Contribution ID: **43** Type: **not specified**

$B_s\pi$–$B\bar{K}$ interaction in finite volume and the nature of $X(5568)$

Recently, the observation of the X(5568) by the D0 Collaboration has attracted a lot of interest both theoretically and experimentally. In a previous study(arXiv:1309.4743[hep-ph]), based on a fit to the lattice QCD scattering lengths of DK and its coupled channels,
unitary chiral perturbation theory (UChPT) can dynamically generate the $D_{s0}(2317)$. Inspired by that work and the recent work of Albaladejo and Eulogio where
one could tune the interaction such that the X(5568) can be generated within UChPT (arXiv:1603.09230 [hep-ph]),
we performed a coupled channel calculation on X(5568) in UChPT
considering the $B_s\pi$ and $B\bar{K}$ coupled channels. Further more, we computed the discrete energy levels of the $B_s\pi$ and $B\bar{K}$ system in finite volume.
Our results show that the $B_s\pi$ and $B\bar{K}$ interaction is weak and the X(5568) cannot be a $B_s\pi$ and $B\bar{K}$ molecular state. Therefore, the X(5568) and the $D_{s0}(2317)$ cannot simultaneously be of molecular nature, from the perspective of heavy quark symmetry and chiral symmetry. The comparison with the latest lattice QCD simulations, which disfavors the existence of the X(5568), supports our picture. In addition, we show that the (generalized) Weinberg compositeness condition also indicates that the X(5568) cannot be a molecular state made from $B_s\pi$ and $B\bar{K}$ interactions.

Summary

We report on a recent study of the $B_s\pi$ and $B\bar{K}$ interactions in finite volume and the nature of the X(5568) (arXiv:1607.06327[hep-ph])

Primary author: LU, Junxu (School of Physics and Nuclear Energy Engineering, International Research Center for Nuclei and Particles in the Cosmos Beijing Key Laboratory of Advanced Nuclear Materials and Physics, Beihang University)

Co-authors: GENG, Lisheng (School of Physics and Nuclear Energy Engineering, International Research Center for Nuclei and Particles in the Cosmos Beijing Key Laboratory of Advanced Nuclear Materials and Physics, Beihang University); REN, Xiulei (State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University)

Presenter: LU, Junxu (School of Physics and Nuclear Energy Engineering, International Research Center for Nuclei and Particles in the Cosmos Beijing Key Laboratory of Advanced Nuclear Materials and Physics, Beihang University)