Emanuel Malek

Solving strongly-coupled conformal field theories using the exceptional symmetries of supergravity

Abstract

The AdS/CFT correspondence is a powerful tool for studying strongly coupled conformal field theories by performing computations in string theory and its low energy limit, supergravity. I will review Exceptional Field Theory, a modern geometric formalism that unifies gravitational and flux degrees of freedom of supergravity, and thereby makes a large exceptional symmetry group manifest. I will show how this large symmetry group simplifies many complicated calculations in AdS backgrounds, such as computing the spectrum of linearised fluctuations around AdS vacua, as well as their n-point couplings. This allows us, for the first time, to compute the spectrum of anomalous dimensions of protected and even unprotected operators in strongly coupled CFTs, without the use of supersymmetry, and to prove 20-year old conjectures about the supergravity n-point couplings. In various applications, I will show how these results give us insights into important features, such as global properties of the moduli space of strongly coupled CFTs and the question of stability of non-supersymmetric AdS vacua.