



Tetraquark-based analysis and predictions of the cross sections and distributions for the processes $e^+e^- \rightarrow \text{Upsilon}(1S) (\pi^+ \pi^-, K^+ K^-, \eta \pi^0)$ near $\text{Upsilon}(5S)$

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We calculate the cross sections and final state distributions for the processes $e^+e^- \rightarrow \text{Upsilon}(1S) (\pi^+ \pi^-, K^+ K^-, \eta \pi^0)$ near the $\text{Upsilon}(5S)$ resonance based on the tetraquark hypothesis. This framework is used to analyse the data on the $\text{Upsilon}(1S) \pi^+ \pi^-$ and $\text{Upsilon}(1S) K^+ K^-$ final states, yielding good fits. Dimension invariant mass spectra in these processes are shown to be dominated by the corresponding light scalar and tensor states. The resulting correlations among the cross sections are worked out. We also predict $\sigma(e^+e^- \rightarrow \text{Upsilon}(1S) K^+ K^-) / \sigma(e^+e^- \rightarrow \text{Upsilon}(1S) K^0 \bar{K}^0) = 1/4$. These features provide crucial tests of the tetraquark framework and can be searched for in the currently available and forthcoming data from the B factories.

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