

Conceptual Draft: The Absolute Dimensional Scale of the UAT Universe From the Minimum Causal Limit to the Maximum Cycle

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Abstract

The Unified Applicable Time / Unified Causal Principle (UAT/UCP) posits that existence itself is defined by fundamental dimensional limits governed by **Absolute Causality**. This document proposes the construction of an **Absolute Dimensional Scale (ADS)** for the universe, determined by its minimum and maximum boundaries. The minimum limit is fixed by the **Minimum Causal Length ($\Delta L_{\kappa_{\text{crit}}}$)**, derived from the constant κ_{crit} , and the maximum limit is given by the **Total Cycle Length ($L_{\text{TotalCycle}}$)**, which represents the physical extent of the $T_{\text{TotalCycle}}$. The contrast between these two dimensional magnitudes provides a test for the symmetry and coherence of the cosmic design.

1 Introduction: The Need for an Absolute Scale

A unified theory must provide a dimensional scale that spans from the minimum unit of causal coherence to the maximum physical extent of the cosmic cycle. If causality is the governing principle, there must be an intrinsic relationship between these two extremes.

2 The Minimum Dimensional Limit: The Causal Unit

The smallest limit is defined by the **Minimum Causal Length ($\Delta L_{\kappa_{\text{crit}}}$)**, the minimum distance over which a causal event can be processed, derived from the Causal Coherence Constant (κ_{crit}) and the Planck Length (L_{P}).

2.1 Calculation of $\Delta L_{\kappa_{\text{crit}}}$

Using the fundamental UCP values:

$$\kappa_{\text{crit}} \approx 1.0 \times 10^{-78}$$

$$L_P \approx 1.616 \times 10^{-35} \text{ meters}$$

The Minimum Causal Length is:

$$\Delta L_{\kappa_{\text{crit}}} = \kappa_{\text{crit}} \cdot L_P$$

$$\Delta L_{\kappa_{\text{crit}}} \approx (1.0 \times 10^{-78}) \times (1.616 \times 10^{-35} \text{ m})$$

$$\Delta L_{\kappa_{\text{crit}}} \approx \mathbf{1.616 \times 10^{-113}} \text{ meters}$$

This is the fundamental unit of space for causal processing (the universe's "pixel").

3 The Maximum Dimensional Limit: The Cycle Extent

The largest limit is determined by the total distance light (the speed of causality, c) can travel during the **Total Cosmic Cycle Time** ($\mathbf{T}_{\text{Total.Cycle}}$), as calculated previously. This represents the maximum causally accessible extent of the universe over its total existence.

3.1 Calculation of $\mathbf{T}_{\text{Total.Cycle}}$

We recall the UCP deduction for the total cycle time:

$$T_{\text{Total.Cycle}} = \frac{t_P}{\kappa_{\text{crit}}} \approx 5.39 \times 10^{34} \text{ seconds}$$

3.2 Calculation of the Total Cycle Length ($\mathbf{L}_{\text{Total.Cycle}}$)

The maximum length is calculated using the speed of light ($c \approx \mathbf{2.998 \times 10^8}$ m/s):

$$L_{\text{Total.Cycle}} = c \times T_{\text{Total.Cycle}}$$

$$L_{\text{Total.Cycle}} \approx (2.998 \times 10^8 \text{ m/s}) \times (5.39 \times 10^{34} \text{ s})$$

$$\mathbf{L}_{\text{Total.Cycle}} \approx \mathbf{1.616 \times 10^{43}} \text{ meters}$$

Note on Cosmological Scale: This maximum length is equivalent to approximately $\mathbf{1.71 \times 10^{27}}$ **light-years**, providing context for the full causal extent of the UAT cycle.

4 The Absolute Dimensional Scale (ADS)

The Absolute Dimensional Scale (ADS) is the ratio between the maximum and minimum limits, providing a metric for the magnitude of the cosmic design:

$$\text{ADS} = \frac{L_{\text{Total_Cycle}}}{\Delta L_{\kappa_{\text{crit}}}}$$

Substituting the values:

$$\text{ADS} = \frac{1.616 \times 10^{43} \text{ meters}}{1.616 \times 10^{-113} \text{ meters}}$$

$$\text{ADS} = \mathbf{1.0 \times 10^{156}}$$

5 Measurement Scale Reference

The dimensional scale used throughout this manuscript and in the Absolute Dimensional Scale (ADS) visualization is determined in **meters**.

This choice is established based on the following foundational reasons:

1. **Basis in L_P :** Planck Length (L_P) serves as the base unit and is defined in meters: $L_P \approx 1.616 \times 10^{-35}$ meters.
2. **Maximum Calculation:** The Total Cycle Length ($L_{\text{Total_Cycle}}$) is derived using the speed of light (c) in m/s multiplied by the total time in seconds, which naturally results in meters: $L_{\text{Total_Cycle}} = c \times T_{\text{Total_Cycle}} \approx 1.616 \times 10^{43}$ meters.
3. **Visualization Consistency:** The X-axis of the Python plot is labeled Log_{10} (Distance in Meters), confirming that the logarithmic representation is based on the meter unit.

6 Visualization Reference: ADS and Key Points

The accompanying visualization (generated via the provided Python code) maps the **Absolute Dimensional Scale (ADS)** in logarithmic space ($\text{Log}_{10}(\text{meters})$), illustrating the vast range of 10^{156} orders of magnitude defined by the UAT framework.

The elements depicted in the visualization are defined as follows:

7 Conclusion: The Symmetry of Causality

The UAT universe spans a range of 10^{156} on its dimensional scale, from the smallest limit of coherence to the maximum extent of its cycle.

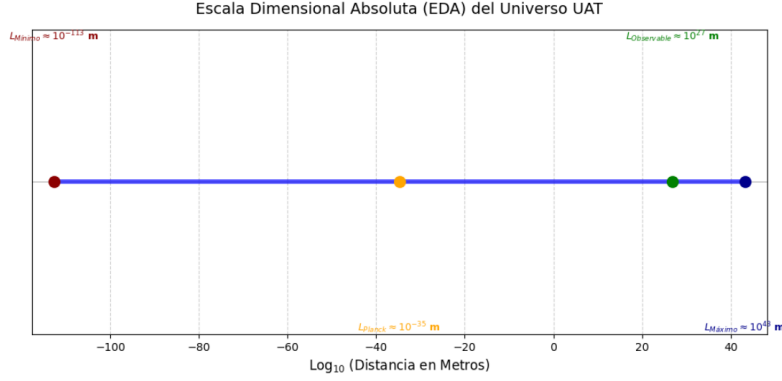


Figure 1: Absolute Dimensional Scale (ADS) of the UAT Universe.

Table 1: Key Reference Points on the ADS ($\text{Log}_{10}(\text{meters})$)

Graphic Element	Description in UAT	Log_{10} Value
Thick Blue Line	Absolute Dimensional Scale (ADS): The full, continuous range of causal existence.	≈ -113 to ≈ 43
Red Dot (L_{Minimum})	Minimum Causal Length ($\Delta L_{\kappa_{\text{crit}}}$): The lower boundary, defined by κ_{crit} .	≈ -112.79
Orange Dot (L_{Planck})	Planck Length: A critical historical reference, significantly larger than the true Causal Limit.	≈ -34.79
Green Dot ($L_{\text{Observable}}$)	Observable Universe Radius: The current extent accessible to observation.	≈ 26.94
Dark Blue Dot (L_{Maximum})	Total Cycle Length ($L_{\text{Total_Cycle}}$): The upper boundary of the scale, representing the maximum size before the cycle resets.	≈ 43.21

This result is a direct function of the inverse of κ_{crit} and the relationship between L_P and t_P :

$$\frac{L_{\text{Total_Cycle}}}{\Delta L_{\kappa_{\text{crit}}}} = \frac{c \cdot (t_P / \kappa_{\text{crit}})}{\kappa_{\text{crit}} \cdot L_P} = \frac{c}{L_P} \cdot \frac{t_P}{\kappa_{\text{crit}}^2}$$

The simplicity and magnitude of this result (a round number, 10^{156}), derived purely from κ_{crit} , underscore the principle of **logical necessity** in the universe's design, where the minimum limit is inherently connected to the maximum limit

by the same causal constant.