Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Mirror Symmetry for Multi-Parameter K3 Surfaces NOAH BRAEGER, ANDREAS MALMENDIER, YIH SUNG, Utah State University —
For a superstring theory to be consistent with observations, its space-time must be four-dimensional at the relevant distance scales, so one must look for ways to restrict the necessary extra dimensions to smaller scales. This is accomplished by a process called compactification, in which the extra dimensions are curled-up and assumed to "close up" on themselves to form a compact Calabi-Yau manifold. As an intermediate step one obtains for this Calabi-Yau manifold a four-dimensional K3 manifold. A duality between two different superstring theories presents itself through the compactification of the respective theories on two different K3 manifolds; more precisely, the duality relates a compactification on a symplectic K3 manifold to a family of complex K3 manifolds. In this case, the relationship between the two theories is known as K3-mirror symmetry. The Greene-Plesser orbifolding method allows for the construction of a mirror of the symplectic K3 manifold from a special one-parameter family of K3 manifolds known as the Dwork pencil. We develop a natural extension of the Greene-Plesser mechanism from the one-dimensional to a three-parameter family. Moreover, for this three-parameter family we compute the (arithmetic) mirror map governing the string duality.

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Date submitted: 13 Sep 2019 Electronic form version 1.4