Chaotic Inflation and No-Scale Gravity

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An extension of general relativity obtained by adding all scale-invariant terms to the action will be considered. Such theory is a UV completion of general relativity, which also solves the hierarchy problem. However, the presence of 4 derivatives implies via the Ostrogradsky theorem that the classical Hamiltonian is unbounded from below. Nevertheless, I will argue that the relevant solutions are not unstable but metastable. When the energies are much below a threshold (that is high enough to describe the whole cosmology) runaways are avoided. Remarkably, the chaotic inflation theory of initial conditions ensures that such bound is satisfied and testable implications for the early universe will be shown. The possible instability occurring when the bound is violated not only is compatible with cosmology but would also explain why we live in a homogeneous and isotropic universe.