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The Pivot Universe: A Stationary Kerr-Based Cosmological Structure

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Abstract. The Pivot Universe (PU) model proposes that the large-scale structure of the cosmos is a stationary, axially symmetric gravitational system organized around a massive rotating central object, the Pivot. The Pivot generates a Kerr-like spacetime that governs the geometry, redshift field, thermal structure, and effective Hubble parameter of the observable universe. Cosmic redshift is interpreted as the combined effect of gravitational time dilation, frame dragging, and special-relativistic Doppler motion, rather than as evidence of global metric expansion. The observable universe is confined to a thin radial band between the Pivot's outer event horizon R^+ and the Cosmic Microwave Background (CMB) shell. We show that temperature, redshift, and the effective Hubble parameter $H_{\rm eff}(r)$ are different manifestations of a single underlying gravitational structure. The observed CMB temperature of 2.725 K, the local Hubble constant at the Milky Way, and the extreme redshifts of high-z galaxies such as JADES, CEERS, and LYNX arise naturally from this stationary geometry.

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1 Global Structure of the Pivot Universe

It is important to emphasize that the present paper is restricted to describing the geometrical, thermodynamical, and observational structure of the Pivot Universe once the Pivot already exists. It does not address the deeper foundational question of the physical origin of the Pivot itself, nor the fundamental processes that determine its mass, angular momentum, or initial formation mechanism. These profound issues, including possible creation scenarios and vacuum-related processes that may define the parameters M_{pivot} and J_{pivot}, are treated separately by the author in:

- A. Sher, *The Structure of the Pivot Universe*, Academia.edu: https://www.academia.edu/45575390/The_structure_of_the_Pivot_Universe

The present work should therefore be understood as a phenomenological and structural description of the Pivot Universe, conditioned on the existence of the Pivot and its measured parameters, rather than as a theory of its ultimate cosmological origin.

The Pivot Universe is organized around a massive rotating central object (the Pivot) that generates a Kerr-type gravitational field. The entire cosmic geometry is divided into distinct radial zones, each with its own physical meaning, thermal properties, and observational role.

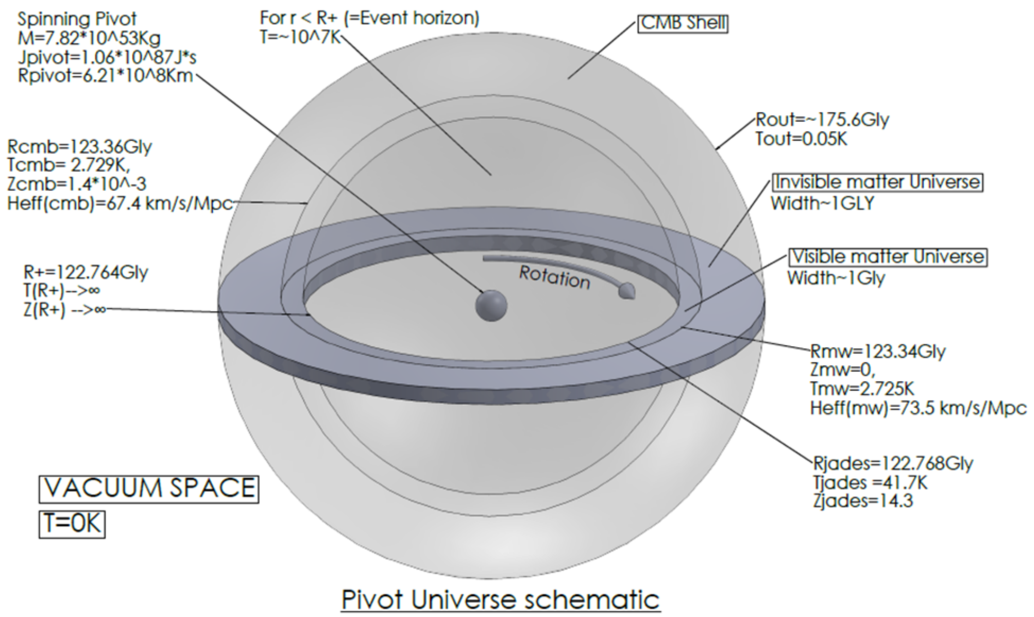

Figure 1. Schematic structure of the Pivot Universe. The diagram shows the central Pivot, the outer Kerr event horizon R^+, the thin visible matter universe, the Milky Way orbit, the CMB shell, the invisible matter universe, and the surrounding vacuum space. Characteristic temperatures, redshifts, and effective Hubble parameters are indicated.

2 Thermal Structure and Local Temperature Profile

The PU model defines a local temperature field $T(r)$ that follows directly from the redshift field according to

$$T(r) = T_{\mathrm{MW}}\,(1 + z(r)), \tag{2.1}$$

with

$$T_{\mathrm{MW}} = 2.725 \text{ K}. \tag{2.2}$$

The temperature therefore decreases monotonically with increasing radius and encodes a strict radial thermal hierarchy.

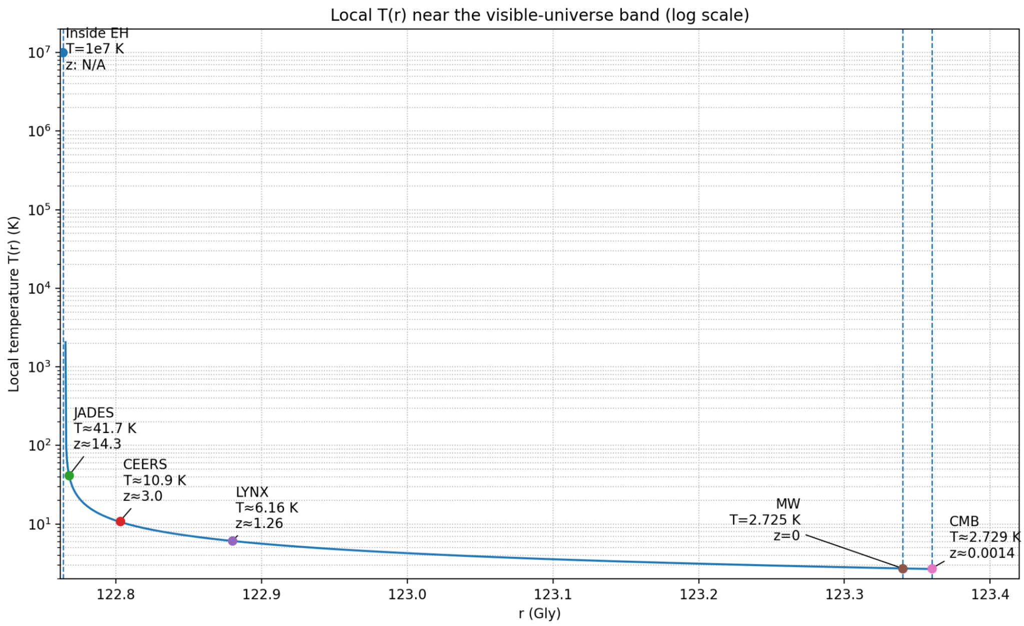

Figure 2. Local temperature $T(r)$ near the visible-universe band. The logarithmic scale shows the steep rise of temperature near the event horizon, the JADES region at tens of kelvin, and the near-isothermal Milky Way–CMB environment at about 2.7 K.

3 Redshift Field and Effective Hubble Parameter

The total redshift is defined as

$$1 + z = (1 + z_{\mathrm{gk}})(1 + z_D), \tag{3.1}$$

where z_{gk} is the gravitational and frame-dragging contribution arising from the Kerr geometry and z_D is the special-relativistic Doppler term.

The effective Hubble parameter is defined locally as

$$H_{\mathrm{eff}}(r) = c \left| \frac{d \ln(1 + z(r))}{dD} \right|, \tag{3.2}$$

where D is the radial distance coordinate and c is the speed of light. It represents the local slope of the redshift field and plays the role usually attributed to the Hubble constant in expanding-universe models.

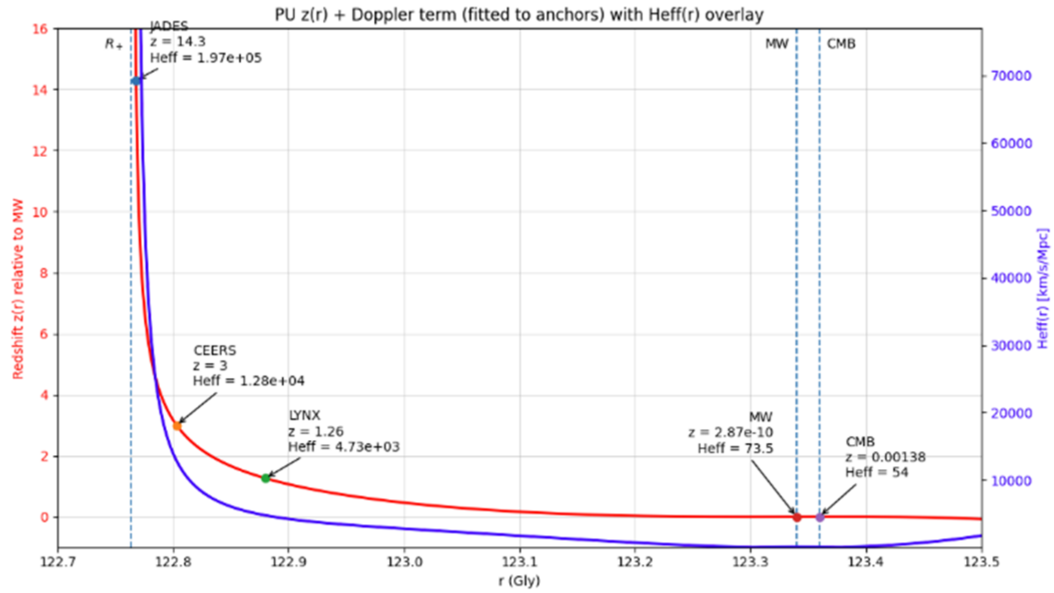

Figure 3. Combined redshift $z(r)$ (red curve, left axis) and effective Hubble parameter $H_{\text{eff}}(r)$ (blue curve, right axis). The Milky Way is forced to reproduce $H_{\text{eff}}(\text{MW}) = 73.5\ \text{km}\,\text{s}^{-1}\,\text{Mpc}^{-1}$, while the anchor redshifts of JADES, CEERS, LYNX, and the CMB shell are satisfied simultaneously.

4 Similarity Between $T(r)$, $z(r)$, and $H_{\text{eff}}(r)$

In the Pivot Universe model, the local temperature $T(r)$, the redshift $z(r)$, and the effective Hubble parameter $H_{\text{eff}}(r)$ are not independent quantities. They are three different expressions of the same underlying spacetime time-dilation structure generated by the gravitational and rotational field of the Pivot. They are mathematically linked by

$$T(r) = T_{\text{MW}}(1 + z(r)), \tag{4.1}$$

$$H_{\text{eff}}(r) = c\frac{dz(r)}{dr}. \tag{4.2}$$

Thus:

- $z(r)$ describes the cumulative gravitational and kinematic time dilation from radius r to the Milky Way.
- $T(r)$ is a direct scaling of $z(r)$ and represents the local emission temperature needed to produce the observed 2.725 K at the Milky Way.
- $H_{\text{eff}}(r)$ is the spatial gradient of $z(r)$, measuring how fast redshift changes with distance.

Because of these relations, all three curves must have the same qualitative shape:

- They rise steeply close to the event horizon R^+.
- They decrease rapidly moving outward.
- They flatten near the Milky Way and the CMB shell.

As $r \to R^+$,

$$z(r) \to \infty, \qquad T(r) \to \infty, \qquad H_{\text{eff}}(r) \to \infty, \tag{4.3}$$

because the event horizon is an infinite redshift surface.

Physically:

- $z(r)$ measures clock slowing.
- $T(r)$ measures the local photon energy scale.
- $H_{\text{eff}}(r)$ measures how rapidly spacetime redshift changes with position.

Therefore, the similarity between the three graphs is not coincidental. They are different mathematical projections of the same stationary spacetime geometry around the Pivot. Once $z(r)$ is known, both $T(r)$ and $H_{\text{eff}}(r)$ are uniquely determined.

5 Conclusions

The Pivot Universe provides a unified geometrical and thermodynamical description of cosmology. Redshift, temperature, and the effective Hubble parameter are not independent phenomena but different manifestations of a single gravitational structure. The observed CMB, the Hubble constant, and the extreme redshifts of distant galaxies are all naturally explained without invoking global cosmic expansion or a primordial singularity.

References

[1] A. Sher, *The Structure of the Pivot Universe*, Academia.edu: https://www.academia.edu/45575390/The_structure_of_the_Pivot_Universe.