String approach to strong coupling phenomena: ABJM case

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Abstract

The ABJM theory is a Chern-Simons matter theory with two $SU(N)$ gauge groups of equal and opposite Chern-Simons levels k and $-k$ with N being the number of M2-branes. Thus constructed, the theory possesses explicit $\mathcal{N}=6$ superconformal symmetry. In scaling limit $N,k\to\infty$ with $k\ll N\ll k^5$ satisfied, the theory can be compactified to type IIA string theory on $AdS_4\times\mathbb{CP}^3$. In this work we present semi-classical folded string solution in $AdS_4\times\mathbb{CP}^3$ spacetime and derive its dispersion relations making ansatz in a nonlinear second order ordinary differential equation for the energy-spin relation. The dispersion relations, by making use of AdS/CFT correspondence, give the anomalous dimensions of certain gauge theory operators. Then on gauge theory side we provide three-point correlation functions for two "heavy" and one "light" operators.

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