

Pedro Pasquini "light BSM physics search using radiative emission of neutrino pair"

Wednesday, 8 November 2023 17:25 (25 minutes)

We propose a new possibility of using the coherently enhanced neutrino pair emission to probe BSM light-mediator interactions between electron and neutrinos. With typical momentum transfer at the atomic $\mathcal{O}(1 \text{ eV})$ scale, this process is extremely sensitive for the mediator mass range $\mathcal{O}(10^{-3} - 10^4) \text{ eV}$. The sensitivity on the product of couplings with electron (g_e or y_e) and neutrinos (g_ν or y_ν) can touch down to $|y_e y_\nu| < 10^{-9} - 10^{-19}$ for a scalar mediator and $|g_e g_\nu| < 10^{-15} - 10^{-26}$ for a vector one, with orders of improvement from the existing constraints. Being a massless mediator, the photon can also mediate the atomic transition for non-zero neutrino electromagnetic properties. We show the neutrino pair emission can put competitive bounds on the neutrino magnetic moment and electric dipole operators but, most importantly, it can identify their individual elements which are not possible by existing observations.

Session Classification: Short talks