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100 years of Physics in Africa Past, Present and Future

Gqeberha formerly Port Elizabeth

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Explaining new type of multi-lepton excesses at the LHC with singlet scalar extended 2HDM model

Thursday, 7 July 2022 12:00 (15 minutes)

The shortfall of the Standard Model (SM) has led the particle physics community to search for a plethora of physics models beyond the SM (BSM). Owing to many recent studies on multi-lepton final states in proton-proton collisions at the LHC, it has become evident that several anomalous features of the LHC data can be explained through the addition of new scalar bosons to the 2HDM model. The anomalies can be well described by a 2HDM+S model, where the mass of the heavy scalar $m_H \approx 270\,$GeV, the mass of the singlet scalar $m_S \approx 150\,$GeV. In this talk, we will discuss a new set of excesses recently reported by the ATLAS and CMS analyses of multi-lepton final states. Mainly the talk will focus on the CP-odd scalar of the 2HDM+S model and how it can explain those excesses. With the motivation from a number of experimental searches, we have looked at the heavy (pseudo)-scalars in the mass range $400 - 600\,$GeV. The heavy pseudo scalar in this parameter space dominantly decays to ZH and $t\bar{t}$ which then produces four top and four lepton in the final state. Here we will discuss the multi-lepton final state in conjunction with the multi-lepton excesses that are recently observed at the LHC.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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