Contribution ID: **15** Type: **Young Scientist Forum**

[YSF] Constraints on $U(1)_{l_\mu - l_\tau}$ from LHC Data

Thursday 15 August 2019 09:25 (10 minutes)

In this study, we apply LHC data to constrain the extension of the Standard Model by an anomaly-free $U(1)_{l_\mu - l_\tau}$ gauge group; this model contains a new gauge boson (Z) and a scalar dark matter particle (ϕ_{DM}). We recast a large number of LHC analyses from ATLAS and CMS of multi-lepton final states. We find that for 10 GeV < m_Z < 60 GeV the strongest constraint comes from a dedicated Z search in the 4μ final state by the CMS collaboration; for larger Z masses, searches for final states with three leptons plus missing E_T are more sensitive. Searches for final states with two leptons and missing E_T, which are sensitive to Z decays into dark matter particles, can only probe regions of parameter space that are excluded by searches in the 3 and 4 lepton channels. The combination of LHC data excludes values of Z mass and coupling constant that can explain the deficit in $g_\mu - 2$ for 4 GeV < m_Z < 500 GeV. However, for much of this range the LHC bound is weaker than the bound that can be derived from searches for trident events in neutrino-nucleus scattering. Therefore, we are trying some optimizations for the event selection based on Machine Learning algorithms, especially XGBoost.

Author: Mr ZHANG, Zhongyi (Bonn University)

Presenter: Mr ZHANG, Zhongyi (Bonn University)

Session Classification: From Models to Signatures