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Three-generation models from $SO(32)$ heterotic string theory

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In this talk, we show the concrete embeddings of the standard model gauge groups into $SO(32)$ gauge group in terms of the multiple $U(1)$ fluxes. The correct matter contents of the standard model are then derived from the adjoint and vector representations of $SO(12)$ given by the subgroup of $SO(32)$.

Since the number of generations corresponds to the number of $U(1)$ fluxes, we search for the desired matter contents of the standard model satisfying the $U(1)_Y$ massless conditions as well as the SUSY conditions. Our models satisfy the typical theoretical constraints which are required from the consistency of heterotic string theory.

Finally, we discuss quark masses and mixing angles in $SU(3)_f$ and $\Delta(27)$ models.

Summary

We search for realistic supersymmetric standard-like models from $SO(32)$ heterotic string theory on factorizable tori with multiple magnetic fluxes. Three chiral generations of quarks and leptons are derived from the adjoint and vector representations of $SO(12)$ gauge groups embedded in $SO(32)$ adjoint representation. Massless spectra of our models also include Higgs fields, which have desired Yukawa couplings to quarks and leptons at the tree-level.

In models with the flavor symmetries $SU(3)_f$ and $\Delta(27)$, we can realize the realistic quark masses and mixing angles.

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