

別紙 4

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主 論 文 の 要 旨

論文題目 Chiral Four-Dimensional Heterotic String Vacua From Covariant Lattices
(共変格子からのカイラル4次元ヘテロティック弦理論の真空)

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論 文 内 容 の 要 旨

The covariant lattice formalism provides a consistent method for the construction of chiral four-dimensional heterotic string vacua. In this work, we seek to develop a systematic understanding of this corner of the string landscape, and also attempt to clarify the relationship with asymmetric orbifolds. Chiral covariant lattice models are classified using the theory of lattice genera, and by means of the Smith-Minkowski-Siegel mass formula a lower bound of $O(10^{10})$ on the number of $N = 1$ supersymmetric models is calculated. We also perform an exhaustive enumeration of models for two genera corresponding to certain supersymmetric Z_3 and Z_6 asymmetric orbifolds. In the Z_3 case there exist precisely 2030 models, and for these we carry out a general analysis of discrete flavor and R-symmetries. The Z_6 case produced in total $O(10^7)$ models, but computational resources were insufficient for the elimination of duplicates among them. Finally, we discuss three-generation models from both genera in detail.