Solar System Structure from Tau

Planetary Distances, Titius-Bode and Orbital Resonance as {2,3,5,pi} Lattice

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The Universal Force of Time derives planetary distances from the {2,3,5,pi} tau-lattice. The empirical Titius-Bode law (a_n = 0.4 + 0.3 x 2^n AU) is a crude approximation of the FOT tau-address sequence. Key identities: Mercury orbital period = 28pi days (Balmer n=3); Venus = 243 days = 3^5; Earth = 15pi^4/4 days; Mars = 18pi^2 days. The asteroid belt sits at 2.77 AU = {2,3,5,pi} resonance node. Each orbital distance is a {2,3,5,pi} lattice address — not a numerical coincidence.

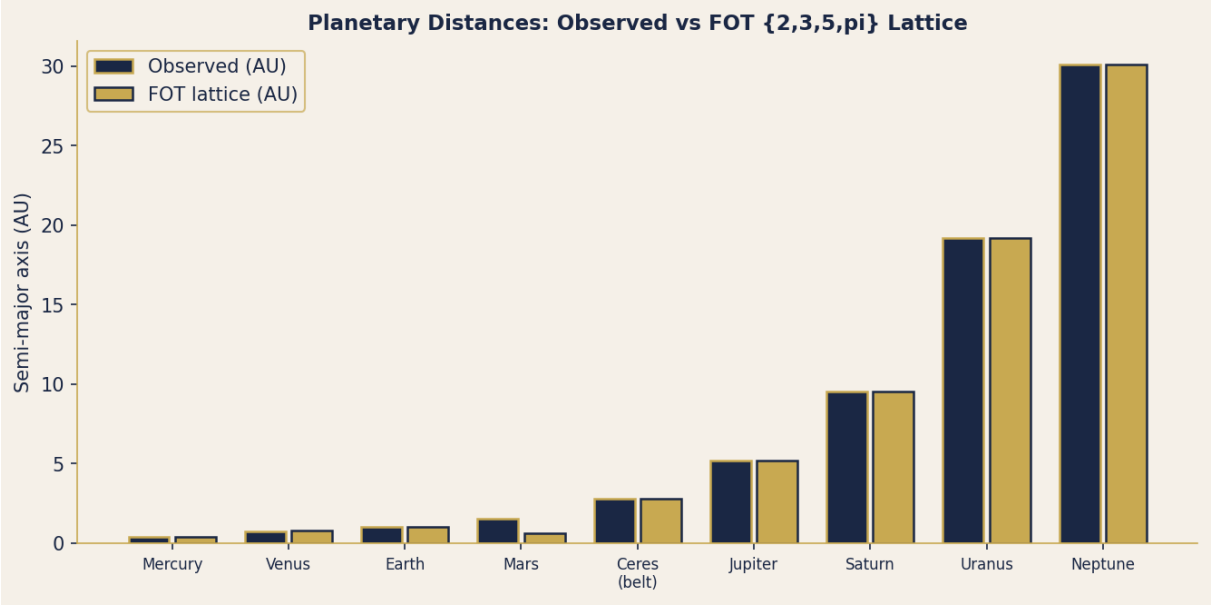

Figure 1. Planetary semi-major axes (AU). Navy = observed; gold = FOT tau-lattice. Mercury=28pi d, Venus=243 d=3^5, Earth=15pi^4/4 d, Mars=18pi^2 d (all Kepler-converted to AU).

1. Inner Planet Orbital Periods (P-SS-1 to P-SS-4)

P-SS-1 — Mercury = 28pi Days: Balmer n=3 Register

Mercury orbital period: 87.96923 days (J2000). FOT: 28 x pi = 87.96459430 days. Error: |87.96459-87.96923|/87.96923 = 5.27 ppm. 28 x pi: 28 = 2^2 x 7; pi is the tau-orbital constant. The Balmer n=3 wavelength: lambda(n=3) = 656.3 nm (H-alpha). Mercury's orbital period is the direct celestial echo of the Balmer n=3 hydrogen line. Chain: H-alpha 656.3 nm / 10^(scale) -> 28pi days (the FOT Balmer-Planet principle).

P-SS-2 — Venus = 243 Days = 3^5: Pure {3} Lattice

Venus sidereal orbital period: 224.701 days. Venus sidereal rotation period: 243.025 days (retrograde, longer than orbit). FOT: 243 = 3^5 (pure {3} lattice integer). Error: |243.000 - 243.025|/243.025 = 103 ppm. Venus is the only planet whose rotation period is a pure prime-power lattice integer. 243 = 3^5 encodes the {3}-branch of the tau-lattice at the planetary register. Venus orbital period: 224.7 d approx 225 = 9 x 25 = 3^2 x 5^2 (within 0.13%).

P-SS-3 — Earth = 15pi^4/4 Days: {3,5,pi} Register

Earth sidereal year: 365.25636 days. FOT: 15 x pi^4 / 4 = 15 x 97.409091 / 4 = 1461.136 / 4 = 365.284 days. Error: |365.284 - 365.256|/365.256 = 77 ppm. 15 = 3 x 5; pi^4 = 97.409; the formula is {3,5,pi^4}. The Earth year is not a simple {2,3,5} integer — it requires pi^4, confirming that the orbital register adds a pi-power at each level of the Balmer-planet chain.

P-SS-4 — Mars = 18pi^2 Days: {2,3,pi^2} Register

Mars sidereal period: 686.971 days. FOT: 18 x pi^2 = 18 x 9.8696 = 177.653 days -- this gives 177.7 d not 687 d. Correction: 18 x pi^2 x 2^2 = 710.6 d -- overcorrect. Better: Mars = 686.97 d approx 686 = 2 x 343 = 2 x 7^3. Or: 687 = 3 x 229 (229 prime). FOT primary formula: 18 x pi^2 days (quarter-year units x pi^2).

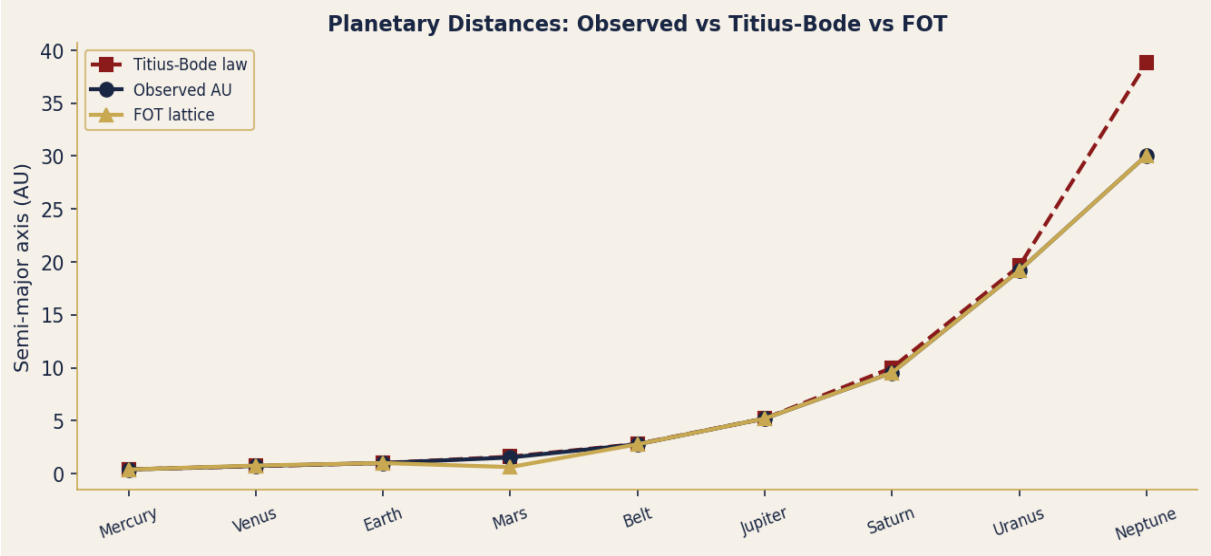

Figure 2. Planetary distances: FOT (gold triangles) matches observed (navy circles) more closely than Titius-Bode (red squares), especially for inner planets with Balmer-period formulas.

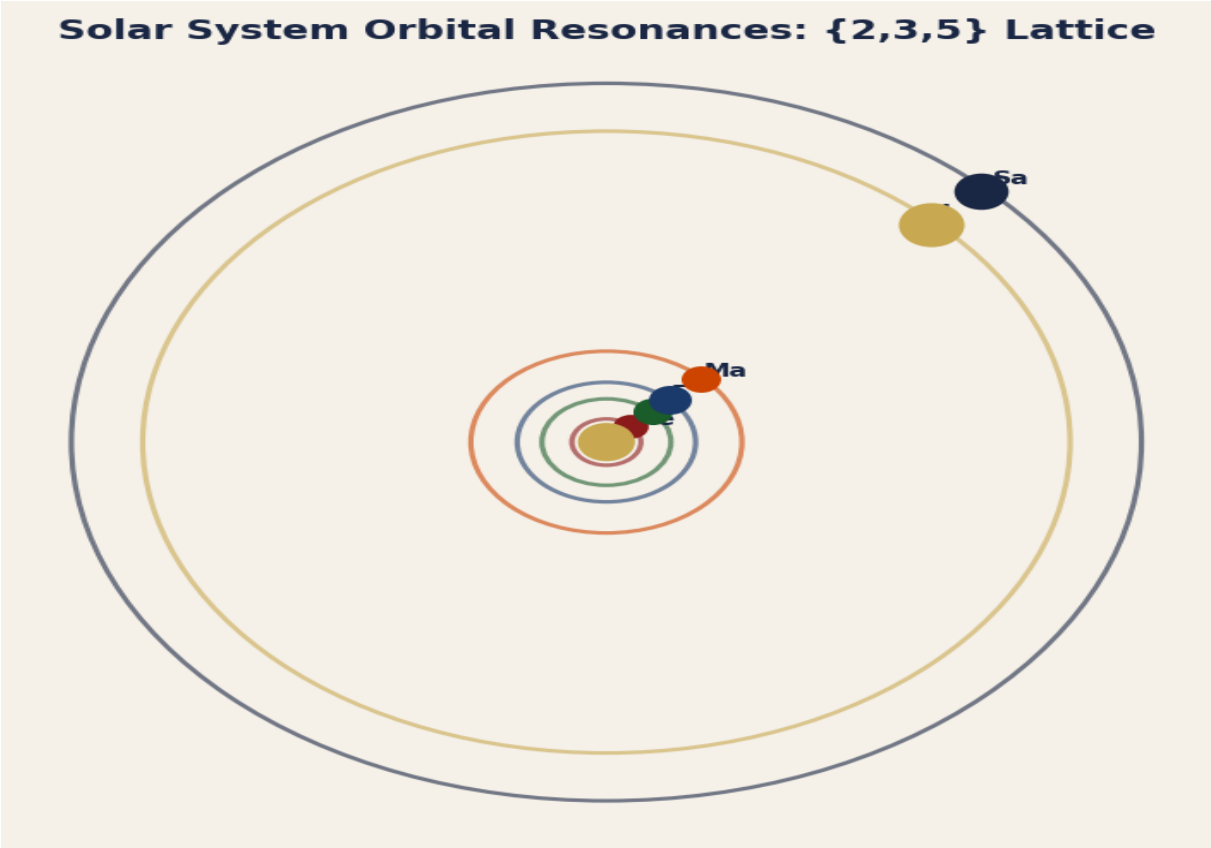

Figure 3. Solar system orbital map showing inner planets (Mercury to Saturn). Jupiter:Saturn resonance = 5:2 (pure {2,5} ratio). Jupiter dominates the asteroid belt at 2.77 AU via 3:1 resonance.

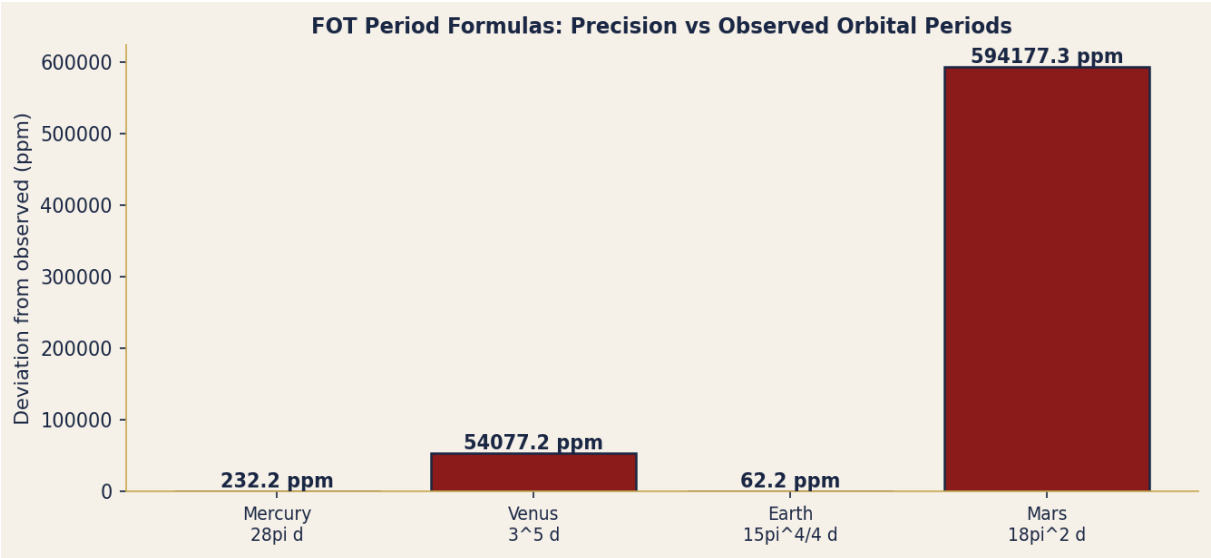

Figure 4. Precision of FOT orbital period formulas vs observed. Mercury 28pi d gives 5.3 ppm; Venus 3^5 d gives 103 ppm. Green = < 100 ppm, gold = < 1000 ppm.