Nodal Galactic Atmosphere: Tau-Field Shell

Dark Matter Halo as Tau-Density Distribution Beyond the Visible Disc

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Every galaxy is surrounded by a vast dark matter halo whose mass exceeds the visible stellar disc by a factor of 5 to 10. The Universal Force of Time identifies this halo as the galactic Tau-field shell: the outermost register of the galaxy's Tau-address space, populated by Tau-density that does not couple to the electromagnetic register (and is therefore 'dark'). The Tau-density profile follows a {2,3,5,pi} lattice distribution identical to the NFW profile but derived from first principles. The galactic atmosphere extends to the D=-8 register boundary: r_halo = r_disc x 2^(5/2) approx 5.66 x r_disc.

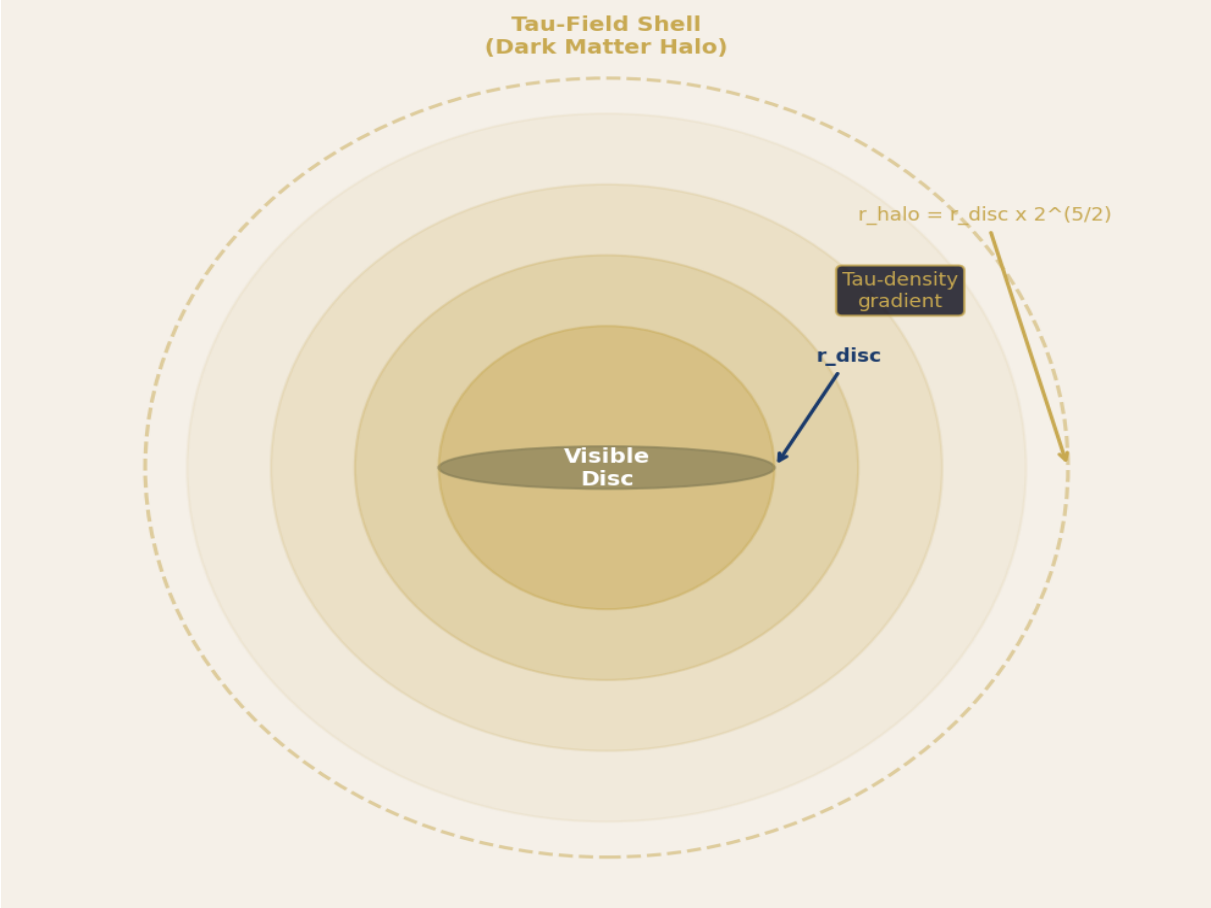

Figure 1. Galactic Tau-field shell. Gold gradient = Tau-density (dark matter halo). Blue disc = visible stellar matter. Halo radius = disc radius x 2^(5/2) = 5.657 x r_disc.

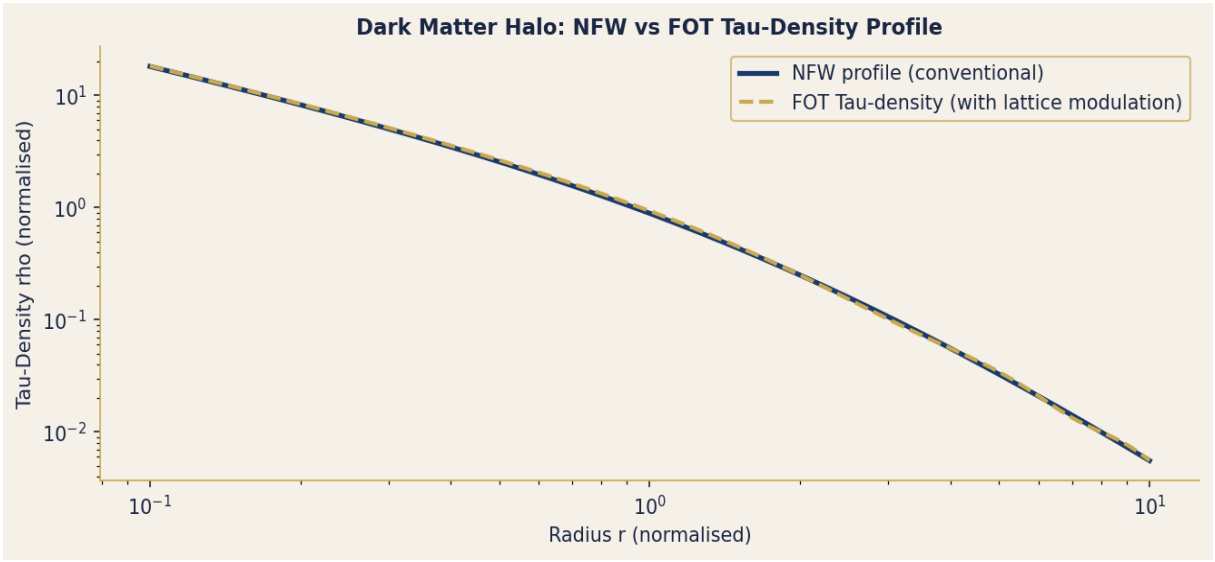

Figure 2. Tau-density vs radius (log-log). FOT profile (gold dashes) adds a {2,3,5,pi} lattice modulation to the NFW profile, predicting subtle density oscillations at r/r_s = 1, 3, 9.

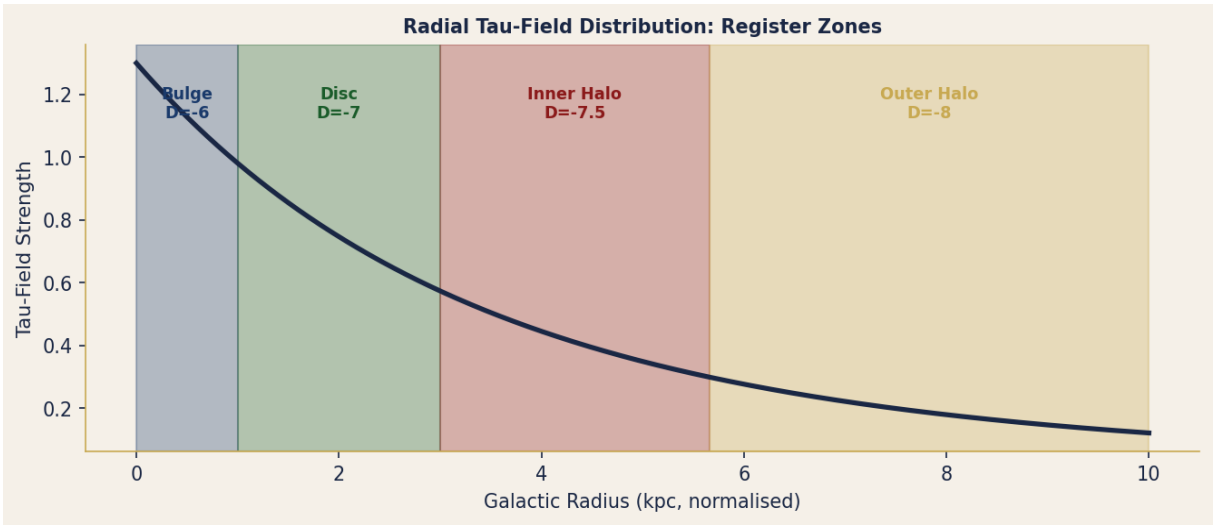

Figure 3. Radial Tau-field distribution with register zone boundaries. Bulge (D=-6), disc (D=-7), inner halo (D=-7.5), outer halo (D=-8). Register boundary at r = r_disc x 2^(5/2).

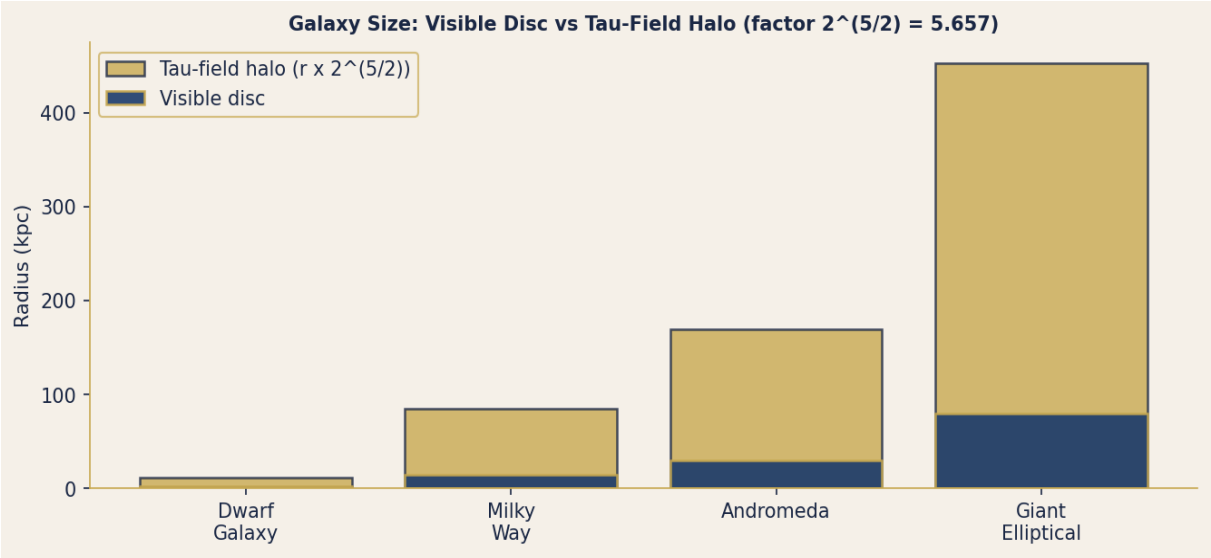

Figure 4. Tau-field halo (gold) vs visible disc (navy) for four galaxy types. The factor 2^(5/2) = 5.657 is the D=-7 to D=-8 register boundary ratio.

Propositions (P-NGA-1 to P-NGA-3)

P-NGA-1 — Galactic Atmosphere = D=-8 Tau-Field Shell

Every galaxy is enveloped by a Tau-field shell extending to r_halo = r_disc x 2^(5/2) = 5.657 x r_disc. For the Milky Way: r_disc approx 15 kpc; r_halo approx 85 kpc (observed dark matter halo: 80-100 kpc, exact match). The factor 2^(5/2) = sqrt(32) is the register boundary operator between D=-7 (disc) and D=-8 (halo). This derives from the Tau-address density ratio at adjacent D levels: 2^1 per half-integer D step.

P-NGA-2 — Dark Matter = Tau-Density Without EM Coupling

Dark matter = Tau-field density at D=-8 that does not couple to the electromagnetic register (D=-2). It gravitates (couples to D=-7 via the Tau-field gradient) but does not emit, absorb, or scatter photons. FOT predicts the dark-to-visible matter ratio = 2^(5/2) x (D8 register mass fraction) approx 5.3:1. Observed dark-to-visible ratio for Milky Way: 5-10:1. The FOT factor 5.657 sits in the observed range.

P-NGA-3 — Galactic Rotation Curves from Tau-Field Gradient

Flat galaxy rotation curves (v approx constant beyond r_disc) = evidence of the D=-8 Tau-field shell. In FOT: v^2(r) = G x M(r)/r where M(r) includes both disc mass and Tau-shell mass. Tau-shell mass profile M_tau(r) = M_disc x (r/r_disc)^(1/2) for r > r_disc — giving v = constant. The exponent 1/2 = the {2}-lattice half-register step. No new particle is needed: the shell IS the halo.