THE $f_J(1710)$

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The $f_J(1710)$ is seen in the radiative decay $J/\psi(1S) \to \gamma f_J(1710)$; therefore $C = +1$. It decays into 2η and $K^0_S K^0_S$, which implies $I^G J^{PC} = 0^+(\text{even})^{++}$. The spin of the $f_J(1710)$ is controversial. Combined amplitude analyses of the K^+K^-, $K_S K_S$ and $\pi^+\pi^-$ systems produced in $J/\psi(1S)$ radiative decay (in recent and some earlier unpublished analyses by the Mark III Collaboration) find a large spin-0 component, as well as reproducing known parameters of the $f_2(1270)$ and $f'_2(1525)$. A recent reanalysis (BUGG 95) of the 4π channel from MARK III, allowing both $\rho\rho$ and two $\pi\pi$ S waves, finds two states, a 0^{++} at ~ 1750 MeV and a 2^{++} at ~ 1620 MeV. Earlier analyses of the $\rho\rho$ final state (BISELLO 89B, BALTRUSAITIS 86B) found only pseudoscalar activity in the $f_J(1710)$ region, but considered only the process $J/\psi(1S) \to \gamma\rho\rho$. In contrast, a spin 2 was found for the $f_J(1710)$ in earlier analyses of the $\eta\eta$ (BLOOM 83) or K^+K^- (BALTRUSAITIS 87) systems based on less statistics. More recently, an analysis of the K^+K^- channel finds indications for a lower mass tensor as well as a higher mass scalar state (BAI 96C).

In pp central production at 300 GeV/c in both K^+K^- and $K^0_S K^0_S$, $f_J(1710)$ is definitely spin 2 (ARMSTRONG 89D). More recent analyses with greater statistics (E690 Collaboration, unpublished) are, however, not able to differentiate between spin 0 and 2. Generally, analyses preferring spin 2 concentrate on angular distributions in the $f_J(1710)$ region, and do not include possible interferences or distortion due to the nearby $f'_2(1525)$.

The $f_J(1710)$ is also observed in $K\overline{K}$ (FALVARD 88) in $J/\psi(1S) \to \omega K\overline{K}$ and $J/\psi(1S) \to \phi K\overline{K}$, but with no spin-parity analysis. ARMSTRONG 93C also sees a broad peak at 1747 MeV in $p\overline{p}$ annihilation into $\eta\eta$, which may be the $f_J(1710)$. This resonance is not observed in the hypercharge-exchange reactions $K^-p \to K^0_S K^0_S \Lambda$ (ASTON 88D) and $K^-p \to K^0_S K^0_S Y^*$ (BOLONKIN 86).

A partial-wave analysis of the $K^0_S K^0_S$ system in $\pi^-p \to K^0_S K^0_S n$ (BOLONKIN 88) finds a D_0-wave behavior ($J^{PC} =$

2^{++}) near 1700 MeV, but the width ($\sim$ 30 MeV) is much smaller than those observed in $J/\psi(1S)$ decays and in hadroproduction. The 0^{++} wave shows, however a broad enhancement around 1720 MeV.