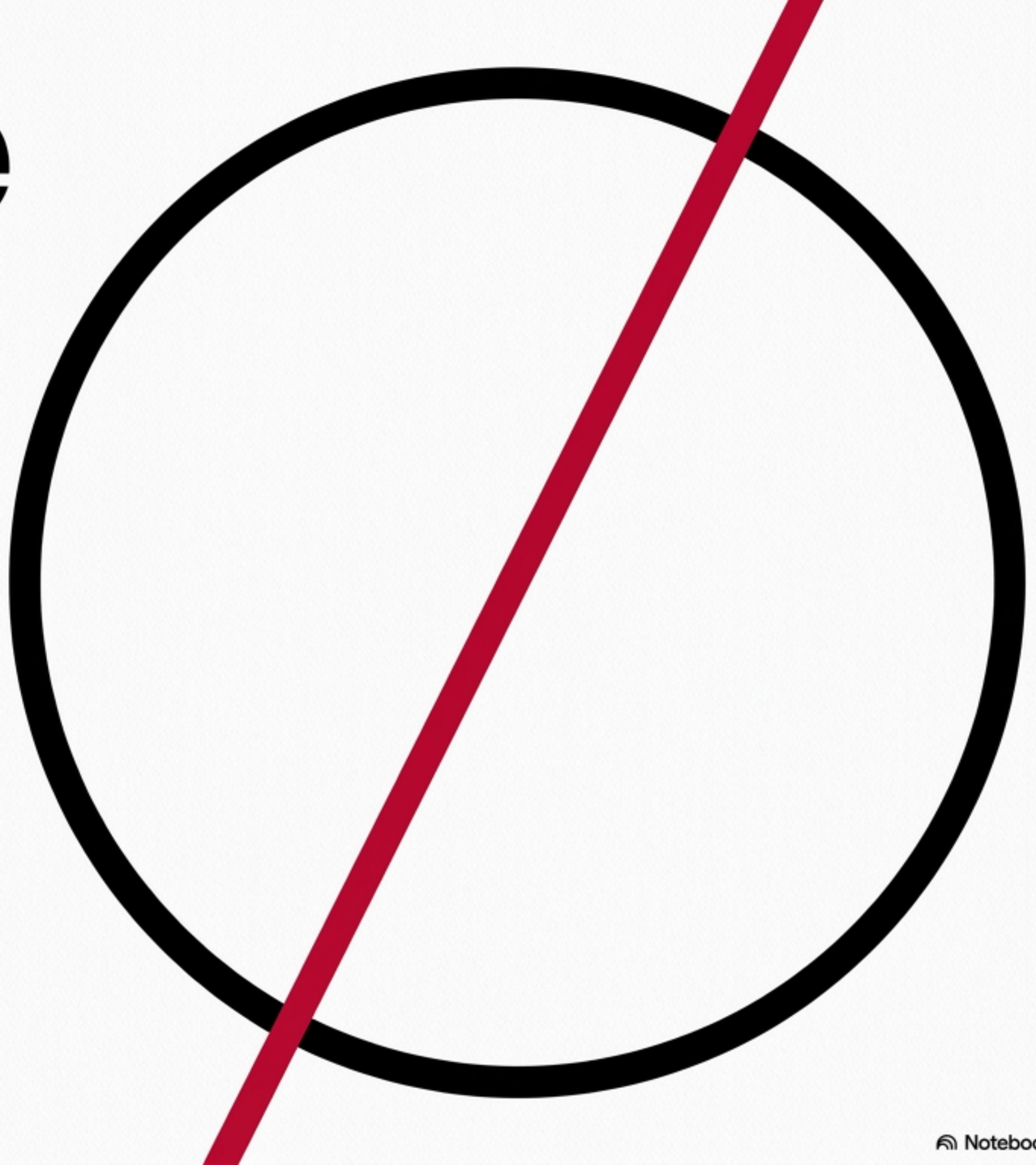
Why Time Flows

A Physical Mechanism Unifying Special and General Relativity

General Relativity



BASED ON BFUT P62 • THE SUBSTRATE PROPAGATION FRAMEWORK

THE SUCCESS

- GPS calibration
- Particle accelerators
- Atomic clock comparisons

Standard Relativity mathematically predicts that clocks slow with perfect precision.

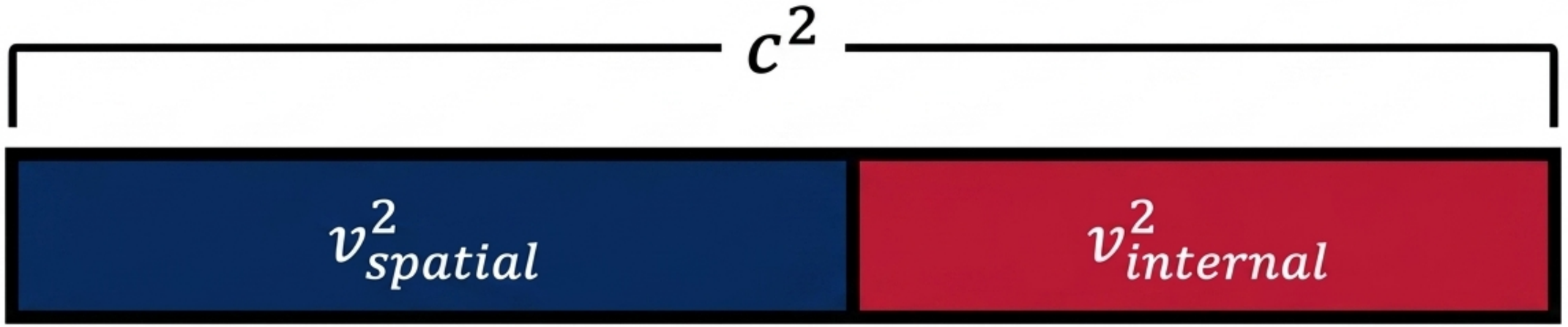
THE GAP

But neither Special nor General Relativity specifies a physical mechanism. Why does every internal process within a clock slow by the exact same factor?

Two Paradigms of Time

Standard Physics (GR/SR)	BFUT P62
Geometric dimension	Accumulated substrate evolution
Spacetime curvature (Coordinate effect)	Physical substrate capacity reduction
Postulated absolute bound	Maximum physical substrate reorganization rate
Mathematically unavoidable	Temporally impossible

The Foundational Axiom: The Propagation Budget



$$c^2 = v^2_{spatial} + v^2_{internal}$$

Total finite causal capacity of the Spaticle substrate.

Budget consumed by spatial motion.

Remaining budget available for internal evolution (time).

Deriving Special Relativity

Step 01

Isolate internal evolution capacity.

$$v_{internal} = \sqrt{c^2 - v^2}$$

Step 02

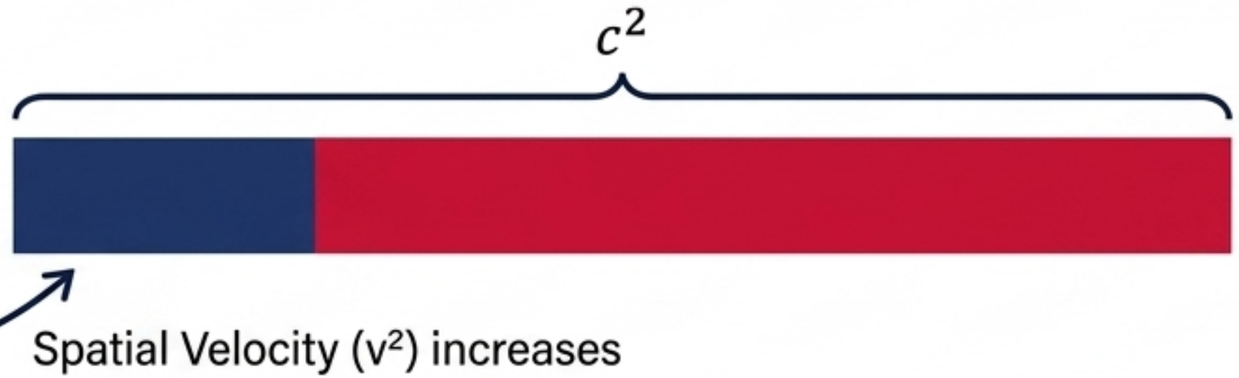
Determine propagation efficiency (η).

$$\eta = \frac{v_{internal}}{c} = \sqrt{1 - v^2/c^2}$$

Step 03

Calculate elapsed proper time (dτ).

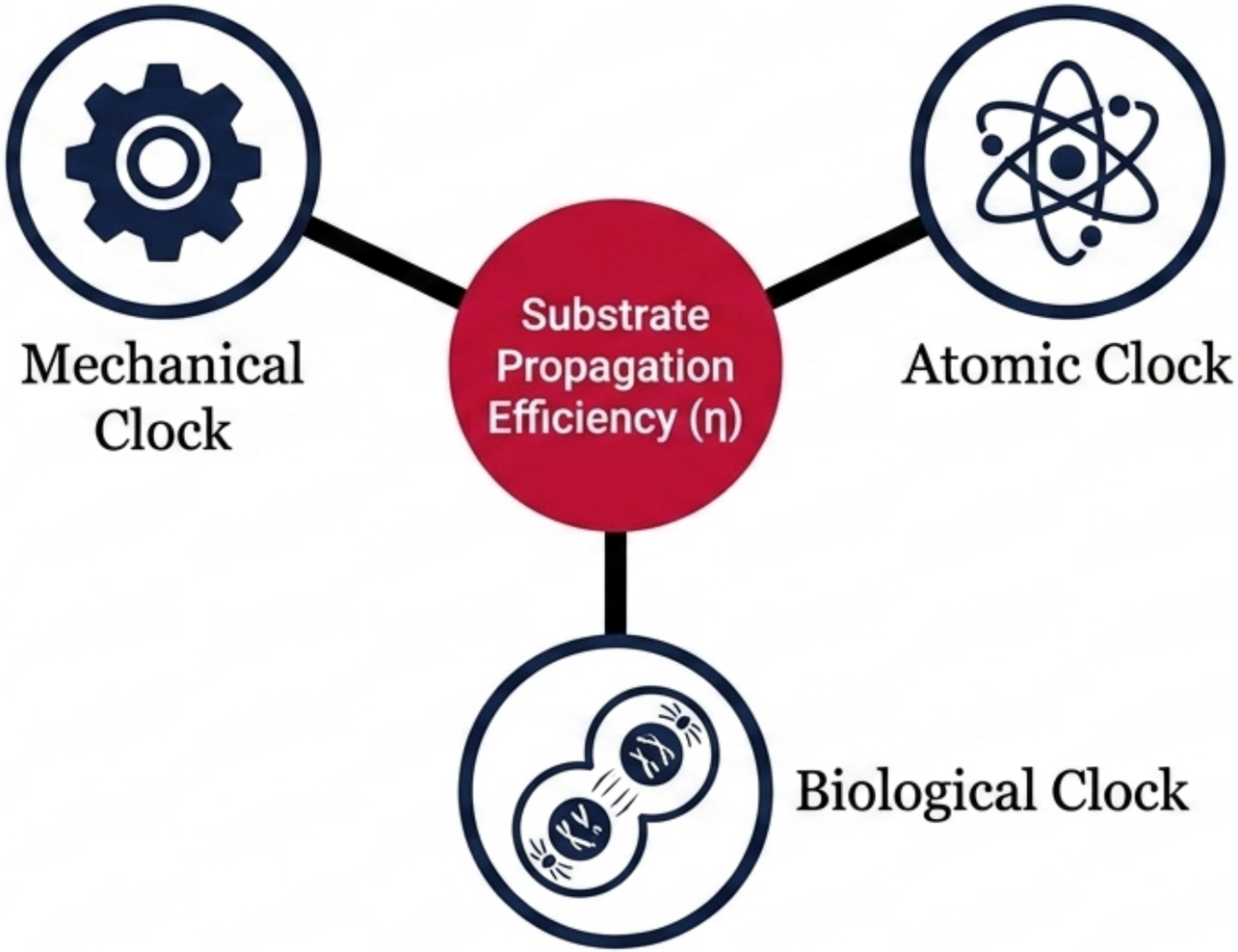
$$d\tau = \eta \cdot dt = dt \cdot \sqrt{1 - v^2/c^2}$$



Spatial Velocity (v^2) increases

Visually proves that as spatial velocity increases, the internal capacity mathematically must shrink.

The Universality of Clock Slowing

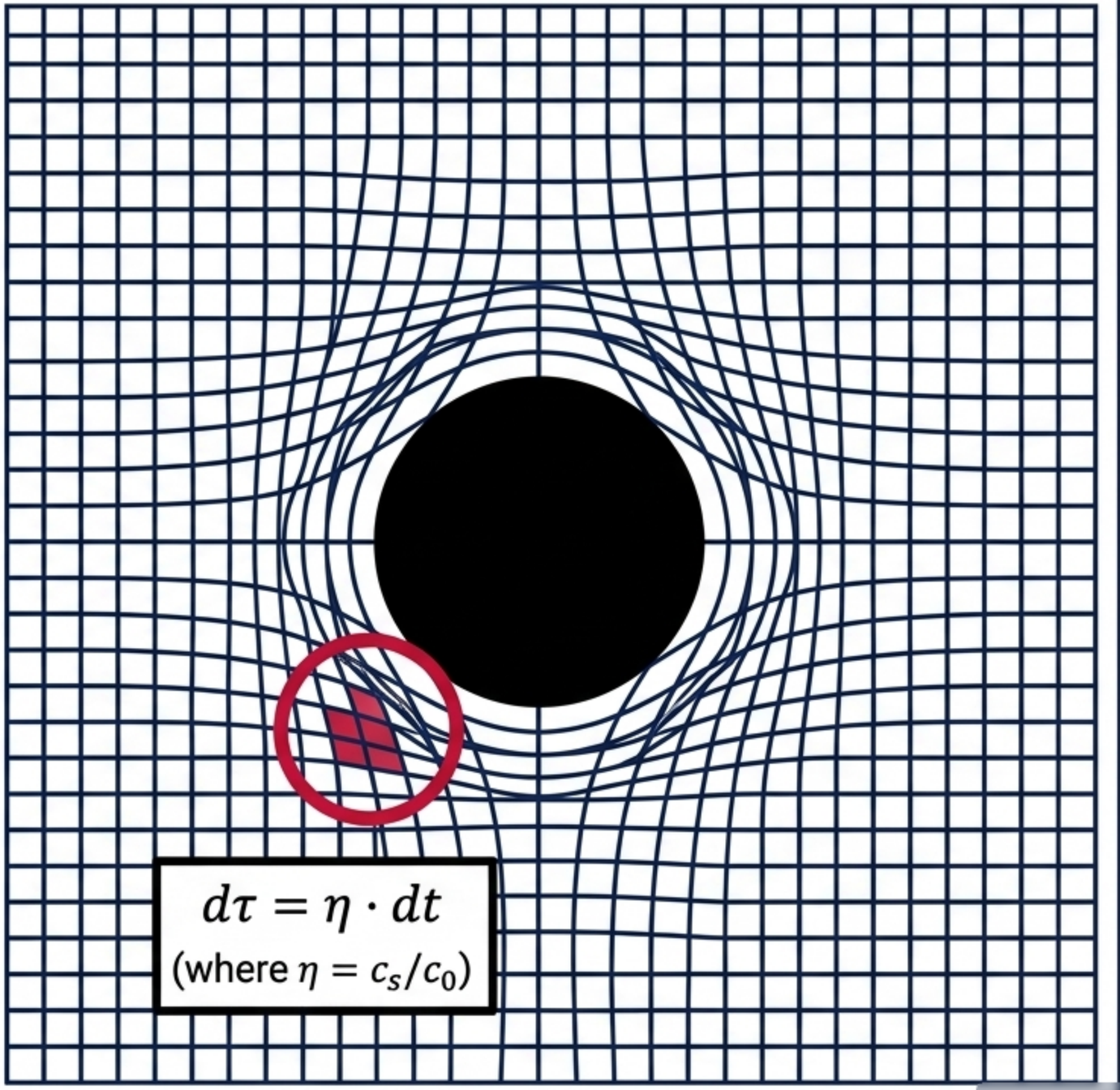


Every physical process unfolds within the substrate. Whether mechanical, atomic, or biological, every clock runs on the exact same reduced propagation budget. Universality is a structural consequence, not an additional postulate.

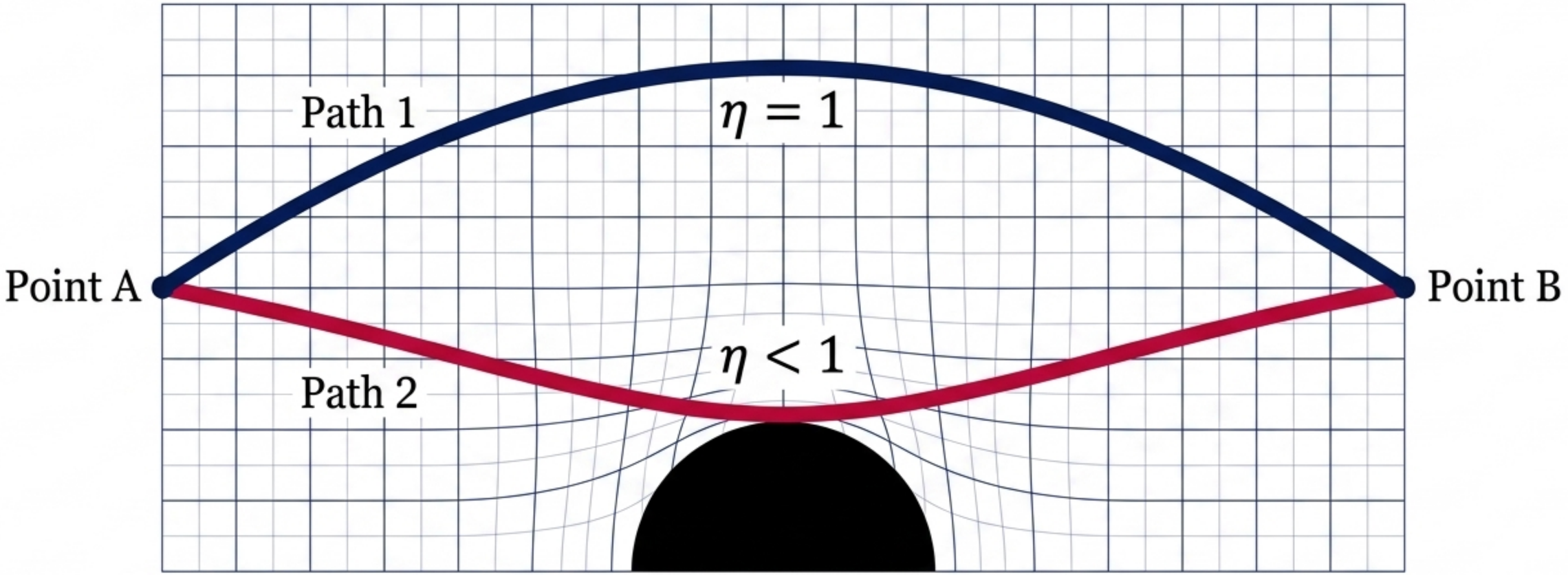
General Relativity: Deformation Consumes Capacity

Maintaining a gravitational deformation requires continual substrate reorganization. This consumes local propagation capacity.

The capacity remaining for internal physical evolution decreases by the exact same mechanism as kinematic motion.

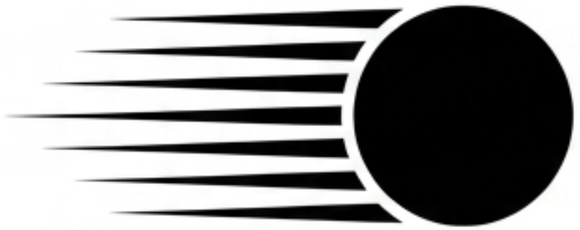


Time Dilation is a Path-Comparison Effect



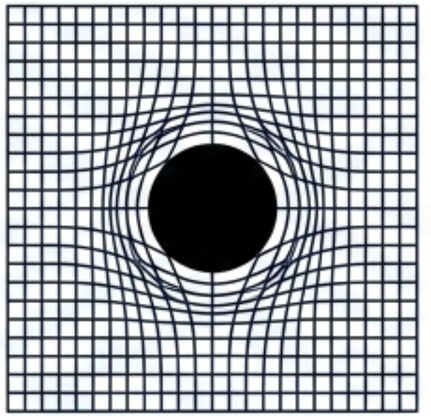
No local observer experiences their own time as ‘slow’ because local propagation capacity is always self-consistent. Time dilation is strictly relational: it only appears when observers compare accumulated propagation histories from different substrate paths.

The Unification of Time Dilation



Motion consumes propagation capacity.

$$\eta = \sqrt{1 - v^2/c^2}$$

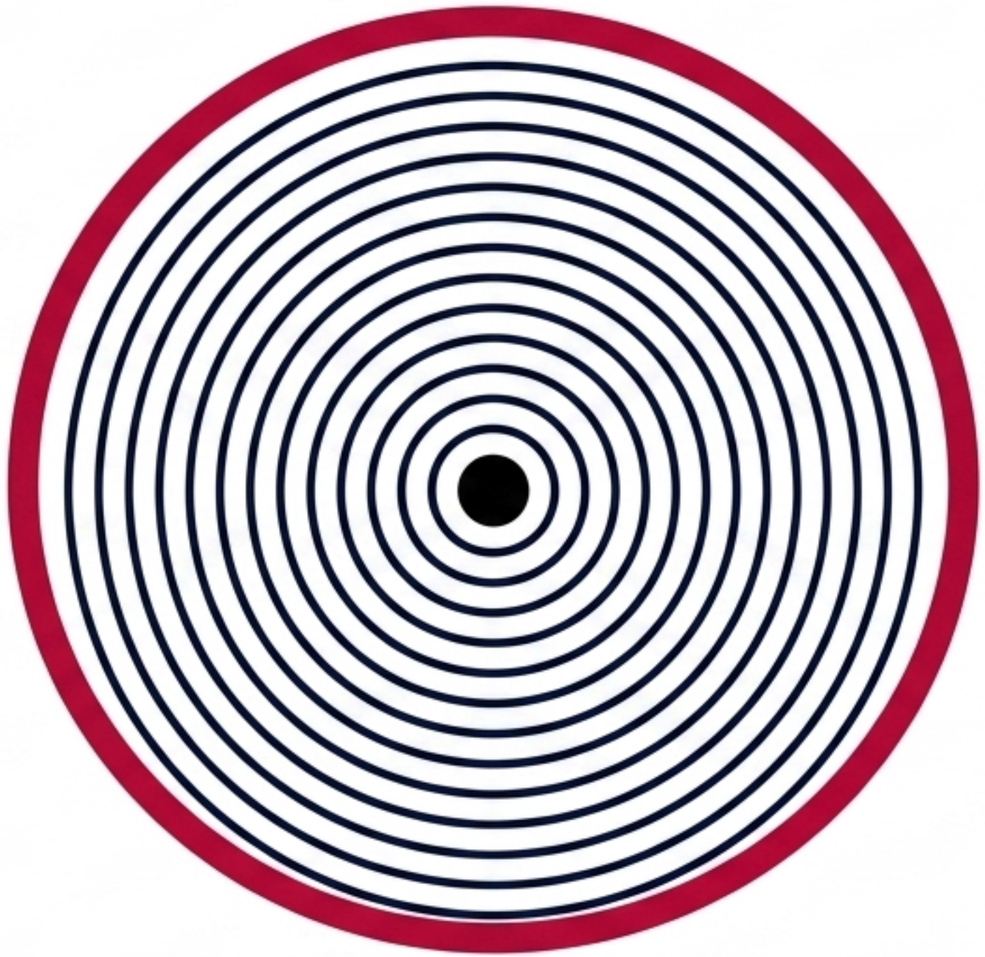


Gravitational deformation consumes propagation capacity.

$$\eta = c_s/c_0$$

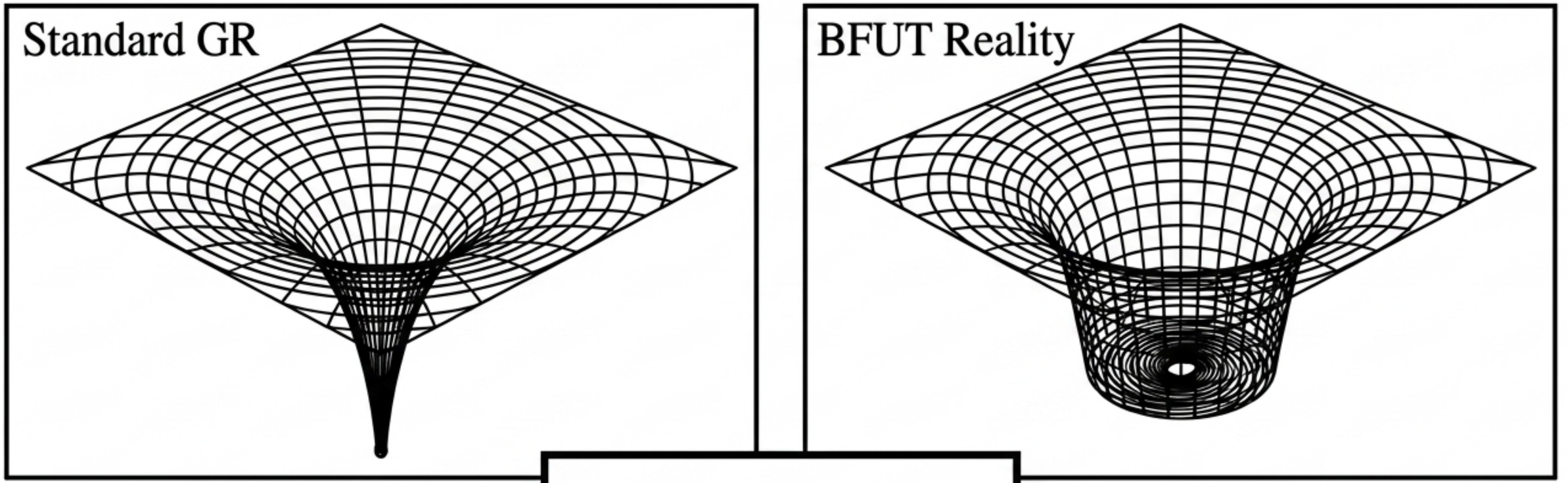
Two manifestations of one conservation principle.
The same shared finite physical resource.

c: The Physical Limit of Causality



Special Relativity postulates a universal speed limit. The Propagation Budget explains it.
c is the maximum rate at which the Spaticle substrate can physically reorganize itself.
No causal influence can exceed the medium from which it is constituted.

The Temporal Proof Against Singularities



Mathematical Artifact

$$\lim_{\text{compression}\to\infty} \eta \to 0$$

Physical Reality

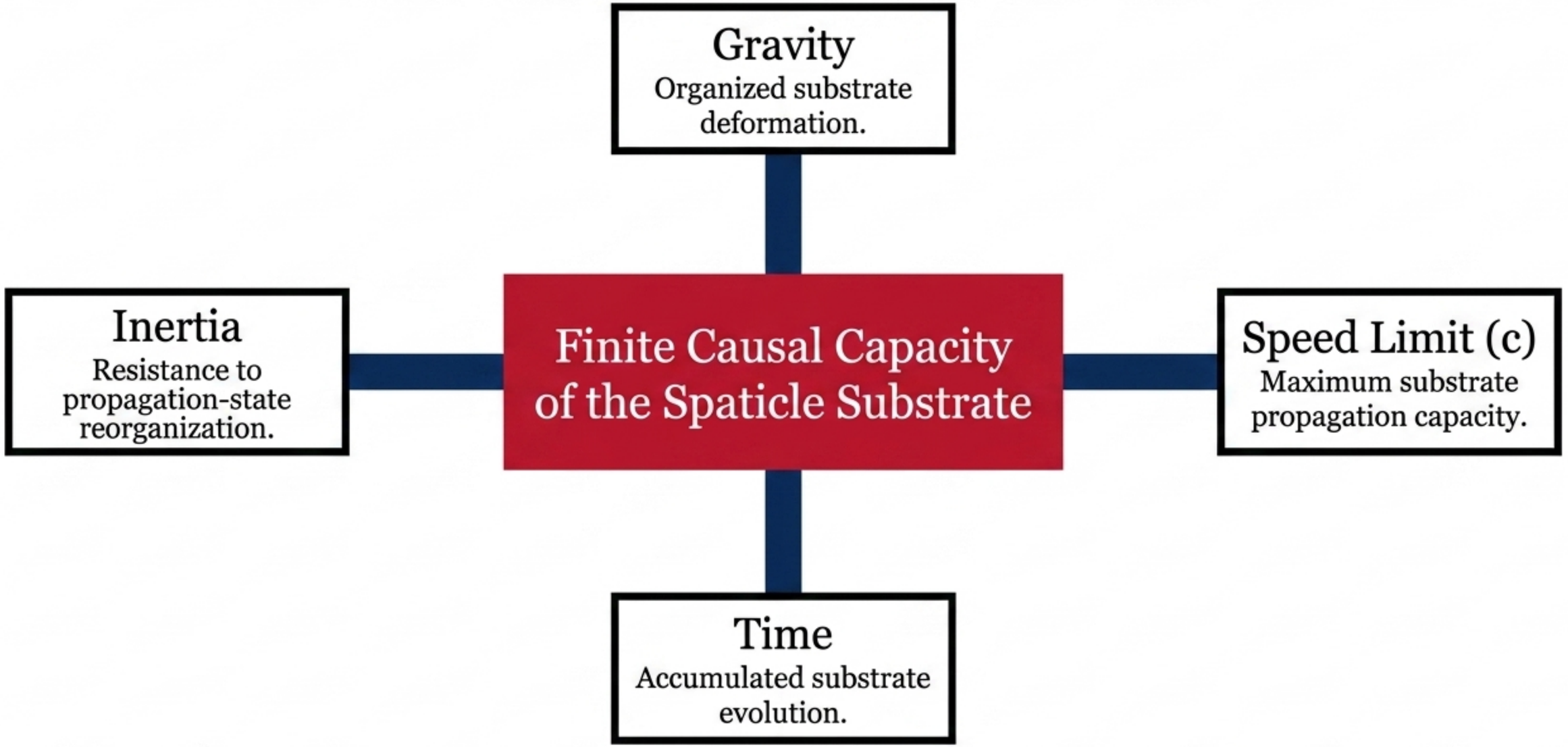
A true singularity requires infinite substrate compression. But as compression increases, local propagation efficiency ($\Pi v \eta$) drops. At $\eta = 0$, time stops. The mechanism of collapse freezes before infinite density can ever be reached.

The Michelson-Morley Distinction

A background medium through which solid matter moves independently. Ruled out by interferometry.

Observer, apparatus, and light are all organized excitations of the exact same medium. There is no “outside" observer to detect directional anisotropy.

The Unified Propagation Principle



Not four different physical laws. Four manifestations of one fundamental constraint.

Falsifiable Predictions

01

Universal Clock Dependence.

Confirmed discovery of any clock technology exhibiting a different functional dependence on velocity or gravity falsifies the substrate mechanism.

02

Time Dilation Saturation.

Precision timing experiments near extreme compact objects will show time dilation approaching, but strictly never reaching, zero ($\eta > 0$).

03

Propagation Equivalence.

Photons and gravitational waves will continue to propagate at exactly the same speed (c), restricted by the identical substrate limit.