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Long-range part of the heavy meson-meson static potential

At the large distances compared to the chiral symmetry breaking scale, a four quark state $\bar{Q}\bar{Q}qq$, where Q (q) is the heavy (light) quark, can be approximated by two asymptotic $\bar{Q}q$ mesons and one can analyze the meson-meson potentials to explore the long-range strong force in such systems. To this end, we study the potential between two bottom mesons in the heavy quark limit (HQL) using the chiral effective field theory and dispersion theory [1]. In this contribution, methods to deal with the two-pion-exchange interaction between two heavy mesons in the HQL and with non-physical pion mass will be discussed. A possible solution, where we use Khuri-Treiman formalism to properly include the left- and right-hand cuts, will be presented. Finally, a comparison of our results with the corresponding lattice QCD potentials [2] obtained using the Born-Oppenheimer approximation will be made.

[1] Muhammad Naeem Anwar, Christoph Hanhart, Feng-Kun Guo, Deciphering Chiral Physics in Lattice Born-Oppenheimer $\bar{b}\bar{b}qq$ Potentials, in preparation.

[2] P. Bicudo, M. Cardoso, A. Peters, M. Pflaumer and M. Wagner, $ud\bar{b}\bar{b}$ tetraquark resonances with lattice QCD potentials and the Born-Oppenheimer approximation, Phys. Rev. D 96, 054510 (2017).

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