Contribution ID: **21** Type: **Oral**

Unraveling Light Dark Matter and Rare B Decays: $L_\mu - L_\tau$ Model Enhanced by Scalar Leptoquark

Wednesday, May 15, 2024 4:20 PM (20 minutes)

We investigate the phenomenology of light GeV-scale fermionic dark matter in $U(1)_{L_\mu - L_\tau}$ gauge extension of the Standard Model. Heavy neutral fermions alongside with a $S_1(\overline{3},1,1/3)$ scalar leptoquark and an inert scalar doublet are added to address the flavor anomalies and light neutrino mass respectively. The light gauge boson associated with $U(1)_{L_\mu - L_\tau}$ gauge group mediates dark to visible sector and helps to obtain the correct relic density. Aided with a colored scalar, we constrain the new model parameters by using the branching ratios of various $b \to sll$ and $b \to s\gamma$ decay processes as well as the lepton flavour non-universality observables $R_{K^{(*)}}$ and then show the implication on the branching ratios of some rare semileptonic $B \to (K^{(*)}, \phi) +$ missing energy, processes.

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Session Classification: Dark Matter

Track Classification: Dark Matter