

Self-interacting dark matter, muon $g-2$, and neutrino physics in a gauged Lmu-Ltau model

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Our current understanding of the large-scale structure of the Universe is based on the cold dark matter model. Observed small-scale (sub-galactic) matter distribution, on the other hand, appears to challenge this standard paradigm.

Self-interaction between dark matter particles reconciles small-scale issues by flattening the dark matter density profile inside halos.

I will present a particle physics model of self-interacting dark matter with the cross section diminishing with increasing velocity, which maintains the success of the cold dark matter model above galactic scales.

The model is based on a gauged Lmu-Ltau extension of the standard model, where the mu and tau leptons and neutrinos in addition to dark matter particles couple to a new gauge boson.

Interestingly, it ameliorates the discrepancy of the measured muon $g-2$ with the standard model prediction and the small-scale issues in the structure formation at the same time.

I will demonstrate how the neutrino physics experiments, such as Borexino (solar neutrino experiment), Ice-Cube (high-energy neutrino observatory), and Planck (cosmological measurement of effective number of neutrino degrees of freedom), constrain its parameter space.

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