



Contribution ID: 89

Type: Oral Presentation

Compatibility of the CMS dilepton spectra with the Neutral Scalar with Mass around 151 GeV

Thursday, 7 July 2022 11:45 (15 minutes)

The measurements related to the different properties of the newly discovered Higgs boson (h) at the LHC by ATLAS and CMS indicate that this 125 GeV boson is compatible with the Standard Model (SM). However, this does not exclude the existence of additional scalar bosons as long as their possible mixing with the SM Higgs is sufficiently small. In a recent phenomenological analysis, a search for narrow resonances with $S \rightarrow \gamma\gamma, Z\gamma$ along with leptons, di-jets, bottom quarks and missing energy was reported. The global significance of the excess at $m_S = 151.5\text{ GeV}$ is 4σ , whereas a combination with the multi-lepton anomalies gives a significance larger than 5σ . Moreover, a recent CMS study in the W boson pair in proton-proton collisions presented an excess in dilepton channel associated with the 0, 1 jet ggH tagged categories. There it shows an excesses around 150 GeV. With this motivation, in this talk, we will compare two different models (namely, $2HDM + S$ and $2HDM + S + N$), containing two new hypothetical scalar bosons, H and S, which can explain these dilepton excesses reasonably well. For $2HDM + S$, we consider the neutral scalar H decays into a lighter one S and the SM Higgs h i.e. $H \rightarrow Sh/SS^*$. On the other hand, in $2HDM + S + N$, the dominant decay of the heavy higgs $H \rightarrow S(\rightarrow NN)S^*(\rightarrow NN)$ is considered to analyze the dilepton states to explain the excess.

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

No

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

N/A

Primary author: BHATTACHARYA, Srimoy (University of the Witwatersrand, Johannesburg)

Co-authors: MELLADO, Bruce (University of the Witwatersrand); Dr SWAIN, Abhaya Kumar (University of the Witwatersrand); RUAN, Xifeng (University of the Witwatersrand); KUMAR, Mukesh (University of the Witwatersrand); Mr COLORETTI, Guglielmo (Institute for Theoretical Physics, ETH, CH-8093 Zurich, Switzerland); Prof. CRIVELLIN, Andreas (Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland)

Presenter: BHATTACHARYA, Srimoy (University of the Witwatersrand, Johannesburg)

Session Classification: Nuclear, Particle and Radiation Physics

Track Classification: Track B - Nuclear, Particle and Radiation Physics