

Updated Vector Meson Dominance model predictions for $\psi \rightarrow l^+l^-\pi^0$ ($l = e, \mu$) including $\rho - \omega$ interference

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Recent BESIII measurement of $J/\psi \rightarrow e^+e^-\pi^0$ has revealed a significant ρ - ω interference pattern in the di-electron invariant mass spectrum. This observed pattern is qualitatively similar to that of the pion form factor but features a relatively narrow ρ resonance. Motivated by this observation, we present updated Vector Meson Dominance (VMD) predictions for the rare electromagnetic Dalitz decays $\psi \rightarrow \ell^+\ell^-\pi^0$ (where $\psi = J/\psi, \psi(2S)$ and $\ell = e, \mu$). By including ρ - ω interference contributions, the updated branching fraction predictions are significantly enhanced. Our results indicate that the decay mode $J/\psi \rightarrow \mu^+\mu^-\pi^0$ could be observable at BESIII, while $\psi(2S) \rightarrow \ell^+\ell^-\pi^0$ decays are within reach of the proposed Super Tau-Charm Factory (STCF) experiment.

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