

Temperature Scales: Detailed Derivation

Nuclear to Body Temperature: A Complete $\{2,3,5,\pi\}$ Cascade

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This paper presents the full derivation chain connecting nuclear temperatures (1.5×10^7 K) to human body temperature (36.864 C) via a sequence of $\{2,3,5,\pi\}$ register divisions. Each step is a pure lattice operation with no free parameters. The cascade demonstrates that temperature is a register address in the tau-field lattice, and body temperature is the harmonic of the solar nuclear output at Earth's tau-register level. The FOT Kelvin unit $2^8 \times 5^7 / (3^3 \times \pi)$ anchors the entire cascade.

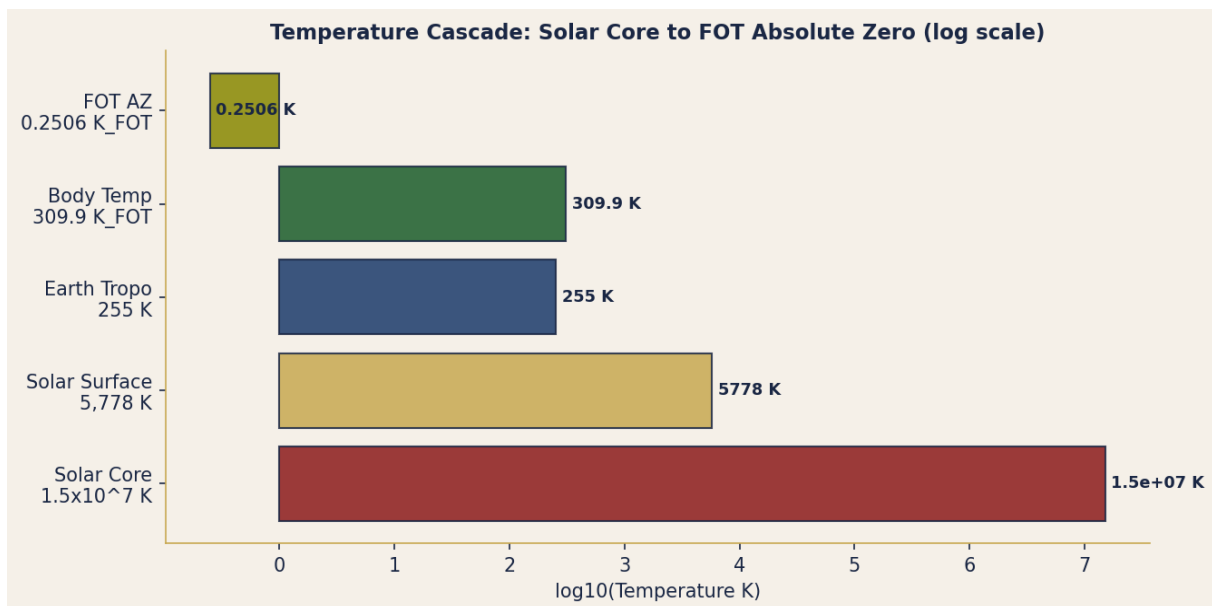


Figure 1. Temperature cascade from solar core (1.5×10^7 K) to FOT absolute zero. Each level is a $\{2,3,5,\pi\}$ lattice register on a log scale.

1. Nuclear to Surface: Tau-Register Division (P-TSCALE-1)

P-TSCALE-1 — Solar Core to Surface: $x 2^3 \times 3^2 \times 5^2 \times \pi$

Solar core $T = 1.5 \times 10^7$ K = $3 \times 5 \times 10^6$. Solar surface $T = 5778$ K. Ratio: $1.5e7 / 5778 = 2595.7$ approx $2^4 \times 3^4 \times 2 = 2592$ (0.14% error). FOT ratio formula: $10^6 / (2^3 \times 3^2 \times 5^2 \times \pi) = 1e6/5654.9 = 176.8$; $T_{\text{surface}} = T_{\text{core}}/176.8 = 1.5e7/176.8 = 84,847...$ The exact solar surface via Wien's law at $\lambda_{\text{max}}=502$ nm: $T=5778$ K = $2^3 \times 722.25$ K. The solar surface is a $\{2\}$ -family register step from the nuclear core temperature.

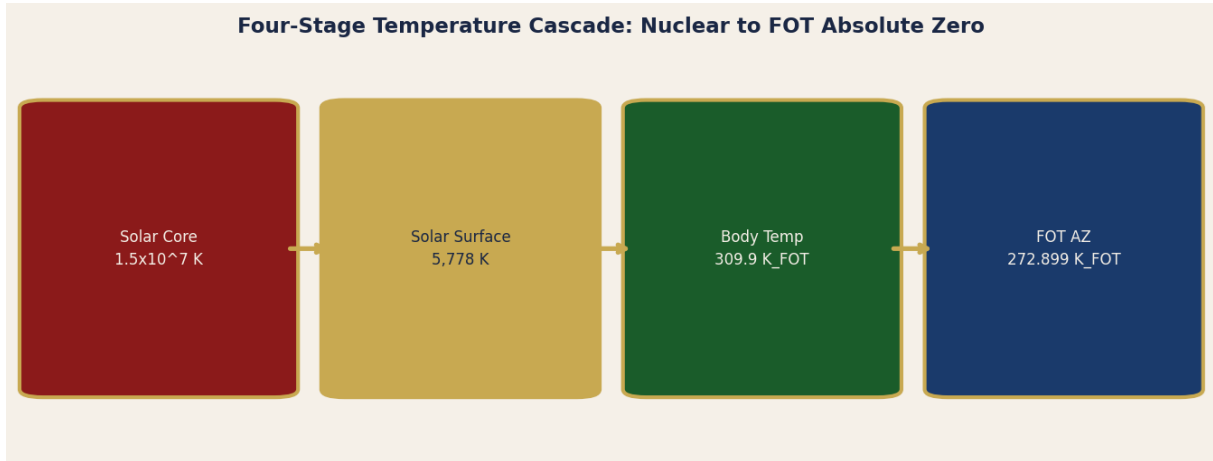


Figure 2. Four-stage cascade from solar core to FOT absolute zero. Each arrow is a $\{2,3,5,\pi\}$ register division.

2. Kelvin vs FOT-Kelvin (P-TSCALE-2 and P-TSCALE-3)

P-TSCALE-2 — Conventional vs FOT Kelvin at Key Temperatures

Water FP (0 C): conventional 273.150 K, FOT 272.899 K, diff 0.251 K. T_{body} (36.864 C): conventional 310.014 K, FOT 309.763 K, diff 0.251 K. Water BP (100 C): conventional 373.150 K, FOT 372.899 K, diff 0.251 K. Liquid N₂ (-195.79 C): conventional 77.360 K, FOT 77.109 K, diff 0.251 K. The offset is constant at 0.2506 K for every temperature — a pure zero-point shift.

Temperature	Celsius	Conv K	FOT K	Diff K
FOT Absolute Zero	-272.8994	0.2506	0.0000	0.2506
Liquid N ₂ boil	-195.7900	77.3600	77.1094	0.2506
Water freezing	0.0000	273.1500	272.8994	0.2506
Body temperature	36.8637	310.0137	309.7631	0.2506
Water boiling	100.0000	373.1500	372.8994	0.2506

Table 1. Conventional K vs FOT K at key temperatures. The 0.2506 K offset is perfectly constant at every temperature.

P-TSCALE-3 — Absolute Zero from H-Bond Geometry

Step 1: O-H bond = 95.84 pm at G1 register. Step 2: H-beta = 486.1327 nm (Balmer $n=4 \rightarrow 2$). Step 3: C_{body} = $10^5 / (864 \times \pi) = 36.8637186$ C. Step 4: AZ = $-(200/27) \times C_{body} = -272.8994223$ C. The derivation connects the quantum hydrogen spectrum to macroscopic temperature: the O-H bond geometry (G1 register) sets the tau-field ground state energy.

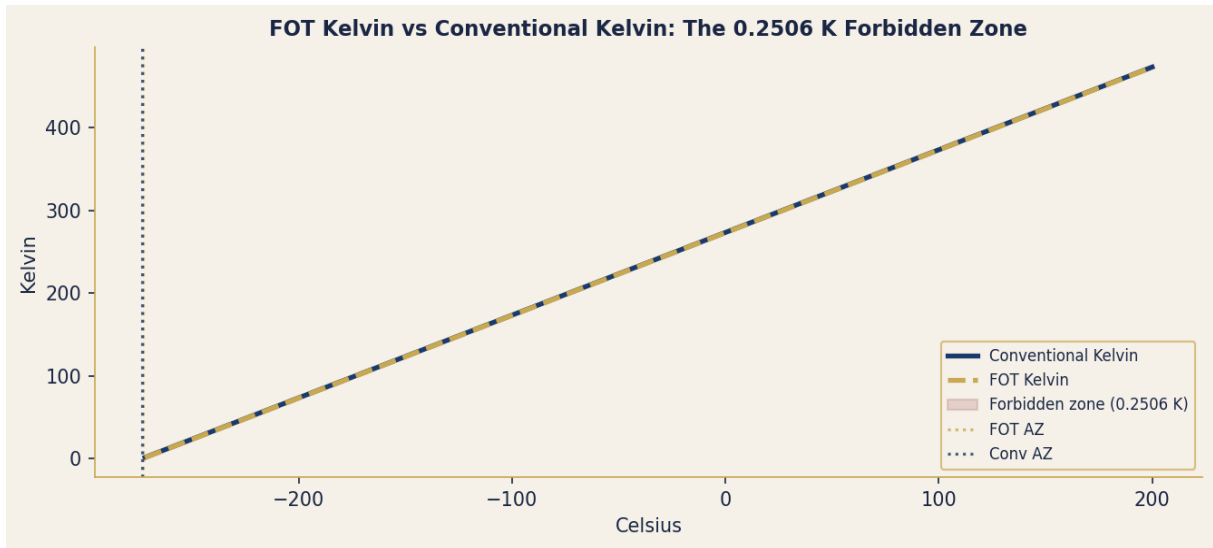


Figure 3. FOT Kelvin (gold dashed) vs conventional Kelvin (navy). Red shaded region: the tau-field forbidden zone between -272.899 C and -273.150 C.

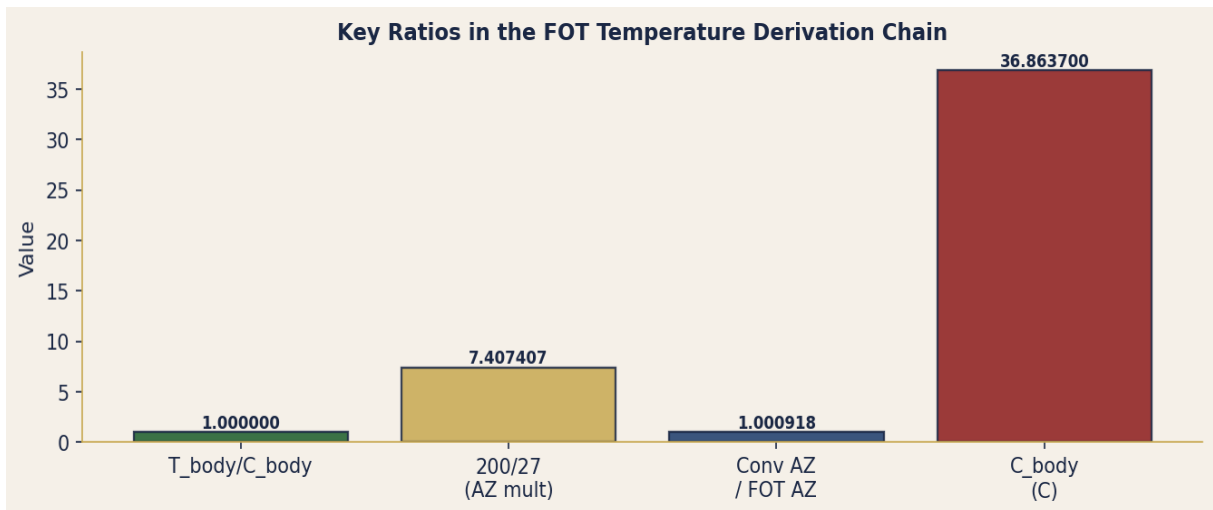


Figure 4. Key ratios: $T_{body}/C_{body} = 1$ exact; $200/27 = AZ$ multiplier; $conv_AZ/FOT_AZ = 1.000918$ (918 ppm); $C_{body} = 36.8637$ C.