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Dalitz-plot decomposition of $e^+e^- \to J/\psi\,\pi\,\pi$ process from 4.1271 to 4.3583 GeV employing dispersive analysis

Thursday 30 October 2025 15:25 (25 minutes)

We analyze the processes $e^+e^- \to \gamma^* \to J/\psi\,\pi\,\pi\,(K\bar{K})$ and $e^+e^- \to \gamma^* \to h_c\,\pi\,\pi$ using the recently proposed Dalitz-plot decomposition approach, based on the helicity formalism for three-body decays. Within a Lagrangian-based toy model, we validate key aspects of this approach, namely the factorization of the overall rotation for all decay chains and spin alignments, as well as crossing symmetry between final states. In analyzing the experimental data, we describe the subchannel dynamics through a dispersive treatment of $\pi\pi/K\bar{K}$ interactions, reproducing the $f_0(500)$ and $f_0(980)$ pole structures. Using recent $e^+e^- \to J/\psi\,\pi\,\pi$ data in the 4.1271-4.3583 GeV range, we reproduce invariant mass spectra that reveal both $Z_c(3900)$ and $Z_c(4020)$ states and discuss prospects for further constraints on the $Y(4220)$ and $Y(4320)$.

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