

Confining QCD-like theory on non-SUSY D2 brane and partial deconfinement

We study the nonperturbative aspects of nonconformal 2+1D Yang-Mills like worldvolume theories on both the isotropic and anisotropic non-supersymmetric D2 brane solution of type II supergravity. Because of broken conformality, the theories for both the cases are found to have running coupling similar to the real world QCD theories. In this context, some salient QCD-like confining properties, for instance, flux-tube tension and glueball masses are analysed in our non-SUSY theories through the holographic notion. In the anisotropic case, tuning the anisotropy parameter in the low energy nonperturbative scale manifests the essence of the Hawking-Page (HP) transition from thermal AdS to a black brane. We present an empirical finite temperature scenario for the same where there appears a competent dual picture of HP transition and QCD confinement-deconfinement phase transition from the behaviours of the aforementioned QCD features in the pure YM theory under consideration. Furthermore, such observations surprisingly exhibit a smooth crossover at the transition point. We argue on this issue by speculating the presence of “partially deconfined” mixed phases of both glueballs and quark-gluon plasma in the prescribed worldvolume theory on the anisotropic non-SUSY D2 brane.

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