^+B^-) / \Gamma(\Upsilon(4S) \to B^0\overline{B}^0) = 1.065 \pm 0.026$ and equal partial widths and helicity angle distributions for charged and neutral D_1 mesons. NODE=M097PAH;LINKAGE=AU

[4] Systematic uncertainties not estimated. NODE=M097PAH;LINKAGE=AV

$D_1(2420)^0$ REFERENCES NODE=M097

YOUR PAPER AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
AUBERT	09Y	PRL 103 051803	B. Aubert *et al.*	(BABAR Collab.)	REFID=52929
CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.)	REFID=52733
ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.)	REFID=51054
ABE	05A	PRL 94 221805	K. Abe *et al.*	(BELLE Collab.)	REFID=50755
ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.)	REFID=50011
ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.)	REFID=46315
AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.)	REFID=44096
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.)	REFID=41013
ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP	REFID=41001
ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.)	REFID=40737

NODE=M119

$D_2^*(2460)^0$ $I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored (ALBRECHT 89B, ALBRECHT 89H), natural parity confirmed by the helicity analysis (DEL-AMO-SANCHEZ 10P). AAIJ 13CC confirms $J^P = 2^+$ and natural parity. NODE=M119

$D_2^*(2460)0$ MASS NODE=M119M

The fit includes $D^\pm$, D^0, $D_s^\pm$, $D^{*\pm}$, D^{*0}, $D_s^{*\pm}$, $D_1(2420)^0$, $D_2^*(2460)^0$, and $D_{s1}(2536)^\pm$ mass and mass difference measurements. NODE=M119M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2460.47±0.21 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.					NODE=M119M
YOUR DATA 2460.4 ±0.4 ±1.2	82k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^- X$

YOUR DATA	2460.4	±0.1	±0.1	675k	AAIJ	13CC	LHCB	$pp \to D^+\pi^-X$	OCCUR=2
	2462.5	±2.4	$^{+1.3}_{-1.1}$	2.3k	[1] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^-X$	
	2462.2	±0.1	±0.8	243k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^+\pi^-X$	
	2460.4	±1.2	±2.2	3.4k	AUBERT	09AB	BABR	$B^- \to D^+\pi^-\pi^-$	
	2461.6	±2.1	±3.3		[2] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$	
	2464.5	±1.1	±1.9	5.8k	[2] LINK	04A	FOCS	γ A	
	2465	±3	±3	486	AVERY	94C	CLE2	$e^+e^- \to D^+\pi^-$X	
	2453	±3	±2	128	FRABETTI	94B	E687	γBe $\to D^+\pi^-$X	
	2461	±3	±1	440	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^-$X	
	2455	±3	±5	337	ALBRECHT	89B	ARG	$e^+e^- \to D^+\pi^-$X	
	2459	±3	±2	153	ANJOS	89C	TPS	$\gamma N \to D^+\pi^-$X	
	• • • We do not use the following data for averages, fits, limits, etc. • • •								
	2469.1	±3.7	$^{+1.2}_{-1.3}$	1.5k	[3] CHEKANOV	09	ZEUS	$e^\pm p \to D^{(*)+}\pi^-X$	
	2463.3	±0.6	±0.8	20k	ABULENCIA	06A	CDF	1900 $p\bar{p} \to D^+\pi^-X$	
	2461	±6		126	[4] ABREU	98M	DLPH	e^+e^-	
	2466	±7		1	ASRATYAN	95	BEBC	53,40 $\nu(\bar{\nu}) \to pX,dX$	

[1] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M119M;LINKAGE=AR

[2] Fit includes the contribution from $D_0^*(2400)^0$. NODE=M119M;LINKAGE=LI

[3] Calculated using the mass difference $m(D_2^{*0}) - m(D^{*+})_{PDG}$ reported below and $m(D^{*+})_{PDG} = 2010.27 \pm 0.17$ MeV. The 0.17 MeV uncertainty of the PDG mass value should be added to the experimental uncertainty of $^{+1.2}_{-1.3}$ MeV. NODE=M119M;LINKAGE=CH

[4] No systematic error given. NODE=M119M;LINKAGE=K

$D_2^*(2460)^0$ WIDTH

NODE=M119W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
47.7± 1.3 OUR AVERAGE Error includes scale factor of 2.0. See the ideogram below.					NODE=M119W
YOUR DATA 43.2± 1.2± 3.0	82k	AAIJ	13CC	LHCB	$pp \to D^{*+}\pi^-X$
YOUR DATA 45.6± 0.4± 1.1	675k	AAIJ	13CC	LHCB	$pp \to D^+\pi^-X$ OCCUR=2
46.6± 8.1$^{+5.9}_{-3.8}$	2.3k	[5] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)+}\pi^-X$
50.5± 0.6± 0.7	243k	DEL-AMO-SA..	10P	BABR	$e^+e^- \to D^+\pi^-X$
41.8± 2.5± 2.9	3.4k	AUBERT	09AB	BABR	$B^- \to D^+\pi^-\pi^-$
49.2± 2.3± 1.3	20k	ABULENCIA	06A	CDF	1900 $p\bar{p} \to D^+\pi^-X$
45.6± 4.4± 6.7		[6] ABE	04D	BELL	$B^- \to D^+\pi^-\pi^-$
38.7± 5.3± 2.9	5.8k	[6] LINK	04A	FOCS	γ A
28 $^{+8}_{-7}$ ± 6	486	AVERY	94C	CLE2	$e^+e^- \to D^+\pi^-$X
25 ±10 ± 5	128	FRABETTI	94B	E687	γBe $\to D^+\pi^-$X
20 $^{+9}_{-12}$ $^{+9}_{-10}$	440	AVERY	90	CLEO	$e^+e^- \to D^{*+}\pi^-$X
15 $^{+13}_{-10}$ $^{+5}_{-10}$	337	ALBRECHT	89B	ARG	$e^+e^- \to D^+\pi^-$X
20 ±10 ± 5	153	ANJOS	89C	TPS	$\gamma N \to D^+\pi^-$X

[5] From the combined fit of the $M(D^+\pi^-)$ and $M(D^{*+}\pi^-)$ distributions. and A_{D_2} fixed to the theoretical prediction of -1. NODE=M119W;LINKAGE=AR

[6] Fit includes the contribution from $D_0^*(2400)^0$. NODE=M119W;LINKAGE=LI

$D_2^*(2460)^0$ REFERENCES

NODE=M119

YOUR PAPER	AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.) REFID=55581
	ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.) REFID=54743
	DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.) REFID=53534
	AUBERT	09AB	PR D79 112004	B. Aubert *et al.*	(BABAR Collab.) REFID=52941
	CHEKANOV	09	EPJ C60 25	S. Chekanov *et al.*	(ZEUS Collab.) REFID=52733
	ABULENCIA	06A	PR D73 051104	A. Abulencia *et al.*	(CDF Collab.) REFID=51054
	ABE	04D	PR D69 112002	K. Abe *et al.*	(BELLE Collab.) REFID=50011
	LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.) REFID=49775
	ABREU	98M	PL B426 231	P. Abreu *et al.*	(DELPHI Collab.) REFID=46315
	ASRATYAN	95	ZPHY C68 43	A.E. Asratyan *et al.*	(BIRM, BELG, CERN+) REFID=44439
	AVERY	94C	PL B331 236	P. Avery *et al.*	(CLEO Collab.) REFID=44096
	FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.) REFID=43687
	AVERY	90	PR D41 774	P. Avery, D. Besson	(CLEO Collab.) REFID=41013
	ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.) JP REFID=40736
	ALBRECHT	89H	PL B232 398	H. Albrecht *et al.*	(ARGUS Collab.) JP REFID=41001
	ANJOS	89C	PRL 62 1717	J.C. Anjos *et al.*	(FNAL E691 Collab.) REFID=40737

NODE=M150

$D_2^*(2460)^\pm$ $I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B). NODE=M150

$D_2^*(2460)^\pm$ MASS

NODE=M150M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2465.4±1.3 OUR AVERAGE		Error includes scale factor of 3.1. See the ideogram below.				NODE=M150M
2465.6±1.8±1.3		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$	
2468.6±0.6±0.3		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
YOUR DATA 2463.1±0.2±0.6	342k	AAIJ	13CC	LHCB	$pp \to D^0 \pi^+ X$	
$2460.6 \pm 4.4^{+3.6}_{-0.8}$	1371	[3] ABRAMOWICZ	13	ZEUS	$e^\pm p \to D^{(*)0} \pi^+ X$	
2465.4±0.2±1.1	111k	[4] DEL-AMO-SA..	10P	BABR	$e^+ e^- \to D^0 \pi^+ X$	
$2465.7 \pm 1.8^{+1.4}_{-4.8}$	2909	KUZMIN	07	BELL	$e^+ e^- \to$ hadrons	
2463 ±3 ±3	310	BERGFELD	94B	CLE2	$e^+ e^- \to D^0 \pi^+ X$	
2453 ±3 ±2	185	FRABETTI	94B	E687	γBe $\to D^0 \pi^+ X$	
2469 ±4 ±6		ALBRECHT	89F	ARG	$e^+ e^- \to D^0 \pi^+ X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2468.1±0.6±0.5		[5] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2
2467.6±1.5±0.8	3.5k	[6] LINK	04A	FOCS	γ A	

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M150M;LINKAGE=A

[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M150M;LINKAGE=B

[3] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively. NODE=M150M;LINKAGE=AB

[4] At a fixed width of 50.5 MeV. NODE=M150M;LINKAGE=DE

[5] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M150M;LINKAGE=C

[6] Fit includes the contribution from $D_0^*(2400)^\pm$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^\pm}) - (m_{D_2^*(2460)^0})$. NODE=M150M;LINKAGE=LI

$D_2^*(2460)^\pm$ WIDTH

NODE=M150W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
46.7± 1.2 OUR AVERAGE						NODE=M150W
46.0± 3.4±3.2		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$	
47.3± 1.5±0.7		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
YOUR DATA 48.6± 1.3±1.9	342k	AAIJ	13CC	LHCB	$pp \to D^0 \pi^+ X$	
49.7± 3.8±6.4	2909	KUZMIN	07	BELL	$e^+ e^- \to$ hadrons	
34.1± 6.5±4.2	3.5k	[3] LINK	04A	FOCS	γ A	
$27 \ ^{+11}_{-8} \ \pm 5$	310	BERGFELD	94B	CLE2	$e^+ e^- \to D^0 \pi^+ X$	
23 ± 9 ±5	185	FRABETTI	94B	E687	γBe $\to D^0 \pi^+ X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
46.0± 1.4±1.8		[4] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M150W;LINKAGE=A

[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M150W;LINKAGE=B

[3] Fit includes the contribution from $D_0^*(2400)^\pm$. NODE=M150W;LINKAGE=LI

[4] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M150W;LINKAGE=C

$D_2^*(2460)^\pm$ REFERENCES

NODE=M150

AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
YOUR PAPER AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931

NODE=M198

$D(2550)^0$ $I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

Unnatural parity according to the helicity analysis of DEL-AMO-SANCHEZ 10P and AAIJ 13CC. DEL-AMO-SANCHEZ 10P suggests $J^P = 0^-$. NODE=M198

$D(2550)^0$ MASS

NODE=M198M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
2564 ±20 OUR AVERAGE		Error includes scale factor of 3.9.		
YOUR DATA 2579.5± 3.4±5.5	60k	AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
2539.4± 4.5±6.8	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^{*+}\pi^- X$

NODE=M198M NODE=M198M

$D(2550)^0$ WIDTH

NODE=M198W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
135 ±17 OUR AVERAGE				
YOUR DATA 177.5±17.8±46.0	60k	AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
130 ±12 ±13	34k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^{*+}\pi^- X$

NODE=M198W NODE=M198W

$D(2550)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M198PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J} \cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^*\pi$ and $D^* \to D\pi$ decays. NODE=M198PAM

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
YOUR DATA 4.2±1.3	60k	[1] AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
YOUR NOTE [1] Systematic uncertainty not estimated.				NODE=M198PAM;LINKAGE=A

NODE=M198PAM

$D(2550)^0$ REFERENCES

NODE=M198

YOUR PAPER AAIJ 13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
DEL-AMO-SA... 10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534

NODE=M199

$D_J^*(2600)$ was $D(2600)$, $I(J^P) = \frac{1}{2}(?^?)$

OMITTED FROM SUMMARY TABLE

J^P consistent with natural parity (DEL-AMO-SANCHEZ 10P, AAIJ 13CC). NODE=M199

$D_J^*(2600)$ MASS

NODE=M199M

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
2622 ±12 OUR AVERAGE		Error includes scale factor of 4.7. See the ideogram below.			
YOUR DATA 2649.2± 3.5±3.5	51k	AAIJ 13CC	LHCB		$pp \to D^{*+}\pi^- X$
2608.7± 2.4±2.5	26k	DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^+\pi^- X$
2621.3± 3.7±4.2	13k	[1] DEL-AMO-SA..10P	BABR	+	$e^+e^- \to D^0\pi^+ X$

NODE=M199M NODE=M199M OCCUR=2

[1] At a fixed width of 93 MeV. NODE=M199M;LINKAGE=DE

$D_J^*(2600)$ WIDTH

NODE=M199W

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
104 ±20 OUR AVERAGE		Error includes scale factor of 1.6.		
YOUR DATA 140.2±17.1±18.6	51k	AAIJ 13CC	LHCB	$pp \to D^{*+}\pi^- X$
93 ± 6 ±13	26k	DEL-AMO-SA..10P	BABR	$e^+e^- \to D^+\pi^- X$

NODE=M199W NODE=M199W

$D_J^*(2600)$ REFERENCES

NODE=M199

YOUR PAPER AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.) REFID=55581
DEL-AMO-SA... 10P PR D82 111101 P. del Amo Sanchez *et al.* (BABAR Collab.) REFID=53534

NODE=M228

$D(2740)^0$

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

OMITTED FROM SUMMARY TABLE

J^P consistent with unnatural parity (AAIJ 13CC).

NODE=M228

$D(2740)^0$ MASS

NODE=M228M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
YOUR DATA **2737.0±3.5±11.2**	7.7k	AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$

NODE=M228M

$D(2740)^0$ WIDTH

NODE=M228W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
YOUR DATA **73.2±13.4±25.0**	7.7k	AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$

NODE=M228W

$D(2740)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M228PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J} \cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^*\pi$ and $D^* \to D\pi$ decays.

NODE=M228PAM

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
YOUR DATA 3.1±2.2	7.7k	[1] AAIJ	13CC LHCB	$pp \to D^{*+}\pi^- X$
YOUR NOTE [1] Systematic uncertainty not estimated.				

NODE=M228PAM

NODE=M228PAM;LINKAGE=A

$D(2740)^0$ REFERENCES

NODE=M228

YOUR PAPER AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.) REFID=55581

NODE=M203

$D(2750)$

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

OMITTED FROM SUMMARY TABLE

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

NODE=M203

$D(2750)$ MASS

NODE=M203M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
2763 ± 4 OUR AVERAGE		Error includes scale factor of 2.3. See the ideogram below.			
2798 ± 7 ± 7		[1] AAIJ	15Y LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$
YOUR DATA 2761.1± 5.1± 6.5	14k	AAIJ	13CC LHCB	0	$pp \to D^{*+}\pi^- X$
YOUR DATA 2760.1± 1.1± 3.7	56k	AAIJ	13CC LHCB	0	$pp \to D^+\pi^- X$
YOUR DATA 2771.7± 1.7± 3.8	20k	AAIJ	13CC LHCB	+	$pp \to D^0\pi^+ X$
2752.4± 1.7± 2.7	23.5k	[2] DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^{*+}\pi^- X$
2763.3± 2.3± 2.3	11.3k	[2] DEL-AMO-SA..10P	BABR	0	$e^+e^- \to D^+\pi^- X$
2769.7± 3.8± 1.5	5.7k	[2,3] DEL-AMO-SA..10P	BABR	+	$e^+e^- \to D^0\pi^+ X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2802 ±11 ±10		[4] AAIJ	15Y LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$

[1] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.
[2] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.
[3] At a fixed width of 60.9 MeV.
[4] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.

OCCUR=2
OCCUR=3
OCCUR=2
OCCUR=3
OCCUR=2

NODE=M203M;LINKAGE=A
NODE=M203M;LINKAGE=DE
NODE=M203M;LINKAGE=DA
NODE=M203M;LINKAGE=B

$D(2750)$ WIDTH

NODE=M203W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT	
65 ± 5 OUR AVERAGE							NODE=M203W
105 ±18 ±24		[5] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
YOUR DATA 74.4± 3.4±37.0	14k	AAIJ	13CC	LHCB	0	$pp \to D^{*+} \pi^- X$	
YOUR DATA 74.4± 3.4±19.1	56k	AAIJ	13CC	LHCB	0	$pp \to D^+ \pi^- X$	OCCUR=2
YOUR DATA 66.7± 6.6±10.5	20k	AAIJ	13CC	LHCB	+	$pp \to D^0 \pi^+ X$	OCCUR=4
71 ± 6 ±11	23.5k	[6] DEL-AMO-SA..	10P	BABR		$e^+ e^- \to D^{*+} \pi^- X$	
60.9± 5.1± 3.6	11.3k	[6] DEL-AMO-SA..	10P	BABR		$e^+ e^- \to D^+ \pi^- X$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
154 ±27 ±16		[7] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2

[5] Modeling the $\pi^+ \pi^-$ S-wave with the Isobar formalism. NODE=M203W;LINKAGE=A

[6] The states observed in the $D^* \pi$ and $D \pi$ final states are not necessarily the same. NODE=M203W;LINKAGE=DE

[7] Modeling the $\pi^+ \pi^-$ S-wave with the K-matrix formalism. NODE=M203W;LINKAGE=B

$D(2750)$ REFERENCES

NODE=M203

AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	JP REFID=56609
YOUR PAPER AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534

NODE=M229

$D(3000)^0$

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

OMITTED FROM SUMMARY TABLE

Both natural- and unnatural-parity components observed depending on the decay mode (AAIJ 13CC). NODE=M229

$D(3000)^0$ MASS

NODE=M229M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						NODE=M229M
YOUR DATA 2971.8±8.7	9.5k	[1,2] AAIJ	13CC	LHCB	$pp \to D^{*+} \pi^- X$	
YOUR DATA 3008.1±4.0	17.6k	[1,3] AAIJ	13CC	LHCB	$pp \to D^+ \pi^- X$	OCCUR=2

YOUR NOTE [1] Systematic uncertainty not estimated. NODE=M229M;LINKAGE=A

YOUR NOTE [2] Unnatural parity preferred. NODE=M229M;LINKAGE=B

YOUR NOTE [3] Natural parity state. A state $D(3000)^+$ is possibly seen in $D^0 \pi^+$ final state. NODE=M229M;LINKAGE=C

$D(3000)^0$ WIDTH

NODE=M229W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						NODE=M229W
YOUR DATA 188.1±44.8	9.5k	[4,5] AAIJ	13CC	LHCB	$pp \to D^{*+} \pi^- X$	
YOUR DATA 110.5±11.5	17.6k	[4,6] AAIJ	13CC	LHCB	$pp \to D^+ \pi^- X$	OCCUR=2

YOUR NOTE [4] Systematic uncertainty not estimated. NODE=M229W;LINKAGE=A

YOUR NOTE [5] Unnatural parity preferred. NODE=M229W;LINKAGE=C

YOUR NOTE [6] Natural parity state. A state $D(3000)^+$ is possibly seen in $D^0 \pi^+$ final state. NODE=M229W;LINKAGE=B

$D(3000)^0$ POLARIZATION AMPLITUDE A_{D_J}

NODE=M229PAM

A polarization amplitude A_{D_J} is a parameter that depends on the initial polarization of the D_J. For D_J decays the helicity angle, θ_H, distribution varies like $1 + A_{D_J} \cos^2(\theta_H)$, where θ_H is the angle in the D_J rest frame between the two pions emitted in the $D_J \to D^* \pi$ and $D^* \to D \pi$ decays. NODE=M229PAM

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
• • • We do not use the following data for averages, fits, limits, etc. • • •						NODE=M229PAM
YOUR DATA 1.5±0.9	9.5k	[7] AAIJ	13CC	LHCB	$pp \to D^{*+} \pi^- X$	

YOUR NOTE [7] Systematic uncertainty not estimated. NODE=M229PAM;LINKAGE=A

$D(3000)^0$ REFERENCES

NODE=M229

YOUR PAPER AAIJ 13CC JHEP 1309 145 R. Aaij *et al.* (LHCb Collab.) REFID=55581

Reference = AAIJ 14BG; JHEP 1410 088
Verifier code = LHCB

Normally we send all verifications for one experiment to one person, usually the spokesperson or data-analysis co-ordinator, who then distributes them to the appropriate people. Please tell us if we should send the verifications for your experiment to someone else.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vincenzo Vagnoni

EMAIL: vincenzo.vagnoni@bo.infn.it

July 21, 2016

Dear Colleague,

(1) Please check the results of your experiment carefully. They are marked.

(2) Please reply within one week.

(3) Please reply even if everything is correct.

(4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.

(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

$b\bar{b}$ MESONS

NODE=MXXX030

NODE=M078

$\chi_{b2}(1P)$

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

Observed in radiative decay of the $\Upsilon(2S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$. $J = 2$ from SKWARNICKI 87.

NODE=M078

$m_{\chi_{b2}(1P)} - m_{\chi_{b1}(1P)}$

NODE=M078DM2

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**19.81±0.65±0.20**	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
YOUR NOTE	[1] From the $\chi_{bj}(1P) \to \Upsilon(1S)\gamma$ transition.				

NODE=M078DM2
NODE=M078DM2;LINKAGE=A

$\chi_{b2}(1P)$ REFERENCES

NODE=M078

YOUR PAPER	AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)
	SKWARNICKI	87	PRL 58 972	T. Skwarnicki *et al.*	(Crystal Ball Collab.) J

REFID=56199
REFID=40019
NODE=M081

$\chi_{b2}(2P)$

$I^G(J^{PC}) = 0^+(2^{++})$
J needs confirmation.

Observed in radiative decay of the $\Upsilon(3S)$, therefore $C = +$. Branching ratio requires E1 transition, M1 is strongly disfavored, therefore $P = +$.

NODE=M081

$m_{\chi_{b2}(2P)} - m_{\chi_{b1}(2P)}$

NODE=M081M2

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
	13.4±0.6 OUR AVERAGE				
YOUR DATA	12.3±2.6±0.6	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
	13.5±0.4±0.5	[2] HEINTZ	92	CSB2	$e^+e^- \to \gamma X, \ell^+\ell^-\gamma\gamma$
YOUR NOTE	[1] From the $\chi_{bj}(2P) \to \Upsilon(1S)\gamma$ transition.				
	[2] From the average photon energy for inclusive and exclusive events. Supersedes NARAIN 91.				

NODE=M081M2
NODE=M081M2;LINKAGE=B
NODE=M081M2;LINKAGE=A

$\chi_{b2}(2P)$ REFERENCES

NODE=M081

YOUR PAPER	AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)
	HEINTZ	92	PR D46 1928	U. Heintz *et al.*	(CUSB II Collab.)
	NARAIN	91	PRL 66 3113	M. Narain *et al.*	(CUSB Collab.)

REFID=56199
REFID=43604
REFID=41586
NODE=M206

$\chi_{b1}(3P)$

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

Observed in the radiative decay to $\Upsilon(1S, 2S, 3S)$, therefore $C = +$.
J needs confirmation.

NODE=M206

$\chi_{b1}(3P)$ MASS

NODE=M206M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**10512.1± 2.1± 0.9**	351	[1] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	$10515.7^{+\ 2.2+\ 1.5}_{-\ 3.9-\ 2.1}$	169	[2] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$
	10511.3± 1.7± 2.5	182	[3] AAIJ	14BI	LHCB	$pp \to \gamma\mu^+\mu^- X$
	10530 ± 5 ± 9		[4] AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$
	10551 ±14 ±17		[4] ABAZOV	12Q	D0	$p\bar{p} \to \gamma\mu^+\mu^- X$

OCCUR=2

YOUR NOTE [1] The mass of the $\chi_{b1}(3P)$ state obtained by combining the results of AAIJ 14BG with that of AAIJ 14BI. The first uncertainty is experimental and the second attributable to the unknown mass splitting, assumed to be $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV. NODE=M206M;LINKAGE=B

YOUR NOTE [2] From $\chi_{b1}(3P) \to \Upsilon(1S,2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for $\pm 30\%$ variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$. NODE=M206M;LINKAGE=A

[3] From $\chi_{b1}(3P) \to \Upsilon(3S)\gamma$ transition assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV. NODE=M206M;LINKAGE=C

[4] The mass barycenter of the merged lineshapes from the $J = 1$ and 2 states. NODE=M206M;LINKAGE=AA

$\chi_{b1}(3P)$ BRANCHING RATIOS

NODE=M206225

$\Gamma(\Upsilon(1S)\gamma)/\Gamma_{total}$ Γ_1/Γ

NODE=M206R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **seen**	169	[5] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$

NODE=M206R01

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

seen		AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$
seen		ABAZOV	12Q	D0	$p\bar{p} \to \gamma\mu^+\mu^- X$

YOUR NOTE [5] From $\chi_{b1}(3P) \to \Upsilon(1S,2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for $\pm 30\%$ variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$. NODE=M206R01;LINKAGE=A

$\Gamma(\Upsilon(2S)\gamma)/\Gamma_{total}$ Γ_2/Γ

NODE=M206R02

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA **seen**	169	[6] AAIJ	14BG	LHCB	$pp \to \gamma\mu^+\mu^- X$

NODE=M206R02

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

seen		AAD	12A	ATLS	$pp \to \gamma\mu^+\mu^- X$

YOUR NOTE [6] From $\chi_{b1}(3P) \to \Upsilon(1S,2S)\gamma$ transitions assuming $m_{\chi_{b2}(3P)} - m_{\chi_{b1}(3P)} = 10.5 \pm 1.5$ MeV and allowing for $\pm 30\%$ variation in the $\chi_{b2}(3P)$ production rate relative to that of $\chi_{b1}(3P)$. NODE=M206R02;LINKAGE=A

$\chi_{b1}(3P)$ REFERENCES

NODE=M206

YOUR PAPER AAIJ	14BG	JHEP 1410 088	R. Aaij *et al.*	(LHCb Collab.)	REFID=56199
AAIJ	14BI	EPJ C74 3092	R. Aaij *et al.*	(LHCb Collab.)	REFID=56235
AAD	12A	PRL 108 152001	G. Aad *et al.*	(ATLAS Collab.)	REFID=54037
ABAZOV	12Q	PR D86 031103	V.M. Abazov *et al.*	(D0 Collab.)	REFID=54264

Reference = AAIJ 15AB; JHEP 1504 024
Verifier code = LHCB

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Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

BOTTOM MESONS
($B = \pm 1$)

$B^+ = u\overline{b}$, $B^0 = d\overline{b}$, $\overline{B}^0 = \overline{d}\,b$, $B^- = \overline{u}\,b$, similarly for B^*'s

NODE=MXXX045

NODE=MXXX045

NODE=M218

$B_1(5721)^+$

$I(J^P) = \frac{1}{2}(1^+)$ Status: **

I, *J*, *P* need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M218

NODE=M218

$m_{B_1^+} - m_{B^{*0}}$

NODE=M218DM

NODE=M218DM

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$401.2^{+2.4}_{-2.7}$ OUR AVERAGE					
YOUR DATA $400.5 \pm 1.8 \pm 3.1$	8K	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$402 \pm 3\ ^{+1}_{-3}$		[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

YOUR NOTE [1] AAIJ 15AB reports $[m_{B_1^+} - m_{B^0}] - (m_{B^{*0}} - m_{B^0}) - m_{\pi^+} = 260.9 \pm 1.8 \pm 3.1$ MeV which we adjust by the π^+ mass and assume $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV. The masses inside the square brackets were measured for each candidate event.

NODE=M218DM;LINKAGE=A

[2] AALTONEN 14I reports $m_{B_1(5721)^+} - m_{B^{*0}} - m_{\pi^+} = 262 \pm 3^{+1}_{-3}$ MeV which we adjusted by the π^+ mass.

NODE=M218DM;LINKAGE=AA

$B_1(5721)^+$ WIDTH

NODE=M218W

NODE=M218W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
31 ± 6 OUR AVERAGE Error includes scale factor of 1.1.					
YOUR DATA $29.1 \pm 3.6 \pm 4.3$	8K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
$49\ ^{+12}_{-10}\ ^{+2}_{-13}$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_1(5721)^+$ BRANCHING RATIOS

NODE=M218220

$\Gamma(B^{*0}\pi^+)/\Gamma_{total}$ **Γ_1/Γ**

NODE=M218R01

NODE=M218R01

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
YOUR DATA seen	8K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_1(5721)^+$ REFERENCES

NODE=M218

YOUR PAPER AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)

REFID=56628

REFID=56029

NODE=M183

$B_1(5721)^0$

$I(J^P) = \frac{1}{2}(1^+)$ Status: ***

I, *J*, *P* need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M183

NODE=M183

$m_{B_1^0} - m_{B^{*+}}$

NODE=M183DM2

NODE=M183DM2

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
402.8 ± 1.1 OUR AVERAGE					
YOUR DATA $403.4 \pm 0.7 \pm 1.5$	35K	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$402.3 \pm 0.9^{+1.1}_{-1.2}$		[3] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

YOUR NOTE [2] AAIJ 15AB reports $[m_{B_1^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 263.9 \pm 0.7 \pm 1.5$ MeV which we adjust by the π^- mass and $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV. The masses inside the square brackets were measured for each candidate event. NODE=M183DM2;LINKAGE=B

[3] AALTONEN 14I reports $m_{B_1(5721)^0} - m_{B^{*+}} - m_{\pi^-} = 262.7 \pm 0.9^{+1.1}_{-1.2}$ MeV which we adjusted by the π^- mass. NODE=M183DM2;LINKAGE=AA

$B_1(5721)^0$ WIDTH

NODE=M183W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
27.5±3.4 OUR AVERAGE Error includes scale factor of 1.1.					
YOUR DATA 30.1±1.5±3.5	35k	AAIJ	15AB	LHCB	pp at 7, 8 TeV
23 ±3 ±4		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

NODE=M183W

$B_1(5721)^0$ BRANCHING RATIOS

NODE=M183220

$\Gamma(B^{*+}\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M183R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA seen	35K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
dominant		AALTONEN	09D	CDF	$p\overline{p}$ at 1.96 TeV
dominant		[4] ABAZOV	07T	D0	$p\overline{p}$ at 1.96 TeV

NODE=M183R01

[4] Observed in $B_1^0 \to B^{*+}\pi^-$ with $B^{*+} \to B^+\gamma$ and $B^+ \to J/\psi\pi^+$. NODE=M183R01;LINKAGE=AB

$B_1(5721)^0$ REFERENCES

NODE=M183

YOUR PAPER AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)	REFID=56628
AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)	REFID=56029
AALTONEN	09D	PRL 102 102003	T. Aaltonen *et al.*	(CDF Collab.)	REFID=52700
ABAZOV	07T	PRL 99 172001	V.M. Abazov *et al.*	(D0 Collab.)	REFID=52014

NODE=M219

$B_2^*(5747)^+$

$I(J^P) = \frac{1}{2}(2^+)$ Status: **
I, *J*, *P* need confirmation.

Quantum numbers shown are quark-model predictions. NODE=M219

$m_{B_2^{*+}} - m_{B^0}$

NODE=M219DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
457.5 ±0.7 OUR AVERAGE					
YOUR DATA 457.62±0.72±0.40	4K	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
457.3 $\pm 1.3\ ^{+0.3}_{-0.9}$		[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

NODE=M219DM

[1] AAIJ 15AB reports $[m_{B_2^{*+}} - m_{B^0}] - m_{\pi^+} = 318.1 \pm 0.7 \pm 0.4$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. NODE=M219DM;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_2^*(5747)^+} - m_{B^0} - m_{\pi^+} = 317.7 \pm 1.2^{+0.3}_{-0.9}$ MeV which we adjusted by the π^+ mass. NODE=M219DM;LINKAGE=A

$B_2^*(5747)^+$ WIDTH

NODE=M219W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
20 ±5 OUR AVERAGE Error includes scale factor of 2.2.					
YOUR DATA 23.6±2.0±2.1	4K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
11 $^{+4}_{-3}$ $^{+3}_{-4}$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

NODE=M219W

$B_2^*(5747)^+$ BRANCHING RATIOS

NODE=M219220

$\Gamma(B^0\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M219R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA seen	4K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

NODE=M219R01

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

NODE=M219R02
NODE=M219R02

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**seen**	4k	AAIJ	15AB	LHCB	pp at 7, 8 TeV

$\Gamma(B^{*0}\pi^+)/\Gamma(B^0\pi^+)$ Γ_2/Γ_1

NODE=M219R03
NODE=M219R03

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	**1.0±0.5±0.8**	4k	AAIJ	15AB	LHCB	pp at 7, 8 TeV

$B_2^*(5747)^+$ REFERENCES

NODE=M219

YOUR PAPER	AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
	AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)

REFID=56628
REFID=56029
NODE=M184

$B_2^*(5747)^0$

$I(J^P) = \frac{1}{2}(2^+)$ Status: ***
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M184

$m_{B_2^{*0}} - m_{B^+}$

NODE=M184DM2

NODE=M184DM2

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	459.9 ±0.8 OUR AVERAGE		Error includes scale factor of 1.8.			
YOUR DATA	460.18±0.37±0.33	17K	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV
	457.5 ±1.2 $^{+0.8}_{-0.9}$		[3] AALTONEN	14I	CDF	$p\bar{p}$ at 1.96 TeV

YOUR NOTE [2] AAIJ 15AB reports $[m_{B_2^{*0}} - m_{B^+}] - m_{\pi^-} = 320.6 \pm 0.4 \pm 0.3$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event.

NODE=M184DM2;LINKAGE=A

[3] AALTONEN 14I reports $m_{B_2^*(5747)^0} - m_{B^+} - m_{\pi^-} = 317.9 \pm 1.2^{+0.8}_{-0.9}$ MeV which we adjusted by the π^- mass.

NODE=M184DM2;LINKAGE=AA

$B_2^*(5747)^0$ WIDTH

NODE=M184W

NODE=M184W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	24.2±1.7 OUR AVERAGE					
YOUR DATA	24.5±1.0± 1.5	17K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
	22 $^{+3}_{-2}$ $^{+4}_{-5}$		AALTONEN	14I	CDF	$p\bar{p}$ at 1.96 TeV
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	22.7$^{+3.8}_{-3.2}$ $^{+3.2}_{-10.2}$		AALTONEN	09D	CDF	Repl. by AALTONEN 14I

$B_2^*(5747)^0$ BRANCHING RATIOS

NODE=M184220

$\Gamma(B^+\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M184R01
NODE=M184R01

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	seen	17K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
	dominant		AALTONEN	09D	CDF	$p\bar{p}$ at 1.96 TeV
	dominant		ABAZOV	07T	D0	$p\bar{p}$ at 1.96 TeV

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

NODE=M184R02
NODE=M184R02

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	seen	17K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
	dominant		AALTONEN	09D	CDF	$p\bar{p}$ at 1.96 TeV
	dominant		ABAZOV	07T	D0	$p\bar{p}$ at 1.96 TeV

$\Gamma(B^{*+}\pi^-)/\Gamma(B^+\pi^-)$ Γ_2/Γ_1

NODE=M184R03
NODE=M184R03

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
	0.82±0.28 OUR AVERAGE					
YOUR DATA	0.71±0.14±0.30	17K	AAIJ	15AB	LHCB	pp at 7, 8 TeV
	1.10±0.42±0.31		[4] ABAZOV	07T	D0	$p\bar{p}$ at 1.96 TeV

[4] Converted from measured ratio of R = B($B_2^{*0} \to B^{*+}\pi^-$) / B($B_2^{*0} \to B^{(*)+}\pi^-$) = 0.475 ± 0.095 ± 0.069.

NODE=M184R03;LINKAGE=AB

$B_2^*(5747)^0$ REFERENCES

NODE=M184

YOUR PAPER	AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
	AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)
	AALTONEN	09D	PRL 102 102003	T. Aaltonen *et al.*	(CDF Collab.)
	ABAZOV	07T	PRL 99 172001	V.M. Abazov *et al.*	(D0 Collab.)

REFID=56628
REFID=56029
REFID=52700
REFID=52014
NODE=M224

$B_J(5840)^+$

$I(J^P) = \frac{1}{2}(?^?)$ Status: **
I, J, P need confirmation.

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

NODE=M224

$m_{B_J(5840)^+} - m_{B^0}$

NODE=M224DM

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
YOUR DATA	**571±13±14**	7k	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	595±26±14	7k	[2] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M224DM
NODE=M224DM
OCCUR=2

YOUR NOTE [1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 431 \pm 13 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224DM;LINKAGE=A

YOUR NOTE [2] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 455 \pm 26 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224DM;LINKAGE=B

$m_{B_J(5840)^+} - m_{B^{*0}}$

NODE=M224DM2

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	565±15±14	7k	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M224DM2
NODE=M224DM2

YOUR NOTE [3] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 425 \pm 15 \pm 14$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224DM2;LINKAGE=A

$B_J(5840)^+$ WIDTH

NODE=M224W

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
YOUR DATA	**224±24±80**	7k	[4] AAIJ	15AB	LHCB	pp at 7, 8 TeV
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	215±27±80	7k	[5] AAIJ	15AB	LHCB	pp at 7, 8 TeV
YOUR DATA	229±27±80	7k	[6] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M224W
NODE=M224W
OCCUR=2
OCCUR=3

YOUR NOTE [4] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224W;LINKAGE=A

YOUR NOTE [5] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224W;LINKAGE=B

YOUR NOTE [6] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.

NODE=M224W;LINKAGE=C

$B_J(5840)^+$ BRANCHING RATIOS

NODE=M224220

$\Gamma(B^{*0}\pi^+)/\Gamma_{total}$ Γ_1/Γ

NODE=M224R01

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
YOUR DATA **seen**	7k	AAIJ	15AB LHCB	pp at 7, 8 TeV

NODE=M224R01

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

NODE=M224R02

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*
YOUR DATA **possibly seen**	7k	[7] AAIJ	15AB LHCB	pp at 7, 8 TeV

NODE=M224R02

YOUR NOTE [7] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed.

NODE=M224R02;LINKAGE=A

$B_J(5840)^+$ REFERENCES

NODE=M224

YOUR PAPER AAIJ 15AB JHEP 1504 024 R. Aaij *et al.* (LHCb Collab.) REFID=56628
NODE=M225

$B_J(5840)^0$

$I(J^P) = \frac{1}{2}(?^?)$ Status: **
I, *J*, *P* need confirmation.

OMITTED FROM SUMMARY TABLE

Quantum numbers shown are quark-model predictions.

NODE=M225

$m_{B_J(5840)^0} - m_{B^+}$

NODE=M225DM

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
						NODE=M225DM
YOUR DATA	**584± 5±7**	12k	[1] AAIJ	15AB LHCB	pp at 7, 8 TeV	
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	610±22±7	12k	[2] AAIJ	15AB LHCB	pp at 7, 8 TeV	OCCUR=2

YOUR NOTE [1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 444 \pm 5 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225DM;LINKAGE=A

YOUR NOTE [2] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 471 \pm 22 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225DM;LINKAGE=B

$m_{B_J(5840)^0} - m_{B^{*+}}$

NODE=M225DM2

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
						NODE=M225DM2
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	584±5±7	12k	[3] AAIJ	15AB LHCB	pp at 7, 8 TeV	

YOUR NOTE [3] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 444 \pm 5 \pm 7$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225DM2;LINKAGE=A

$B_J(5840)^0$ WIDTH

NODE=M225W

	VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
						NODE=M225W
YOUR DATA	**127±17±34**	12k	[4] AAIJ	15AB LHCB	pp at 7, 8 TeV	
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	107±20±34	12k	[5] AAIJ	15AB LHCB	pp at 7, 8 TeV	OCCUR=2
YOUR DATA	119±17±34	12k	[6] AAIJ	15AB LHCB	pp at 7, 8 TeV	OCCUR=3

YOUR NOTE [4] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225W;LINKAGE=A

YOUR NOTE [5] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225W;LINKAGE=B

YOUR NOTE [6] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference. NODE=M225W;LINKAGE=C

$B_J(5840)^0$ BRANCHING RATIOS

NODE=M225220

$\Gamma(B^{*+}\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M225R01

VALUE	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
					NODE=M225R01
YOUR DATA **seen**	12k	AAIJ	15AB LHCB	pp at 7, 8 TeV	

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

NODE=M225R02

VALUE	*DOCUMENT ID*	*TECN*	*COMMENT*	
				NODE=M225R02
YOUR DATA **possibly seen**	[7] AAIJ	15AB LHCB	pp at 7, 8 TeV	

YOUR NOTE [7] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed. NODE=M225R02;LINKAGE=A

$B_J(5840)^0$ REFERENCES

NODE=M225

YOUR PAPER AAIJ 15AB JHEP 1504 024 R. Aaij *et al.* (LHCb Collab.) REFID=56628
NODE=M220

$B_J(5970)^+$

$I(J^P) = \frac{1}{2}(?^?)$ Status: **
I, *J*, *P* need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M220

$m_{B_J(5970)^+} - m_{B^0}$

NODE=M220DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
685 ±5 OUR AVERAGE					
YOUR DATA 685.3±4.1± 2.5	2K	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
681 ±5 ±12		[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 686.8±4.5± 2.5	2K	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M220DM

OCCUR=2

YOUR NOTE [1] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 545.8 \pm 4.1 \pm 2.5$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220DM;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_J(5970)^+} - m_{B^0} - m_{\pi^+} = 541 \pm 5 \pm 12$ MeV which we adjusted by the π^+ mass.
NODE=M220DM;LINKAGE=A

YOUR NOTE [3] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - m_{\pi^+} = 547 \pm 5 \pm 3$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220DM;LINKAGE=C

$m_{B_J(5970)^+} - m_{B^{*0}}$

NODE=M220DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 686.0±4.0±2.5	2k	[4] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M220DM2

YOUR NOTE [4] AAIJ 15AB reports $[m_{B_J^+} - m_{B^0}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^+} = 547 \pm 4 \pm 3$ MeV which we adjust by the π^+ mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*0}} - m_{B^0}) = (m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220DM2;LINKAGE=A

$B_J(5970)^+$ WIDTH

NODE=M220W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
62±20 OUR AVERAGE					
YOUR DATA 63±15±17	2K	[5] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$60^{+30}_{-20}\pm40$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 61±14±17	2K	[6] AAIJ	15AB	LHCB	pp at 7, 8 TeV
YOUR DATA 61±15±17	2K	[7] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M220W

OCCUR=2

OCCUR=3

YOUR NOTE [5] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220W;LINKAGE=A

YOUR NOTE [6] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220W;LINKAGE=B

YOUR NOTE [7] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M220W;LINKAGE=C

$B_J(5970)^+$ BRANCHING RATIOS

NODE=M220220

$\Gamma(B^0\pi^+)/\Gamma_{\text{total}}$ Γ_1/Γ

NODE=M220R01

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA possibly seen	2K	[8] AAIJ	15AB	LHCB	pp at 7, 8 TeV
possibly seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

NODE=M220R01

YOUR NOTE [8] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed.
NODE=M220R01;LINKAGE=A

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

NODE=M220R02
NODE=M220R02

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
YOUR DATA	seen	2k	AAIJ	15AB	LHCB	pp at 7, 8 TeV
	seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV

$B_J(5970)^+$ REFERENCES

NODE=M220

YOUR PAPER	AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
	AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)

REFID=56628
REFID=56029
NODE=M221

$B_J(5970)^0$

$I(J^P) = \frac{1}{2}(?^?)$ Status: **
I, J, P need confirmation.

Quantum numbers shown are quark-model predictions.

NODE=M221

$m_{B_J(5970)^0} - m_{B^+}$

NODE=M221DM

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
691 ±5 OUR AVERAGE					
YOUR DATA 689.9±2.9± 5.1	10K	[1] AAIJ	15AB	LHCB	pp at 7, 8 TeV
698 ±5 ±12		[2] AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 714.3±6.4± 5.1	10K	[3] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M221DM
NODE=M221DM
OCCUR=2

YOUR NOTE [1] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 550.4 \pm 2.9 \pm 5.1$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses two relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221DM;LINKAGE=B

[2] AALTONEN 14I reports $m_{B_J(5970)^0} - m_{B^+} - m_{\pi^-} = 558 \pm 5 \pm 12$ MeV which we adjusted by the π^- mass.
NODE=M221DM;LINKAGE=A

YOUR NOTE [3] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - m_{\pi^-} = 575 \pm 6 \pm 5$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = (-1)^J$ and uses three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221DM;LINKAGE=C

$m_{B_J(5970)^0} - m_{B^{*+}}$

NODE=M221DM2

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 691.6±3.7±5.1	10k	[4] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M221DM2
NODE=M221DM2

YOUR NOTE [4] AAIJ 15AB reports $[m_{B_J^0} - m_{B^+}] - (m_{B^{*+}} - m_{B^+}) - m_{\pi^-} = 552 \pm 4 \pm 5$ MeV which we adjust by the π^- mass. The masses inside the square brackets were measured for each candidate event. The result assumes $P = -(-1)^J$, $(m_{B^{*+}} - m_{B^+}) = 45.01 \pm 0.30 \pm 0.23$ MeV, and uses three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221DM2;LINKAGE=A

$B_J(5970)^0$ WIDTH

NODE=M221W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
81±12 OUR AVERAGE					
YOUR DATA 82± 8± 9	10K	[5] AAIJ	15AB	LHCB	pp at 7, 8 TeV
$70^{+30}_{-20}\pm30$		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 56± 7± 9	10K	[6] AAIJ	15AB	LHCB	pp at 7, 8 TeV
YOUR DATA 82±10± 9	10K	[7] AAIJ	15AB	LHCB	pp at 7, 8 TeV

NODE=M221W
NODE=M221W
OCCUR=2
OCCUR=3

YOUR NOTE [5] Assuming $P = (-1)^J$ and using two relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221W;LINKAGE=A

YOUR NOTE [6] Assuming $P = (-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221W;LINKAGE=B

YOUR NOTE [7] Assuming $P = -(-1)^J$ and using three relativistic Breit-Wigner functions in the fit for mass difference.
NODE=M221W;LINKAGE=C

$B_J(5970)^0$ BRANCHING RATIOS

NODE=M221220

$\Gamma(B^+\pi^-)/\Gamma_{total}$ Γ_1/Γ

NODE=M221R01
NODE=M221R01

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
YOUR DATA	possibly seen	10K	[8] AAIJ	15AB	LHCB	pp at 7, 8 TeV	OCCUR=2
	possibly seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV	

YOUR NOTE [8] A $B\pi$ decay is forbidden from a $P = -(-1)^J$ parent, whereas $B^*\pi$ is allowed. NODE=M221R01;LINKAGE=A

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

NODE=M221R02
NODE=M221R02

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT	
YOUR DATA	seen	10K	AAIJ	15AB	LHCB	pp at 7, 8 TeV	OCCUR=2
	seen		AALTONEN	14I	CDF	$p\overline{p}$ at 1.96 TeV	

$B_J(5970)^0$ REFERENCES

NODE=M221

YOUR PAPER	AAIJ	15AB	JHEP 1504 024	R. Aaij *et al.*	(LHCb Collab.)
	AALTONEN	14I	PR D90 012013	T. Aaltonen *et al.*	(CDF Collab.)

REFID=56628
REFID=56029

Reference = AAIJ 14AH; NP B886 665
Verifier code = LHCB

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PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vincenzo Vagnoni

EMAIL: vincenzo.vagnoni@bo.infn.it

July 21, 2016

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(2) Please reply within one week.

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(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

$c\bar{c}$ MESONS

NODE=MXXX025

NODE=M176

$X(3872)$

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

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

NODE=M176

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

See our note on "Developments in Heavy Quarkonium Spectroscopy".

$X(3872)$ BRANCHING RATIOS

NODE=M176235

$\Gamma(\gamma\psi(2S))/\Gamma_{total}$ **Γ_{13}/Γ**

NODE=M176R10

	VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
						NODE=M176R10
YOUR DATA	seen	36 ± 9	[1] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S)K^+$
	>0.030	25 ± 7	[2] AUBERT	09B	BABR	$B^+ \to \gamma\psi(2S)K^+$
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
	not seen		[3] BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S)K^+$

YOUR NOTE

[1] From 36.4 ± 9 events of $X(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ. NODE=M176R10;LINKAGE=A

[2] AUBERT 09B reports $[\Gamma(X(3872) \to \gamma\psi(2S))/\Gamma_{total}] \times [B(B^+ \to X(3872)K^+)] = (9.5 \pm 2.7 \pm 0.6) \times 10^{-6}$ which we divide by our best value $B(B^+ \to X(3872)K^+) < 3.2 \times 10^{-4}$. NODE=M176R10;LINKAGE=AU

[3] BHARDWAJ 11 reports $B(B^+ \to K^+X(3872)) \times B(X \to \gamma\psi(2S)) < 3.45 \times 10^{-6}$ at 90% CL. NODE=M176R10;LINKAGE=BH

$\Gamma(\gamma\psi(2S))/\Gamma(\gamma J/\psi)$ **Γ_{13}/Γ_{12}**

NODE=M176R11

	VALUE	CL%	EVTS	DOCUMENT ID		TECN	COMMENT
							NODE=M176R11
	2.6 ±0.6 OUR AVERAGE						
YOUR DATA	$2.46 \pm 0.64 \pm 0.29$		36 ± 9	[1] AAIJ	14AH	LHCB	$B^+ \to \gamma\psi(2S)K^+$
	3.4 ± 1.4			AUBERT	09B	BABR	$B^+ \to \gamma c\bar{c}K'$
	• • • We do not use the following data for averages, fits, limits, etc. • • •						
	<2.1		90	BHARDWAJ	11	BELL	$B^+ \to \gamma\psi(2S)K^+$

YOUR NOTE

[1] From 36.4 ± 9 events of $X(3872) \to J/\psi\gamma$ decays with a statistical significance of 4.4σ. NODE=M176R11;LINKAGE=A

$X(3872)$ REFERENCES

NODE=M176

YOUR PAPER	AAIJ	15AO	PR D92 011102	R. Aaij *et al.*	(LHCb Collab.)	REFID=56771
YOUR PAPER	AAIJ	14AH	NP B886 665	R. Aaij *et al.*	(LHCb Collab.)	REFID=55897
	AAIJ	13Q	PRL 110 222001	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=54985
	BHARDWAJ	11	PRL 107 091803	V. Bhardwaj *et al.*	(BELLE Collab.)	REFID=53779
	CHOI	11	PR D84 052004	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=53934
	AUBERT	09B	PRL 102 132001	B. Aubert *et al.*	(BABAR Collab.)	REFID=52722
	AUBERT	05B	PR D71 031501	B. Aubert *et al.*	(BABAR Collab.)	REFID=50498
	CHOI	03	PRL 91 262001	S.-K. Choi *et al.*	(BELLE Collab.)	REFID=49628

Reference = AAIJ 15X; PR D92 012012
Verifier code = LHCB

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RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

CHARMED MESONS ($C = \pm 1$)

NODE=MXXX035

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}\,u$, $D^- = \overline{c}\,d$, similarly for D^*'s

NODE=MXXX035

NODE=M179

$D_0^*(2400)^\pm$ $I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

J, P need confirmation.

NODE=M179

$D_0^*(2400)^\pm$ MASS

NODE=M179M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2351± 7 OUR AVERAGE						NODE=M179M
YOUR DATA 2360±15±30		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$	
2349± 6± 4		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
2403±14±35	18.8k	LINK	04A	FOCS	γ A	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
2354± 7±11		[3] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2

YOUR NOTE

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M179M;LINKAGE=A

[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M179M;LINKAGE=B

[3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M179M;LINKAGE=C

$D_0^*(2400)^\pm$ WIDTH

NODE=M179W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
230±17 OUR AVERAGE Error includes scale factor of 1.1.						NODE=M179W
YOUR DATA 255±26±51		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$	
217±13±13		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
283±24±34	18.8k	LINK	04A	FOCS	γ A	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
230±15±21		[3] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	OCCUR=2

YOUR NOTE

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves. NODE=M179W;LINKAGE=A

[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism. NODE=M179W;LINKAGE=B

[3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism. NODE=M179W;LINKAGE=C

$D_0^*(2400)^\pm$ REFERENCES

NODE=M179

YOUR PAPER AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775

NODE=M150

$D_2^*(2460)^\pm$ $I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B).

NODE=M150

$D_2^*(2460)^\pm$ MASS

NODE=M150M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
2465.4±1.3 OUR AVERAGE Error includes scale factor of 3.1. See the ideogram below.						NODE=M150M
YOUR DATA 2465.6±1.8±1.3		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$	
2468.6±0.6±0.3		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$	
2463.1±0.2±0.6	342k	AAIJ	13CC	LHCB	$pp \to D^0 \pi^+ X$	
$2460.6 \pm 4.4^{+3.6}_{-0.8}$	1371	[3] ABRAMOWICZ13		ZEUS	$e^\pm p \to D^{(*)0} \pi^+ X$	
2465.4±0.2±1.1	111k	[4] DEL-AMO-SA..10P		BABR	$e^+ e^- \to D^0 \pi^+ X$	

$2465.7 \pm 1.8^{+1.4}_{-4.8}$	2909	KUZMIN	07	BELL	$e^+e^- \to$ hadrons		
2463 ±3 ±3	310	BERGFELD	94B	CLE2	$e^+e^- \to D^0\pi^+X$		
2453 ±3 ±2	185	FRABETTI	94B	E687	γBe $\to D^0\pi^+X$		
2469 ±4 ±6		ALBRECHT	89F	ARG	$e^+e^- \to D^0\pi^+X$		
• • • We do not use the following data for averages, fits, limits, etc. • • •							
$2468.1 \pm 0.6 \pm 0.5$		[5] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$		OCCUR=2
$2467.6 \pm 1.5 \pm 0.8$	3.5k	[6] LINK	04A	FOCS	γ A		
YOUR NOTE	[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.						NODE=M150M;LINKAGE=A
	[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.						NODE=M150M;LINKAGE=B
	[3] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively.						NODE=M150M;LINKAGE=AB
	[4] At a fixed width of 50.5 MeV.						NODE=M150M;LINKAGE=DE
	[5] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.						NODE=M150M;LINKAGE=C
	[6] Fit includes the contribution from $D_0^*(2400)^\pm$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^\pm}) - (m_{D_2^*(2460)^0})$.						NODE=M150M;LINKAGE=LI

$D_2^*(2460)^\pm$ WIDTH

NODE=M150W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
46.7± 1.2 OUR AVERAGE					NODE=M150W
YOUR DATA 46.0± 3.4±3.2		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0K^+\pi^-$
47.3± 1.5±0.7		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$
48.6± 1.3±1.9	342k	AAIJ	13CC	LHCB	$pp \to D^0\pi^+X$
49.7± 3.8±6.4	2909	KUZMIN	07	BELL	$e^+e^- \to$ hadrons
34.1± 6.5±4.2	3.5k	[3] LINK	04A	FOCS	γ A
$27\ ^{+11}_{-\ 8}$ ±5	310	BERGFELD	94B	CLE2	$e^+e^- \to D^0\pi^+X$
23 ± 9 ±5	185	FRABETTI	94B	E687	γBe $\to D^0\pi^+X$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
46.0± 1.4±1.8		[4] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$
YOUR NOTE	[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.				
	[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.				
	[3] Fit includes the contribution from $D_0^*(2400)^\pm$.				
	[4] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.				

OCCUR=2

NODE=M150W;LINKAGE=A

NODE=M150W;LINKAGE=B

NODE=M150W;LINKAGE=LI

NODE=M150W;LINKAGE=C

$D_2^*(2460)^\pm$ REFERENCES

NODE=M150

YOUR PAPER AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931

Reference = AAIJ 15Y; PR D92 032002
Verifier code = LHCB

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($C = \pm 1$)

$D^+ = c\overline{d}$, $D^0 = c\overline{u}$, $\overline{D}^0 = \overline{c}\,u$, $D^- = \overline{c}\,d$, similarly for D^*'s

NODE=MXXX035

NODE=MXXX035

NODE=M179

$D_0^*(2400)^\pm$ $I(J^P) = \frac{1}{2}(0^+)$

OMITTED FROM SUMMARY TABLE

J, P need confirmation.

NODE=M179

$D_0^*(2400)^\pm$ MASS

NODE=M179M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	2351± 7 OUR AVERAGE					
	2360±15±30		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$
YOUR DATA	2349± 6± 4		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
	2403±14±35	18.8k	LINK	04A	FOCS	γ A
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	2354± 7±11		[3] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$

NODE=M179M

NODE=M179M

OCCUR=2

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.

NODE=M179M;LINKAGE=A

YOUR NOTE [2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.

NODE=M179M;LINKAGE=B

YOUR NOTE [3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.

NODE=M179M;LINKAGE=C

$D_0^*(2400)^\pm$ WIDTH

NODE=M179W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	230±17 OUR AVERAGE Error includes scale factor of 1.1.					
	255±26±51		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$
YOUR DATA	217±13±13		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
	283±24±34	18.8k	LINK	04A	FOCS	γ A
	• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA	230±15±21		[3] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$

NODE=M179W

NODE=M179W

OCCUR=2

[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.

NODE=M179W;LINKAGE=A

YOUR NOTE [2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.

NODE=M179W;LINKAGE=B

YOUR NOTE [3] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.

NODE=M179W;LINKAGE=C

$D_0^*(2400)^\pm$ REFERENCES

NODE=M179

	AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)
YOUR PAPER	AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)
	LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)

REFID=56588
REFID=56609
REFID=49775

NODE=M150

$D_2^*(2460)^\pm$ $I(J^P) = \frac{1}{2}(2^+)$

$J^P = 2^+$ assignment strongly favored(ALBRECHT 89B).

NODE=M150

$D_2^*(2460)^\pm$ MASS

NODE=M150M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
	2465.4±1.3 OUR AVERAGE Error includes scale factor of 3.1. See the ideogram below.					
	2465.6±1.8±1.3		[1] AAIJ	15X	LHCB	$B^0 \to \overline{D}^0 K^+ \pi^-$
YOUR DATA	2468.6±0.6±0.3		[2] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0 \pi^+ \pi^-$
	2463.1±0.2±0.6	342k	AAIJ	13CC	LHCB	$pp \to D^0 \pi^+ X$
	$2460.6 \pm 4.4 ^{+3.6}_{-0.8}$	1371	[3] ABRAMOWICZ13		ZEUS	$e^\pm p \to D^{(*)0} \pi^+ X$
	2465.4±0.2±1.1	111k	[4] DEL-AMO-SA..10P		BABR	$e^+ e^- \to D^0 \pi^+ X$

NODE=M150M

	$2465.7 \pm 1.8^{+1.4}_{-4.8}$	2909	KUZMIN	07	BELL	$e^+e^- \to$ hadrons		
	2463 ±3 ±3	310	BERGFELD	94B	CLE2	$e^+e^- \to D^0\pi^+X$		
	2453 ±3 ±2	185	FRABETTI	94B	E687	γBe $\to D^0\pi^+X$		
	2469 ±4 ±6		ALBRECHT	89F	ARG	$e^+e^- \to D^0\pi^+X$		
	• • • We do not use the following data for averages, fits, limits, etc. • • •							
YOUR DATA	2468.1±0.6±0.5		[5] AAIJ	15Y	LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$		OCCUR=2
	2467.6±1.5±0.8	3.5k	[6] LINK	04A	FOCS	γ A		
	[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.							NODE=M150M;LINKAGE=A
YOUR NOTE	[2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.							NODE=M150M;LINKAGE=B
	[3] From the fit of the $M(D^0\pi^+)$ distribution. The widths of the D_1^+ and D_2^{*+} are fixed to 25 MeV and 37 MeV, and A_{D_1} and A_{D_2} are fixed to the theoretical predictions of 3 and -1, respectively.							NODE=M150M;LINKAGE=AB
	[4] At a fixed width of 50.5 MeV.							NODE=M150M;LINKAGE=DE
YOUR NOTE	[5] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.							NODE=M150M;LINKAGE=C
	[6] Fit includes the contribution from $D_0^*(2400)^\pm$. Not independent of the corresponding mass difference measurement, $(m_{D_2^*(2460)^\pm}) - (m_{D_2^*(2460)^0})$.							NODE=M150M;LINKAGE=LI

$D_2^*(2460)^\pm$ WIDTH

NODE=M150W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*COMMENT*	
46.7± 1.2 OUR AVERAGE					NODE=M150W
46.0± 3.4±3.2		[1] AAIJ	15X LHCB	$B^0 \to \overline{D}^0K^+\pi^-$	
YOUR DATA 47.3± 1.5±0.7		[2] AAIJ	15Y LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$	
48.6± 1.3±1.9	342k	AAIJ	13CC LHCB	$pp \to D^0\pi^+X$	
49.7± 3.8±6.4	2909	KUZMIN	07 BELL	$e^+e^- \to$ hadrons	
34.1± 6.5±4.2	3.5k	[3] LINK	04A FOCS	γ A	
$27\ ^{+11}_{-\ 8}$ ±5	310	BERGFELD	94B CLE2	$e^+e^- \to D^0\pi^+X$	
23 ± 9 ±5	185	FRABETTI	94B E687	γBe $\to D^0\pi^+X$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 46.0± 1.4±1.8		[4] AAIJ	15Y LHCB	$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2
[1] From the Dalitz plot analysis including various K^* and D^{**} mesons as well as broad structures in the $K\pi$ S-wave and the $D\pi$ S- and P-waves.					NODE=M150W;LINKAGE=A
YOUR NOTE [2] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.					NODE=M150W;LINKAGE=B
[3] Fit includes the contribution from $D_0^*(2400)^\pm$.					NODE=M150W;LINKAGE=LI
YOUR NOTE [4] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.					NODE=M150W;LINKAGE=C

$D_2^*(2460)^\pm$ REFERENCES

NODE=M150

AAIJ	15X	PR D92 012012	R. Aaij *et al.*	(LHCb Collab.)	REFID=56588
YOUR PAPER AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.)	REFID=56609
AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)	REFID=55581
ABRAMOWICZ	13	NP B866 229	H. Abramowicz *et al.*	(ZEUS Collab.)	REFID=54743
DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)	REFID=53534
KUZMIN	07	PR D76 012006	A. Kuzmin *et al.*	(BELLE Collab.)	REFID=51854
LINK	04A	PL B586 11	J.M. Link *et al.*	(FOCUS Collab.)	REFID=49775
BERGFELD	94B	PL B340 194	T. Bergfeld *et al.*	(CLEO Collab.)	REFID=44099
FRABETTI	94B	PRL 72 324	P.L. Frabetti *et al.*	(FNAL E687 Collab.)	REFID=43687
ALBRECHT	89B	PL B221 422	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40736
ALBRECHT	89F	PL B231 208	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=40931

NODE=M203

$D(2750)$

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

OMITTED FROM SUMMARY TABLE

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

NODE=M203

$D(2750)$ MASS

NODE=M203M

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*	
2763 ± 4 OUR AVERAGE		Error includes scale factor of 2.3. See the ideogram below.				NODE=M203M
YOUR DATA 2798 ± 7 ± 7		[1] AAIJ	15Y LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	
2761.1± 5.1± 6.5	14k	AAIJ	13CC LHCB	0	$pp \to D^{*+}\pi^-X$	
2760.1± 1.1± 3.7	56k	AAIJ	13CC LHCB	0	$pp \to D^+\pi^-X$	OCCUR=2

	2771.7± 1.7± 3.8	20k		AAIJ	13CC	LHCB	+	$pp \to D^0\pi^+X$	OCCUR=3
	2752.4± 1.7± 2.7	23.5k	[2]	DEL-AMO-SA..10P		BABR	0	$e^+e^- \to D^{*+}\pi^-X$	
	2763.3± 2.3± 2.3	11.3k	[2]	DEL-AMO-SA..10P		BABR	0	$e^+e^- \to D^+\pi^-X$	OCCUR=2
	2769.7± 3.8± 1.5	5.7k	[2,3]	DEL-AMO-SA..10P		BABR	+	$e^+e^- \to D^0\pi^+X$	OCCUR=3
	• • • We do not use the following data for averages, fits, limits, etc. • • •								
YOUR DATA	2802 ±11 ±10		[4]	AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2
YOUR NOTE	[1] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.								NODE=M203M;LINKAGE=A
	[2] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.								NODE=M203M;LINKAGE=DE
	[3] At a fixed width of 60.9 MeV.								NODE=M203M;LINKAGE=DA
YOUR NOTE	[4] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.								NODE=M203M;LINKAGE=B

D(2750) WIDTH

NODE=M203W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*	
65 ± 5 OUR AVERAGE							NODE=M203W
YOUR DATA 105 ±18 ±24		[5] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	
74.4± 3.4±37.0	14k	AAIJ	13CC	LHCB	0	$pp \to D^{*+}\pi^-X$	
74.4± 3.4±19.1	56k	AAIJ	13CC	LHCB	0	$pp \to D^+\pi^-X$	OCCUR=2
66.7± 6.6±10.5	20k	AAIJ	13CC	LHCB	+	$pp \to D^0\pi^+X$	OCCUR=4
71 ± 6 ±11	23.5k	[6] DEL-AMO-SA..10P		BABR		$e^+e^- \to D^{*+}\pi^-X$	
60.9± 5.1± 3.6	11.3k	[6] DEL-AMO-SA..10P		BABR		$e^+e^- \to D^+\pi^-X$	OCCUR=2
• • • We do not use the following data for averages, fits, limits, etc. • • •							
YOUR DATA 154 ±27 ±16		[7] AAIJ	15Y	LHCB		$B^0 \to \overline{D}^0\pi^+\pi^-$	OCCUR=2
YOUR NOTE [5] Modeling the $\pi^+\pi^-$ S-wave with the Isobar formalism.							NODE=M203W;LINKAGE=A
[6] The states observed in the $D^*\pi$ and $D\pi$ final states are not necessarily the same.							NODE=M203W;LINKAGE=DE
YOUR NOTE [7] Modeling the $\pi^+\pi^-$ S-wave with the K-matrix formalism.							NODE=M203W;LINKAGE=B

D(2750) REFERENCES

NODE=M203

YOUR PAPER	AAIJ	15Y	PR D92 032002	R. Aaij *et al.*	(LHCb Collab.) JP
	AAIJ	13CC	JHEP 1309 145	R. Aaij *et al.*	(LHCb Collab.)
	DEL-AMO-SA...	10P	PR D82 111101	P. del Amo Sanchez *et al.*	(BABAR Collab.)

REFID=56609
REFID=55581
REFID=53534

Reference = AAIJ 14Y; PRL 112 091802
Verifier code = LHCB

Normally we send all verifications for one experiment to one person, usually the spokesperson or data-analysis co-ordinator, who then distributes them to the appropriate people. Please tell us if we should send the verifications for your experiment to someone else.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vincenzo Vagnoni

EMAIL: vincenzo.vagnoni@bo.infn.it

July 21, 2016

Dear Colleague,

(1) Please check the results of your experiment carefully. They are marked.

(2) Please reply within one week.

(3) Please reply even if everything is correct.

(4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.

(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

LIGHT UNFLAVORED MESONS ($S = C = B = 0$)

NODE=MXXX005

For $I = 1$ (π, b, ρ, a): $u\overline{d}$, $(u\overline{u}-d\overline{d})/\sqrt{2}$, $d\overline{u}$;
for $I = 0$ (η, η', h, h', ω, ϕ, f, f'): $c_1(u\overline{u} + d\overline{d}) + c_2(s\overline{s})$

NODE=MXXX005

NODE=M008

$f_1(1285)$

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

$f_1(1285)$ MASS

NODE=M008M

NODE=M008M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
1282.0 ± 0.5 OUR AVERAGE		Error includes scale factor of 1.8. See the ideogram below.			
1287.4 ± 3.0	87	ABLIKIM	15P	BES3	$J/\psi \to K^+K^-3\pi$
1281.16 ± 0.39 ± 0.45		[1] LEES	12X	BABAR	$\tau^- \to \pi^- f_1(1285)\nu_\tau$
1285.1 ± 1.0 $^{+\ 1.6}_{-\ 0.3}$		[2] ABLIKIM	11J	BES3	$J/\psi \to \omega(\eta\pi^+\pi^-)$
1281 ± 2 ± 1		AUBERT	07AU	BABAR	10.6 $e^+e^- \to f_1(1285)\pi^+\pi^-\gamma$
1276.1 ± 8.1 ± 8.0	203	BAI	04J	BES2	$J/\psi \to \gamma\gamma\pi^+\pi^-$
1274 ± 6	237	ABDALLAH	03H	DLPH	91.2 $e^+e^- \to K^0_S K^\pm\pi^\mp + X$
1280 ± 4		ACCIARRI	01G	L3	
1288 ± 4 ± 5	20k	ADAMS	01B	B852	18 GeV $\pi^- p \to K^+K^-\pi^0 n$
1284 ± 6	1400	ALDE	97B	GAM4	100 $\pi^- p \to \eta\pi^0\pi^0 n$
1281 ± 1		BARBERIS	97B	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1281 ± 1		BARBERIS	97C	OMEG	450 $pp \to pp K^0_S K^\pm\pi^\mp$
1280 ± 2		[3] ANTINORI	95	OMEG	300,450 $pp \to pp2(\pi^+\pi^-)$
1282.2 ± 1.5		LEE	94	MPS2	18 $\pi^- p \to K^+\overline{K}^0 2\pi^- p$
1279 ± 5		FUKUI	91C	SPEC	8.95 $\pi^- p \to \eta\pi^+\pi^- n$
1278 ± 2	140	ARMSTRONG	89	OMEG	300 $pp \to K\overline{K}\pi pp$
1278 ± 2		ARMSTRONG	89G	OMEG	85 $\pi^+ p \to 4\pi\pi p$, $pp \to 4\pi pp$
1280.1 ± 2.1	60	RATH	89	MPS	21.4 $\pi^- p \to K^0_S K^0_S \pi^0 n$
1285 ± 1	4750	[4] BIRMAN	88	MPS	8 $\pi^- p \to K^+\overline{K}^0\pi^- n$
1280 ± 1	504	BITYUKOV	88	SPEC	32.5 $\pi^- p \to K^+K^-\pi^0 n$
1280 ± 4		ANDO	86	SPEC	8 $\pi^- p \to \eta\pi^+\pi^- n$
1277 ± 2	420	REEVES	86	SPEC	6.6 $p\overline{p} \to K K\pi X$
1285 ± 2		CHUNG	85	SPEC	8 $\pi^- p \to N K\overline{K}\pi$
1279 ± 2	604	ARMSTRONG	84	OMEG	85 $\pi^+ p \to K\overline{K}\pi\pi p$, $pp \to K\overline{K}\pi pp$
1286 ± 1		CHAUVAT	84	SPEC	ISR 31.5 pp
1278 ± 4		EVANGELIS...	81	OMEG	12 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$
1283 ± 3	103	DIONISI	80	HBC	4 $\pi^- p \to K\overline{K}\pi n$
1282 ± 2	320	NACASCH	78	HBC	0.7,0.76 $\overline{p}p \to K\overline{K}3\pi$
1279 ± 5	210	GRASSLER	77	HBC	16 $\pi^\mp p$
1286 ± 3	180	DUBOC	72	HBC	1.2 $\overline{p}p \to 2K4\pi$
1283 ± 5		DAHL	67	HBC	1.6–4.2 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 1284.2 ± 2.2		[5] AAIJ	14Y	LHCB	$\overline{B}^0_{(s)} \to J/\psi 2(\pi^+\pi^-)$
1281.9 ± 0.5		[5] SOSA	99	SPEC	$pp \to p_{\text{slow}} (K^0_S K^+\pi^-)\ p_{\text{fast}}$
1282.8 ± 0.6		[5] SOSA	99	SPEC	$pp \to p_{\text{slow}} (K^0_S K^-\pi^+)\ p_{\text{fast}}$ OCCUR=2
1270 ±10		AMELIN	95	VES	37 $\pi^- N \to \pi^-\pi^+\pi^-\gamma N$
1280 ± 2		ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$
1282 ± 4		ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$
1270 ± 6 ±10		ARMSTRONG	92C	OMEG	300 $pp \to pp\pi^+\pi^-\gamma$

1281	± 1			ARMSTRONG	89E	OMEG	300 $pp \rightarrow pp2(\pi^+\pi^-)$	
1279	± 6	±10	16	BECKER	87	MRK3	$e^+e^- \rightarrow \phi K\overline{K}\pi$	
1286	± 9			GIDAL	87	MRK2	$e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$	
1287	± 5		353	BITYUKOV	84B	SPEC	32 $\pi^- p \rightarrow K^+K^-\pi^0 n$	
∼ 1279				[6] TORNQVIST	82B	RVUE		
1275	± 6		31	BROMBERG	80	SPEC	100 $\pi^- p \rightarrow K\overline{K}\pi X$	
1288	± 9		200	GURTU	79	HBC	4.2 $K^- p \rightarrow n\eta 2\pi$	
∼ 1275.0			46	[7] STANTON	79	CNTR	8.5 $\pi^- p \rightarrow n2\gamma 2\pi$	
1271	±10		34	CORDEN	78	OMEG	12–15 $\pi^- p \rightarrow K^+K^-\pi n$	
1295	±12		85	CORDEN	78	OMEG	12–15 $\pi^- p \rightarrow n5\pi$	OCCUR=2
1292	±10		150	DEFOIX	72	HBC	0.7 $\overline{p}p \rightarrow 7\pi$	
1280	± 3		500	[8] THUN	72	MMS	13.4 $\pi^- p$	
1303	± 8			BARDADIN-...	71	HBC	8 $\pi^+ p \rightarrow p6\pi$	
1283	± 6			BOESEBECK	71	HBC	16.0 $\pi p \rightarrow p5\pi$	
1270	±10			CAMPBELL	69	DBC	2.7 $\pi^+ d$	
1285	± 7			LORSTAD	69	HBC	0.7 $\overline{p}p$, 4,5-body	
1290	± 7			D'ANDLAU	68	HBC	1.2 $\overline{p}p$, 5–6 body	

[1] Using the $2\pi^+2\pi^-$ and $\pi^+\pi^-\eta$ modes of $f_1(1285)$ decay. NODE=M008M;LINKAGE=LE
[2] The selected process is $J/\psi \rightarrow \omega a_0(980)\pi$. NODE=M008M;LINKAGE=BL
[3] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008M;LINKAGE=B
[4] From partial wave analysis of $K^+\overline{K}^0\pi^-$ system. NODE=M008M;LINKAGE=A
YOUR NOTE [5] No systematic error given. NODE=M008M;LINKAGE=N1
[6] From a unitarized quark-model calculation. NODE=M008M;LINKAGE=T
[7] From phase shift analysis of $\eta\pi^+\pi^-$ system. NODE=M008M;LINKAGE=P
[8] Seen in the missing mass spectrum. NODE=M008M;LINKAGE=S

$f_1(1285)$ WIDTH

NODE=M008W

Only experiments giving width error less than 20 MeV are kept for averaging. NODE=M008W

NODE=M008W

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
24.1± 1.0 OUR AVERAGE		Error includes scale factor of 1.3. See the ideogram below.			
18.3± 6.3	87	ABLIKIM	15P	BES3	$J/\psi \rightarrow K^+K^-3\pi$
22.0± 3.1$^{+\ 2.0}_{-\ 1.5}$		[1] ABLIKIM	11J	BES3	$J/\psi \rightarrow \omega(\eta\pi^+\pi^-)$
35 ± 6 ± 4		AUBERT	07AU	BABR	10.6 $e^+e^- \rightarrow f_1(1285)\pi^+\pi^-\gamma$
40.0± 8.6± 9.3	203	BAI	04J	BES2	$J/\psi \rightarrow \gamma\gamma\pi^+\pi^-$
29 ±12	237	ABDALLAH	03H	DLPH	91.2 $e^+e^- \rightarrow K^0_S K^\pm\pi^\mp + X$
45 ± 9 ± 7	20k	ADAMS	01B	B852	18 GeV $\pi^- p \rightarrow K^+K^-\pi^0 n$
55 ±18	1400	ALDE	97B	GAM4	100 $\pi^- p \rightarrow \eta\pi^0\pi^0 n$
24 ± 3		BARBERIS	97B	OMEG	450 $pp \rightarrow pp2(\pi^+\pi^-)$
20 ± 2		BARBERIS	97C	OMEG	450 $pp \rightarrow ppK^0_S K^\pm\pi^\mp$
36 ± 5		[2] ANTINORI	95	OMEG	300,450 $pp \rightarrow pp2(\pi^+\pi^-)$
29.0± 4.1		LEE	94	MPS2	18 $\pi^- p \rightarrow K^+\overline{K}^0 2\pi^- p$
25 ± 4	140	ARMSTRONG	89	OMEG	300 $pp \rightarrow K\overline{K}\pi pp$
22 ± 2	4750	[3] BIRMAN	88	MPS	8 $\pi^- p \rightarrow K^+\overline{K}^0\pi^- n$
25 ± 4	504	BITYUKOV	88	SPEC	32.5 $\pi^- p \rightarrow K^+K^-\pi^0 n$
19 ± 5		ANDO	86	SPEC	8 $\pi^- p \rightarrow \eta\pi^+\pi^- n$
32 ± 8	420	REEVES	86	SPEC	6.6 $p\overline{p} \rightarrow K K\pi X$
22 ± 2		CHUNG	85	SPEC	8 $\pi^- p \rightarrow NK\overline{K}\pi$
32 ± 3	604	ARMSTRONG	84	OMEG	85 $\pi^+ p \rightarrow K\overline{K}\pi\pi p$, $pp \rightarrow K\overline{K}\pi pp$
24 ± 3		CHAUVAT	84	SPEC	ISR 31.5 pp
29 ±10	103	DIONISI	80	HBC	4 $\pi^- p \rightarrow K\overline{K}\pi n$
28.3± 6.7	320	NACASCH	78	HBC	0.7,0.76 $\overline{p}p \rightarrow K\overline{K}3\pi$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
YOUR DATA 32.4± 5.8		[4] AAIJ	14Y	LHCB	$\overline{B}^0_{(s)} \rightarrow J/\psi 2(\pi^+\pi^-)$
18.2± 1.2		[4] SOSA	99	SPEC	$pp \rightarrow p_{\text{slow}}\ (K^0_S K^+\pi^-)\ p_{\text{fast}}$

19.4	± 1.5			[4] SOSA	99	SPEC	$pp \to p_{slow}\,(K^0_S K^-\pi^+)\,p_{fast}$	OCCUR=2
40	± 5			ABATZIS	94	OMEG	450 $pp \to pp2(\pi^+\pi^-)$	
31	± 5			ARMSTRONG	89E	OMEG	300 $pp \to pp2(\pi^+\pi^-)$	
41	±12			ARMSTRONG	89G	OMEG	85 $\pi^+ p \to 4\pi\pi p$, $pp \to 4\pi pp$	
17.9	±10.9		60	RATH	89	MPS	21.4 $\pi^- p \to K^0_S K^0_S \pi^0 n$	
14	$^{+20}_{-14}$	±10	16	BECKER	87	MRK3	$e^+e^- \to \phi K\overline{K}\pi$	
26	±12			EVANGELIS...	81	OMEG	12 $\pi^- p \to \eta\pi^+\pi^-\pi^- p$	
25	±15		200	GURTU	79	HBC	4.2 $K^- p \to n\eta 2\pi$	
~ 10				[5] STANTON	79	CNTR	8.5 $\pi^- p \to n2\gamma 2\pi$	
24	±18		210	GRASSLER	77	HBC	16 $\pi^\mp p$	
28	± 5		150	[6] DEFOIX	72	HBC	0.7 $\overline{p}p \to 7\pi$	
46	± 9		180	[6] DUBOC	72	HBC	1.2 $\overline{p}p \to 2K4\pi$	
37	± 5		500	[7] THUN	72	MMS	13.4 $\pi^- p$	
10	±10			BOESEBECK	71	HBC	16.0 $\pi p \to p5\pi$	
30	±15			CAMPBELL	69	DBC	2.7 $\pi^+ d$	
60	±15			[6] LORSTAD	69	HBC	0.7 $\overline{p}p$, 4,5-body	
35	±10			[6] DAHL	67	HBC	1.6–4.2 $\pi^- p$	

[1] The selected process is $J/\psi \to \omega a_0(980)\pi$. NODE=M008W;LINKAGE=BL
[2] Supersedes ABATZIS 94, ARMSTRONG 89E. NODE=M008W;LINKAGE=B
[3] From partial wave analysis of $K^+\overline{K}^0\pi^-$ system. NODE=M008W;LINKAGE=A
YOUR NOTE [4] No systematic error given. NODE=M008W;LINKAGE=N1
[5] From phase shift analysis of $\eta\pi^+\pi^-$ system. NODE=M008W;LINKAGE=P
[6] Resolution is not unfolded. NODE=M008W;LINKAGE=R
[7] Seen in the missing mass spectrum. NODE=M008W;LINKAGE=S

$f_1(1285)$ REFERENCES

NODE=M008

YOUR PAPER	ABLIKIM	15P	PR D92 012007	M. Ablikim *et al.*	(BES III Collab.)	REFID=56781
YOUR PAPER	AAIJ	14Y	PRL 112 091802	R. Aaij *et al.*	(LHCb Collab.)	REFID=55837
	LEES	12X	PR D86 092010	J.P. Lees *et al.*	(BABAR Collab.)	REFID=54714
	ABLIKIM	11J	PRL 107 182001	M. Ablikim *et al.*	(BES III Collab.)	REFID=53931
	AUBERT	07AU	PR D76 092005	B. Aubert *et al.*	(BABAR Collab.)	REFID=52049
	BAI	04J	PL B594 47	J.Z. Bai *et al.*	(BES Collab.)	REFID=50167
	ABDALLAH	03H	PL B569 129	J. Abdallah *et al.*	(DELPHI Collab.)	REFID=49548
	ACCIARRI	01G	PL B501 1	M. Acciarri *et al.*	(L3 Collab.)	REFID=48319
	ADAMS	01B	PL B516 264	G.S. Adams *et al.*	(BNL E852 Collab.)	REFID=49649
	SOSA	99	PRL 83 913	M. Sosa *et al.*		REFID=46937
	ALDE	97B	PAN 60 386	D. Alde *et al.*	(GAMS Collab.)	REFID=45396
			Translated from YAF 60 458.			
	BARBERIS	97B	PL B413 217	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45758
	BARBERIS	97C	PL B413 225	D. Barberis *et al.*	(WA 102 Collab.)	REFID=45759
	AMELIN	95	ZPHY C66 71	D.V. Amelin *et al.*	(VES Collab.)	REFID=44376
	ANTINORI	95	PL B353 589	F. Antinori *et al.*	(ATHU, BARI, BIRM+)	REFID=44437
	ABATZIS	94	PL B324 509	S. Abatzis *et al.*	(ATHU, BARI, BIRM+)	REFID=44090
	LEE	94	PL B323 227	J.H. Lee *et al.*	(BNL, IND, KYUN, MASD+)	REFID=44092
	ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
	ARMSTRONG	92C	ZPHY C54 371	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+)	REFID=42097
	FUKUI	91C	PL B267 293	S. Fukui *et al.*	(SUGI, NAGO, KEK, KYOT+)	REFID=41748
	ARMSTRONG	89	PL B221 216	T.A. Armstrong *et al.*	(CERN, CDEF, BIRM+) JPC	REFID=40729
	ARMSTRONG	89E	PL B228 536	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41011
	ARMSTRONG	89G	ZPHY C43 55	T.A. Armstrong *et al.*	(CERN, BIRM, BARI+)	REFID=40930
	RATH	89	PR D40 693	M.G. Rath *et al.*	(NDAM, BRAN, BNL, CUNY+)	REFID=40924
	BIRMAN	88	PRL 61 1557	A. Birman *et al.*	(BNL, FSU, IND, MASD) JP	REFID=40568
	BITYUKOV	88	PL B203 327	S.I. Bityukov *et al.*	(SERP)	REFID=40569
	BECKER	87	PRL 59 186	J.J. Becker *et al.*	(Mark III Collab.)	REFID=40015
	GIDAL	87	PRL 59 2012	G. Gidal *et al.*	(LBL, SLAC, HARV)	REFID=40223
	ANDO	86	PRL 57 1296	A. Ando *et al.*	(KEK, KYOT, NIRS, SAGA+) IJP	REFID=20891
	REEVES	86	PR D34 1960	D.F. Reeves *et al.*	(FLOR, BNL, IND+) JP	REFID=20936
	CHUNG	85	PRL 55 779	S.U. Chung *et al.*	(BNL, FLOR, IND+) JP	REFID=20934
	ARMSTRONG	84	PL 146B 273	T.A. Armstrong *et al.*	(ATHU, BARI, BIRM+) JP	REFID=20929
	BITYUKOV	84B	PL 144B 133	S.I. Bityukov *et al.*	(SERP)	REFID=20468
	CHAUVAT	84	PL 148B 382	P. Chauvat *et al.*	(CERN, CLER, UCLA+)	REFID=20932
	TORNQVIST	82B	NP B203 268	N.A. Tornqvist	(HELS)	REFID=20573
	EVANGELIS...	81	NP B178 197	C. Evangelista *et al.*	(BARI, BONN, CERN+)	REFID=20462
	BROMBERG	80	PR D22 1513	C.M. Bromberg *et al.*	(CIT, FNAL, ILLC+)	REFID=20922
	DIONISI	80	NP B169 1	C. Dionisi *et al.*	(CERN, MADR, CDEF+)	REFID=20924
	GURTU	79	NP B151 181	A. Gurtu *et al.*	(CERN, ZEEM, NIJM, OXF)	REFID=20456
	STANTON	79	PRL 42 346	N.R. Stanton *et al.*	(OSU, CARL, MCGI+) JP	REFID=20887
	CORDEN	78	NP B144 253	M.J. Corden *et al.*	(BIRM, RHEL, TELA+) JP	REFID=20452
	NACASCH	78	NP B135 203	R. Nacasch *et al.*	(PARIS, MADR, CERN)	REFID=20919
	GRASSLER	77	NP B121 189	H. Grassler *et al.*	(AACH3, BERL, BONN+)	REFID=20447
	DEFOIX	72	NP B44 125	C. Defoix *et al.*	(CDEF, CERN)	REFID=20435
	DUBOC	72	NP B46 429	J. Duboc *et al.*	(PARIS, LIVP)	REFID=20339
	THUN	72	PRL 28 1733	R. Thun *et al.*	(STON, NEAS)	REFID=20911
	BARDADIN-...	71	PR D4 2711	M. Bardadin-Otwinowska *et al.*	(WARS)	REFID=20196
	BOESEBECK	71	PL 34B 659	K. Boesebeck	(AACH, BERL, BONN, CERN, CRAC+)	REFID=20905
	CAMPBELL	69	PRL 22 1204	J.H. Campbell *et al.*	(PURD)	REFID=20419
	LORSTAD	69	NP B14 63	B. Lorstad *et al.*	(CDEF, CERN) JP	REFID=20901
	D'ANDLAU	68	NP B5 693	C. d'Andlau *et al.*	(CDEF, CERN, IRAD+) IJP	REFID=20897
	DAHL	67	PR 163 1377	O.I. Dahl *et al.*	(LRL) IJP	REFID=20321

Reference = AAIJ 14AW; PRL 113 162001
Verifier code = LHCB

Normally we send all verifications for one experiment to one person, usually the spokesperson or data-analysis co-ordinator, who then distributes them to the appropriate people. Please tell us if we should send the verifications for your experiment to someone else.

PLEASE READ NOW

PLEASE REPLY WITHIN ONE WEEK

Vincenzo Vagnoni

EMAIL: vincenzo.vagnoni@bo.infn.it

July 21, 2016

Dear Colleague,

(1) Please check the results of your experiment carefully. They are marked.

(2) Please reply within one week.

(3) Please reply even if everything is correct.

(4) IMPORTANT!! Please tell WHICH papers you are verifying. We have lots of requests out.

(5) Feel free to make comments on our treatment of any of the results (not just yours) you see.

Thank you for helping us make the Review accurate and useful.

Sincerely,

Simon Eidelman
BINP, Budker Inst. of Nuclear Physics
Prospekt Lavrent'eva 11
RU-630090 Novosibirsk
Russian Federation

EMAIL: simon.eidelman@cern.ch

CHARMED, STRANGE MESONS ($C = S = \pm 1$)

NODE=MXXX040

$D_s^+ = c\bar{s}$, $D_s^- = \bar{c}s$, similarly for D_s^*'s

NODE=MXXX040

NODE=M148

$D_{s2}^*(2573)$

$I(J^P) = 0(2^+)$

J^P is natural, width and decay modes consistent with 2^+. AAIJ 14BJ confirms $J^P = 2^+$.

NODE=M148

$D_{s2}^*(2573)$ MASS

NODE=M148M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2569.1 ±0.8 OUR AVERAGE		Error includes scale factor of 2.4. See the ideogram below.			
YOUR DATA 2568.39±0.29±0.26		AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$
2569.4 ±1.6 ±0.5	82	AAIJ	11A	LHCB	$B_s \to D_{s2}^*(2573)\mu\overline{\nu}X$
2572.2 ±0.3 ±1.0		AUBERT,BE	06E	BABR	$e^+e^- \to DKX$
2574.5 ±3.3 ±1.6		ALBRECHT	96	ARG	$e^+e^- \to D^0K^+X$
2573.2 $^{+1.7}_{-1.6}$ ±0.9	217	KUBOTA	94	CLE2	$e^+e^-\sim$ 10.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2570.0 ±4.3	25	[1] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0K^+X$
2568.6 ±3.2	64	[2] HEISTER	02B	ALEP	$e^+e^- \to D^0K^+X$

[1] Not independent of the mass difference below.

NODE=M148M;LINKAGE=EV

[2] Calculated using m_{D^0}= 1864.5 ± 0.5 MeV and the mass difference below.

NODE=M148M;LINKAGE=HI

$D_{s2}^*(2573)$ WIDTH

NODE=M148W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
16.9±0.8 OUR AVERAGE					
YOUR DATA 16.9±0.5±0.6		AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$
12.1±4.5±1.6	82	AAIJ	11A	LHCB	$B_s \to D_{s2}^*(2573)\mu\overline{\nu}X$
27.1±0.6±5.6		AUBERT,BE	06E	BABR	$e^+e^- \to DKX$
10.4±8.3±3.0		ALBRECHT	96	ARG	$e^+e^- \to D^0K^+X$
16 $^{+5}_{-4}$ ±3	217	KUBOTA	94	CLE2	$e^+e^-\sim$ 10.5 GeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
14 $^{+9}_{-6}$	25	[1] EVDOKIMOV	04	SELX	600 $\Sigma^- A \to D^0K^+X$

[1] Systematic errors not estimated.

NODE=M148W;LINKAGE=EV

$D_{s2}^*(2573)$ REFERENCES

NODE=M148

YOUR PAPER AAIJ	14AW	PRL 113 162001	R. Aaij *et al.*	(LHCb Collab.)	REFID=56105
AAIJ	14BJ	PRL 113 242002	R. Aaij *et al.*	(LHCb Collab.) JP	REFID=56258
AAIJ	11A	PL B698 14	R. Aaij *et al.*	(LHCb Collab.)	REFID=16665
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)	REFID=51512
EVDOKIMOV	04	PRL 93 242001	A.V. Evdokimov *et al.*	(SELEX Collab.)	REFID=50337
HEISTER	02B	PL B526 34	A. Heister *et al.*	(ALEPH Collab.)	REFID=48562
ALBRECHT	96	ZPHY C69 405	H. Albrecht *et al.*	(ARGUS Collab.)	REFID=44631
KUBOTA	94	PRL 72 1972	Y. Kubota *et al.*	(CLEO Collab.)	REFID=43781

NODE=M196

$D_{s1}^*(2860)^\pm$

$I(J^P) = 0(1^-)$

OMITTED FROM SUMMARY TABLE

J^P consitent with 1^- from angular analysis of AAIJ 14AW. Observed by AUBERT,BE 06E and AUBERT 09AR in inclusive production of DK and D^*K in e^+e^- annihilation.

NODE=M196

$D_{s1}^*(2860)^+$ MASS

NODE=M196M

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
							NODE=M196M
YOUR DATA	**2859 ±12 ±24**		[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$	
	• • • We do not use the following data for averages, fits, limits, etc. • • •						
	2866.1± 1.0± 6.3	36k	[2,3] AAIJ	12AU	LHCB	$pp \to (DK)^+ X$ at 7 TeV	
	2862 ± 2 $^{+5}_{-2}$	3122	[3,4] AUBERT	09AR	BABR	$e^+e^- \to D^{(*)} KX$	
	2856.6± 1.5± 5.0		[5] AUBERT,BE	06E	BABR	$e^+e^- \to DKX$	

YOUR NOTE

[1] Separated from the spin-3 component $D_{s3}^*(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0 K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M196M;LINKAGE=A

[2] From the combined fit of the $D^+ K_S^0$ and $D^0 K^+$ modes in the model including the $D_{s2}^*(2573)^+$, $D_{s1}^*(2700)^+$ and spin-0 $D_{sJ}^*(2860)^+$. NODE=M196M;LINKAGE=AA

[3] Possible contribution from the $D_{s3}^*(2860)$ state. NODE=M196M;LINKAGE=B

[4] From simultaneous fits to the two DK mass spectra and to the total D^*K mass spectrum. NODE=M196M;LINKAGE=AB

[5] Superseded by AUBERT 09AR. NODE=M196M;LINKAGE=AU

$D_{s1}^*(2860)^+$ WIDTH

NODE=M196W

	VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT	
							NODE=M196W
YOUR DATA	**159 ±23 ±77**		[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$	
	• • • We do not use the following data for averages, fits, limits, etc. • • •						
	69.9± 3.2± 6.6	36k	[2,3] AAIJ	12AU	LHCB	$pp \to (DK)^+ X$ at 7 TeV	
	48 ± 3 ± 6	3122	[3,4] AUBERT	09AR	BABR	$e^+e^- \to D^{(*)} KX$	
	47 ± 7 ±10		[5] AUBERT,BE	06E	BABR	$e^+e^- \to DKX$	

YOUR NOTE

[1] Separated from the spin-3 component $D_{s3}^*(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0 K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M196W;LINKAGE=A

[2] From the combined fit of the $D^+ K_S^0$ and $D^0 K^+$ modes in the model including the $D_{s2}^*(2573)^+$, $D_{s1}^*(2700)^+$ and spin-0 $D_{sJ}^*(2860)^+$. NODE=M196W;LINKAGE=AA

[3] Possible contribution from the $D_{s3}^*(2860)$ state. NODE=M196W;LINKAGE=B

[4] From simultaneous fits to the two DK mass spectra and to the total D^*K mass spectrum. NODE=M196W;LINKAGE=AB

[5] Superseded by AUBERT 09AR. NODE=M196W;LINKAGE=AU

$D_{s1}^*(2860)^\pm$ REFERENCES

NODE=M196

YOUR PAPER

AAIJ	14AW	PRL 113 162001	R. Aaij *et al.*	(LHCb Collab.) JP
AAIJ	12AU	JHEP 1210 151	R. Aaij *et al.*	(LHCb Collab.)
AUBERT	09AR	PR D80 092003	B. Aubert *et al.*	(BABAR Collab.)
AUBERT,BE	06E	PRL 97 222001	B. Aubert *et al.*	(BABAR Collab.)

REFID=56105
REFID=54735
REFID=53135
REFID=51512
NODE=M226

$D_{s3}^*(2860)^\pm$

$I(J^P) = 0(3^-)$

OMITTED FROM SUMMARY TABLE

J^P consitent with 3^- from angular analysis of AAIJ 14AW. NODE=M226

$D_{s3}^*(2860)^+$ MASS

NODE=M226M

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
						NODE=M226M
YOUR DATA	**2860.5±2.6±6.5**	[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$	

YOUR NOTE

[1] Separated from the spin-1 component $D_{s1}^*(2860)^-$ by a fit of the helicity angle of the $\overline{D}^0 K^-$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M226M;LINKAGE=A

$D_{s3}^*(2860)^+$ WIDTH

NODE=M226W

	VALUE (MeV)	DOCUMENT ID		TECN	COMMENT	
						NODE=M226W
YOUR DATA	**53±7±7**	[1] AAIJ	14AW	LHCB	$B_s^0 \to \overline{D}^0 K^- \pi^+$	

YOUR NOTE [1] Separated from the spin-1 component $D_{s1}^{*}(2860)^{-}$ by a fit of the helicity angle of the $\overline{D}^{0}K^{-}$ system, with a statistical significance of the spin-3 and spin-1 components in excess of 10 σ. NODE=M226W;LINKAGE=A

$D_{s3}^{*}(2860)^{\pm}$ REFERENCES

NODE=M226

YOUR PAPER AAIJ 14AW PRL 113 162001 R. Aaij *et al.* (LHCb Collab.) JP REFID=56105