Mathematical Formalization of the Pure Time and Four States of Space (PT+4SS) Framework

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Abstract

This document constructs a formal mathematical model based on the conceptual framework of the "Four States of Space" (PT+4SS). It translates the qualitative assertions regarding the interchangeability of time and spatial motion, the discrete states of matter, and the cognitive-physical isomorphism of the Spatial Acquisition Device (SAD) into symbolic logic and metric tensor modifications.

1 The Fundamental Ontology: The Fiene State Space

The theory postulates that reality is not a continuum of spacetime, but a configuration of Space (S) defined by two orthogonal axes: **Certainty** (Density/Substance) and **Expression** (Kinematics).

Let $\mathbb{S}$ be the universal set of Space. We define a state vector ψ for any locus in space based on two parameters:

- ρ: The density parameter (Certainty axis).
- v: The velocity/expansion magnitude (Expression axis).

The fundamental dualities are defined as binary or limit-based states:

$$\text{State}(\psi) = \begin{cases} \text{Filled}(F) & \text{if } \rho > 0 \\ \text{Empty}(E) & \text{if } \rho \to 0 \end{cases} \quad \text{and} \quad \text{Kinematics}(\psi) = \begin{cases} \text{Motion}(M) & \text{if } v > 0 \\ \text{Stationary}(St) & \text{if } v \to 0 \end{cases} \tag{1}$$

2 The Four States Matrix

The interaction of these parameters generates the four fundamental quadrants of reality (Q_{1-4}). We define the Fiene Matrix $\mathbf{M}_F$ as the Cartesian product of the state sets:

$$\mathbf{M}_F = \begin{bmatrix} Q_2 : \text{Filled} \cap \text{Motion} & Q_3 : \text{Empty} \cap \text{Motion} \\ Q_1 : \text{Filled} \cap \text{Stationary} & Q_4 : \text{Empty} \cap \text{Stationary} \end{bmatrix} \tag{2}$$

Mathematically, these quadrants yield the emergent phenomena described in the source texts:

$$Q_1(\rho > 0, v \to 0) \implies \text{Object Permanence / Mass } (\mathcal{M}) \tag{3}$$
$$Q_2(\rho > 0, v > 0) \implies \text{Energy / Momentum } (\mathcal{E}) \tag{4}$$
$$Q_3(\rho \to 0, v > 0) \implies \text{Pure Time } (\mathcal{T}) \tag{5}$$
$$Q_4(\rho \to 0, v \to 0) \implies \text{Singularity } (\mathcal{Z}) \tag{6}$$

3 The Fundamental Identity of Time

The central axiom of the theory is that Time is not a fundamental dimension but an emergent property of Empty Space in Motion (Q_3).

Classical formulation: t is an independent dimension. **PT+4SS formulation:** T is a function of the expansion vector of empty space.

Let S_E be a volumetric region of empty space. The phenomenon of "Time" (T) is defined as the magnitude of the expansion vector of S_E:

$$T \equiv \nabla \cdot \vec{S}_E \tag{7}$$

Or, in the context of the universal expansion rate (Hubble flow equivalent):

$$T = \frac{dS_E}{d\tau} \tag{8}$$

Where τ represents the sequential iteration of the universe's expansion.

4 The Unified Field and Gravity

Gravity (G) is defined not as a force, but as the geometric interaction between Filled Space (S_F) and Empty Space (S_E).

$$G = \Phi(S_F, S_E) \tag{9}$$

Where the interaction follows the reciprocal rule:

- $S_F \rightarrow \text{Curvature}(\nabla S_E)$ (Filled space curves empty space)
- $\nabla S_E \rightarrow \vec{a}(S_F)$ (Empty space dictates acceleration of filled space)

5 Modification of General Relativity

The theory proposes a direct modification to the Schwarzschild metric by replacing the temporal differential dt with the spatial motion differential dS_{esm} (Empty Space in Motion).

Standard Schwarzschild Metric:

$$c^2 d\tau^2 = \left(1 - \frac{r_s}{r}\right) c^2 dt^2 - \left(1 - \frac{r_s}{r}\right)^{-1} dr^2 - r^2 d\Omega^2 \tag{10}$$

PT+4SS Modified Metric: We substitute $c \cdot dt \rightarrow v_E \cdot dS_{esm}$, where v_E is the velocity of empty space expansion.

$$d\sigma^2 = \left(1 - \frac{2G\mathcal{M}}{rc^2}\right) (dS_{esm})^2 - \left(1 - \frac{2G\mathcal{M}}{rc^2}\right)^{-1} dr^2 - r^2 d\Omega^2 \tag{11}$$

Implication at the Event Horizon ($r \rightarrow r_s$): In standard GR, $dt \rightarrow \infty$ (time stops). In PT+4SS, as $r \rightarrow r_s$, the term associated with motion vanishes.

$$\lim_{r \rightarrow r_s} (dS_{esm}) \rightarrow 0 \tag{12}$$

This implies that at the Schwarzschild radius, space transitions from Q_3 (Motion) to Q_4 (Stationary). The Singularity is therefore defined mathematically as the limit where spatial motion reaches zero:

$$\mathcal{Z} = \{S \mid \vec{v} = 0, \rho \rightarrow 0\} \tag{13}$$

6 The Spatial Acquisition Isomorphism

The theory posits a direct mapping between the cognitive development stages (Piagetian) and the physical dimensions of the universe. Let $C(x)$ be the cognitive state and $D(x)$ be the physical dimensionality.

We define the Isomorphism $\cong_{SAD}$:

$$\text{SAD} : C_{\text{stage}} \rightarrow \mathbb{R}^n \tag{14}$$

The mapping sequence is invariant:

1. **Object Permanence (Sensori-motor):**

$$C_{OP} \rightarrow \mathcal{M} \quad \text{(Stationary Mass, } Q_1\text{)}$$

2. **Conservation of Number (Pre-operational):**

$$C_{Num} \to \mathbb{R}^1 \quad \text{(Linearity)}$$

3. **Conservation of Area (Concrete Operational A):**

$$C_{Area} \to \mathbb{R}^2 \quad \text{(Planes)}$$

4. **Conservation of Volume (Concrete Operational B):**

$$C_{Vol} \to \mathbb{R}^3 \quad \text{(Volume)}$$

7 The Cosmological Cycle Equation

The universe is modeled as a competition between the Expansion Energy of Empty Space (E_{exp}) and the Gravitational Drag of Filled Space (G_{drag}).

Let N_{BH} be the number of black holes (anchors). Let Λ_{drag} be the drag coefficient per black hole.

The state of the universe $U(t)$ is determined by:

$$\frac{dU}{d\tau} = E_{exp} - \sum_{i=1}^{N_{BH}} \Lambda_{drag}^{(i)} \tag{15}$$

The Big Collapse Condition: The universe enters the collapse phase when the collective drag of stationary space exceeds the momentum of empty space:

$$\sum \Lambda_{drag} > E_{exp} \implies v_{expansion} \to -v \tag{16}$$