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

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

OMITTED FROM SUMMARY TABLE

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

## $f_J(2220)$ MASS

| VALUE (MeV) | EVTS | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **2225± 6 OUR AVERAGE** | | | | | |
| $2209^{+17}_{-15}\pm10$ | | ASTON | 88F | LASS | 11 $K^-p \to K^+K^-\Lambda$ |
| 2230±20 | | BOLONKIN | 88 | SPEC | 40 $\pi^-p \to K^0_SK^0_Sn$ |
| 2220±10 | 41 | [1] ALDE | 86B | GA24 | 38–100 $\pi p \to n\eta\eta'$ |
| 2230± 6±14 | 93 | BALTRUSAIT... | 86D | MRK3 | $e^+e^- \to \gamma K^+K^-$ |
| 2232± 7± 7 | 23 | BALTRUSAIT... | 86D | MRK3 | $e^+e^- \to \gamma K^0_SK^0_S$ |

[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 |
|---|---|---|---|---|---|
| **$38^{+\ 15}_{-\ 13}$ OUR AVERAGE** | | | | | |
| $60^{+107}_{-\ 57}$ | | ASTON | 88F | LASS | 11 $K^-p \to K^+K^-\Lambda$ |
| 80± 30 | | BOLONKIN | 88 | SPEC | 40 $\pi^-p \to K^0_SK^0_Sn$ |
| $26^{+\ 20}_{-\ 16}\pm17$ | 93 | BALTRUSAIT... | 86D | MRK3 | $e^+e^- \to \gamma K^+K^-$ |
| $18^{+\ 23}_{-\ 15}\pm10$ | 23 | BALTRUSAIT... | 86D | MRK3 | $e^+e^- \to \gamma K^0_SK^0_S$ |

## $f_J(2220)$ DECAY MODES

| | Mode | Fraction ($\Gamma_i/\Gamma$) | Confidence level |
|---|---|---|---|
| $\Gamma_1$ | $K\overline{K}$ | | |
| $\Gamma_2$ | $p\overline{p}$ | $<1.1\times10^{-3}$ | 99.7% |
| $\Gamma_3$ | $\gamma\gamma$ | | |
| $\Gamma_4$ | $\eta\eta'(958)$ | | |

## $f_J(2220)$ $\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(total)$

**$\Gamma(K\overline{K}) \times \Gamma(\gamma\gamma)/\Gamma_{total}$** **$\Gamma_1\Gamma_3/\Gamma$**

| VALUE (keV) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<0.086** | 95 | [2] ALBRECHT | 90G | ARG | $\gamma\gamma \to K^+K^-$ |
| • • • 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 $J^P = 2^+$.

## $f_J(2220)$ BRANCHING RATIOS

### $\Gamma(p\overline{p})/\Gamma_{total}$ $\Gamma_2/\Gamma$

| VALUE (units $10^{-3}$) | CL% | DOCUMENT ID | | TECN | COMMENT |
|---|---|---|---|---|---|
| **<1.1** | 99.7 | [4] BARNES | 93 | SPEC | 1.3-1.57$\overline{p}p \rightarrow K^0_S K^0_S$ |
| • • • We do not use the following data for averages, fits, limits, etc. • • • | | | | | |
| <2.6 | 99.7 | [4] BARDIN | 87 | CNTR | 1.3-1.5$\overline{p}p \rightarrow K^+K^-$ |
| <3.6 | 99.7 | [4] SCULLI | 87 | CNTR | 1.29-1.55$\overline{p}p \rightarrow K^+K^-$ |

[4] Assuming $\Gamma$ = 30-35 MeV, $J^P = 2^+$ and B($f_J(2220) \rightarrow K\overline{K}$) = 10%.

## $f_J(2220)$ REFERENCES


| | | | | |
|---|---|---|---|---|
| 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


| | | | | |
|---|---|---|---|---|
| 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) |