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Non-linear Regge trajectories with AdS/QCD

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In this work, we consider a non-quadratic dilaton $\Phi(z) = (\kappa\, z)^{2-\alpha}$ in the context of the static soft wall model to describe the mass spectrum of a wide range of vector mesons from the light up to the heavy sectors. The effect of this non-quadratic approach is translated into non-linear Regge trajectories with the generic form $M^2 = a\,(n+b)^{\nu}$. We apply this sort of fits for the isovector states of ω, ϕ, J/ψ, and Υ mesons and compare with the corresponding holographic duals. We also extend these ideas to the heavy-light sector by using the isovector set of parameters to extrapolate the proper values of κ and α through the average constituent mass $\bar{m}$ for each mesonic specie considered. In the same direction, we address the description of possible non-$q\,\bar{q}$ candidates using $\bar{m}$ as a holographic threshold, associated with the structure of the exotic state, to define the values of κ and α. We study the π_1 mesons in the light sector and the Z_c, Y, and Z_b mesons in the heavy sector as possible exotic vector states. Finally, the RMS error for describing these twenty-seven states with fifteen parameters (four values for κ and α respectively and seven values for $\bar{m}$) is 12.61%.

Authors: MARTÍN CONTRERAS, Miguel Angel (Universidad de Valparaíso); VEGA, Alfredo

Presenter: MARTÍN CONTRERAS, Miguel Angel (Universidad de Valparaíso)

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