

Commentary: CMB and Quasar Dipole  
Anomaly – A Dramatic Confirmation of T0  
Predictions!

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## Abstract

Besprechung des Videos "Two Compasses Pointing in Different Directions: The CMB and Quasar Dipole Crisis" [1]. The dipole anomaly between CMB and quasars poses a fundamental problem for standard cosmology. This document analyzes the contradictions presented in the video and shows how T0 theory explains them as a natural consequence of wavelength-dependent redshift in the  $\xi$ -field. For the derivation of the Hubble constant and the resolution of the Hubble tension, see Document 026.

## 0.1 The Problem: Two Dipoles, Two Directions

The video presents the core contradiction (based on the Quiaia catalog with 1.3 million quasars [2]):

- **CMB Dipole:** Points towards Leo (galactic coordinates  $l \approx 264^\circ$ ,  $b \approx +48^\circ$ ), corresponding to  $\sim 370$  km/s

- **Quasar Dipole:** Points in a significantly different direction, with an amplitude of  $\sim 1700$  km/s [3]
- **Angular offset:** The video claims the two dipoles are “almost exactly  $90^\circ$  apart” [4]. The actual measured angles vary between approximately  $30^\circ$ – $90^\circ$  depending on the study and catalog, but all studies confirm a highly significant discrepancy ( $> 5\sigma$ , cf. Sarkar 2025 [5])

The video presents the resulting trilemma for standard cosmology:

1. The quasar data are flawed — hard to justify with 1.3 million objects
2. Both dipoles are artifacts — implausible given independent confirmations
3. The universe is anisotropic — the cosmological principle would be violated

## 0.2 The T0 Solution: Wavelength-Dependent Redshift

### 0.2.1 The CMB Dipole Is Not Motion

In T0 theory (cf. Document 063), the CMB temperature follows from:

$$T_{\text{CMB}} = \frac{16}{9}\xi^2 \times E_\xi \approx 2.725 \text{ K}$$

The CMB dipole is not a Doppler motion of our Local Group but an intrinsic anisotropy of the  $\xi$ -field ( $\xi = \frac{4}{3} \times 10^{-4}$ ). The video reaches the same conclusion at 12:19: “*The cleanest reading is that the CMB dipole is not a velocity at all. It’s something else.*” — This corresponds to the T0 interpretation.

### 0.2.2 Wavelength-Dependent Redshift Explains the Quasar Dipole

In T0 theory, redshift depends on the observation wavelength (for the quantitative derivation see Document 026):

- **Optical quasar spectra** (visible light,  $\sim 500$  nm): Stronger redshift
- **Radio observations** (21 cm): Weaker redshift
- **CMB photons** (microwaves,  $\sim 1$  mm): Different energy loss rate

The quasar dipole can arise from:

1. Structural asymmetry in the  $\xi$ -field along the galactic plane
2. Wavelength selection effects in the Quia catalog [2]
3. Combination of a local  $\xi$ -field gradient and actual motion

### 0.2.3 The Angular Offset: Hint at Field Geometry

The video states at 13:17: *“The two dipoles don’t just disagree. They’re almost exactly 90° apart.”* [4]. While the exact angle varies between studies (see Section 1), the significant angular offset is well established. In the standard model this is inexplicable, since both dipoles should reflect the same kinematic dipole. In T0 theory:

- The quasar dipole reflects the matter distribution (baryonic structures)
- The CMB dipole shows the  $\xi$ -field anisotropy (vacuum field)
- Since both originate from different physical mechanisms, an angular offset is not only possible but expected

The time-mass duality ( $T \cdot m = 1$ ) of T0 theory implies a fundamental decoupling between matter and radiation components. Recent 2025 analyses reinforce this tension with hints of superhorizon fluctuations and residual dipoles [5, 7].

### 0.2.4 Static Universe Solves the “Great Attractor” Problem

The video mentions “Dark Flow” and large-scale structures. In the T0 model (static universe without expansion):

- Structure formation is continuous — no initial moment required
- Large-scale matter flows are real gravitational motions, not “peculiar velocities” relative to an expansion
- The “Great Attractor” is simply a massive structure in static space

## 0.3 Testable Predictions

The video ends with frustration: *“Two compasses, two directions.”* (at 13:22). T0 theory offers concrete tests:

### 0.3.1 Multi-Wavelength Spectroscopy

Hydrogen line test for the same quasars:

- Lyman- $\alpha$  (121.6 nm) vs. H $\alpha$  (656.3 nm)
- T0 prediction:  $z_{\text{Ly}\alpha}/z_{\text{H}\alpha} \neq 1$
- Standard cosmology: = 1 (frequency-independent)

### 0.3.2 Radio vs. Optical Redshift

For the same quasars, the 21 cm HI line and optical emission lines should show different redshifts in T0 theory; standard cosmology expects identity.

### 0.3.3 CMB Temperature–Redshift Relation

$$T(z) = T_0(1+z)(1 + \ln(1+z))$$

instead of the standard relation  $T(z) = T_0(1+z)$ .

## 0.4 Resolution of the Hubble Tension

Though the video does not directly address the Hubble tension, it is closely related. Since different measurement methods use different wavelengths, T0 predicts systematically different apparent Hubble “constants”. The parameter-free T0 prediction  $H_0 \approx 66.2$  km/s/Mpc and the full resolution are found in Document 026. Recent investigations into dipole tensions support the need for alternative models [6, 7].

## 0.5 Alternative Explanatory Pathways

Should cosmological redshift prove to be fundamentally different than assumed, T0 offers alternative mechanisms:

### 0.5.1 Energy Loss through Field Coupling

$$\frac{dE}{dx} = -\Gamma(\lambda) \cdot E \cdot \rho_\xi(\vec{x}) \quad (1)$$

Even with an extremely small coupling constant ( $\Gamma \sim 10^{-25} \text{ m}^{-1}$ ), the effect accumulates over cosmological distances ( $L \sim 10^{25} \text{ m}$ ) to measurable redshifts.

### 0.5.2 Gravitational Potential Effects

$$\frac{\Delta\nu}{\nu} = \frac{\Delta\Phi}{c^2} \cdot h(\lambda) \quad (2)$$

The required rates of change ( $10^{-15}$ – $10^{-25}$  per unit) lie below current laboratory detection limits but become measurable over cosmological scales.

## 0.6 Conclusion: T0 Turns Crisis into Prediction

Observation (Video)	Standard Cosmology	T0 Solution
CMB Dipole ≠ Quasar Dipole	Catastrophe [3]	Expected (different mechanisms)
Significant angular offset	Unexplained [4]	Field geometry
Amplitude contra-diction	Impossible	Different phenomena
Anisotropy	Cosmological principle threatened	Local $\xi$ -field structure
Hubble Tension	Unsolved	Resolved (Doc. 026)

The video concludes: *“Whichever way you turn, something in cosmology doesn’t add up.”*

In the T0 framework, the observations are self-consistent: if the CMB dipole is not a motion but a  $\xi$ -field anisotropy, then CMB and matter dipoles need neither point in the same direction nor have the same amplitude. The 1.3 million quasars of the Quiaia catalog are not an anomaly but a confirmation of this interpretation. Current developments from 2025 reinforce this conclusion [5].

The data described in the video should be analyzed specifically for wavelength-dependent effects. The T0 predictions are sufficiently specific to be testable with existing multi-wavelength catalogs.

# Bibliography

- [1] YouTube Video: "Two Compasses Pointing in Different Directions: The CMB and Quasar Dipole Crisis", <https://www.youtube.com/watch?v=0ywWThFmEII>.
- [2] K. Storey-Fisher, D. J. Farrow, D. W. Hogg, et al., "Quaia, the Gaia-unWISE Quasar Catalog: An All-sky Spectroscopic Quasar Sample", *The Astrophysical Journal* **964**, 69 (2024), arXiv:2306.17749.
- [3] V. Mittal, O. T. Oayda, G. F. Lewis, "The Cosmic Dipole in the Quaia Sample of Quasars: A Bayesian Analysis", *Monthly Notices of the Royal Astronomical Society* **527**, 8497 (2024), arXiv:2311.14938.
- [4] A. Abghari, E. F. Bunn, L. T. Hergt, et al., "Reassessment of the dipole in the distribution of quasars on the sky", *Journal of Cosmology and Astroparticle Physics* **11**, 067 (2024), arXiv:2405.09762.
- [5] S. Sarkar, "Colloquium: The Cosmic Dipole Anomaly", arXiv:2505.23526 (2025), Accepted for Reviews of Modern Physics.
- [6] M. Land-Strykowski et al., "Cosmic dipole tensions: confronting the CMB with infrared and radio populations", arXiv:2509.18689 (2025), Accepted for MNRAS.
- [7] J. Bengaly et al., "The kinematic contribution to the cosmic number count dipole", *Astronomy & Astrophysics* **685**, A123 (2025), arXiv:2503.02470.