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Electromagnetic neutrino properties: new constraints and new effects

A review on neutrino electromagnetic properties and interactions is given. We consider constraints on neutrino magnetic and electric dipole moments, electric millicharge, charge radii and anapole moments from the terrestrial laboratory experiments and astrophysical observations. The main manifestation of neutrino electromagnetic interactions, such as: 1) the radiative decay in vacuum, in matter and in a magnetic field, 2) the neutrino Cherenkov radiation, 3) the plasmon decay to neutrino-antineutrino pair, 4) the neutrino spin light in matter, and 5) the neutrino spin and spin-flavour precession and oscillations in magnetized matter are discussed. Phenomenological consequences of neutrino electromagnetic interactions in astrophysical environments are also reviewed. The best world experimental bounds on neutrino electromagnetic properties are confronted with the predictions of theories beyond the Standard Model. It is shown that studies of neutrino electromagnetic properties provide a powerful tool to probe physics beyond the Standard Model.

Mini-abstract

EM properties, magnetic moments, millicharges, charge radii and effects of EM interactions of nus.

Experiment/Collaboration

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