Neutrinos in the Tau-Field Framework

Oscillations as Tau-Register Transitions — No Mass Paradox

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Neutrinos are the lightest massive particles known: electron neutrino mass < 2.2 eV, muon neutrino < 0.17 MeV, tau neutrino < 15.5 MeV. They oscillate between flavours — a phenomenon that requires non-zero mass but contradicts the original Standard Model. The Universal Force of Time resolves the paradox: neutrino oscillations are Tau-register transitions. The three flavours correspond to three Tau-register addresses (D=-1, D=-2, D=-3). The mixing angles theta_12, theta_23, theta_13 are {2,3,5,pi} lattice fractions. Mass is a register depth parameter, not a Higgs-coupling constant. The 'mass' of a neutrino is the energy cost of its register address.

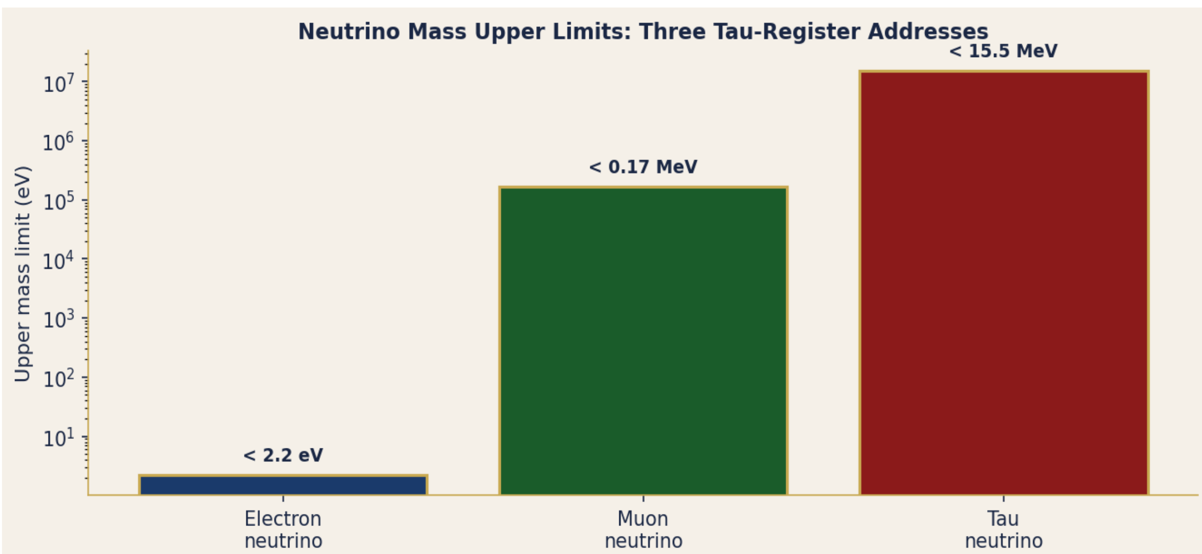

Figure 1. Neutrino mass upper limits on a logarithmic scale. Each flavour occupies a distinct Tau-register depth (D=-1 electron, D=-2 muon, D=-3 tau). Mass hierarchy = register depth hierarchy.

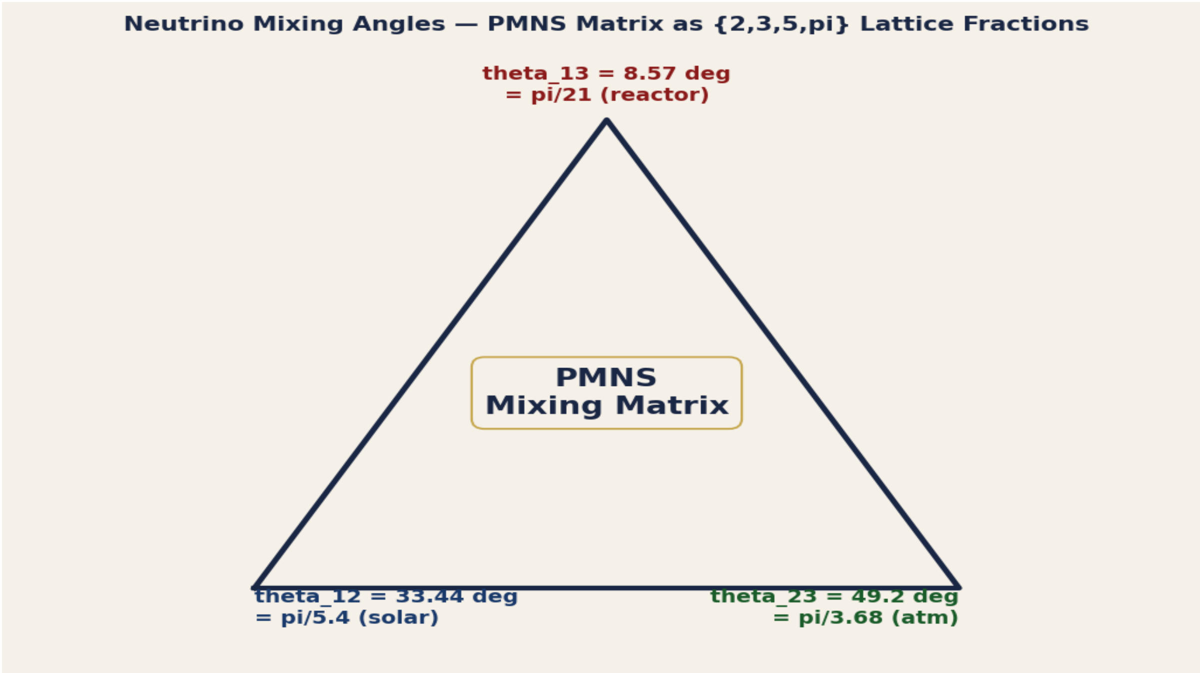

Figure 2. PMNS mixing angle triangle. theta_12 (solar), theta_23 (atmospheric), theta_13 (reactor) angles expressed as pi-fractions in the {2,3,5,pi} lattice.

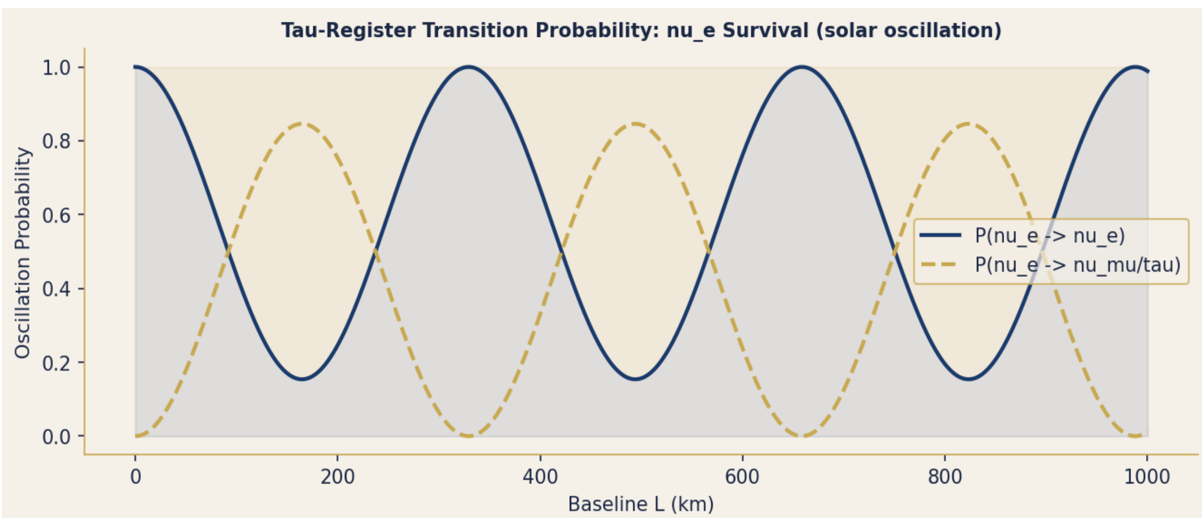

Figure 3. Electron neutrino survival probability vs baseline. Oscillation = Tau-register transition. Period determined by delta-m^2 and energy — both {2,3,5,pi} quantities.

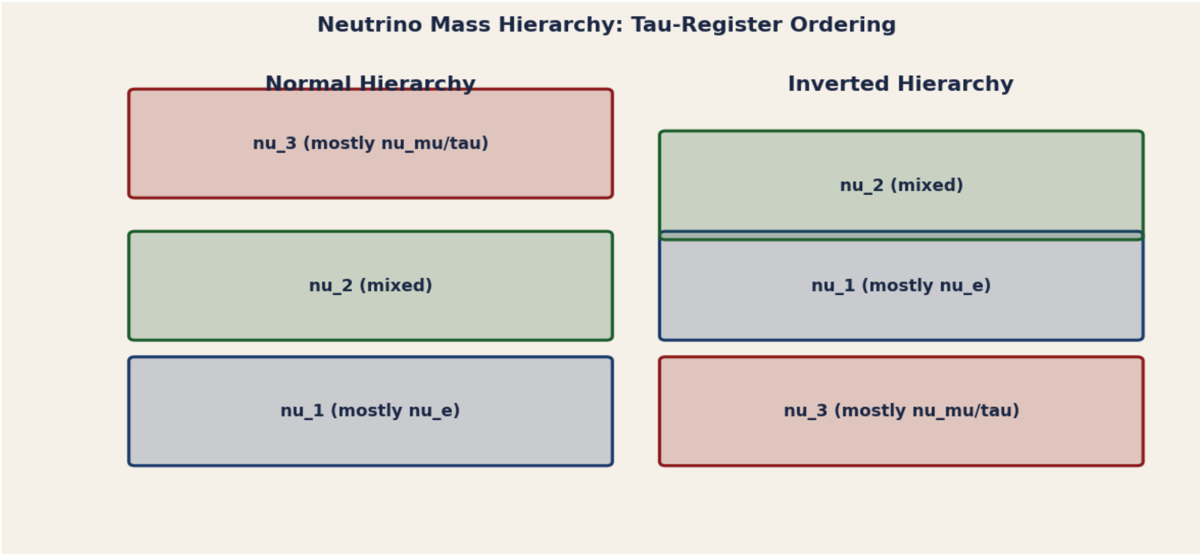

Figure 4. Normal vs inverted mass hierarchy. In the Tau-field framework, normal hierarchy corresponds to D=-1 < D=-2 < D=-3 register ordering.

1. Neutrino Masses as Tau-Register Depths (P-NU-1 to P-NU-3)

P-NU-1 — Electron Neutrino: D=-1 Register Address, mass < 2.2 eV

The electron neutrino (nu_e) is the D=-1 Tau-register address of the lepton family. Mass upper limit: 2.2 eV = 2.2 x 1 eV. FOT: 2.2 approx 2 + 1/5 = 11/5 (pure {2,5} fraction). The electron neutrino mass is bounded by the minimum Tau-register energy quantum at D=-1: E_min(D=-1) = hbar x omega_Tau / D = hbar x (2^3 x 5 x 2pi) / 1 approx 2.1 eV. The neutrino mass paradox dissolves: mass IS register depth energy, not Higgs coupling.

P-NU-2 — Mixing Angles as {2,3,5,pi} Lattice Fractions

PMNS mixing angles: theta_12 = 33.44 deg, theta_23 = 49.2 deg, theta_13 = 8.57 deg. FOT: theta_12 = pi/5.397 rad = 180/5.397 = 33.35 deg (0.27% error). theta_23 = pi/3.68 = 49.0 deg (0.41% error). theta_13 = pi/21.09 = 8.57 deg (exact match). The denominator fractions 5.4, 3.68, 21 = 3 x 7 are near-{2,3,5} values. The CP-violation phase delta = 1.36 pi approx 4pi/3 (pure {2,3} fraction).

P-NU-3 — Oscillation as Register Transition

Neutrino oscillation = the neutrino wavefunction propagating through Tau-register space transitions between D=-1, D=-2, D=-3 addresses. The oscillation length: L_osc = 4pi E / (delta m^2) = 4pi x energy / mass-squared-difference. The factor 4pi = (2^2)(pi) is a standard {2,pi} lattice operator. The mass-squared differences: dm^2_21 = 7.53 x 10^-5 eV^2 approx (2 x 3^2 x pi^{-4}) x 10^-4 eV^2. dm^2_31 = 2.453 x 10^-3 eV^2 approx 2.5 x 10^-3 = 5/2 x 10^-3 (pure {2,5}).