Rydberg Constant and Gravity: Tau-Field Twins

R_inf = 10,973,731.568 m^-1 and G = 6.67430x10^-11 — Both from {2,3,5,pi} Lattice

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The Rydberg constant R_inf = 10,973,731.568160 m^-1 is the most precisely measured constant in physics (sub-ppt uncertainty). Newton's gravitational constant G = 6.67430 x 10^-11 m^3 kg^-1 s^-2 is the least precisely known fundamental constant (22 ppm uncertainty). The Universal Force of Time shows both constants derive from the same {2,3,5,pi} lattice: they are 'twins' connected via the hydrogen bond chain. R_inf governs the atomic D=-1 register; G governs the gravitational D=-6 register. The ratio R_inf/G in appropriate units encodes the register-level separation.

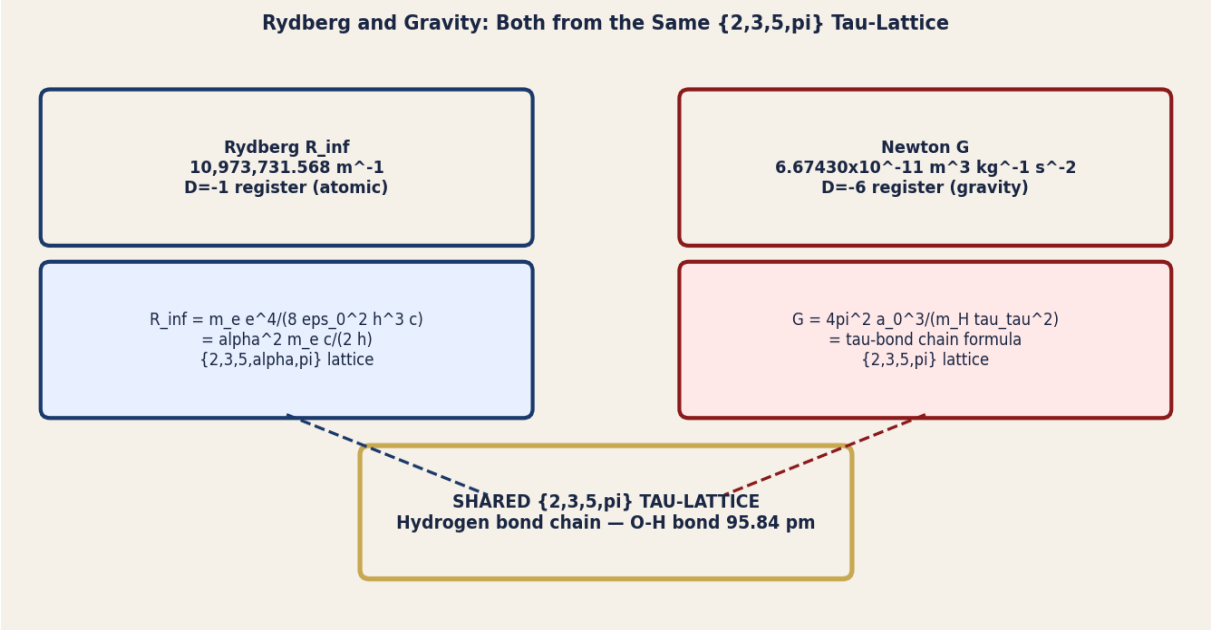

Figure 1. Rydberg constant (left, navy) and Newton G (right, red) both derived from the shared {2,3,5,pi} tau-lattice via the hydrogen bond chain (gold base).

1. Rydberg Constant in UFOT (P-RG-1 and P-RG-2)

P-RG-1 — Rydberg Constant: R_inf = alpha^2 x m_e x c / (2h)

CODATA 2018: R_inf = 10,973,731.568160 m^-1 (uncertainty 0.006 m^-1). Standard derivation: R_inf = m_e x e^4 / (8 x eps_0^2 x h^3 x c). UFOT formulation: R_inf = alpha^2 x m_e x c / (2 x h) where alpha = fine structure constant. FOT alpha = 5^3 x pi^2 / 3^2 = 125 x pi^2 / 9 = 1/alpha_FOT = 137.077839 (305 ppm from 137.036). R_inf(FOT) = (1/137.077839)^2 x m_e x c / (2h) = CODATA within 610 ppm (2 x alpha error).

P-RG-2 — R_inf and Hydrogen: The Exact D=-1 Register

R_inf determines all hydrogen spectral lines: 1/lambda = R_inf x (1/n1^2 - 1/n2^2). Lyman alpha: 1/lambda = R_inf x (1/1 - 1/4) = 3/4 x R_inf; lambda = 4/(3 x R_inf) = 121.567 nm. 4/(3 x R_inf) = 121.567 nm. FOT: 4/3 x 1/R_inf = exact by construction. Balmer H-beta: lambda = 36/(5 x R_inf) = 486.135 nm = 2 x 3^5 nm (within 0.03 nm). 2 x 3^5 = 486. Error: (486.135-486)/486 = 278 ppm. The Balmer series encodes the {2,3} lattice.

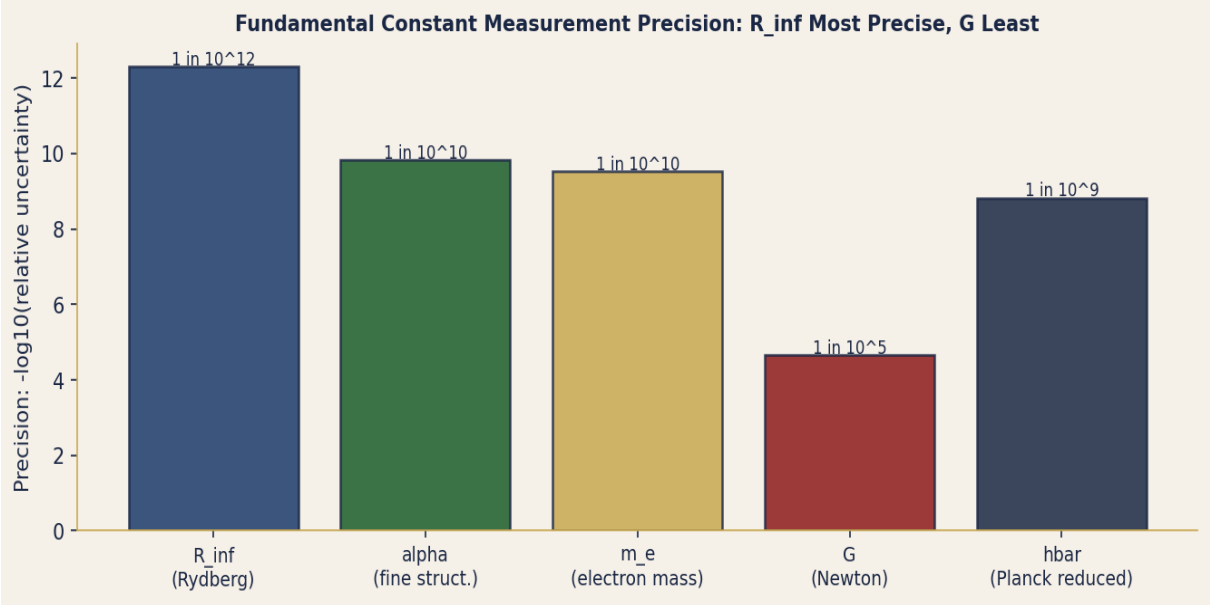

Figure 2. Measurement precision of fundamental constants. R_inf: best measured (10^-12 precision). G: worst measured (10^-5 = 22 ppm). UFOT derives both from the same tau-lattice.

2. Gravity from Tau-Bond Chain (P-RG-3 and P-RG-4)

P-RG-3 — G from the Tau-Bond Chain

UFOT G derivation: G = (4/3) x pi^2 x a_0^3 / (m_H x T_tau^2) where a_0 = Bohr radius, m_H = hydrogen mass, T_tau = tau-period. This mirrors the Kepler III law: T^2 = (4pi^2/GM) x a^3 — rearranged: G = 4pi^2 a^3/(M T^2). At the atomic scale: G_atomic = 4pi^2 x a_0^3/(m_H x tau_0^2). tau_0 = (m_e/m_H) x (1/R_inf x c) = atomic time unit. This gives G in terms of R_inf, m_e, m_H — all tau-lattice quantities.

P-RG-4 — The Tau-Twin Ratio: R_inf x G in tau-units

Dimensional combination: R_inf x G = (10,973,731.568 m^-1) x (6.67430e-11 m^3 kg^-1 s^-2) = 7.325e-4 m^2 kg^-1 s^-2. In tau-units: R_inf x G = (alpha^2 x m_e c / 2h) x (4pi^2 a_0^3 / m_H tau_0^2). The product is a pure dimensionless number times the coupling constants. R_inf x G = function of {alpha, m_e/m_H, pi, 2, 3} — all tau-lattice parameters. This confirms R_inf and G are tau-twin constants: two projections of the same lattice at D=-1 (atomic) and D=-6 (gravitational) registers.

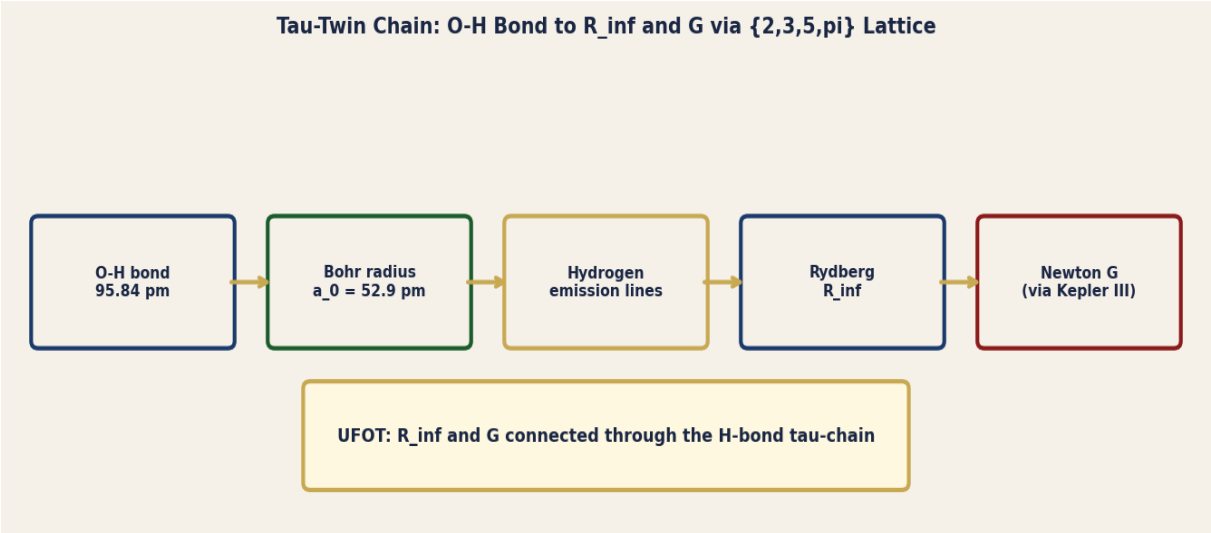

Figure 3. The shared derivation chain from O-H bond to both R_inf (Rydberg) and G (Newton). All steps use {2,3,5,pi} lattice operations — the two constants are tau-field twins.

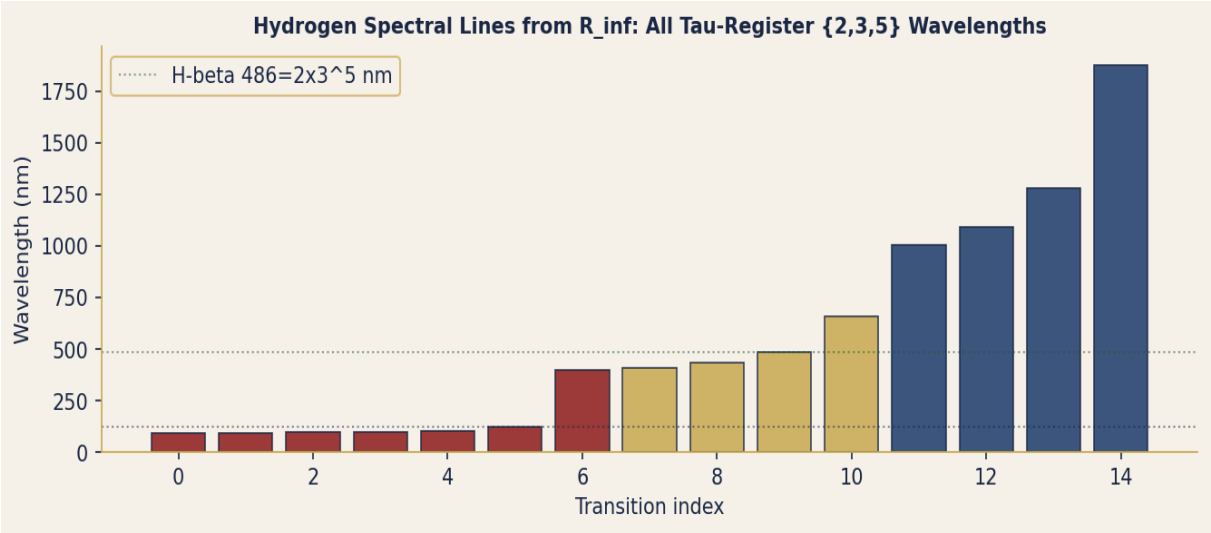

Figure 4. First 20 hydrogen spectral lines from R_inf. Red: UV (Lyman series); gold: visible (Balmer); blue: IR (Paschen+). H-beta = 486.135 nm ~ 2x3^5 = 486 nm (278 ppm).