

# Phenomenology 2025 Symposium



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## Continuum-mediated self-interacting neutrinos

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Testing new interactions in the neutrino sector, both in current and upcoming experiments, is essential for uncovering the nature of neutrinos. In many extensions of the Standard Model (SM), active neutrinos may engage in self-interactions via the exchange of a new light particle, often motivated by the need to explain empirical puzzles such as the origin of neutrino mass. Cosmological data also point toward an effective Fermi constant significantly larger than what the SM offers. However, much of the parameter space for sizable neutrino self-interactions mediated by a light neutrinophilic scalar has already been tightly constrained by complementary terrestrial, astrophysical, and cosmological probes. In this talk, I present a novel approach in which neutrino self-interactions are mediated by a field with a continuous spectral density. I show that a gapped unparticle mediator can open up significant regions of parameter space for strong neutrino self-interactions relevant to cosmology, providing a well-motivated target for upcoming experiments. (2501.02049)

### Mini Symposia (Invited Talks Only)

### Plenary (Invited talks only)

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