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## Modification of Neutrino Floor: Case of $U(1)_{L_\mu-L_\tau}$ Model

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In this work, we investigate the beyond standard model (BSM) impact of leptophilic  $U(1)$  models, specifically  $U(1)_{L_\mu-L_\tau}$  on coherent elastic neutrino-nucleus scattering ( $CE\nu NS$ ) and hence its effect on dark matter (DM) direct detection experiments. Imposing the latest relevant experimental constraints on these models, we obtain  $\mathcal{O}(50\%)$  enhancement for case of  $U(1)_{L_\mu-L_\tau}$  in a region  $m'_Z \approx 20$  MeV. Subsequently, we observe that the enhancement seen in  $CE\nu NS$  is roughly getting translated to enhancement by a factor of 2.7 (for Germanium based detectors) and 1.8 (for Xenon based detectors) in the neutrino scattering event rate which eventually enhances the neutrino floor by same amount.

This enhancement is more prominent in the region with DM masses less than 10 GeV. The model parameter space that leads to this enhancement, can simultaneously explain both anomalous magnetic moment of muon ( $(g-2)_\mu$ ) and observed DM relic density, in a modified scenario.

**Author:** SADHUKHAN, Soumya (Ramakrishna Mission Residential College (Autonomous), Narendrapur)

**Presenter:** SADHUKHAN, Soumya (Ramakrishna Mission Residential College (Autonomous), Narendrapur)

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