

# Three Roads to 4D Supersymmetric Physics

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# Abstract

Abstract: There are three roads to 4D supersymmetric physics from higher dimensional theories: F-theory compactified on the base of an elliptic Calabi-Yau fourfold, M-theory compactified on a space with holonomy  $G_2$ , and the heterotic string compactified on a Calabi-Yau threefold with bundle and connection. We will explore recent progress down each of these three roads.

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Spin/charge  
relations

The symmetries of  
type IIB  
supergravity

Supersymmetry  
and the  
complexified gauge  
group

Parallel spin<sup>c</sup>  
structures

Anomaly  
cancellation in  
F-theory

F-theory vacua, I:  
 $SL(2, \mathbb{Z})$ -invariant  
scalar fields

The lattice of  
string charges and  
the  
 $SL(2, \mathbb{Z})$ -doublet  
of two-forms

## Road 1: Heterotic compactifications

## Road 2: F-theory compactifications

## Road 3: G2 compactifications

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