

## Heavy-light exotics: old laces and new pieces

I will compare, in a pedagogical way, the traditional approach to heavy-light hadrons based on effective models of QCD, to recent developments for heavy-light hadrons based on string theory. In particular, I will present predictions for the properties of recently discovered heavy-light tetraquarks and pentaquarks, based on the series of works [1-6].

[1] Y. Liu, M. A. Nowak, I. Zahed; Heavy holographic exotics: tetraquarks as Efimov states, Phys. Rev. D100 (2019)126023.

[2] Y. Liu, M. A. Nowak, I. Zahed; Holographic charm and bottom pentaquarks I: Mass spectra with spin effects, Phys. Rev. D104 (2021)114021.

[3] Y. Liu, M. A. Nowak, I. Zahed; Holographic charm and bottom pentaquarks II: Open and hidden decay widths, Phys. Rev. D104 (2021)112022.

[4] Y. Liu, K. Mamo, M. A. Nowak, I. Zahed; Holographic charm and bottom pentaquarks III: Excitations through photo-production of heavy mesons, Phys. Rev. D104 (2021) 112023.

[5] Y. Liu, M. A. Nowak, I. Zahed; Holographic tetraquarks and the newly observed  $T_{cc}^+$  at LHCb, Phys. Rev. D105 (2022)054021.

[6] Y. Liu, M. A. Nowak, I. Zahed; Hyperons and  $\Theta_s^+$  in holographic QCD, Phys. Rev. D105 (2022)114021.

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