$f_J(2220)$
was $\xi(2220)$

$I^G(J^{PC}) = 0^+(2^{++} \text{ or } 4^{++})$

OMITTED FROM SUMMARY TABLE

This state has been seen at SPEAR in the $K\overline{K}$ systems (K^+K^- and $K_S^0 K_S^0$) produced in the radiative decay of $J/\psi(1S)$. Seen in $\eta\eta'$ (ALDE 86B), in $K_S^0 K_S^0$ (ASTON 88D), and in K^+K^- (ASTON 88F). Not seen in Υ radiative decays (BARU 89) nor in B inclusive decay (BEHRENDS 84). Not seen in $\overline{p}p \rightarrow K^+K^-$ formation experiment (BARDIN 87,SCULLI 87) and $\overline{p}p \rightarrow K_S^0 K_S^0$ formation experiment (BARNES 93). Not seen at DCI in either K^+K^- or $K_S^0 K_S^0$ systems (AUGUSTIN 88). Needs confirmation.

$f_J(2220)$ MASS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
2231.1± 3.5 OUR AVERAGE					
2235 ± 4 ± 6	74	BAI	96B	BES	$e^+e^- \rightarrow \gamma\pi^+\pi^-$
2230 $^{+6}_{-7}$ ±16	46	BAI	96B	BES	$e^+e^- \rightarrow \gamma K^+K^-$
2232 $^{+8}_{-7}$ ±15	23	BAI	96B	BES	$e^+e^- \rightarrow \gamma K_S^0 K_S^0$
2235 ± 4 ± 5	32	BAI	96B	BES	$e^+e^- \rightarrow \gamma p\overline{p}$
2209 $^{+17}_{-15}$ ±10		ASTON	88F	LASS	11 $K^-p \rightarrow K^+K^-\Lambda$
2230 ±20		BOLONKIN	88	SPEC	40 $\pi^-p \rightarrow K_S^0 K_S^0 n$
2220 ±10	41	[1] ALDE	86B	GA24	38–100 $\pi p \rightarrow n\eta\eta'$
2230 ± 6 ±14	93	BALTRUSAIT...	86D	MRK3	$e^+e^- \rightarrow \gamma K^+K^-$
2232 ± 7 ± 7	23	BALTRUSAIT...	86D	MRK3	$e^+e^- \rightarrow \gamma K_S^0 K_S^0$

[1] ALDE 86B uses data from both the GAMS-2000 and GAMS-4000 detectors.

$f_J(2220)$ WIDTH

VALUE (MeV)	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
23 $^{+8}_{-7}$ OUR AVERAGE					
19 $^{+13}_{-11}$ ±12	74	BAI	96B	BES	$e^+e^- \rightarrow \gamma\pi^+\pi^-$
20 $^{+20}_{-15}$ ±17	46	BAI	96B	BES	$e^+e^- \rightarrow \gamma K^+K^-$
20 $^{+25}_{-16}$ ±14	23	BAI	96B	BES	$e^+e^- \rightarrow \gamma K_S^0 K_S^0$

$15^{+12}_{-9} \pm 9$	32	BAI	96B	BES	$e^+ e^- \rightarrow \gamma p \overline{p}$
60^{+107}_{-57}		ASTON	88F	LASS	$11\ K^- p \rightarrow K^+ K^- \Lambda$
80 ± 30		BOLONKIN	88	SPEC	$40\ \pi^- p \rightarrow K^0_S K^0_S n$
$26^{+20}_{-16} \pm 17$	93	BALTRUSAIT...	86D	MRK3	$e^+ e^- \rightarrow \gamma K^+ K^-$
$18^{+23}_{-15} \pm 10$	23	BALTRUSAIT...	86D	MRK3	$e^+ e^- \rightarrow \gamma K^0_S K^0_S$

$f_J(2220)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$\pi\pi$	seen
Γ_2	$K\overline{K}$	seen
Γ_3	$p\overline{p}$	seen
Γ_4	$\gamma\gamma$	
Γ_5	$\eta\eta'(958)$	
Γ_6	$\pi^+\pi^-$	

$f_J(2220)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{\text{total}}$ — $\Gamma_2\Gamma_4/\Gamma$

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<0.086	95	[2] ALBRECHT	90G	ARG	$\gamma\gamma \rightarrow K^+ K^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.0	95	[3] ALTHOFF	85B	TASS	$\gamma\gamma$, $K\overline{K}\pi$

[2] Assuming $J^P = 2^+$.
[3] True for $J^P = 0^+$ and $J^P = 2^+$.

$f_J(2220)$ $\Gamma(i)\Gamma(\overline{p}p)/\Gamma(\text{total})$

$\Gamma(p\overline{p}) \times \Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$ — $\Gamma_3\Gamma_6/\Gamma$

VALUE (keV)	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
<3.9	99	[4] HASAN	96	SPEC	$\overline{p}p \rightarrow \pi^-\pi^+$

[4] Assuming $\Gamma = 15$ MeV and $J^P = 2^+$

$f_J(2220)$ BRANCHING RATIOS

$\Gamma(p\overline{p})/\Gamma_{\text{total}}$ — Γ_3/Γ

VALUE (units 10^{-3})	*CL%*	*DOCUMENT ID*		*TECN*	*COMMENT*
seen		BAI	96B	BES	$e^+ e^- \rightarrow \gamma p \overline{p}$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.1	99.7	[5] BARNES	93	SPEC	1.3-1.57$\overline{p}p \rightarrow K^0_S K^0_S$
<2.6	99.7	[5] BARDIN	87	CNTR	1.3-1.5$\overline{p}p \rightarrow K^+ K^-$
<3.6	99.7	[5] SCULLI	87	CNTR	1.29-1.55$\overline{p}p \rightarrow K^+ K^-$

[5] Assuming Γ = 30-35 MeV, $J^P = 2^+$ and B($f_J(2220) \rightarrow K\overline{K}$) = 100%.

$\Gamma(\pi\pi)/\Gamma(K\overline{K})$ Γ_1/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
1.0±0.5	BAI	96B	BES	$e^+e^- \rightarrow \gamma 2\pi, K\overline{K}$

$\Gamma(p\overline{p})/\Gamma(K\overline{K})$ Γ_3/Γ_2

VALUE	DOCUMENT ID		TECN	COMMENT
0.17±0.09	BAI	96B	BES	$e^+e^- \rightarrow \gamma p\overline{p}, K\overline{K}$

$f_J(2220)$ REFERENCES

BAI	96B	PRL 76 3502	+Chen, Chen+	(BES Collab.)
HASAN	96	PL B388 376	+Bugg	(BRUN, LOQM)
BARNES	93	PL B309 469	+Birien, Breunlich	(PS185 Collab.)
ALBRECHT	90G	ZPHY C48 183	+Ehrlichmann, Harder+	(ARGUS Collab.)
BARU	89	ZPHY C42 505	+Beilin, Blinov, Blinov+	(NOVO)
ASTON	88D	NP B301 525	+Awaji, Bienz+	(SLAC, NAGO, CINC, INUS)
ASTON	88F	PL B215 199	+Awaji+	(SLAC, NAGO, CINC, INUS) JP
AUGUSTIN	88	PRL 60 2238	+Calcaterra+	(DM2 Collab.)
BOLONKIN	88	NP B309 426	+Bloshenko, Gorin+	(ITEP, SERP)
BARDIN	87	PL B195 292	+Burgun+	(SACL, FERR, CERN, PADO, TORI)
SCULLI	87	PRL 58 1715	+Christenson, Kreiter, Nemethy, Yamin	(NYU, BNL)
ALDE	86B	PL B177 120	+Binon, Bricman+	(SERP, BELG, LANL, LAPP)
BALTRUSAIT...	86D	PRL 56 107	Baltrusaitis	(CIT, UCSC, ILL, SLAC, WASH)
ALTHOFF	85B	ZPHY C29 189	+Braunschweig, Kirschfink+	(TASSO Collab.)
BEHRENDS	84	PL 137B 277	+Chadwich, Chauveau, Gentile+	(CLEO Collab.)

OTHER RELATED PAPERS

HUANG	96	PL B380 189	+Jin, Zhang, Chao	(BHEP, BEIJ)
BARDIN	87	PL B195 292	+Burgun+	(SACL, FERR, CERN, PADO, TORI)
YAOUANC	85	ZPHY C28 309	+Oliver, Pene, Raynal, Ono	(ORSAY, TOKY)
GODFREY	84	PL 141B 439	+Kokoski, Isgur	(TNTO)
SHATZ	84	PL 138B 209		(CIT)
WILLEY	84	PRL 52 585		(PITT)
EINSWEILER	83	Brighton Conf. 348		(Mark III Collab.)
HITLIN	83	Cornell Conf. 746		(CIT)