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Quantum Gravity on AdS3×S3 from CFT: Bootstrapping n=21

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Abstract

We consider the simplest four-point scattering amplitude of SO(n) tensor multiplets in six-dimensional (2,0) supergravity on AdS3×S3. Using crossing symmetry and the consistency of the operator product expansion in the dual CFT, we explicitly construct the one-loop contribution to the correlator, both in position space and in Mellin space. We show that a strong form of the bootstrap equations imposes constraints on the value of n. Remarkably, we find that our bootstrap approach uniquely determines n=21, which corresponds to the spectrum of IIB string theory compactified on K3. This stands in sharp contrast to the tree-level correlator for which n is unconstrained. We also analyse the spectrum of unprotected double-trace operators and solve the mixing problem in the first case that involves both tensor and graviton correlators. When n=21, the anomalous dimensions rationalise and one of them vanishes. Lastly, we study the flat-space limit of the correlator and find perfect agreement with the one-loop amplitude recently obtained in [arXiv:2510.24558].

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