No-scale strikes back: dynamical relaxation of vacuum energies

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Abstract

We argue that the approximate scaling symmetries robustly featured by low energy string vacua are relevant in presence of strong supersymmetry breaking, with consequences for moduli stabilisation and potential implications for the cosmological constant problem. We couple N=1 supergravity with spontanously broken supersymmetry to a sector featuring a perturbative shift symmetry and gravitational couplings to the source of supersymmetry breaking, reminiscent to Kahler moduli in string compactifications. After working out the most general scalar potential of this theory, we identify a perfect square structure which stabilises the scalar field with zero vacuum energy at leading order, assuming a tree-level no-scale form. This is a dynamical relaxation of the vacuum energy sourced by supersymmetry breaking.

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