

XVth Quark Confinement and the Hadron Spectrum



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

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We study the $J/\psi \rightarrow \phi\pi^+a_0(980)^-(a_0^- \rightarrow \pi^-\eta)$ 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 $M_{\text{inv}}(\pi^+a_0^-) = 1420$ 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 $J/\psi \rightarrow \phi\eta\pi^+\pi^-$ decay and encourage further analysis to extract from there the $\phi\pi^+a_0^-$ and $\phi\pi^-a_0^+$ decay modes.

Primary author: LIANG, Wei-Hong

Co-authors: Prof. XIAO, Chu-Wen (Guangxi Normal University); Prof. OSET, E. (University of Valencia); Dr DIAS, J. M. (Institute of Theoretical Physics, CAS); Prof. DAI, L. R. (Huzhou University)

Presenter: LIANG, Wei-Hong

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