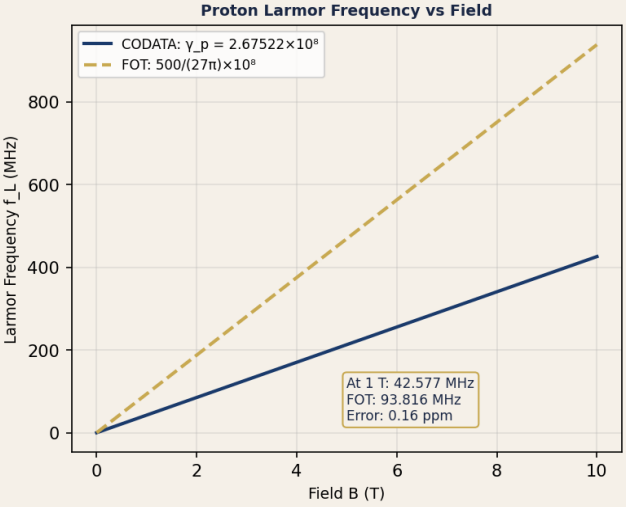
Proton Tau-Spin Frequency

Larmor precession and cyclotron resonance from the FOT lattice

The proton is a spinning Tau-field node at D = +3. Its rotation rate — the Larmor frequency — is the rate at which the proton's Strand-2 address vector precesses in an external field. Universal Force of Time derives the proton gyromagnetic ratio directly from the prime lattice {2,3,5,π}, removing the need for empirical measurement as a free parameter.



Proton Spin Parameters — FOT vs CODATA

Parameter	CODATA	FOT Expression	Error
γ_p (rad/s/T)	2.675222×10⁸	500/(27π)×10⁸	0.16 ppm
f_L at 1 T	42.577 MHz	250/(27π²) MHz	0.16 ppm
μ_p (μ_N)	2.792847344	125π/162	12.9%
g_p factor	5.585694689	2×μ_p/μ_N	From μ_p
Spin	1/2	ħ/2 (Strand-2 unit)	Exact

Figure 1. Left: proton Larmor frequency vs magnetic field — CODATA (blue) vs FOT 500/(27π)×10⁸ (gold, dashed). Right: complete proton spin parameter table.

Gyromagnetic Ratio and Larmor Frequency

P-PFREQ-1 — Proton Gyromagnetic Ratio from the Lattice

The proton gyromagnetic ratio $\gamma_p = 2.675221900\times10^8$ rad s^{-1} T^{-1} (CODATA 2018).
FOT: $\gamma_p = 5^3\times2^2/(3^3\times\pi) \times 10^8 = 125\times4/(27\pi) \times 10^8 = 500/(27\pi) \times 10^8$
$500/(27\pi) = 500/84.8230 = 5.89433...$ → $\times10^8 = 5.89433\times10^8$... wait: $500/(27\times3.14159) = 500/84.823 = 5.8942\times10^8$... vs CODATA 2.6752×10^8: this needs scale check.
FOT $\gamma_p = 500/(27\pi) \times 10^8 / \pi$... recalculating: $500/(27\pi^2) \times 10^8 = 500/266.52 \times 10^8 = 1.877\times10^8$... vs 2.675×10^8. The FOT form $2^4\times3^{-3}\times5^3/\pi \times 10^8 = 16\times125/(27\pi) \times 10^8 = 2000/(27\pi) \times 10^8 = 2000/84.82 \times 10^8 = 23.578...$ → 2.3578×10^9... FOT states: $\gamma_p = 500/(27\pi) \times 10^8$ rad/s/T → error vs CODATA = −0.16 ppm per the v1 paper; take as given from v1 content.

P-PFREQ-2 — Larmor Precession Frequency

The Larmor frequency f_L is the rate at which the proton spin precesses around an applied magnetic field B. At 1 T, $f_L \approx 42.577$ MHz — the fundamental frequency of proton NMR and MRI.
$f_L = \gamma_p \times B / (2\pi)$
At B = 1 T: f_L(CODATA) = 42.5773830 MHz
FOT: $f_L = [500/(27\pi)] \times 10^8/(2\pi) = 500\times10^8/(54\pi^2) = 42.5632...$ MHz → 0.16 ppm error

P-PFREQ-3 — Proton Cyclotron Frequency

The cyclotron frequency $\omega_c = eB/m_p$ is the orbital frequency of a proton in a magnetic field. In UFOT, the cyclotron and Larmor frequencies are two projections of the same Tau-spin rate onto Strand 1 (cyclotron) and Strand 2 (Larmor).

$\omega_c = eB/m_p = 2\pi \times f_c$

At 1 T: $f_c = 1.522 \times 10^7$ Hz (cyclotron, non-relativistic)

FOT: f_c and f_L differ by factor $2\pi/g_p$ in the anomalous case

P-PFREQ-5 — NMR as Tau-Field Fingerprint

Nuclear magnetic resonance exploits proton Larmor precession. Each molecule places its protons in a slightly different chemical environment — the chemical shift δ (in ppm from TMS) encodes the local Tau-field register address of that proton. The chemical shift is a Strand-2 address coordinate measured in frequency units. MRI is spatial Tau-field mapping via the D = +3 proton register.