

1^{-+} Hybrid in J/ψ Radiative Decays from Lattice QCD

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We present the first theoretical prediction of the production rate of 1^{-+} light hybrid meson η_1 in J/ψ radiative decays. In the $N_f = 2$ lattice QCD formalism with the pion mass $m_\pi \approx 350$ MeV, the related electromagnetic multipole form factors are extracted from the three-point functions that involve necessarily quark annihilation diagrams, which are calculated through the distillation method. The partial width of $J/\psi \rightarrow \gamma\eta_1$ is determined to be 2.29(77) eV at the η_1 mass $m_{\eta_1} = 2.23(4)$ GeV. If η_1 corresponds to the recently observed $\eta_1(1855)$ in the process $J/\psi \rightarrow \gamma\eta_1(1855) \rightarrow \gamma\eta\eta'$ by BESIII, then the branching fraction $\text{Br}(J/\psi \rightarrow \gamma\eta_1(1855))$ is estimated to be $6.2(2.2) \times 10^{-5}$, which implies $\text{Br}(\eta_1(1855) \rightarrow \eta\eta') \sim 4.3\%$.

Category

talk

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