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Disentangle neutrino electromagnetic properties with atomic radiative pair emission

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"We elaborate the possibility of using the atomic radiative emission of neutrino pair (RENP) to probe the neutrino electromagnetic properties, including magnetic and electric dipole moments, charge radius, and anapole. With the typical O(eV) momentum transfer, the atomic RENP is sensitive to not just the tiny neutrino masses but also very light mediators to which the massless photon belongs. The neutrino EM properties introduce extra contribution besides the SM one induced by the heavy W/Z gauge bosons. Since the associated photon spectrum is divided into several sections whose boundaries are determined by the final-state neutrino masses, it is possible to identify the individual neutrino EM form factor elements. Most importantly, scanning the photon spectrum inside the particular section with deviation from the SM prediction once observed allows identification of the neutrino EM form factor type. The RENP provides an ultimate way of disentangling the neutrino EM properties to go beyond the current experimental searches or observations."

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