Contribution ID: **1076** Type: **Parallel Session Talk**

Tetraquark interpretation of e+ e- -> Upsilon pi+ pi- Belle data and e+ e- -> b bbar Babar data

Friday 23 July 2010 15:20 (13 minutes)

We study the spectroscopy and dominant decays of the bottomonium-like tetraquarks (bound diquarks-antidiquarks), focusing on the lowest lying P-wave [bq][bbar qbar] states Y_[bq] (with q=u,d), having Jˆ PC=1ˆ−. To search for them, we analyse the recent BaBar data obtained during an energy scan of the e+ e- -> b bbar cross section in the range of sqrt(s)=10.54 to 11.20 GeV. We find that these data are consistent with the presence of an additional b bbar state Y_[bq] with a mass of 10.90 GeV and a width of about 30 MeV apart from the Upsilon(5S) and Upsilon(6S) resonances. A closeup of the energy region around the Y_[bq]-mass may resolve this state in terms of the two mass eigenstates, Y_[b,l] and Y_[b,h], with a mass difference, estimated as about 6 MeV. We tentatively identify the state Y_bq from the R_b-scan with the state Y_b(10890) observed by Belle in the process e+e- -> Y_b(10890) -> Upsilon(1S, 2S)pi+ pi- due to their proximity in masses and decay widths. We also analyze the Belle data [K.F. Chen, et al. (Belle Collaboration), Phys. Rev. Lett. 100, 112001 (2008); I.Adachi et al. (Belle Collaboration), arXiv:0808.2445] on the processes e+ e- -> Upsilon(1S) pi+pi-, Upsilon(2S) pi+pi- near the peak of the Upsilon(5S) resonance, which are found to be anomalously large in rates compared to similar dipion transitions between the lower Upsilon resonances. Assuming these final states arise from the production and decays of the Jˆ PC=1ˆ− state Y_b(10890), which we interpret as a bound (diquark-antidiquark) tetraquark state [bq][bbar qbar], a dynamical model for the decays Y_b -> Upsilon(1S) pi+pi-, Upsilon(2S) pi+pi- is presented. Depending on the phase space, these decays receive significant contributions from the scalar 0ˆ++ states, f_0(600) and f_0(980), and from the 2ˆ++ qqbar-meson f_2(1270). Our model provides excellent fits for the decay distributions, supporting Y_b as a tetraquark state.

Author: ALI, Ahmed (DESY)

Co-authors: HAMBROCK, Christian (DESY); AHMED, Ishtiaq (NCP, Quaid-i-Azam University, Islamabad, Pakistan); JAMIL ASLAM, Muhammad (NCP, Quaid-i-Azam University, Islamabad, Pakistan)

Presenter: ALI, Ahmed (DESY)

Session Classification: 04 - Hadronic Structure, Parton Distributions, soft QCD, Spectroscopy

Track Classification: 04 - Hadronic Structure, Parton Distributions, soft QCD, Spectroscopy