Contribution ID: **12** Type: **not specified**

Explaining lepton-flavor non-universality and self-interacting dark matter with L_mu - L_tau

Experimental hints for lepton-flavor universality violation in the muon's magnetic moment as well as neutral- and charged-current B-meson decays require Standard-Model extensions by particles such as leptoquarks that generically lead to unacceptably fast rates of charged lepton flavor violation and proton decay. We propose a model based on a gauged $U(1)_{L_\mu - L_\tau}$ that eliminates all these unwanted decays by symmetry rather than finetuning and efficiently explains $(g-2)_\mu$, $R_{K^{(*)}}$, $R_{D^{(*)}}$, and neutrino masses. The $U(1)_{L_\mu - L_\tau}$ furthermore acts as a stabilizing symmetry for dark matter and the light Z' gauge boson mediates velocity-dependent dark-matter self-interactions that resolve the small-scale structure problems. Lastly, even the Hubble tension can be ameliorated via the light Z' contribution to the relativistic degrees of freedom.

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Session Classification: Collider: W mass/QCD, Electroweak