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A new mechanism for symmetry breaking from nilmanifolds

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We present a method to obtain a scalar potential at tree level from a pure gauge theory on nilmanifolds, a class of negatively-curved compact spaces, and discuss the spontaneous symmetry breaking mechanism induced in the residual Minkowski space after compactification at low energy. We show that the scalar potential is completely determined by the gauge symmetries and the geometry of the compact manifold. In order to allow for simple analytic calculations we consider three extra space dimensions as the minimal example of a nilmanifold, therefore considering a pure Yang-Mills theory in seven dimensions. We further investigate the effective potential at one-loop and the spectrum when fermions are included.

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