The CMB as the T-Floor of the Cosmological Helix

Absolute Zero · The Third Law · The Universe Without a Beginning · P-CMB-1 to P-CMB-5 and P-THERM-3

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Abstract

The cosmic microwave background (CMB) at 2.72548 K is conventionally interpreted as a Big Bang thermal relic redshifted over 13.8 billion years. The Force of Time provides a structurally different explanation requiring neither a creation event nor cosmic expansion. The CMB is the T-floor of the cosmological helix: the minimum non-zero T-density at regions most distant from any stellar T-source node. This follows directly from the FOT Third Law (P-THERM-3): no node within a propagating T-field can reach zero thermal T, because the T-field has no boundary and was never created. The CMB's perfect blackbody spectrum is the expected signature of a T-field in thermal equilibrium at its structural floor. Its extraordinary uniformity ($\Delta T/T \approx 10^{-5}$) is not a puzzle requiring inflation — the cosmological helix is the same structure in all directions by construction. CMB anisotropies are the T-source distribution imprint of the nearest galactic structures, not inflation-era quantum fluctuations. The universe has no beginning in FOT: $d\Sigma T = 0$ is the eternal conservation law.

1. Introduction

The cosmic microwave background radiation is one of the most precisely characterised physical observations in science. Its temperature (2.72548 ± 0.00057 K, Fixsen 2009), its blackbody spectrum (the most perfect blackbody ever measured), and its extraordinary uniformity ($\Delta T/T \approx 10^{-5}$) are firmly established facts.

The conventional interpretation holds that the CMB is thermal radiation from the early universe at the moment of recombination ($z \approx 1100$), when the universe cooled enough for electrons and protons to combine into neutral hydrogen, making the universe transparent. The radiation has since been redshifted to microwave wavelengths by cosmic expansion over approximately 13.8 billion years.

The Force of Time offers a structurally different explanation. The CMB exists not as a relic of a past event but as a present structural feature of the eternal cosmological T-helix. This paper develops the FOT account through six propositions (P-CMB-1 to P-CMB-5 and P-THERM-3) and a systematic comparison with the conventional interpretation.

2. The Conventional CMB Interpretation

The standard cosmological model (ΛCDM) accounts for the CMB as follows:

Temperature: $T_{CMB} = 2.72548 \pm 0.00057$ K (Fixsen 2009). This corresponds to the temperature of a blackbody at the last scattering surface, redshifted by the expansion factor $(1+z_{rec}) \approx 1100$ from the recombination epoch temperature of ~3000 K.

Spectrum: The CMB spectrum fits a perfect Planck blackbody to measurement precision (fractional deviations $< 10^{-4}$). This is taken as evidence for thermal equilibrium in the early universe when the photon mean free path was much smaller than the Hubble radius.

Uniformity: $\Delta T/T \approx 10^{-5}$ across the sky (after dipole subtraction). In the standard model, this requires inflation — a period of exponential expansion that brought causally disconnected regions to the same temperature before separation. Without inflation, the horizon problem is: why are regions separated by more than ~1° (the angular size of the causal horizon at recombination) at the same temperature?

Anisotropies: The temperature fluctuations $\Delta T/T \approx 10^{-5}$ are attributed to quantum fluctuations from the inflationary era, frozen in and then amplified by gravity to seed large-scale structure.

3. The FOT Third Law

The FOT Third Law (P-THERM-3) states:

No node within a propagating T-field can reach zero thermal T, because every node exists within a T-field of non-zero density and cannot be disconnected from it.

The conventional Third Law of Thermodynamics states that absolute zero is unreachable by process — no finite sequence of cooling steps can bring a system to T = 0. The FOT Third Law is stronger: absolute zero is unreachable by structure. To reach T = 0, a node would have to be completely removed from the T-propagation field — impossible, because the T-field is the medium of existence. The conventional statement is a special case of the FOT statement.

Every region of space — including the deepest void between galactic superclusters — has a minimum non-zero T-density. This minimum is the T-floor at that node's dimensional address. For the cosmological helix, this floor is uniform in all directions by the helix's own symmetry.

4. The CMB as the Cosmological T-Floor

The most source-distant regions of the universe are the voids between galactic superclusters. These regions contain no stellar T-source nodes. By P-THERM-3, their T-density cannot be zero. The CMB at 2.72548 K is this minimum T-density — the T-floor.

Three observed properties of the CMB follow immediately:

(1) Uniformity: The cosmological helix has the same structure in all directions by construction — it has no preferred direction and no preferred location. The T-floor of a structure with this symmetry is uniform in all directions. The uniformity requires no inflation.

(2) Perfect blackbody spectrum: A T-field at its minimum sustainable density is in ground-state thermal equilibrium — by definition a blackbody at that temperature. The spectrum does not require a hot early universe. It is the equilibrium signature of the T-floor

itself.

(3) Temperature 2.72548 K: This is the structural minimum of the cosmological helix at the present epoch — not a cooling relic. It is the value at which the cosmological T-field reaches its ground state in the void regions.

5. The Universe Without a Beginning

The First FOT Law is $d\Sigma T = 0$ — the total T-field density is conserved. This identity is eternal: it was not established at any moment, and it will not cease. The universe — the two-strand cosmological T-helix — did not begin.

The conventional cosmological puzzles dissolve:

Singularity: No initial singularity is required. $d\Sigma T = 0$ does not have a $t=0$. The helix has no beginning and no end.

Horizon problem: The helix is the same structure everywhere by construction. There is no puzzle about why separated regions have the same temperature — they are part of the same eternal structure.

Flatness problem: The helix has the spatial topology it has — not because initial conditions were fine-tuned, but because the helix geometry is self-consistent.

Hubble expansion: The apparent recession of distant galaxies is the spatial projection of T-sphere propagation from stellar nodes. It is not a velocity; it is a T-field density gradient.

Cosmological redshift: The redshift of distant light is dimensional T-flow rate differential — the T-field frequency shifts as the photon traverses regions of different T-density. It is not recession velocity.

6. CMB Anisotropies as Stellar T-Source Imprint

The CMB temperature anisotropies $\Delta T/T \approx 10^{-5}$ are real structure in the T-floor — not random. In FOT, their origin is the T-source distribution of the nearest galactic structures.

Regions above the floor temperature ($T > 2.72548$ K) are regions of space closer to stellar-node-dense structures (galactic filaments and clusters). The T-density from nearby stellar nodes raises the local T-floor above its void value.

Regions below the floor temperature are void centres — the most distant from any stellar node.

The multipole structure (acoustic peaks) of the CMB power spectrum reflects the T-source geometry of the local universe — the distribution of galactic filaments, voids, and superclusters projected onto the sky. The Sachs-Wolfe effect is the T-density correlation with T-source concentrations.

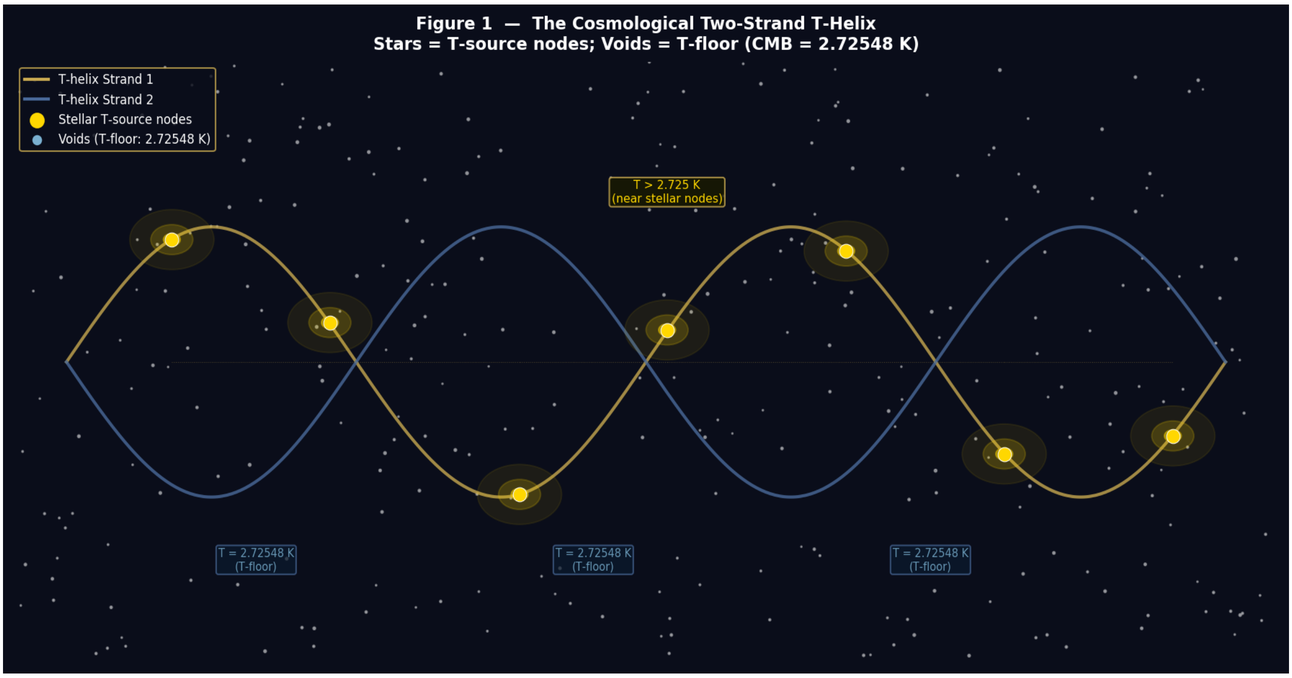

Figure 1. The cosmological two-strand T-helix. Gold stars: stellar T-source nodes (higher T-density, T > 2.725 K). Voids: the T-floor regions at T = 2.72548 K. The helix is the same structure in all directions — the CMB uniformity requires no inflation.

7. Comparison Table

Observation	Conventional (ΛCDM)	FOT (T-floor / Eternal Helix)
T_CMB = 2.72548 K	Relic from Big Bang at z≈1100, cooled by expansion	T-floor of cosmological helix — structural minimum in voids
Perfect blackbody spectrum	Thermal equilibrium in early universe at ~3000 K	T-field at floor = ground-state thermal equilibrium; blackbody by
Uniformity $\Delta T/T \approx 10^{-5}$	Inflation required — solves horizon problem	Helix same everywhere by construction; no horizon problem exis
Anisotropies $\Delta T/T \approx 10^{-5}$	Inflation-era quantum fluctuations, frozen in	T-source distribution imprint of nearest galactic structure
No horizon problem	Inflation as solution (added postulate)	No problem; helix was never causally separated from itself
No singularity	Initial singularity required at t=0	dΣT=0 is eternal; universe was never created; no t=0

Figure 2. Side-by-side comparison of CMB observations with conventional (ΛCDM) and FOT explanations. The FOT explanations require no additional postulates beyond dΣT = 0 and the cosmological T-helix structure.

8. Propositions P-CMB-1 to P-CMB-5 and P-THERM-3

P-CMB-1 | The CMB is the T-Floor of the Cosmological Helix

The cosmic microwave background is the minimum non-zero T-density at regions of the universe most distant from any stellar T-source node. It is the T-floor of the cosmological two-strand helix — the baseline below which no region can fall because the T-field is everywhere present and was never created. T_{CMB} = 2.72548 K is identified as the T-floor temperature at the present epoch. No Big Bang or creation event is required.

P-CMB-2 | Perfect Blackbody Spectrum = T-Thermal Equilibrium at Floor

The CMB's perfect blackbody spectrum to measurement precision is the expected signature of a field in thermal T-equilibrium at its floor value. A T-field at its minimum sustainable density is in ground-state thermal equilibrium — by definition a blackbody at that temperature. The spectrum does not require thermal equilibration in an early hot universe.

P-CMB-3 | CMB Uniformity = Helix Structural Symmetry

The CMB's extraordinary uniformity ($\Delta T/T \approx 10^{-5}$) is not a puzzle requiring inflation to solve. The cosmological helix is the same structure in all directions by construction — it has no preferred direction and no preferred location. The T-floor of a structure with this symmetry is uniform in all directions. No horizon problem exists within FOT because the helix was never causally separated from itself.

P-CMB-4 | CMB Anisotropies = Stellar T-Source Distribution Imprint

The temperature anisotropies $\Delta T/T \approx 10^{-5}$ are the T-source distribution imprint of the nearest galactic structures projected onto the cosmological T-floor. Regions above floor temperature are closer to stellar-node-dense structures. Regions below are voids. The multipole structure reflects the T-source geometry of the local universe, not inflation-era quantum fluctuations.

P-CMB-5 | The Universe Has No Beginning

The FOT cosmological structure — the eternal two-strand T-helix with $d\Sigma T = 0$ — requires no initial singularity. The universe did not begin. The T-conservation identity $d\Sigma T = 0$ is not a law that came into existence; it is the eternal identity of the structure. Stars, planets, and life are local T-fluctuations within the eternal helix. The apparent Hubble expansion is the spatial projection of T-sphere propagation from stellar nodes. Cosmological redshift is dimensional T-flow rate differential, not recession velocity.

P-THERM-3 | FOT Third Law — Absolute Zero is Structurally Unreachable

No node within a propagating T-field can reach zero thermal T, because every node exists within a T-field of non-zero density and cannot be disconnected from it. To reach zero thermal T, a node would have to be completely removed from the T-propagation field — impossible, since the T-field is the medium of existence. The conventional Third Law states absolute zero is unreachable by process; the FOT Third Law states it is unreachable by structure. The conventional statement is a special case.

9. Discussion

The FOT account of the CMB requires fewer postulates than the conventional model. ΛCDM requires inflation (an additional field and potential), a primordial singularity, a specific reheating mechanism, and a detailed account of the recombination epoch. FOT requires only: (1) the eternal two-strand T-helix with $d\Sigma T=0$; (2) P-THERM-3 (structural unreachability of $T=0$). From these, all six CMB properties follow.

A key distinction: the CMB temperature 2.72548 K is, in FOT, a structural parameter of the cosmological helix — not a derived quantity from a cooling calculation. Predicting its exact value from first principles would require knowing the T-source density of the local galactic supercluster. The present paper establishes the framework; the precise derivation of 2.72548 K from {2,3,5,π} is a future proposition.

The CMB anisotropy interpretation reframes the Sachs-Wolfe effect. In ΛCDM, the large-scale anisotropies arise from gravitational redshift of photons climbing out of potential wells at last scattering. In FOT, the same pattern arises from T-source density correlations: stellar-node-dense regions have higher T-floor, stellar-node-sparse regions (voids) have lower T-floor. The pattern is the same; the mechanism is T-geometric, not gravitational.

10. Conclusion

The CMB is the T-floor of the eternal cosmological helix. Its four principal properties — temperature, blackbody spectrum, uniformity, and anisotropies — follow from the FOT structure with fewer postulates than the standard cosmological model. The universe has no beginning in FOT: $d\Sigma T = 0$ is the eternal conservation identity. Inflation, the initial singularity, and the horizon problem do not exist within the T-helix framework. The Third Law of Thermodynamics is a special case of the structural theorem P-THERM-3.
