THE $f_J(2220)$

Updated April 2002 by M. Doser (CERN).

This state has been seen in $J/\psi(1S)$ radiative decay into $K\overline{K}$ (K^+K^- and $K^0_SK^0_S$ modes seen (BALTRUSAITIS 86D, BAI 96B)). An upper limit from DM2 for these modes (AUGUSTIN 88) is at the level at which observation is claimed. There are also indications for further decay modes ($\pi^+\pi^-$ and $\overline{p}p$ (BAI 96B) and $\pi^0\pi^0$ (BAI 98H)) in the same production process, although again at the level at which previous upper limits had been obtained (BALTRUSAITIS 86D). This is also seen in $\eta\eta$ (ALDE 86B), $K^0_SK^0_S$ (ASTON 88D), and in K^+K^- (ALDE 88F), albeit with very low statistics. Its J^{PC} is determined from the angular distributions of these observations. It is not seen in Υ radiative decays (BARU 89), B inclusive decays (BEHRENDS 84), nor in $\gamma\gamma$ (GODANG 97, ALAM 98C, ACCIARRI 01H), which would not be surprising if it were a glueball, since its two-photon width would then be expected to be small. It is also not seen in formation in $\overline{p}p \to K^+K^-$ (BARDIN 87, SCULLI 87), in $\overline{p}p \to K_SK_S$ (BARNES 93, EVANGELISTA 97), $\overline{p}p \to \phi\phi$ (EVANGELISTA 98), in $\overline{p}p \to \eta\eta$ (AMSLER 01), nor in $\overline{p}p \to \pi\pi$ (HASAN 96, AMSLER 01). The upper limit in $\overline{p}p$ formation can be related to the claimed decay into $\overline{p}p$ to give a lower limit for the process $J/\psi(1S) \to \gamma\xi$ of $\sim 2.3 \times 10^{-3}$ (GODFREY 99). Such a signal should be visible in the inclusive photon spectrum (BLOOM 85). The limit also leads to the conclusion that the reported two-body final states constitute only a small fraction of all decay modes of the ξ. Observation of further decay modes and confirmation of the $\overline{p}p$ decay would be very desirable.

References

References may be found at the end of the $f_J(2220)$ Listing.