Orientifolds of six-dimensional quasicrystallographic orbifolds

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Abstract

Quasicrystallographic orbifolds are among the most exotic exactly solvable backgrounds of string theory. Their major feature is that the orbifold symmetry acts crystallographic on the full Narain lattice, while it cannot be lifted to an ordinary symmetry of the target-space torus. They therefore provide controlled examples of genuinely non-geometric compactifications, living at special points in moduli space with frozen geometric moduli. A natural question is whether such closed-string backgrounds can be completed into full orientifold vacua with unoriented strings, D-branes and O-planes. I will discuss our current work in this direction for six-dimensional Type IIB compactifications. The principal result is that the standard technology of toroidal orbifolds and orientifolds can be extended to quasicrystallographic backgrounds, leading to explicit perturbatively consistent orientifold descendants. These constructions provide a way to connect the current knowledge on non-geometric orbifolds and the usual open-string consistency conditions of orientifold models, including tadpole cancellation, six-dimensional anomaly constraints, KSV conditions.... They also offer a useful arena for studying supersymmetry breaking in non-geometric orientifold settings, both through Scherk–Schwarz or M-theory mechanisms in orbifold compactifications and through brane supersymmetry breaking in open-string sectors. This gives new explicit examples of six-dimensional orientifold vacua beyond the conventional geometric and crystallographic cases.

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