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Electroweak Symmetry Breaking in Five-Dimensional Sp(6) Gauge-Higgs Unification Model

Abstract

Gauge-Higgs Unification (GHU) is one of the solutions to the gauge hierarchy problem, where the Standard Model Higgs field is embedded into the spatial component of the higher dimensional gauge field. In 5D GHU, the tree-level Higgs potential is forbidden by 5D gauge symmetry and the non-local potential is generated by quantum corrections. Moreover, since the Higgs interaction can be considered as a 5D gauge interaction, the weak mixing angle which is a parameter in SM that characterizes the ratio of the weak boson, can be predicted by an electric charge of the Higgs doublet. We study the electroweak symmetry breaking in a 5D Sp(6) GHU model where the weak mixing angle can be predicted at the compactification scale. We find that the correct pattern of electroweak symmetry breaking and a realistic Higgs mass is realized by introducing a 4-rank totally symmetric representation and several adjoint fermions.