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An $SU(5)$ heterotic standard model. (English) Zbl 1247.81348

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Summary: We introduce a new heterotic Standard Model which has precisely the spectrum of the Minimal Supersymmetric Standard Model (MSSM), with no exotic matter. The observable sector has gauge group $SU(3)_C \times SU(2)_L \times U(1)_Y$. Our model is obtained from a compactification of heterotic strings on a Calabi-Yau threefold with Z_2 fundamental group, coupled with an invariant $SU(5)$ bundle. Depending on the region of moduli space in which the model lies, we obtain a spectrum consisting of the three generations of the Standard Model, augmented by 0, 1 or 2 Higgs doublet conjugate pairs. In particular, we get the first compactification involving a heterotic string vacuum (i.e., a stable bundle) yielding precisely the MSSM with a single pair of Higgs.

MSC:

81T30	String and superstring theories; other extended objects (e.g., branes) in quantum field theory	Cited in **63** Documents
14J32	Calabi-Yau manifolds (algebro-geometric aspects)	
14J81	Relationships between surfaces, higher-dimensional varieties, and physics	
81V22	Unified quantum theories	
81T60	Supersymmetric field theories in quantum mechanics	

Keywords:

Minimal Supersymmetric Standard Model (MSSM); heterotic stringsheterotic strings; Calabi-Yau threefold

Full Text: DOI arXiv

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