

Bootstrapping Higher-Derivative Corrections in M-theory

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We study higher-derivative corrections to the graviton scattering amplitude in M-theory, via the stress tensor correlator of 3d $N=8$ ABJM theory. We use the conformal bootstrap combined with an integral constraint derived from supersymmetric localization in order to constrain semishort OPE coefficients appearing in the stress tensor correlator. We obtain islands that are significantly more precise than those in previous studies that did not use the integral constraint. Using these islands, we can estimate the powers and coefficients in a large central charge expansion. This allows us to accurately read off the N3LO contribution, from the protected $D^6 R^4$ correction, and also estimate the N4LO contribution, from the unprotected $D^8 R^4$ correction.

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