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Decoupling Neutrino Magnetic Moment from Mass with $SU(2)_L$ Invariance

Saturday 15 November 2025 14:00 (18 minutes)

Standard Model extensions that yield observable neutrino magnetic moments typically also induce large neutrino masses, incompatible with experimental limits.
This tension motivates the search for mechanisms that naturally decouple magnetic moments from mass generation without requiring fine-tuning.
In this talk, I propose a novel mechanism for generating Dirac and Majorana neutrino magnetic moment, in which the associated mass contribution is forbidden by $SU(2)_L$ invariance.
By carefully selecting the $SU(2)_L$ representations connecting the neutrino to the loop diagram, we ensure that only the effective dipole operator involving the non-Abelian part of the photon — the neutral $SU(2)_L$ gauge boson — is generated. Crucially, the corresponding mass diagram, obtained by removing the external gauge boson leg, vanishes.
I will also provide explicit UV completions that implement this mechanism and yield neutrino magnetic moments within the sensitivity of current and future experiments.

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