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String Theory in Greater Paris

Rencontres Théoriciennes

“Supergravité, théorie des cordes et théorie M”

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A geometric perspective on duality symmetries in supergravity

Symmetries are one of the major tools to understand the structure of physical theories. However, even the most powerful symmetry is useless if it is hidden and, therefore, not accessible in calculations. Prominent examples are S-, T-, and U-dualities of superstrings and branes. They unify the five perturbative superstring theories and M-theory into a single framework. Still, their imprints on the low-energy effective supergravity theories are subtle and easy to miss. A framework that addresses this issue is (exceptional) generalized geometry. Although thought of as a natural extension of geometry to an extended tangent bundle, it still lacks fundamental objects of differential geometry like the Riemann tensor. After a short review of the most important differences between generalized and standard differential geometry, I will present the underlying cause for this trouble and present a proposal for a solution that gives a new, geometric perspective on duality symmetries in supergravity. This approach will not just resolve some old puzzles but it also has direct applications, leading to a much broader notion of dualities in supergravity that can be used to generate new solutions and even higher-derivative corrections.

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