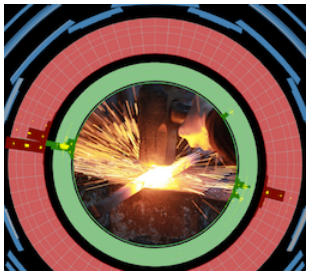

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125 GeV Higgs boson mass from 5D gauge-Higgs unification

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In the context of a simple gauge-Higgs unification (GHU) scenario based on the gauge group SU(3)×U(1)′ in a 5-dimensional flat space-time, we investigate a possibility to reproduce the observed Higgs boson mass of around 125 GeV. We introduce bulk fermion multiplets with a bulk mass and a (half) periodic boundary condition. In our analysis, we adopt a low energy effective theoretical approach of the GHU scenario, where the running Higgs quartic coupling is required to vanish at the compactification scale. Under this "gauge-Higgs condition," we investigate the renormalization group evolution of the Higgs quartic coupling and find a relation between the bulk mass and the compactification scale so as to reproduce the 125 GeV Higgs boson mass. Through quantum corrections at the one-loop level, the bulk fermions contribute to the Higgs boson production and decay processes and deviate the Higgs boson signal strengths at the Large Hadron Collider (LHC) experiments from the Standard Model (SM) predictions. Employing the current experimental data which show the the Higgs boson signal strengths for a variety of Higgs decay modes are consistent with the SM predictions, we obtain lower mass bounds on the lightest mode of the bulk fermions.

Summary

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