

M2-branes with Flux and Their Reduction to String Theory

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We construct the gauge invariant interaction terms between the world-volume fields of multiple M2-branes and the 3- and 6-form fields in the context of ABJM theory. with $U(N) \times U(N)$ gauge and show that the obtained dimensionally reduced couplings coincide with the effective action of D2-branes coupled to R-R 3- and 5-form fields in type IIA string theory. As an application of our formulation, we turn on constant flux terms and consider their supersymmetric completions with $N=2,4,6$ supersymmetries. Employing the Mukhi-Papageorgakis Higgsing procedure, we find the connection between the $N=2,4$ theories with flat directions in their potential and the $N=2, 4$ mass-deformed $(2+1)$ -dimensional super Yang-Mills theories. We also comment on the relation between our mass-deformed ABJM theories and the $N=1$ and $N=2$ mass-deformed super Yang-Mills theories constructed by Polchinski and Strassler in the context of type IIB theory.

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