

The XXVIII International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY 2021)



Contribution ID: 74

Type: **not specified**

Neutrino as the Dark Force

Tuesday, 24 August 2021 20:00 (20 minutes)

We point out a novel role for the Standard Model neutrino in dark matter phenomenology where the exchange of neutrinos generates a long-range potential between dark matter particles. The resulting dark matter self interaction could be sufficiently strong to impact small-scale structure formation, without the need of any dark force carrier. This is a generic feature of theories where dark matter couples to the visible sector through the neutrino portal. It is highly testable with improved decay rate measurements at future Z, Higgs, and τ factories, as well as precision cosmology.

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Session Classification: Dark Matter and Astroparticle Physics

Track Classification: Dark Matter and Astroparticle Physics