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Exact results in a $N=2$ superconformal gauge theory at strong coupling

We consider the $N=2$ SYM theory with gauge group $SU(N)$ and a matter content consisting of one multiplet in the symmetric and one in the anti-symmetric representation of the gauge group. This theory is conformal and it admits a large- N 't Hooft expansion and a gravity dual given by a particular orientifold of $AdS_5 \times S^5$. We analyze this gauge theory relying on the matrix model provided by localization à la Pestun. Even though this matrix model has very non-trivial interactions, by exploiting the full Lie algebra approach to the matrix integration, we show that a large class of observables can be expressed in a closed form in terms of an infinite matrix depending on the 't Hooft coupling λ . These exact expressions can be used to generate the perturbative expansions at high orders, and also to study analytically the leading behavior at strong coupling. Finally we compare these predictions to a direct Monte Carlo numerical evaluation of the matrix integral and to the Padé resummation derived from very long perturbative series.

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