G2 Flux Compactifications of String Theory

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Abstract

In this talk based on arXiv:2605.06800, I present a unified and fully general framework for string compactifications on G2 manifolds and more generally G2-structure spaces across type IIA, type IIB/type I, and heterotic theories. This generalizes the existing work, which is often restricted to toroidal orbifolds and b^2 = 0. We systematically derive the complete 3D N=1 effective actions including all scalars. Our construction incorporates fluxes, geometric data, orientifold projections, and dualizations in a unified way, making the underlying structure of the scalar potential and real superpotential manifest. I will highlight how flux compactifications to three dimensions provide a sharp arena for testing Swampland constraints, studying moduli stabilization, and scale separation.

Keywords: G2 Compactification, G2 Manifold, Flux Compactification, 3D EFT.

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