Contribution ID: **73** Type: **Invited**

On the molecular $\eta_1(1855)$ and its SU(3) partners

Monday, 5 June 2023 17:25 (20 minutes)

In this work, we interpret the newly observed $\eta_1(1855)$ resonance with exotic $J^{PC} = 1^{-+}$ quantum numbers in the $I = 0$ sector, reported by the BESIII Collaboration, as a dynamically generated state from the interaction between the lightest pseudoscalar mesons and axial-vector mesons. The interaction is derived from the lowest order chiral Lagrangian from which the Weinberg-Tomozawa term is obtained, describing the transition amplitudes among the relevant channels, which are then unitarized using the Bethe-Salpeter equation, according to the chiral unitary approach. We evaluate the $\eta_1(1855)$ decays into the $\eta\eta'$ and $K\bar{K}^*\pi$ channels and find that the latter has a larger branching fraction. We also investigate its SU(3) partners, and according to our findings, the $\pi_1(1400)$ and $\pi_1(1600)$ structures may correspond to dynamically generated states, with the former one coupled mostly to the $b_1\pi$ component and the latter one coupled to the $K_1(1270)\bar{K}$ channel. In particular, our result for the ratio $\Gamma(\pi_1(1600) \to f_1(1285)\pi)/\Gamma(\pi_1(1600) \to \eta'\pi)$ is consistent with the measured value, which supports our interpretation for the higher π_1 state. We also report two poles with a mass about 1.7~GeV in the $I = 1/2$ sector, which may be responsible for the $K^*(1680)$. We suggest searching for two additional η_1 exotic mesons with masses around 1.4 and 1.7~GeV. In particular, the predicted $\eta_1(1700)$ is expected to have a width around 0.1~GeV and can decay easily into $K\bar{K}\pi\pi$.

Primary authors: YAN, Mao-Jun (Institute of Theoretical Physics, Chinese Academy of Sciences); Dr GUEVARA, Adolfo (Institute of Theoretical Physics, Chinese Academy of Sciences); Dr DIAS, Jorgivan (Institute of Theoretical Physics, Chinese Academy of Sciences); GUO, Feng-Kun (Institute of Theoretical Physics, Chinese Academy of Sciences); ZOU, Bing-song (Institute of Theoretical Physics, Beijing)

Presenter: YAN, Mao-Jun (Institute of Theoretical Physics, Chinese Academy of Sciences)

Session Classification: Exotic hadrons and candidates

Track Classification: Exotic hadrons and candidates