THE $f_J(1710)$

The $f_J(1710)$ is seen in the "gluon rich" radiative decay $J/\psi(1S) \to \gamma f_J(1710)$; therefore $C = +$. It decays into 2η and $K^0_S K^0_S$, which implies $I^G J^{PC} = 0^+(\text{even})^{++}$. In an amplitude analysis of the $K\overline{K}$ and $\pi^+\pi^-$ systems produced in $J/\psi(1S)$ radiative decay, CHEN 91 finds a large spin-0 component for this particle, but WA 76 favors spin 2 in central production. The spin is thus uncertain. This resonance is also observed in $K\overline{K}$ systems recoiling against a ϕ or an ω in hadronic $J/\psi(1S)$ decay [however, according to FALVARD 88, $J/\psi(1S) \to \omega f_J(1710)$ is rather controversial]. The $f_J(1710)$ is not seen in $J/\psi(1S) \to \gamma\rho^0\rho^0$ (BISELLO 89B), in agreement with the indication (BALTRUSAITIS 85G) that the $\rho\rho$ enhancement in this region has $J^P = 0^-$, and hence is unrelated to the $f_J(1710)$.

Clear evidence is seen in hadroproduction (ARMSTRONG 89D, 300-GeV/c pp central production of $K\overline{K}$), both in K^+K^- and $K^0_S K^0_S$. Mass and width determinations are complicated because the spectra are dominated by overlap with the $f'_2(1525)$. The apparent large disagreement between the widths found by ARMSTRONG 89D in the two channels (≈ 180 MeV in K^+K^- and ≈ 100 MeV in $K^0_S K^0_S$) can be explained by the arbitrariness of the polynomial-exponential background shape, which leads to a large systematic error for the width. ARMSTRONG 93C also sees in $\eta\eta$ a broad peak at 1747 MeV, which may be the $f_J(1710)$. This resonance is not observed in the exclusive hypercharge-exchange reaction $K^-p \to K^0_S K^0_S \Lambda$ (ASTON 88D).

A partial-wave analysis of the $K^0_S K^0_S$ system (BOLONKIN 88) finds a D_0 wave ($J^{PC} = 2^{++}$) behavior near 1700 MeV, but the width (≈ 30 MeV) is much narrower than that observed in $J/\psi(1S)$ decays and in hadroproduction.

Note that in our 1992 edition, this particle was named the $f_2(1710)$; see also our note on "Non-$q\overline{q}$ Mesons."