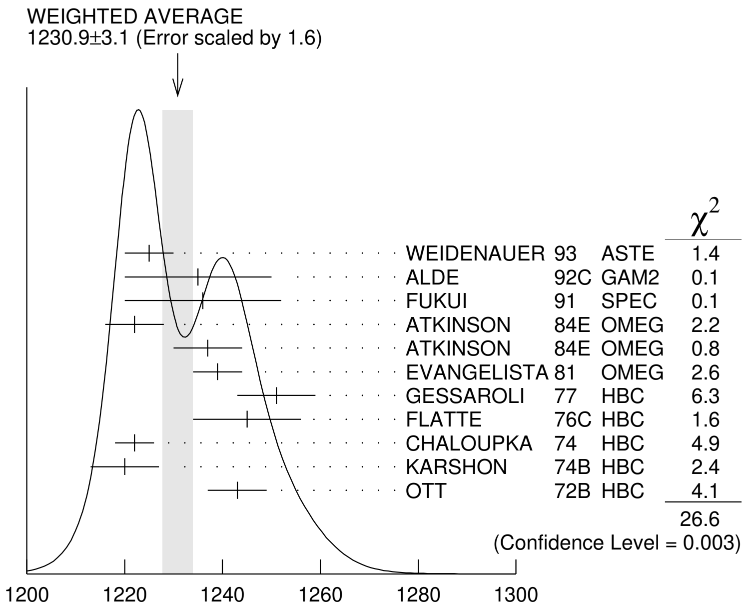
$b_1(1235)$

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

$b_1(1235)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
1231 ±10 OUR ESTIMATE	This is only an educated guess; the error given is larger than the error on the average of the published values.					
1230.9± 3.1 OUR AVERAGE	Error includes scale factor of 1.6. See the ideogram below.					
1225 ± 5		WEIDENAUER	93	ASTE		$\overline{p}p \to 2\pi^+ 2\pi^- \pi^0$
1235 ±15		ALDE	92C	GAM2		38,100 $\pi^- p \to \omega\pi^0 n$
1236 ±16		FUKUI	91	SPEC		8.95 $\pi^- p \to \omega\pi^0 n$
1222 ± 6		ATKINSON	84E	OMEG	$\pm$	25–55 $\gamma p \to \omega\pi X$
1237 ± 7		ATKINSON	84E	OMEG	0	25–55 $\gamma p \to \omega\pi X$
1239 ± 5		EVANGELISTA	81	OMEG	$-$	12 $\pi^- p \to \omega\pi p$
1251 ± 8	450	GESSAROLI	77	HBC	$-$	11 $\pi^- p \to \pi^- \omega p$
1245 ±11	890	FLATTE	76C	HBC	$-$	4.2 $K^- p \to \pi^- \omega \Sigma^+$
1222 ± 4	1400	CHALOUPKA	74	HBC	$-$	3.9 $\pi^- p$
1220 ± 7	600	KARSHON	74B	HBC	$+$	4.9 $\pi^+ p$
1243 ± 6	1163	[1] OTT	72B	HBC	$+$	7.1 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1311 ±10		[2] TAKAMATSU	90	SPEC	0	8 $\pi^- p \to \eta\rho n$
1190 ±10		AUGUSTIN	89	DM2	$\pm$	$e^+e^- \to 5\pi$
1213 ± 5		ATKINSON	84C	OMEG	0	20–70 γp
1271 ±11		COLLICK	84	SPEC	$+$	200 $\pi^+ Z \to Z\pi\omega$

[1] From fit of the mass spectrum.
[2] Breit−Wigner fitting of PWA of $\eta\pi\pi$ system.



$b_1(1235)$ mass (MeV)

$b_1(1235)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
142± 8 OUR AVERAGE	Error includes scale factor of 1.1.					
113±12		WEIDENAUER	93	ASTE		$\overline{p}p \to 2\pi^+ 2\pi^- \pi^0$
160±30		ALDE	92C	GAM2		38,100 $\pi^- p \to \omega\pi^0 n$
151±31		FUKUI	91	SPEC		8.95 $\pi^- p \to \omega\pi^0 n$
170±15		EVANGELISTA	81	OMEG	−	12 $\pi^- p \to \omega\pi p$
170±50	225	BALTAY	78B	HBC	+	15 $\pi^+ p \to p 4\pi$
155±32	450	GESSAROLI	77	HBC	−	11 $\pi^- p \to \pi^- \omega p$
182±45	890	FLATTE	76C	HBC	−	4.2 $K^- p \to \pi^- \omega \Sigma^+$
135±20	1400	CHALOUPKA	74	HBC	−	3.9 $\pi^- p$
156±22	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$
134^{+23}_{-26}	1163	[3] OTT	72B	HBC	+	7.1 $\pi^+ p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
126±10		[4] TAKAMATSU	90	SPEC	0	8 $\pi^- p \to \eta\rho n$
210±19		AUGUSTIN	89	DM2	±	$e^+ e^- \to 5\pi$
231±14		ATKINSON	84C	OMEG	0	20–70 γp
232±29		COLLICK	84	SPEC	+	200 $\pi^+ Z \to Z\pi\omega$

[3] From fit of the mass spectrum.

[4] Breit–Wigner fitting of PWA of $\eta\pi\pi$ system.

$b_1(1235)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$\omega\pi$	dominant	
	[D/S amplitude ratio = 0.26 ± 0.04]		
Γ_2	$\pi^\pm\gamma$	$(1.6\pm0.4)\times10^{-3}$	
Γ_3	$\eta\rho$	seen	
Γ_4	$\pi^+\pi^+\pi^-\pi^0$	< 50 %	84%
Γ_5	$(K\overline{K})^\pm\pi^0$	< 8 %	90%
Γ_6	$K^0_S K^0_L \pi^\pm$	< 6 %	90%
Γ_7	$K^0_S K^0_S \pi^\pm$	< 2 %	90%
Γ_8	$\pi\phi$	< 1.5 %	84%

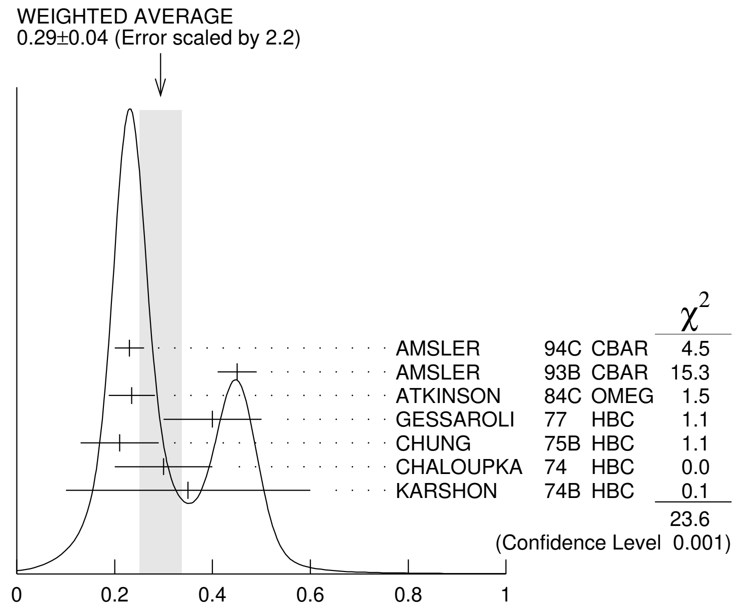
$b_1(1235)$ PARTIAL WIDTHS

$\Gamma(\pi^\pm\gamma)$ — Γ_2

VALUE (keV)	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
230±60	COLLICK	84	SPEC	+	200 $\pi^+ Z \rightarrow Z\pi\omega$

$b_1(1235)$ *D*-wave/*S*-wave AMPLITUDE RATIO IN DECAY OF $b_1(1235) \rightarrow \omega\pi$

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*CHG*	*COMMENT*
0.29 ±0.04 OUR AVERAGE		Error includes scale factor of 2.2. See the ideogram below.				
0.23 ±0.03		AMSLER	94C	CBAR		0.0 $\overline{p}p \rightarrow \omega\eta\pi^0$
0.45 ±0.04		AMSLER	93B	CBAR		0.0 $\overline{p}p \rightarrow \omega\pi^0\pi^0$
0.235±0.047		ATKINSON	84C	OMEG		20–70 γp
0.4 $^{+0.1}_{-0.1}$		GESSAROLI	77	HBC	−	11 $\pi^- p \rightarrow \pi^-\omega p$
0.21 ±0.08		CHUNG	75B	HBC	+	7.1 $\pi^+ p$
0.3 ±0.1		CHALOUPKA	74	HBC	−	3.9–7.5 $\pi^- p$
0.35 ±0.25	600	KARSHON	74B	HBC	+	4.9 $\pi^+ p$



$b_1(1235)$ D-wave/S-wave amplitude ratio in decay of $b_1(1235) \rightarrow \omega\pi$

$b_1(1235)$ BRANCHING RATIOS

$\Gamma(\eta\rho)/\Gamma(\omega\pi)$ Γ_3/Γ_1

VALUE	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
seen	TAKAMATSU	90	SPEC	
<0.10	ATKINSON	84D	OMEG	20–70 γp

$\Gamma(\pi^+\pi^+\pi^-\pi^0)/\Gamma(\omega\pi)$ Γ_4/Γ_1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
<0.5	ABOLINS	63	HBC	+	3.5 $\pi^+ p$

$\Gamma((K\overline{K})^{\pm}\pi^0)/\Gamma(\omega\pi)$ Γ_5/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.08	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K_S^0 K_L^0 \pi^{\pm})/\Gamma(\omega\pi)$ Γ_6/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.06	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(K_S^0 K_S^0 \pi^{\pm})/\Gamma(\omega\pi)$ Γ_7/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.02	90	BALTAY	67	HBC	±	0.0 $\overline{p}p$

$\Gamma(\pi\phi)/\Gamma(\omega\pi)$ Γ_8/Γ_1

VALUE	CL%	DOCUMENT ID		TECN	CHG	COMMENT
<0.004	95	VICTOROV	96	SPEC	0	32.5 $\pi^- p \to K^+ K^- \pi^0 n$
<0.015		DAHL	67	HBC		1.6–4.2 $\pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<0.04	95	BIZZARRI	69	HBC	±	0.0 $\overline{p}p$

b_1(1235) REFERENCES

VICTOROV	96	PAN 59 1184	+Golovkin+	(SERP)
		Translated from YAF 59 1239.		
AMSLER	94C	PL B327 425	+Armstrong, Ravndal+	(Crystal Barrel Collab.)
AMSLER	93B	PL B311 362	+Armstrong, v.Dombrowski+	(Crystal Barrel Collab.)
WEIDENAUER	93	ZPHY C59 387	+Duch+	(ASTERIX Collab.)
ALDE	92C	ZPHY C54 553	+Bencheikh, Binon+	(BELG, SERP, KEK, LANL, LAPP)
FUKUI	91	PL B257 241	+Horikawa+	(SUGI, NAGO, KEK, KYOT, MIYA)
TAKAMATSU	90	Hadron 89 Conf. p 71	+Ando+	(KEK)
AUGUSTIN	89	NP B320 1	+Cosme	(DM2 Collab.)
ATKINSON	84C	NP B243 1	+	(BONN, CERN, GLAS, LANC, MCHS, CURIN+) JP
ATKINSON	84D	NP B242 269	+	(BONN, CERN, GLAS, LANC, MCHS, CURIN+)
ATKINSON	84E	PL 138B 459	+	(BONN, CERN, GLAS, LANC, MCHS, CURIN+)
COLLICK	84	PRL 53 2374	+Heppelmann, Berg+	(MINN, ROCH, FNAL)
EVANGELISTA	81	NP B178 197	+	(BARI, BONN, CERN, DARE, LIVP+)
BALTAY	78B	PR D17 62	+Cautis, Cohen, Csorna+	(COLU, BING)
GESSAROLI	77	NP B126 382	+	(BGNA, FIRZ, GENO, MILA, OXF, PAVI) JP
FLATTE	76C	PL 64B 225	+Gay, Blokzijl, Metzger+	(CERN, AMST, NIJM, OXF) JP
CHUNG	75B	PR D11 2426	+Protopopescu, Lynch, Flatte+	(BNL, LBL, UCSC) JP
CHALOUPKA	74	PL 51B 407	+Ferrando, Losty, Montanet	(CERN) JP
KARSHON	74B	PR D10 3608	+Mikenberg, Eisenberg, Pitluck, Ronat+	(REHO) JP
OTT	72B	Thesis LBL-1547		(LBL) JP
BIZZARRI	69	NP B14 169	+Foster, Gavillet, Montanet+	(CERN, CDEF)
BALTAY	67	PRL 18 93	+Franzini, Severiens, Yeh, Zanello	(COLU)
DAHL	67	PR 163 1377	+Hardy, Hess, Kirz, Miller	(LRL)
ABOLINS	63	PRL 11 381	+Lander, Mehlhop, Nguyen, Yager	(UCSD)

OTHER RELATED PAPERS

BRAU	88	PR D37 2379	+Franek+	(SLAC Hybrid Facility Photon Collab.) JP
ATKINSON	84C	NP B243 1	+	(BONN, CERN, GLAS, LANC, MCHS, CURIN+) JP
GOLDHABER	65	PRL 15 118	+Goldhaber, Kadyk, Shen	(LRL)
CARMONY	64	PRL 12 254	+Lander, Rindfleisch, Xuong, Yager	(UCB) JP
BONDAR	63B	PL 5 209	+Dodd+	(AACH, BIRM, HAMB, LOIC, MPIM)