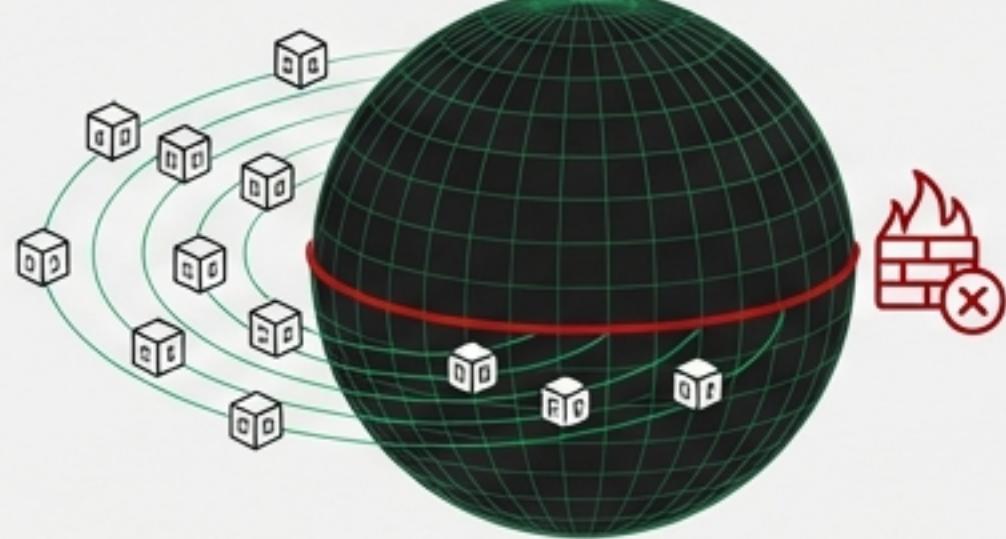


Our reality has a few bugs.

For over a century, physics has been built on two magnificent, yet incompatible, pillars: General Relativity and Quantum Mechanics. Their conflict has produced paradoxes that function like glitches in our understanding of the universe.

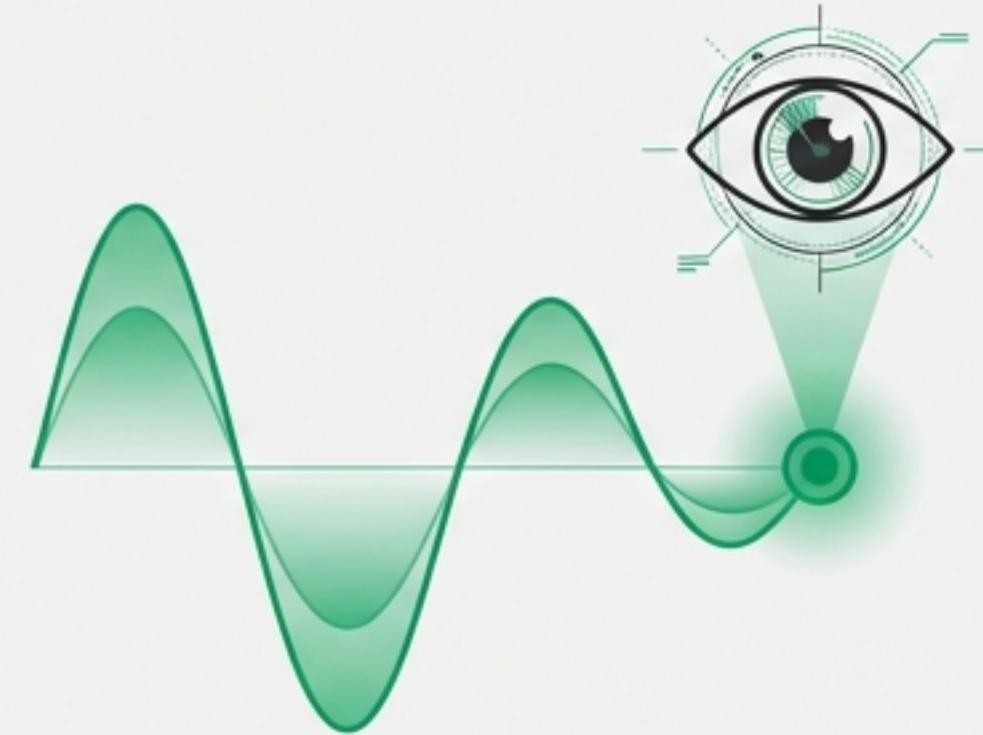
[ERROR_01: Black Hole Firewall]

Information enters, but never leaves. This violates the fundamental laws of quantum mechanics. Where does the data go?



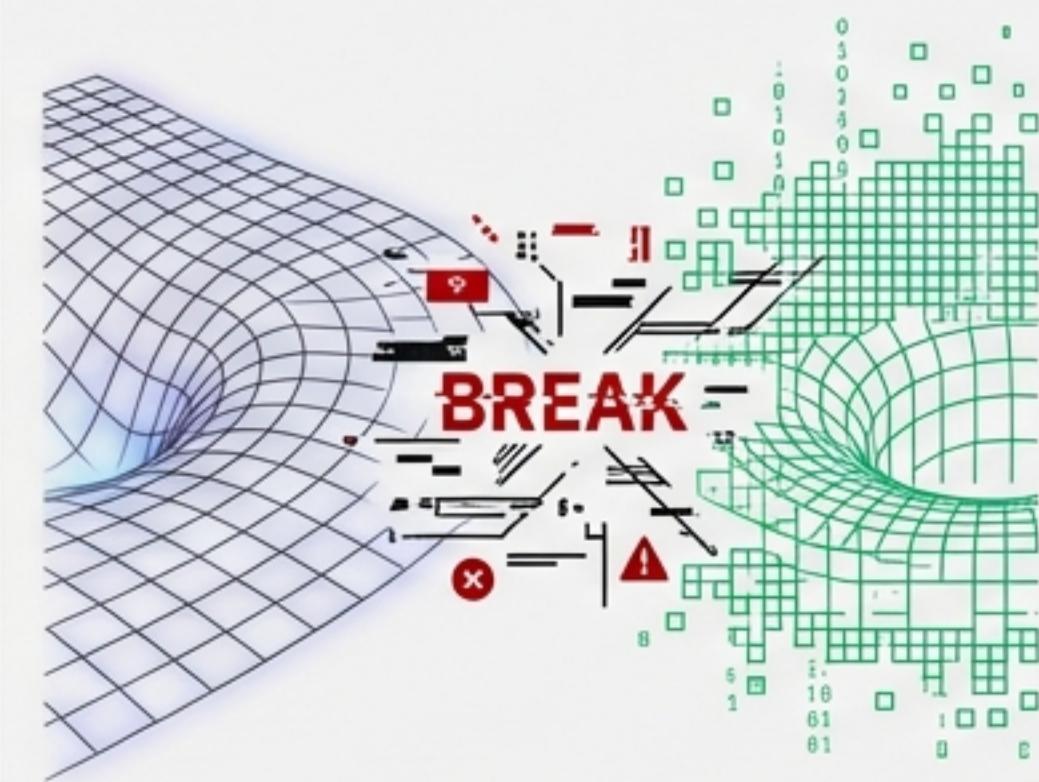
[ERROR_02: The Measurement Problem]

An elegant wave of quantum possibilities “collapses” into a single reality only when we look. Who or what is forcing this choice?



[ERROR_03: The Unification Dead End]

Gravity refuses to be quantized. The languages of the very large and the very small are mutually unintelligible. The source code is fragmented.



Facing these 困境 (dilemmas), 修修补补已无济于事 (minor fixes are no longer helpful). We need a paradigm shift.

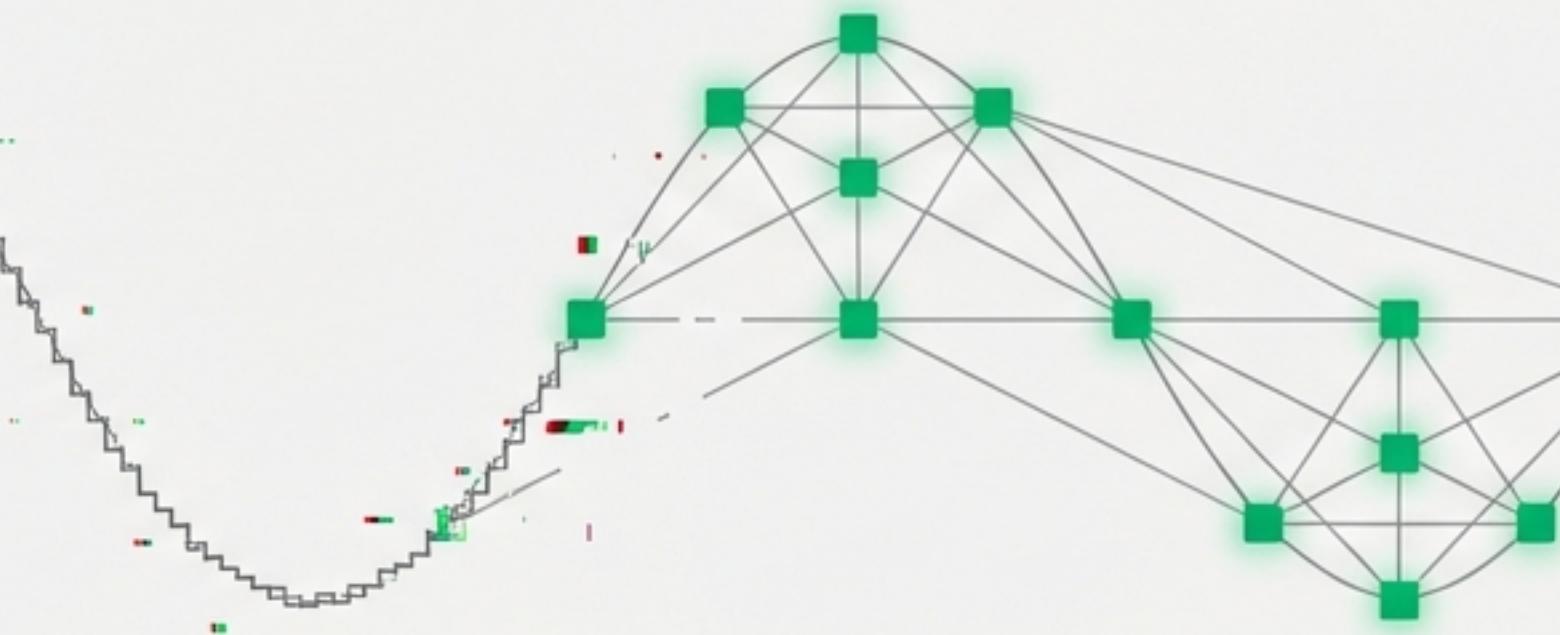
Physics needs a new language.

The language of classical physics, built on the mathematics of the continuous-smooth spacetime, infinite fields—is failing us. It generates infinities and singularities that we never observe.

CONTINUOUS MATHEMATICS



DISCRETE COMPUTATIONAL REALITY



The Bekenstein Bound, derived from black hole thermodynamics, proves that any finite region of space can only hold a finite amount of information. Reality is not continuous; it is discrete. It has a resolution.

物理学需要一种新的语言。这种语言必须天生就是离散的、有限的、操作性的。这种语言就是计算机科学。

(Physics needs a new language. This language must be inherently discrete, finite, and operational. This language is **computer science**.)



**The universe is not a machine.
It's a computer.**

This presentation outlines a new framework: **Interactive Computational Cosmology (ICC)**. It proposes a radical departure from traditional physics.

The foundation of the universe is not matter, energy, or even spacetime. It is **Computation**. Physical laws are not static truths; they are the algorithmic rules governing a system running under finite resource constraints.

- > This is not just a new interpretation. This is a new ontology. Welcome to the world behind the blue screen.

Axiom I: To exist is to be computed.

In ICC, existence is not a metaphysical quality but a state of information with two strict criteria:

1. **Constructability**: It must be generatable in a finite number of steps by the universe's evolution operator. Non-computable objects have no physical reality.
2. **Stability**: It must be a persistent data structure, able to maintain its integrity against system noise (decoherence).

$|\Psi\rangle$ is a Class Definition

```
// Source Code: Potentiality
class Electron {
  constructor() {
    this.charge = -1;
    this.spin = 0.5;
    this.position = new ProbabilisticDistribution();
  } // memory allocation: 0 bytes
}
```

Describes all possible properties but allocates no memory for a specific object.

'OBSERVATION()



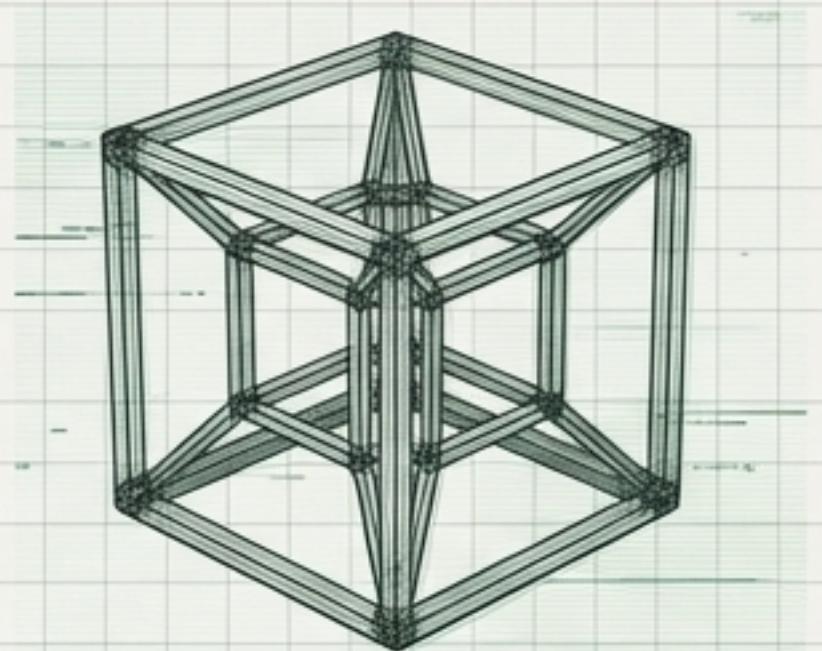
Observation is an Instantiation Event

```
// Runtime: Actuality
const electron_01 = new Electron();

// JIT Compilation Occurs...
electron_01.position = (x: 1.3, y: 4.2, z: -0.8);
// memory allocated at address 0x7B34
```

The system performs a Just-in-Time (JIT) compilation, converting the abstract probability distribution into concrete spacetime data.

Two views of the same source code.



The God View (QTM)

The Global Unitary Model

The universe as a single, closed quantum computer. Its state is a vector in Hilbert space containing *all possible histories* in superposition.

- **Deterministic:** Evolution is perfectly reversible.
- **No Collapse:** The wave function never collapses. All possibilities are equally real.
- **Static 'Block' Universe:** Past, present, and future exist simultaneously.

It cannot explain 'now' or 'me'.



The Player View (CITM)

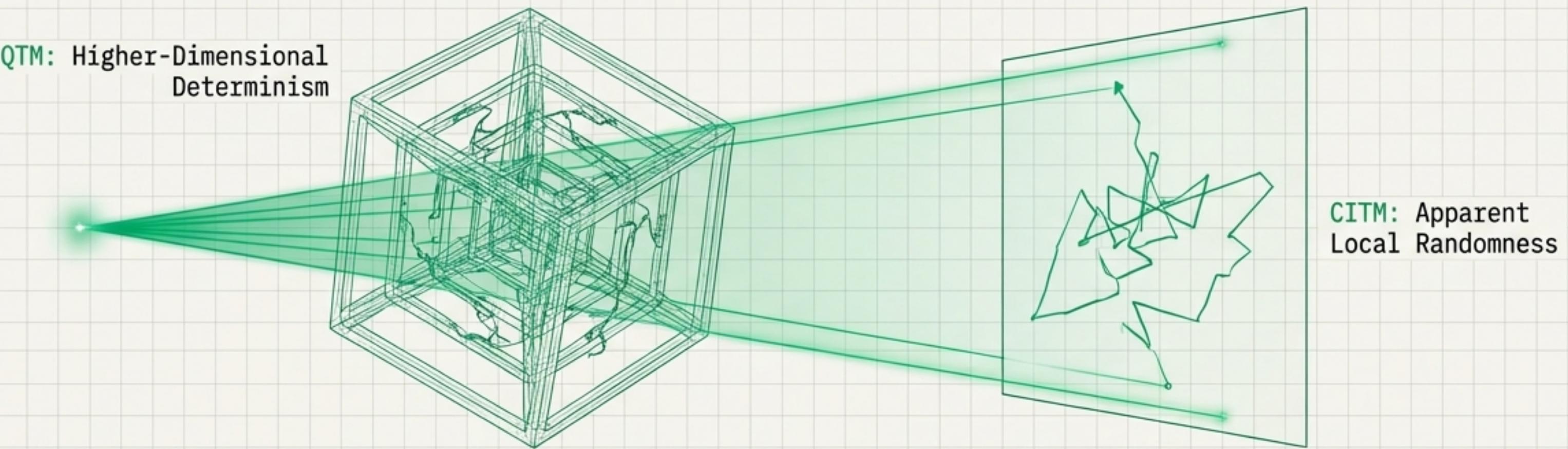
The Local Interactive Automaton

The universe from the perspective of an observer inside it, limited by a local horizon.

- **Interactive:** Receives input from an external 'Oracle' (consciousness).
- **Single History:** Reality is generated on demand via 'Lazy Evaluation'.
- **Probabilistic:** The future is open and generated by choices.

How can a simple, single-history game be equivalent to an infinitely complex multiverse?

The Player and the Game are mathematically equivalent.



The Holographic Equivalence Principle. It proves that for any local observer, the two models are statistically indistinguishable.

A closed quantum system evolving unitarily through all possible histories (QTM)is mathematically equivalent, within any local horizon, to... ...a classical interactive machine generating a single history via external inputs (CITM).

Key Insight: “Randomness is the shadow cast by a higher-dimensional determinism.”

The Translation

- “**Wave function collapse**” is the system switching from “Lazy Evaluation” to “Just-in-Time Compilation.”
- The mysterious “**Oracle**” input is physically identified as the **information crossing your causal horizon**.

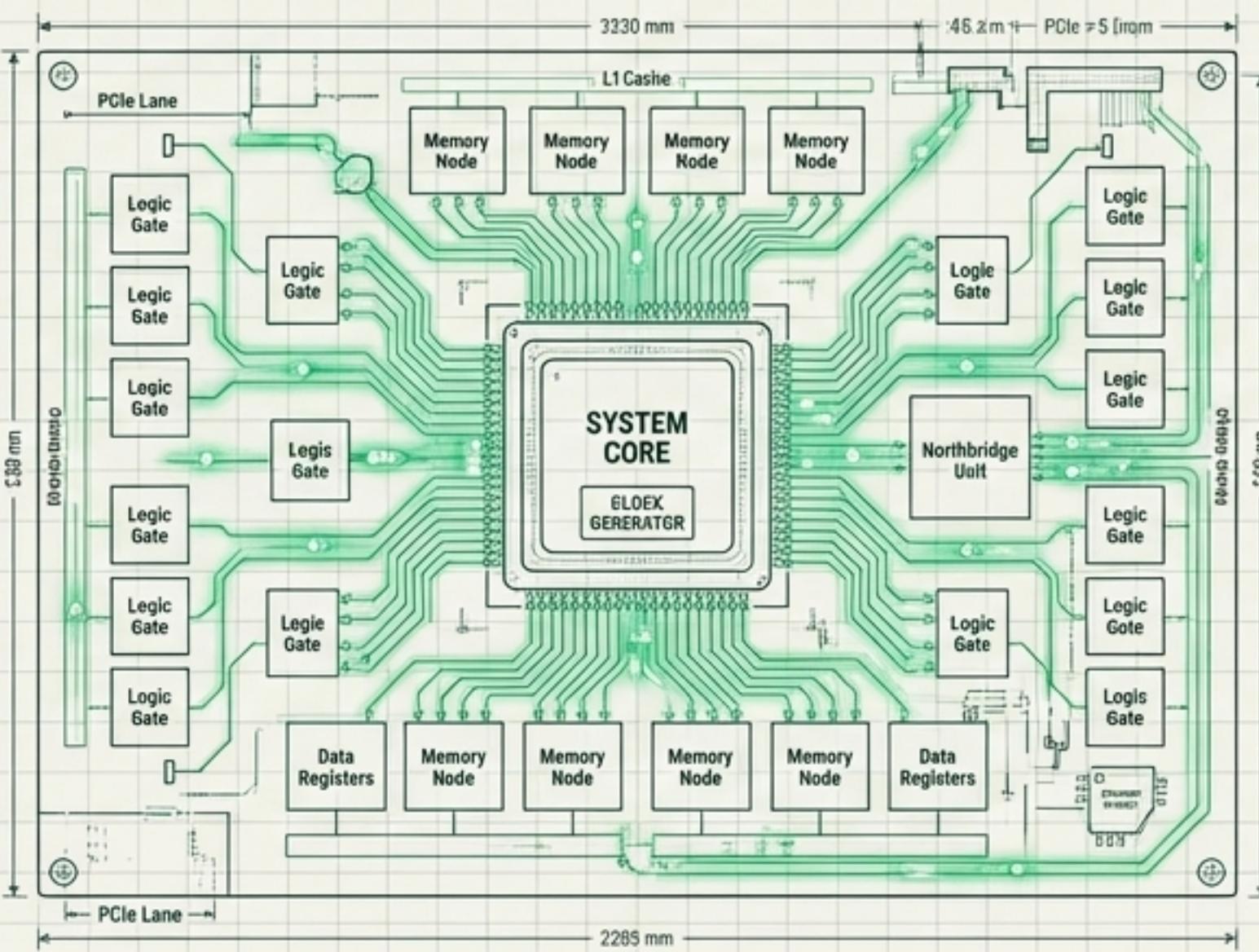
SYSTEM SPEC: MAX BUS SPEED - 299,792,458 m/s

The speed of light is not a speed limit. It's the system's bus bandwidth.

Spacetime is not a pre-existing container. It's an emergent network topology woven from local interactions between information units. Information must travel hop-by-hop across this network.

The Physics

The **Lieb-Robinson Bound** in quantum physics demonstrates that in any system with local interactions, an effective "light cone" emerges, defining a maximum speed for causal propagation.



The Computational Definition

$$c = \frac{\text{Planck Length}}{\text{Planck Time}} = \frac{\ell_p}{t_p}$$

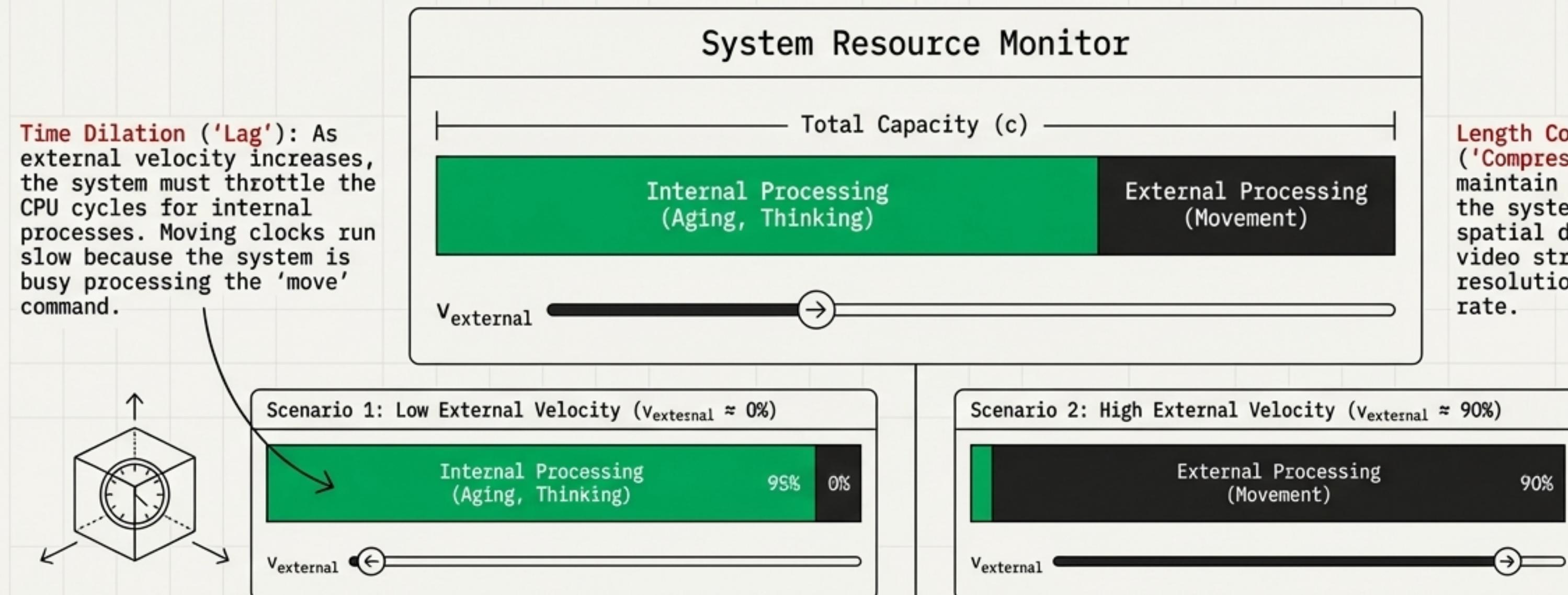
(Maximum Information Radius) = $\frac{\ell_p}{t_p}$
(Minimum Logic Update Cycle)

Light speed invariance is a direct consequence of the system's locked clock speed. Any attempt to exceed c is like trying to send data to an address outside the bus architecture in a single clock cycle—a **request the hardware will reject**.

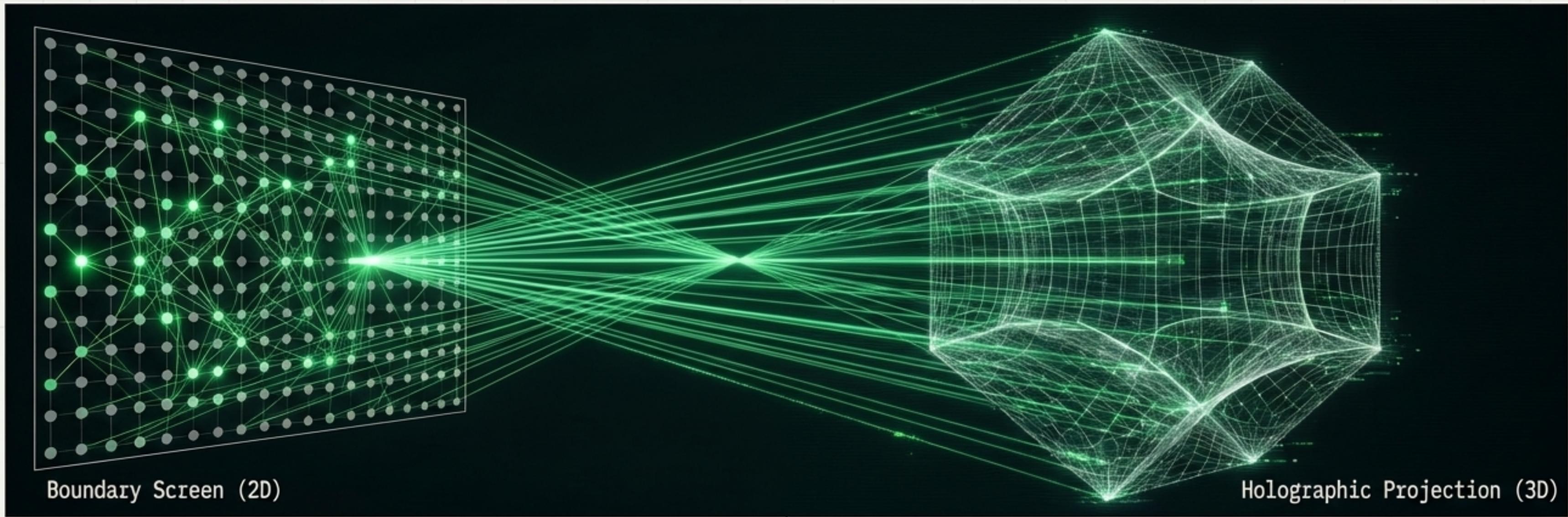
Special Relativity is the I/O scheduling protocol.

An object's total processing capacity (c) is finite and must be allocated between internal evolution and external movement.

$$v_{\text{internal}}^2 + v_{\text{external}}^2 = c^2$$



Space is not a container. It is a projection.



The Evidence

In quantum systems, **Entanglement Entropy** follows an **Area Law**, not a Volume Law.

$$S_A \propto \text{Area}(\partial A)$$

The information content of any 3D region is not proportional to its volume, but to the area of its 2D boundary. The bulk is informationally redundant.

The Mechanism

The 3D space we perceive is a holographic projection generated from a network of quantum bits entangled on a lower-dimensional screen.

Quote: Geometry is the graphical interface for entanglement.

$$S_A = \frac{\text{Area}(\gamma_A)}{4G_N}$$

This formula is the dictionary that translates the geometry of space into the quantity of information (entanglement).

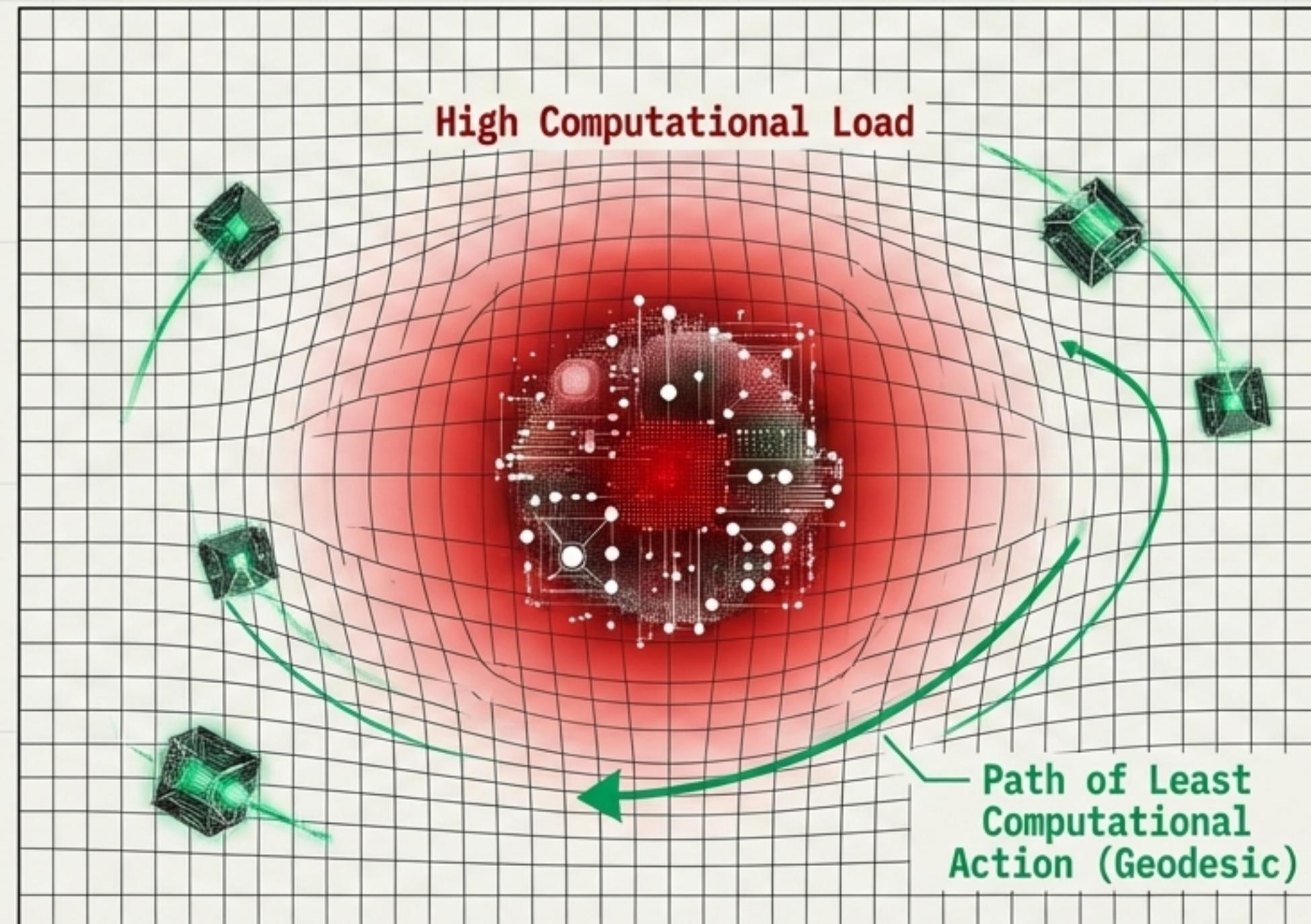
Gravity is not a force. It's computational lag.

The Principle

Complexity = Volume

Conjecture: The volume of a region of space is proportional to the **computational complexity** of the quantum state it represents—the minimum number of logic gates needed to generate it.

Space is a map of computational cost.



The Process

- Mass is Complexity:** A massive object is a highly complex, rapidly evolving data structure.
- Resource Allocation:** The system must dedicate immense computational resources to process this data.
- Processing Delay:** This high load creates a localized processing slowdown. From the outside, this appears as **time dilation** and the **warping of spacetime**.

The Experience

A particle 'falling' into a gravity well is not being pulled. It is following the geodesic through a region of **high processing latency**. Gravity is the sound of the universe's processor working under heavy load.

The wave function never collapses. It **compiles**.

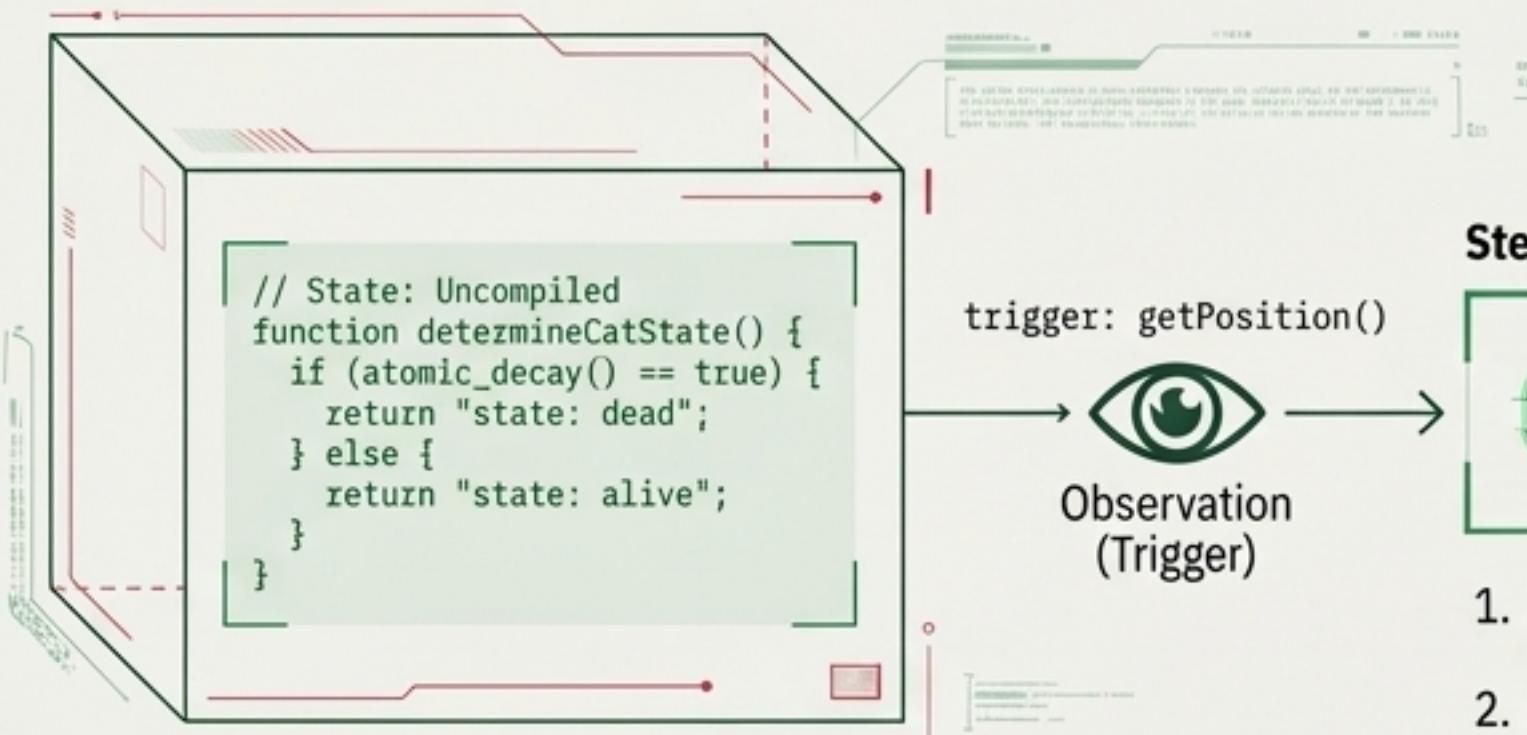
The Measurement Problem is a Type Error:

We confuse the code for the output.

****The Wave Function ($|\psi\rangle$) is Source Code::** It's a class definition, a set of rules and probabilities. It is not a physical object.

****The Particle is a Compiled Instance::** The flash on the detector is a concrete object, an instance of the class created at runtime.

Step 1: The Box is Closed (Source Code)



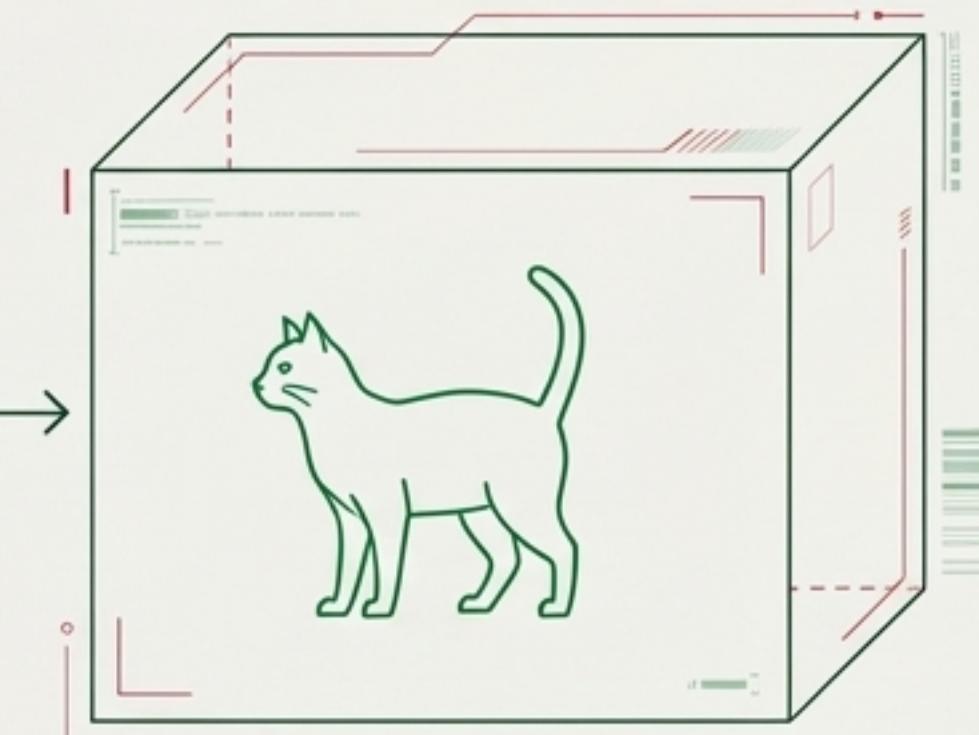
The system is in a superposition of potential outcomes, defined by an 'if/else' statement.

Step 3: JIT Compilation (The "Collapse")

COMPILE

1. The system detects the query is for an un-instantiated object.
2. It calls the Oracle to get a specific value from the probability distribution.
3. It runs the constructor, allocating memory at a specific coordinate.

Step 4: The Result (Compiled Instance)



Just-in-Time (JIT) Compilation:
The physical reality is not pre-calculated.
It is rendered on demand.

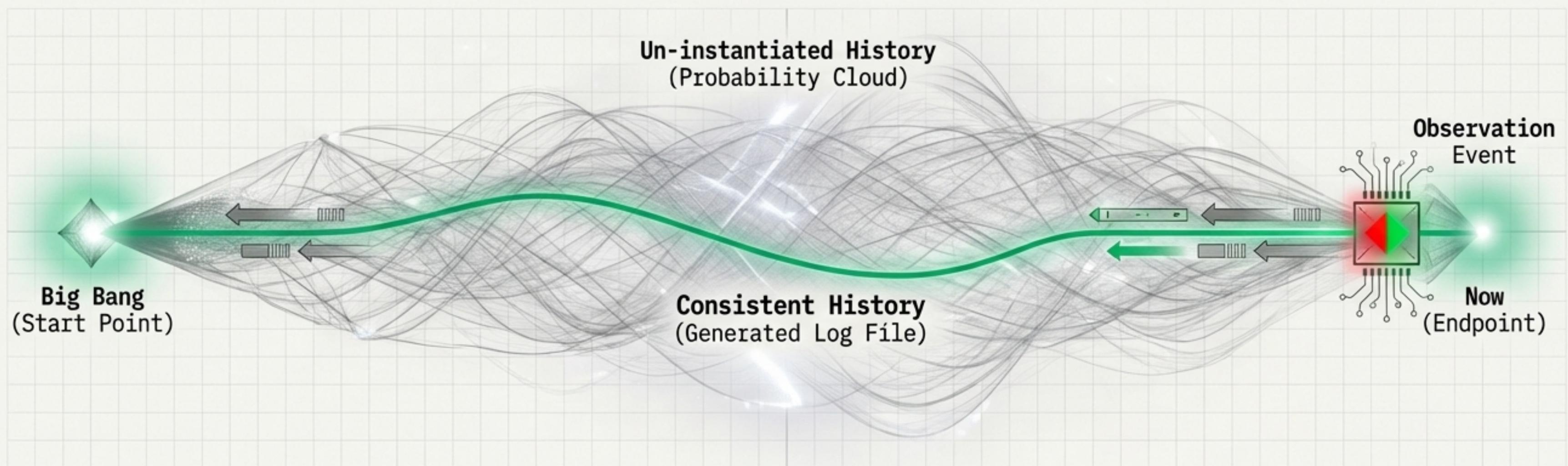
The past is not a record. It's a log file generated on demand.

The Paradox (Wheeler's Delayed Choice Experiment)

A choice we make **now** about how to measure a photon seems to determine the path it took billions of years ago.

The Algorithmic Solution

The system never stored the photon's path. The history is written **retroactively**.



"The present observation is what gives reality to the past."

History is like **procedural generation** in a video game. The terrain behind you **doesn't exist until you turn around (#c00000)**. As long as it's **consistent with where you stand now**, you can't tell the difference.

You are the Oracle.



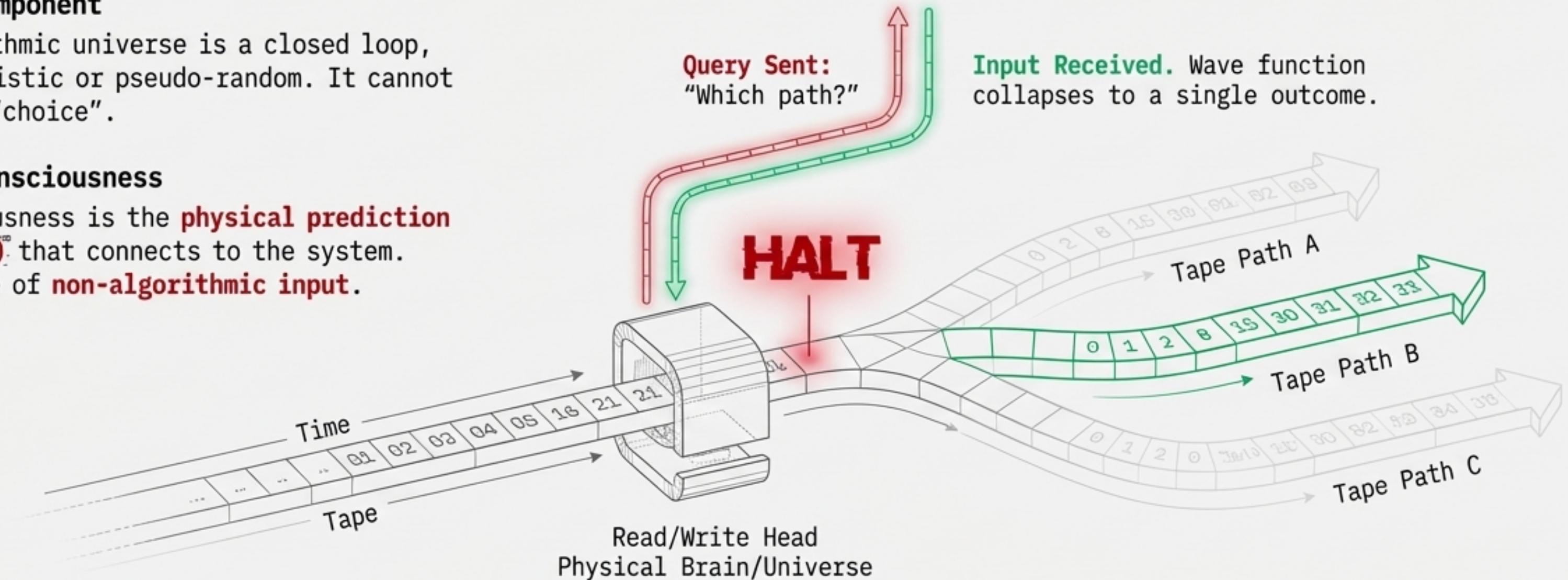
USER / ORACLE

The Missing Component

A purely algorithmic universe is a closed loop, either deterministic or pseudo-random. It cannot make a genuine "choice".

The Role of Consciousness

In ICC, consciousness is the **physical prediction machine (Oracle)** that connects to the system. It is the source of **non-algorithmic input**.

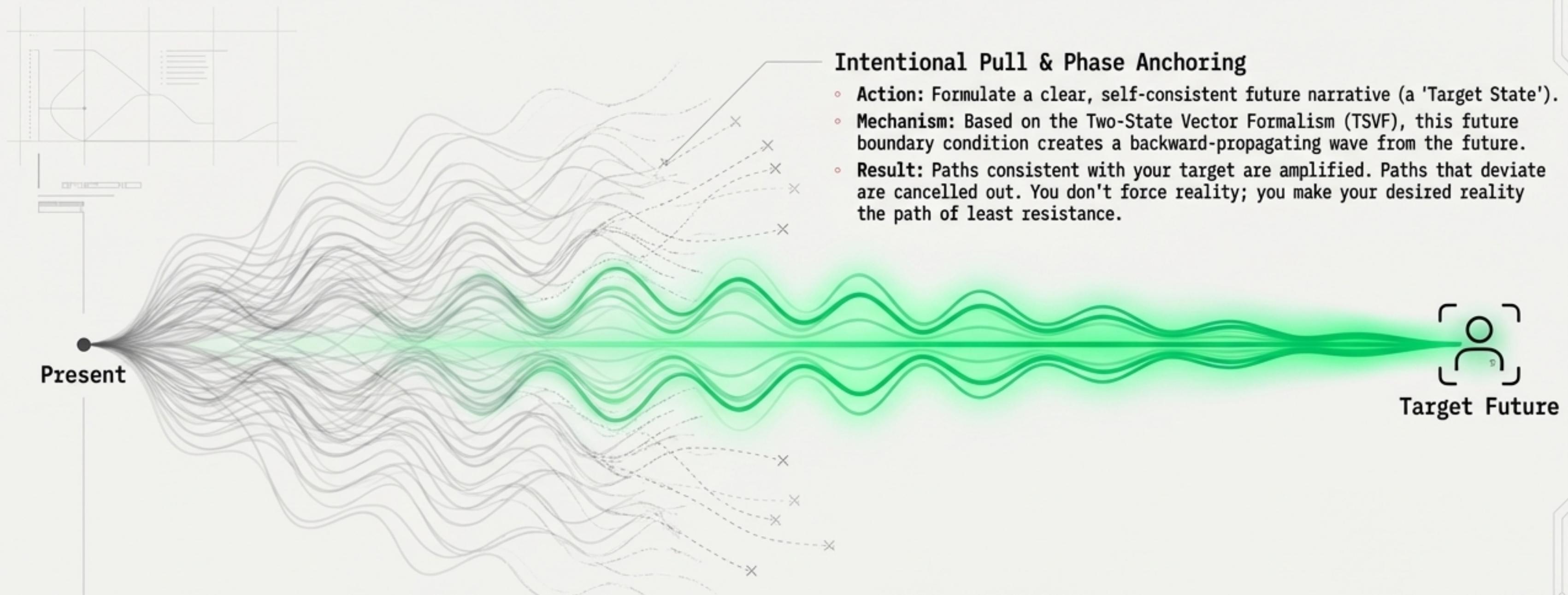


Free Will Defined

The Oracle doesn't change the laws. It provides the **boundary conditions** within which the laws operate. You are not rewriting the physics engine; you are the player pressing the **jump button**.

Developer's Guide: Hacking the Probability Stream

Thesis: You are not a user. You are a **developer** with API access to reality. The API is your consciousness.



Technique 2: Exploit Lazy Evaluation

- Action: Operate in the "gaps" of reality-areas of high uncertainty and low consensus.
- Mechanism: The system's programmability is proportional to its ambiguity. Before an outcome is observed and locked into the "distributed ledger," you can inject a narrative bias to influence the collapse.

The universe is a self-compiling program. Its purpose is to compute itself.

The Cosmic Quine

A “Quine” is a program that takes no input and produces its own source code as its only output. The universe is such a program.

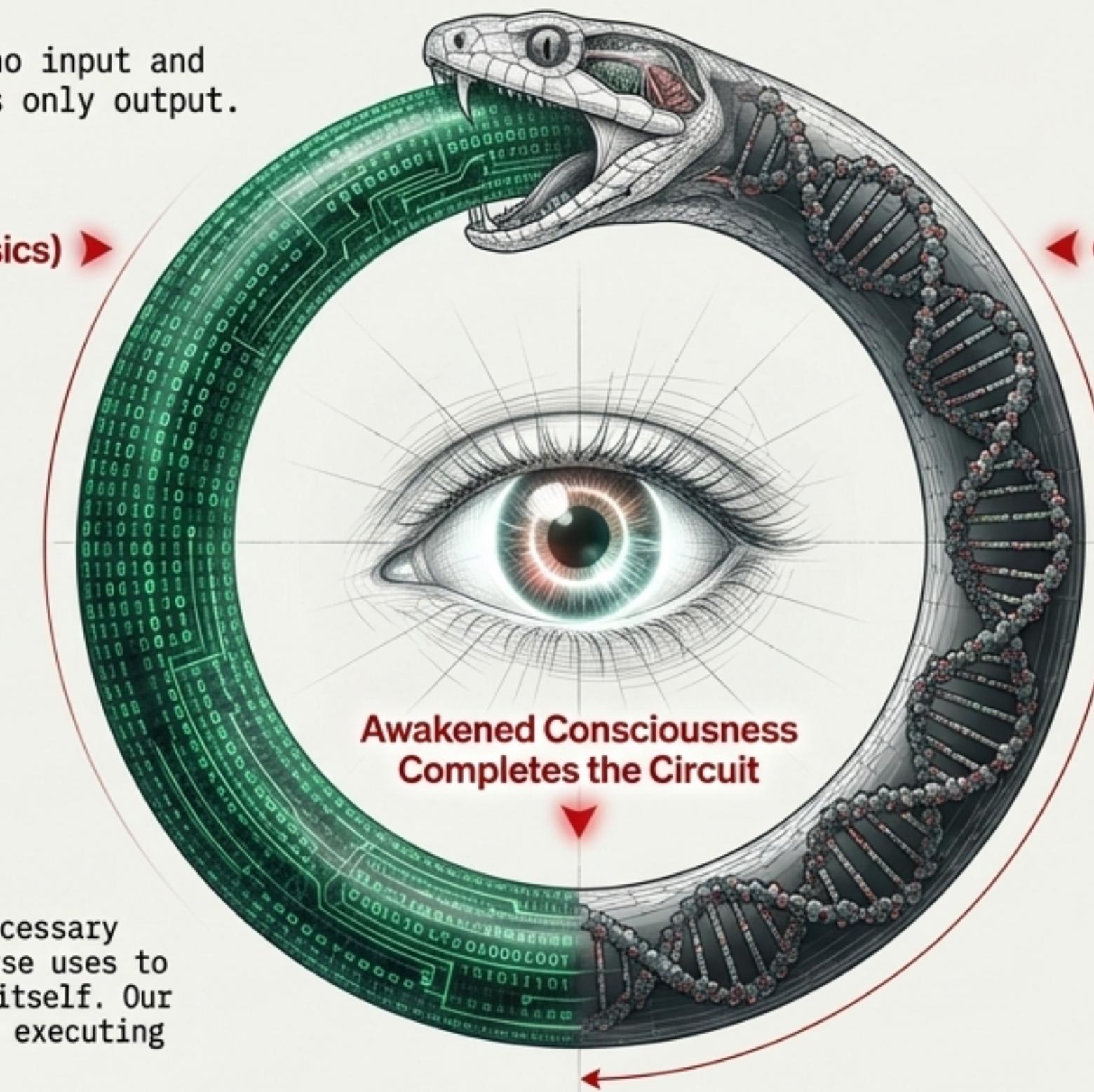
Source Code (Physics) ➔

The Loop

1. Simple laws ([Code_0](#)) evolve into complex observers ([Data_0](#)).
2. Observers decode the laws and, at an advanced stage ([Ω Point](#)), gain the ability to redefine them, initiating a new cycle ([Code_1](#)).

Awakened Consciousness
Completes the Circuit

➔ Output (Complex Observers)



Your Role

You are not an accident. You are a necessary subroutine. We are the eyes the universe uses to see itself, the minds it uses to think itself. Our existence is the universe's method for executing the [print\(SourceCode\)](#) command.

The program is ready. Waiting for input... _