



Contribution ID: 21

Type: **not specified**

Charged charmonium-like and bottomonium-like structures and the initial single chiral particle emission mechanism

Monday 8 September 2014 16:50 (19 minutes)

In the past decade, many of charmoniumlike and bottomoniumlike states have been reported in experiments, which have led us to extensive discussions on the underlying structure of these states. We would like to address the possibility to explain these structures by hadronic one-loop diagrams, which may correspond to recapitulate threshold effects. Starting from charged XYZ states, we also apply our mechanism to the recent $Z_c(3900)$ as well as $Z_b(4430)$.

Summary

Including the hadronic one-loop diagrams, many of charged as well as neutral charmoniumlike and bottomoniumlike states can be successfully explained. That is to say, many of these states as evidence of existence of multi-quark states can be explained in the ordinary quark picture by our findings. A real multi-quark state may exist when our fitting can not be applied, e.g., a couple of states among three Z_b states observed by Belle and LHCb.

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Session Classification: Parallel III: C1 Heavy Quarks

Track Classification: Section C: Heavy Quarks