

# Regge-like relation and universal description of heavy-light systems

Thursday, 28 September 2017 18:10 (20 minutes)

Using the Regge-like formula  $(M - m_Q)^2 = \pi\sigma L$  between hadron mass  $M$  and angular momentum  $L$  with a heavy quark mass  $m_Q$  and a string tension  $\sigma$ , we analyze heavy-light systems like  $D/D_s/B/B_s$  mesons and charmed and bottomed baryons.

Numerical plots are obtained for  $D/B$  mesons of experimental data whose slope coefficient becomes nearly equal to 1/2 of that for light mesons as expected, while the slope deviates from 1/2 for  $D_s/B_s$ .

Assuming that charmed and bottomed baryons consist of one heavy quark and one light cluster of two light quarks (diquark), we apply the formula to all the heavy-light baryons including recently discovered  $\Omega_c$ 's and find that  $\Lambda_c/\Lambda_b$  baryons well satisfy the above formula. We predict the average mass of  $\Lambda_b(3/2^+, 5/2^+)$  as 6.150 GeV, assignments of  $J^P$  of five  $\Omega_c$ 's. Successful results of  $\Lambda_Q$  suggests that these baryons can be safely regarded as heavy quark-light cluster configuration. We also find a universal description for  $D/B$  mesons as well as  $\Lambda_c/\Lambda_b$  baryons, i.e., one unique line is enough to describe both of charmed and bottomed heavy-light systems.

**Primary author:** Dr MATSUKI, Takayuki (Tokyo Kasei University)

**Co-authors:** Dr LIU, Qi-Fang (Institute of High Energy Physics, CAS, Beijing); LIU, Xiang (Lanzhou University); DONG, Yubing (Institute of High Energy Physics, Chinese Academy of Sciences)

**Presenter:** Dr MATSUKI, Takayuki (Tokyo Kasei University)

**Session Classification:** Spectroscopy of baryons

**Track Classification:** Spectroscopy of baryons