NEW GEOMETRIC STRUCTURES FROM STRING THEORY

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Double Field Theory (DFT) is a framework, which aims to realize the O(d,d) T-duality symmetry as a manifest symmetry for the low energy effective space-time actions of string theory. This is achieved by doubling the space-time coordinates by introducing dual coordinates, that has to be supplemented by an O(d,d) covariant constraint, known as the “section constraint”. This framework calls for new geometric structures, which can be regarded as generalizations of those that appear in Riemannian geometry. For a certain solution of the section constraint, the right mathematical framework is that of Generalized Complex Geometry (GCG), introduced in 2003 by Nigel Hitchin, in order to describe complex and symplectic geometry in a unified way. GCG has also relevance for flux compactifications of superstring theory, which preserve a certain fraction of supersymmetry. It is known that the internal manifolds for such compactifications must be Generalized Calabi-Yau manifolds. The aim of this talk is to give a mild introduction to the basic concepts in Double Field Theory and Generalised Complex Geometry within the context of string theory. We will also talk about our recent work, which studies duality twisted reductions of DFT to lower dimensions. For a certain sector of DFT, such reductions will require us to study Spin(d,d), the double covering group of O(d,d), rather than the group O(d,d) itself.