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Radiative Symmetry Breaking of the Minimal Left-Right Symmetric Model

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Under the assumption of classical conformal invariance, we study the Coleman-Weinberg symmetry breaking mechanism in the minimal left-right symmetric model. This model is attractive as it provides a natural framework for small neutrino masses and the restoration of parity as a good symmetry of nature. We find that, in a large fraction of the parameter space, the parity symmetry is maximally broken by quantum corrections in the Coleman-Weinberg potential, which are a consequence of the conformal anomaly. As the left-right symmetry breaking scale is connected to the Planck scale through the logarithmic running of the dimensionless couplings of the scalar potential, a large separation of the two scales can be dynamically generated. The symmetry breaking dynamics of the model was studied using a renormalization group analysis. Electroweak symmetry breaking is triggered by the breakdown of left-right symmetry, and the left-right breaking scale is therefore expected in the few TeV range. The phenomenological implications of the symmetry breaking mechanism are discussed.

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