

Interpretation of the $\eta_1(1855)$ as a $K\bar{K}_1(1400) + c.c.$ molecule

Tuesday, 16 August 2022 14:45 (25 minutes)

An exotic state with $J^{PC} = 1^{-+}$, denoted by $\eta_1(1855)$, was observed by BESIII collaboration recently in $J/\psi \rightarrow \gamma\eta\eta'$. The fact that its mass is just below the threshold of $K\bar{K}_1(1400)$ stimulates us to investigate whether this exotic state can be interpreted as a $K\bar{K}_1(1400) + c.c.$ {molecule or not}. Using the one boson exchange model, we show that it is possible for $K\bar{K}_1(1400)$ with $J^{PC} = 1^{-+}$ to bind together by taking the momentum cutoff $\Lambda \sim 2$ GeV and yield the same binding energy as the experimental value when $\Lambda \approx 2.5$ GeV. In this molecular picture, the predicted branch ratio $\text{Br}(\eta_1(1855) \rightarrow \eta\eta') \approx 15\%$ is consistent with the experimental results, which again supports the molecular explanation of $\eta_1(1855)$. Relevant systems, namely $K\bar{K}_1(1400)$ with $J^{PC} = 1^{--}$ and $K\bar{K}_1(1270)$ with $J^{PC} = 1^{-\pm}$, are also investigated, some of which can be searched for in the future experiments.

Category

talk

Primary author: DONG, Xiang-Kun (ITP, CAS)

Co-authors: Prof. ZOU, Bingsong (ITP, CAS); LIN, Yong-Hui (Helmholtz Institute for Radiation and Nuclear Physics, University of Bonn)

Presenter: DONG, Xiang-Kun (ITP, CAS)

Session Classification: Session 1