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Triangle singularity in the $J/\psi \to \phi\pi^+ a_0^-(\pi^-\eta),\ \phi\pi^- a_0^+(\pi^+\eta)$ decays

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We study the $J/\psi \to \phi\pi^+ a_0(980)^-(a_0^- \to \pi^-\eta)$ decay, evaluating the double mass distribution in terms of the $\pi^-\eta$ and $\pi^+ a_0^-$ invariant masses. We show that the $\pi^-\eta$ mass distribution exhibits the typical cusp structure of the $a_0(980)$ seen in recent high statistics experiments, and the $\pi^+ a_0^-$ spectrum shows clearly a peak around $M_{\rm inv}(\pi^+ a_0^-) = 1420\,\text{MeV}$, corresponding to a triangle singularity. When integrating over the two invariant masses we find a branching ratio for this decay of the order of 10^{-5}, which is easily accessible in present laboratories. We also call the attention to the fact that the signal obtained is compatible with a bump experimentally observed in the $\eta\pi^+\pi^-$ mass distribution in the $J/\psi \to \phi\eta\pi^+\pi^-$ decay and encourage further analysis to extract from there the $\phi\pi^+ a_0^-$ and $\phi\pi^- a_0^+$ decay modes.

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