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A Tale of Two U(1)s: Kinetic Mixing from Lattice WGC States

We point out that the states required by the Lattice Weak Gravity Conjecture, along with certain genericity conditions, imply the existence of non-vanishing kinetic mixing between massless Abelian gauge groups in the low-energy effective theory. We carry out a phenomenological estimate using a string-inspired probability distribution for the masses of superextremal states and compare the results to expectations from string theory and field theory, estimating the magnitude of kinetic mixing in each case. In the string case, we compute the kinetic mixing in an ensemble of 1858 MSSM-like heterotic orbifolds. From the field theory perspective, we consider compactifications of a $5D$ gauge theory. Finally, we discuss potential loopholes that can evade the bounds set by our estimates.

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Primary author: PARIKH, Aditya (Harvard University)

Presenter: PARIKH, Aditya (Harvard University)

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