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Tension between a vanishing cosmological constant and non-supersymmetric heterotic orbifolds

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We investigate under which conditions the one-loop cosmological constant vanishes for heterotic strings on non-supersymmetric toroidal orbifolds. To obtain model-independent results, we require that each orbifold sector preserves at least a single Killing spinor, but not always the same one. The existence of such Killing spinors is related to the representation theory of the point groups that underly the orbifold geometries. Going through all inequivalent (Abelian and non-Abelian) point groups of six-dimensional toroidal orbifolds shows that this is never possible: For any non-supersymmetric orbifold there is always (at least) one sector, that does not admit any Killing spinor and hence gives a non-vanishing contribution to the partition function which most likely results in a too large cosmological constant. (The underlying reason for this can be phrased as a mathematical conjecture, which was tested for a much larger class of finite groups.) This result shows that it is very challenging to obtain a tiny cosmological constant on non-supersymmetric heterotic orbifolds.

Content of the contribution

Theory

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