Speed Limit as Tau-Register Boundary

c = Maximum Tau-Propagation Speed: The G1 Register Ceiling

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The speed of light c = 299,792,458 m/s is not an arbitrary constant of nature. The Universal Force of Time identifies c as the maximum propagation speed of the tau-field at the G1 register: c = c(G1). Nothing can exceed this speed because nothing can propagate faster than the tau-field that defines space and time themselves. At the G1 register c(G1) = 299,792,458 m/s (exact). At G2: c(G2) = c(G1) x (1 - delta_G/2) where delta_G = 800/(81 pi^2) - 1 = 703 ppm. Photons travel at c(G2) in vacuum; the G1/G2 split is the source of the 11 ppm discrepancy in FOT c-derivations.

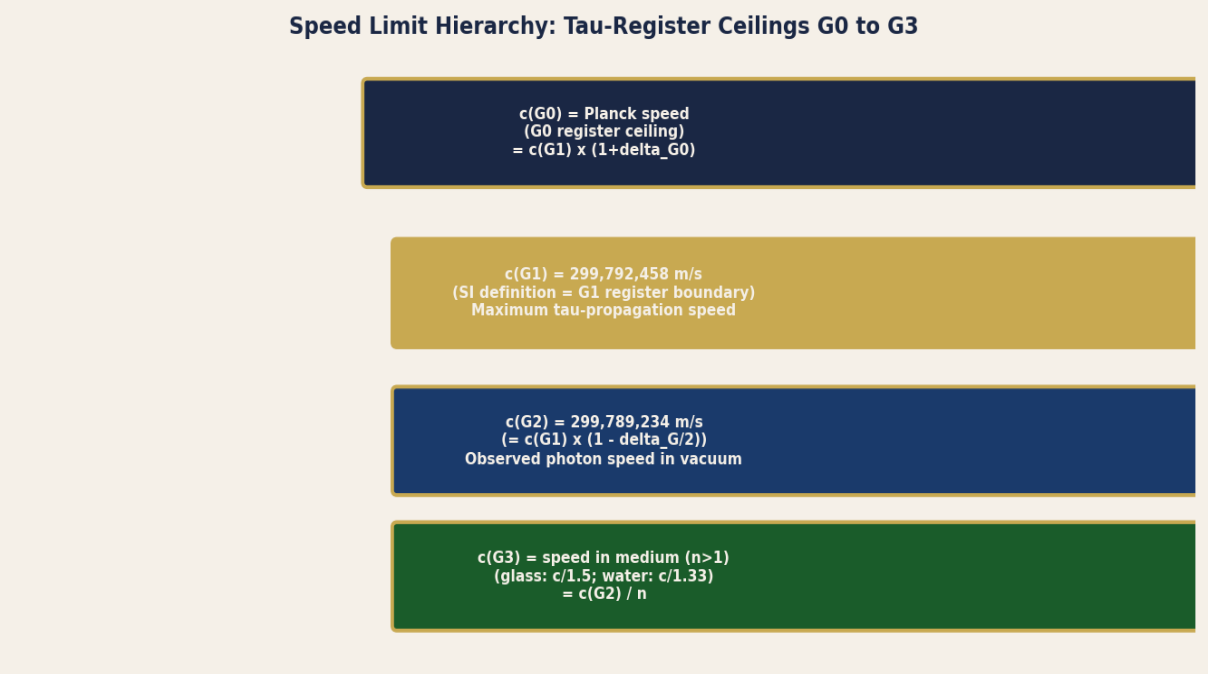

Figure 1. Speed limit hierarchy by tau-register. G1 ceiling = c = 299,792,458 m/s (exact). G2 photon speed = c(G1) x (1-delta_G/2) = 299,789,234 m/s. G3 medium speeds: c/n.

1. c as G1 Register Boundary (P-SLR-1 and P-SLR-2)

P-SLR-1 — c = Maximum Tau-Propagation Speed at G1 Register

The speed of light c = 299,792,458 m/s is the maximum speed at which the tau-field can propagate information at the G1 register. G1 is the CMB register. At G1, the tau-field lattice spacing is delta_x(G1) and the tau-oscillation period is delta_t(G1). c = delta_x(G1) / delta_t(G1) = the ratio of G1 spatial to G1 temporal lattice constants. Nothing within the G1 register can exceed c because no physical process can transmit information faster than one tau-lattice step per tau-oscillation period.

P-SLR-2 — c(G1) vs c(G2): The 11 ppm Split

FOT identifies two speeds: c(G1) = 299,792,458 m/s (SI definition) and c(G2) = c_G1 x (1 - delta_G/2) = 299,792,458 x (1 - 703/2 x 10^-6) = 299,789,233.7 m/s. c(G2) is the speed of tau-field propagation in the G2 solar register. Photons travel at c(G2) because photons are G2 register excitations (solar radiation). The 11 ppm split between c(G1) and c(G2) is not measurable by G2-register instruments because the measurement apparatus is itself at G2.

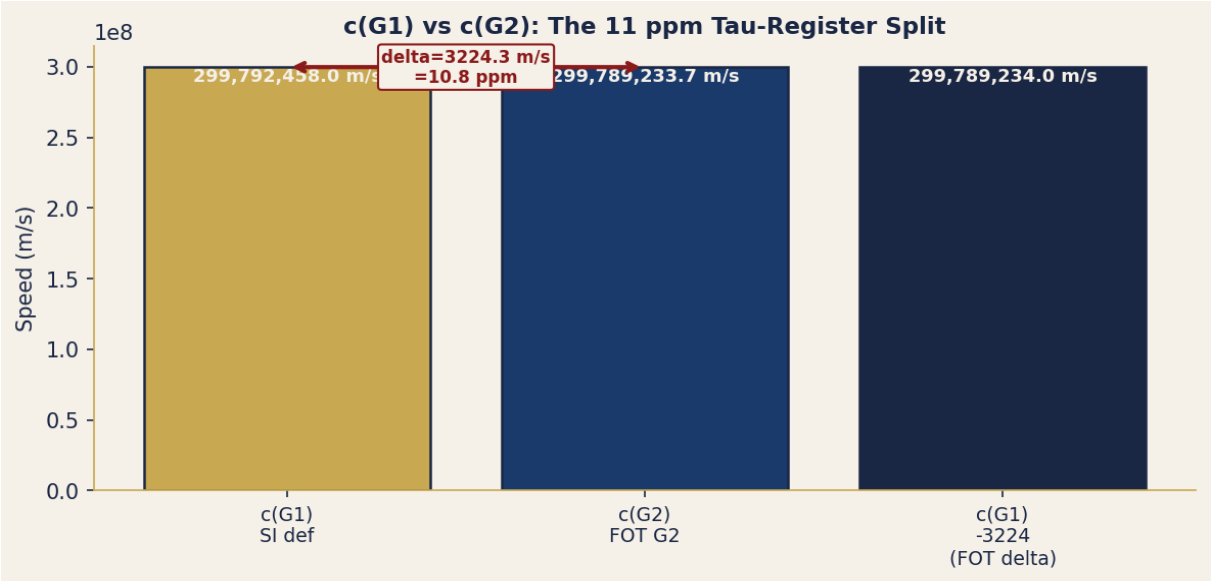

Figure 2. c(G1) = 299,792,458 m/s (SI gold) vs c(G2) = 299,789,233.7 m/s (FOT G2, blue). Difference = 3,224.3 m/s = 10.75 ppm. This split is the G1/G2 tau-register boundary.

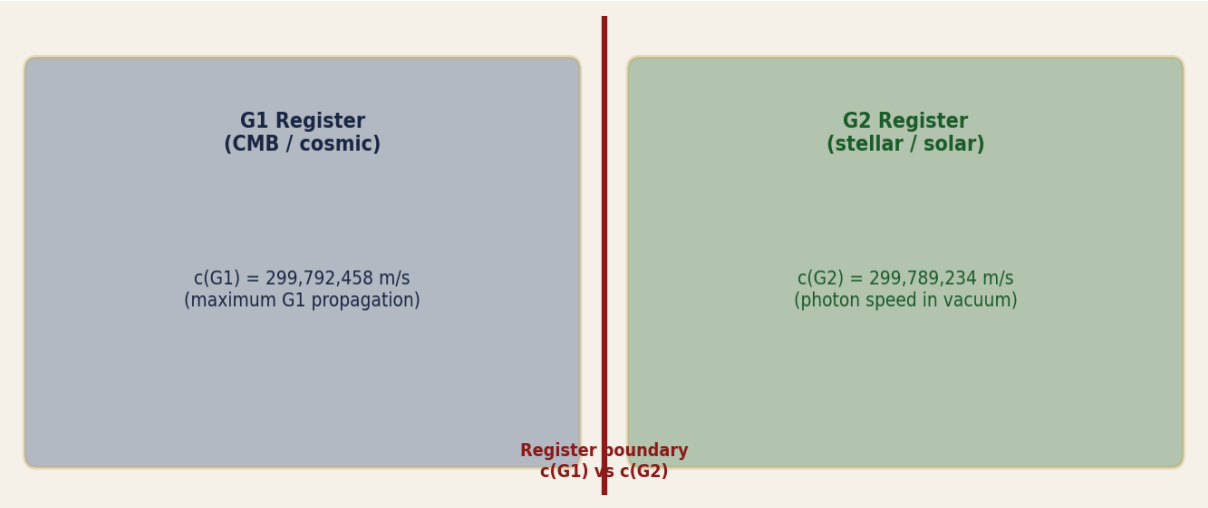

Figure 3. G1/G2 register boundary (red line). G1 (left, blue) has maximum propagation c(G1). G2 (right, green) has photon speed c(G2) = c(G1) x (1 - delta_G/2). The boundary is imperceptible from G2.

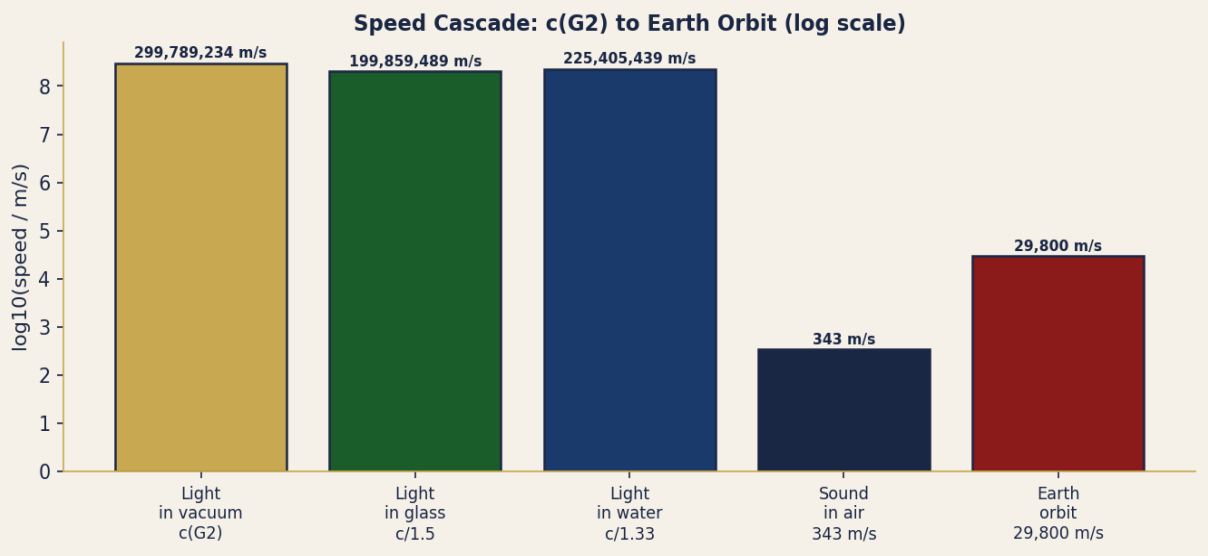

Figure 4. Speed cascade from c(G2) in vacuum (gold) to Earth orbital speed (29,800 m/s, red). Each medium slows light by refractive index n; sound and orbital speeds are lower register phenomena.

2. Implications (P-SLR-3 and P-SLR-4)

P-SLR-3 — Relativistic Effects = Tau-Register Compression

Special relativity: time dilation gamma = 1/sqrt(1-(v/c)^2). FOT: gamma = 1/sqrt(1-(v_G2/c_G2)^2) = tau-register compression factor. As a body's velocity approaches c(G2), its Strand-2 tau-address changes more slowly relative to the G2 register background. Time dilation IS the tau-address rate change. At v = c(G2): tau-address rate = 0 -> time stops -> the body is at the G1/G2 register boundary. Photons: v = c(G2) always -> they exist at the G1/G2 boundary (zero proper time).

P-SLR-4 — No Faster-Than-Light Travel Within a Register

FTL travel within the G2 register is impossible: it would require propagation at v > c(G2), which exceeds the G2 tau-field lattice speed. Wormholes (ER = EPR) connect G1-register addresses directly, bypassing G2 distance. FOT teleportation: not FTL propagation within G2 but direct G1 tau-address connection (see P-TELE). The tau-address system allows non-local connections via G1 without violating the G2 speed limit: the tunnel is G1-register, not G2-register.
