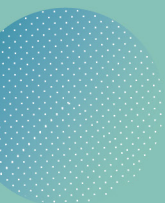




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Gravitational Coleman-Weinberg Mechanism

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Abstract

The Coleman-Weinberg mechanism provides a procedure by which a scalar field, which initially has no mass parameters, acquires a mass due to the anomalous nature of scale symmetry.

Loop corrections trigger a spontaneous symmetry breaking and the appearance of a non-trivial vacuum.

We first review the basic example of the Coleman-Weinberg mechanism, scalar Quantum Electrodynamics, in a perturbative regime where the scalar particle becomes massive through photon loops.

We then present the main results of this article, what we name the gravitational Coleman-Weinberg mechanism: we analyse the same effect in a gravitational theory without explicit energy scales at tree-level.

Finally, we also study the mechanism for two scalar fields in the mentioned gravitational theory.

We will derive the gravitational Coleman-Weinberg potentials, analyse the parameter space where we have a symmetry breaking, and obtain the value of the corresponding scalar masses.

