Modular R-Symmetries and Discrete Gauge Symmetries

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Abstract

We discuss the modular origin of R-symmetries and discrete gauge symmetries in string compactifications, focusing on heterotic orbifolds. We find that in heterotic orbifolds, string selection rules are in fact discrete gauge symmetries. To understand them one needs discrete remnants of gauge symmetries from different fixed points in the fundamental domain of the appropriate congruence subgroup of the target space SL(2,Z). In particular, the fundamental domain of SL(2,Z) is too small to obtain the full set of discrete gauge symmetries. Discrete R-symmetries derive from target space modular symmetries, and every orbifold plane has an order-4 discrete R-symmetry, Z_4^R.

Keywords: R, symmetries, heterotic, orbifolds, modular forms

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