Contribution ID: **111**   Type: **Talk**

Investigation of (g − 2) μ anomaly in the μ-specific 2HDM with Vector like leptons

Monday 12 December 2022 17:30 (15 minutes)

The anomalous magnetic moment of muons has been a long-standing problem in SM. The current deviation of experimental value of the (g − 2) μ from the standard model prediction is exactly 4.2σ. Two Higgs Doublet Models can accommodate this discrepancy but such type of model naturally generate flavor changing neutral current(FCNC). To prevent this it was postulated that 2HDM without FCNC required that all fermions of a given charge couple to the same Higgs boson but the

rule breaks in Muon Specific Two Higgs Doublet Model where all fermions except muon couple to one Higgs doublet and muon with the other Higgs doublet. The Muon Specific Two Higgs Doublet model explain muon anomaly with a fine tuning problem of very large tan β value with other parameters. We have found a simple solution of this fine tuning problem by extending this model with a vector like lepton generation which could explain the muon anomaly at low tan β value with a heavy pseudo scalar Higgs boson under the shadow of current experimental and theoretical constraints. Moreover, with the help of the cut based analysis and multivariate analysis methods, we have also attempted to shed some light on the potential experimental signature of vector lepton decay to the heavy Higgs boson in the LHC experiment. We have showed that a multivariate analysis can increase the vector like leptons signal significance by up to an order of magnitude than that of a cut based analysis.

Session

Higgs Physics

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Session Classification: WG6 - Higgs Physics