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The Dynamics of Electroweak Relaxation

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We explore a recent proposal of Cosmological Relaxation, by Graham, Kaplan and Rajendran, for generating a hierarchically small Higgs vacuum expectation value. In particular, we discuss its capacity for solving the electroweak hierarchy problem. To do so, we study the dynamics of the model and determine the relation between the fundamental input parameters and the electroweak vacuum expectation value. Depending on the input parameters the model exhibits three qualitatively different regimes, two of which allow for a hierarchically small Higgs vacuum expectation value. In one case we obtain standard electroweak symmetry breaking whereas in the other electroweak symmetry is mainly broken by a Higgs source term. While the latter is not acceptable in a model based on the QCD axion, in non-QCD models this may lead to new and interesting signatures in Higgs observables.

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