

Engineering F-Theory GUTs

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Attempts have been made at constructing D-brane GUT models which suffer from a number of difficulties like the lack of spinor representation for the $SO(10)$ or the perturbative vanishing of the top quark Yukawa couplings for the $SU(5)$ models. In fact, these difficulties arose as the past constructions relied heavily on local 7-branes. Such obstacles can be avoided by considering mutually non-local 7-branes. This enlarged class of models goes under the name of F-theory. F-theory encodes the physics of 7-branes in higher-dimensional geometry. Moreover, in certain limits F-theory is dual to the heterotic $E8 \times E8$ and M-theory. As a matter of fact, one of the most convenient ways to think about F-theory is via the duality with M-theory. This method is used to construct global F-theory GUTs.

The aim of the talk will be to introduce some of the key ideas in engineering F-theory GUTs. We will look at some aspects of the $SU(5)$ (extensive work has been done in this case) and the $SO(10)$ GUT like matter curves and Yukawa points. To conclude, GUT breaking methods will be discussed briefly and work in progress will be mentioned.

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