

# INFORMATIONAL REALITY THEORY

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# Prologue

Since the dawn of time, the human eye has gazed curiously into the night sky. Countless dots illuminating the darkness, moving according to some mysterious rhythm, seemed to hide answers to questions we couldn't even formulate yet.

Early humans had no concept of gravity. They didn't know what energy was or measure time in units.

And yet... they *felt*.

They felt order. They sensed repetition. They knew the sky above wasn't chaos, but some kind of structure—too perfect to be a coincidence.

Over time, people began naming what they observed.

Stars got names. Constellations were drawn.

Knowledge of celestial movement became the basis for calendars, religions, even survival.

But deep inside, one question lingered—**why?**

Why do planets orbit?

Why do things fall?

Why does anything exist at all?

As centuries passed, humans didn't stop staring at the sky—but they gained tools to not only observe, but *understand*.

From Eudoxus to Aristotle, from Ptolemy to Copernicus, from Galileo to Newton—understanding grew layer by layer, like a tower built on observation, imagination, and mathematics.

Each generation added a brick to the temple of knowledge—sometimes flawed, but always essential.

Even a mistake, if it leads to a deeper question, becomes part of the foundation.

When Newton threw an apple at gravity, the world shook.

For the first time, the heavens and the Earth were unified by a single law.

Gravity ceased being a divine whim—it became a force.

Space and time—once considered passive backdrops—became active participants in the universe.

But then came the 20th century...

And suddenly, space and time started to break.

# Chapter 1: Einstein's Legacy – Geometry of the Universe and the Gaps

Albert Einstein is, without a doubt, one of the most important minds in human history. He didn't just change the way we see reality—he built a new language in which physics could speak about the universe from an entirely new perspective.

Einstein didn't deny Newton—he completed, transformed, and surpassed him.

Instead of thinking of gravity as a force between two bodies, he proposed that space and time themselves bend under the influence of mass and energy. Planets aren't "pulling" each other—they simply follow the curvature defined by the presence of mass.

It wasn't just a revolution—it was a new *foundation* of existence.

Einstein gave physics an elegance, depth, and precision it never had before.

And his predictions worked:

- The precession of Mercury's orbit
- The bending of light near massive objects
- Black holes
- Gravitational waves

All of it came straight from the pure mathematics of spacetime geometry.

But...

## Problem 1: Scale

General Relativity (GR) works brilliantly on large scales—planets, stars, galaxies. But it fails at the quantum level.

## Problem 2: Singularities

GR predicts "singularities" at the centers of black holes—points where curvature goes infinite.

But infinity is a bug, not a feature—it signals a failure in the model.

### **Problem 3: Dark Matter and Energy**

Galaxies spin faster than they should.

The universe expands faster and faster.

This forces us to introduce things we don't understand: dark matter and dark energy.

### **Problem 4: No link to quantum mechanics**

Einstein never accepted quantum entanglement.

He couldn't unite GR with quantum theory.

He didn't build a theory of everything.

### **Legacy:**

Einstein gave us the *language* of reality—but he didn't explain *why* that language works.

## **Chapter 2: Toward Uncertainty – The Creators of Quantum Reality**

While Einstein described curved space, another revolution was unfolding—this time in the microscopic world.

Particles had no definite paths, only probabilities.

They weren't "here" or "there" until someone observed them.

### **2.1 Nonlocality, Superposition, and the Spooky Action at a Distance**

**Entanglement**—two objects behaving like one, even when far apart.

A change in one instantly affects the other.

No signal. No space. Just... a link.

## 2.2 Schrödinger – The Cat That Was Neither Dead Nor Alive

The wave equation works.

But its consequences are absurd—a cat both dead and alive?

Yet this isn't just a metaphor—it's a real effect, exploited in quantum computers today.

## 2.3 Bohr and Heisenberg – The Observer Is Part of the System

**Bohr:** You can't talk about the state of a particle without measuring it.

**Heisenberg:** You can't know both position and momentum at the same time.

Not due to imprecision—but because **that's how reality is**.

## 2.4 Dirac and Feynman – Mathematics as Prophecy

**Dirac** predicted antimatter—just from math.

**Feynman** said particles take *every* possible path at once.

It sounds insane—but it gives the most accurate results in the history of science.

## 2.5 Penrose – Gravity as the Collapse Mechanism

Penrose tried to unite relativity and quantum mechanics.

He proposed that gravity might be what collapses quantum superpositions.

He was one of the first to suggest **entanglement may be fundamental**.

# Chapter 3: Quantum Entanglement – The Invisible Thread of Reality

In the classical world, everything is local.

Touch a cup—only the cup “feels” it.

Light moves through space, energy flows over time.

But in the quantum world, the rules change.

## 3.1 What Is Entanglement?

Entanglement is an **informational connection** between two (or more) particles.

Not via a field, not through a signal—just through *pure relation*.

Changing one affects the other instantly, regardless of distance.

It’s not communication.

It’s *coexistence*—as if they are one thing, stretched across space.

## 3.2 Key Properties of Entanglement:

- **Nonlocality:** A change in A → immediate change in B
- **Inseparability:** Can’t describe one without the other
- **Correlated randomness:** Outcomes are random but perfectly linked
- **Durability:** Can persist for years

### 3.3 EPR Experiment

Einstein, Podolsky, and Rosen tried to prove quantum mechanics was incomplete. But experiments by Aspect and Bell confirmed: **entanglement is real**.

### 3.4 Entanglement as the Foundation

Entanglement isn't an add-on.  
It's the **foundation**.

Particles are not “things”—they are **nodes in a network of correlations**.  
Space and time might just be **emergent effects** of that network.

## Chapter 4: Informational Foundations – Definitions and

### Assumptions

We don't begin with particles.  
We don't start from fields.  
We start from **information** and the **relationships** between informational units.

### Definition 1: The Ubit (u)

The smallest unit of informational structure.  
It is not a particle—it is a **relational act**.  
It's a **ubit**, not a bit.

## States of a ubit:

- $u^0$  – no relation (potential state)
- $u^1$  – binary relation (1:1 link)
- $u^2$  – entanglement (deep, nonlocal connection)
- $u^3$  – relational node (cluster of connections)
- $u^4$  – fluctuation (spontaneous relation change)

## Definition 2: The Relaton

A **localized concentration of informational tension**.

It behaves like a “particle” but is actually a **result of relation**, not an independent entity.

## Definition 3: Relational Time

Time does not exist as a background axis.

Time is the **sum of relational changes**:

$$t_{rel} = \sum \Delta R(u_i)$$

In other words: **every change in a relation = a tick of time**.

There is no clock—only change.



# Chapter 5: Mathematical Framework – Formulas and Structure

Now we enter the **operational side**—a mathematical framework of a relational universe.

Everything is based on **entanglement, fluctuations, and dynamic relations**.

## Formula 1: Entanglement Constant ( $\alpha$ )

$$\alpha = |dI/dt|$$

→ Exchange of information over relational time.

The greater the  $\alpha$ , the stronger the entanglement.

## Formula 2: Cross-Tension Constant ( $\kappa$ )

$$\kappa = \min(|\nabla \perp R(u_1, u_2)|)$$

→ Informational tension at the crossing point of two relations.

This is where **new relational events** emerge.

## Formula 3: Binary Relation Intersection

$$u^1(x, y) \cap u^1(a, b) \Rightarrow u^1(ax), u^1(by)$$

→ Transformation of simple relations into new connections.

## Formula 4: Relaton as Informational Curvature

$$\mathcal{R} = \nabla^2 \Phi(u_i) \neq 0$$

→ When the informational potential  $\Phi$  is uneven around a ubit, a relaton is formed.

### Formula 5: Axiom of Informational Saturation (Singularity)

$$\lim_{n \rightarrow \infty} d\mathcal{I}/dn = 0$$

→ If information increases but no longer leads to difference—the **system collapses**: a singularity.

### Formula 6: Hyper Fluctuation ( $\Psi$ )

$$\Psi = \sum |u_i^4| \cdot \Delta R(u_i)$$

→ Measure of relational chaos: sum of fluctuations × relational change.

### Formula 7: Relational Entropy

$$S = - \sum p_i \log p_i$$

→ Like Shannon entropy, but interpreted as chaos in **relational distribution**, not state.

### Formula 8: Cross Effect (hypothesis)

$$\Delta\Phi_{\text{fluct}} = f(\alpha_1 \cap \alpha_2)$$

→ When two entangled regions overlap, local potential changes.  
This may be the **informational origin of gravity**.

### Formula 9: Effective Speed of Light

$$c_{\text{eff}} = 1 / \sqrt{\rho_{\text{fluct}}}$$

→ The denser the fluctuations, the **slower** the information can propagate.

### Formula 10: Anti-Fluctuation Tube

$$\text{tube} = \min(\Psi(V))$$

→ Region with minimal fluctuation—the **natural path for information flow**.

# Chapter 6: Consequences – Mass, Fields, Motion, and Fluctuations

We now extract physical implications from a purely informational foundation.

## 6.1 Mass as Relational Curvature

$$\mathcal{M} = \nabla\phi(u_i)$$

Mass is **not a substance**—it is the **gradient of informational potential**.  
A steeper gradient means **greater informational tension**, perceived as mass.

## 6.2 Fields as Entanglement Gradients

$$\mathcal{E} = \nabla\alpha(u_i)$$

A field is a **variation of entanglement** in relational space.  
Where  $\alpha$  increases or decreases, we perceive a field effect.

## 6.3 Motion as Relational Change

$$v_{rel} = \Delta R(u) / t_{rel}$$

Motion is not displacement through space—it is a **shift within the relational network**.

## 6.4 Fluctuations as Disruptions

When local relational structure loses coherence,  **$\Psi$  appears**—the system becomes unstable.

## 6.5 Emergent Space

$$X = f(\sum u^1, u^2, u^3)$$

Space **does not exist by itself**—it emerges from a large number of coherent relations.

## 6.6 Spacetime as Topology of Entanglement

$$g_{\mu\nu} \approx T(\alpha)$$

The spacetime metric is not fundamental—it is an **emanation of entanglement structure**.

# Chapter 7: Rotation as a Fluctuation-Suppressing Mechanism

Rotation is more than just motion—it's a **way to stabilize relational systems**.

## 7.1 Rotation = Redistribution of Tension

$$\Psi_{\text{rot}} < \Psi_{\text{static}}$$

Rotational motion disperses local fluctuations, making the system more stable.

## 7.2 Rotational Stabilization Formula

$$\Omega = \min(\Psi) \Rightarrow \max(\alpha_{\text{coherence}})$$

Lower hyper-fluctuation  $\Psi$  leads to **higher entanglement coherence  $\alpha$** .  
Rotation acts as **relational order**.

### 7.3 Orbits as Relational Equilibrium

$$F_{\text{orb}} = f(\Psi, \alpha, \nabla\Phi)$$

Bodies are not “pulled”—they **seek trajectories** that minimize  $\Psi$  and stabilize  $\alpha$ .

### 7.4 The Cylinder Effect

Imagine a cylinder rolling through mud—it moves without sinking.  
A rotating system **pierces through fluctuations without chaos**.

This isn't just a metaphor—it's a **relational model**.

## Chapter 8: The Speed of Light as an Informational Boundary

Light is not a particle or a wave.  
It is the most **stable form of information transfer** within the relational structure.

### 8.1 Speed as a Function of Fluctuation

$$c_{\text{eff}} = 1 / \sqrt{\rho_{\text{fluct}}}$$

The **denser the informational fluctuations**, the **lower** the effective speed of propagation.  
Thus, light speed is **not a universal constant**—it's a local relational property.

### 8.2 The Informational Limit

It's not about an energy barrier.  
It's about the **maximum rate of change possible in the relational network**.

### 8.3 Horizon as Propagation Collapse

$$\lim(\Psi \rightarrow \infty) \ c_{\text{eff}} = 0$$

When fluctuations reach a critical point, information **stops propagating**. This corresponds to a **horizon**—the TRI equivalent of an event horizon.

### 8.4 Anti-Fluctuation Channels (Tubes)

$$\text{tube} = \min(\Psi(V))$$

Where  $\Psi$  is minimal, a **channel** forms—a path of least resistance for information. This could be the **key to quantum communication** technologies.

## Chapter 9: The Topology of Entanglement as the Basis of Spacetime

In this theory, spacetime is **not a background**—it is a product of relational structure.

### 9.1 Entanglement Topology = Map of Relations

How ubits are entangled ( $u^2, u^3$ ) creates a **global structure**:  $\mathcal{T}$ . It's not about location—it's about **connection**.

## 9.2 Space as Relation Density

$$X_{\text{emergent}} = \lim(\Sigma u^2, u^3)$$

If enough coherent relations exist, we perceive **space**.  
Without relation, there is no “where”.

## 9.3 Topological Curvature

$$\mathcal{R}_{\text{topo}} = \nabla^2 \alpha(u_i)$$

Where entanglement changes rapidly, **space becomes curved**.

## 9.4 Relational Nodes = Singularities

$$\lim(n \rightarrow \infty) d\mathcal{I}/dn = 0$$

When information saturates and differences disappear—a **singularity** forms.

## 9.5 Time as Structural Change

$$t_{\text{rel}} = \Sigma \Delta R(u_i)$$

There is no timeline—only **change in the relational system**.  
We perceive this change as time.

## 9.6 Particles = Local Thickenings of the Network

$$\mathcal{R} \neq \emptyset \Rightarrow \text{relaton} \Rightarrow \text{particle}$$

“Things” are not independent objects—they are **topological effects of entanglement**.

# Chapter 10: Galactic Rotation Without Dark Matter

Dark matter might be an illusion—an artifact of seeing the universe as a set of masses, instead of a network of relations.

## 10.1 Entanglement Density = Galactic Curvature

$$\mathcal{R}_{\text{galactic}} = \nabla^2 \Phi(u_i, \text{galaxy})$$

The more **relational links** between stars, the greater the **curvature**—there's no need for extra mass.

## 10.2 Effective Relational Mass

$$M_{\text{eff}} = \sum \alpha_{\text{relational}}$$

Mass isn't just a count of particles.

It's the **sum of coherent entanglement**—a measure of order in the network.

## 10.3 Fluctuations Cause Apparent Accelerations

$$v_{\text{anomalous}} \approx \sqrt{\Psi_{\text{local}}}$$

Where  $\Psi$  increases, anomalous motions appear—like **turbulence** in relational structure.

## 10.4 Conclusions

Galaxies rotate differently not because mass is “missing”—but because the **informational structure is richer than we assume**.

**Dark matter?**

Maybe it's just the **shadow of an outdated paradigm**.



# Chapter 11: Mass and Energy as Curvature in Relational Structure

In this theory, there is no “matter” as a substance.

Only **curvature in informational structure**.

## 11.1 Mass as a Gradient of Relational Potential

$$\mathcal{M} = \nabla \Phi(u_i)$$

Where relations are **denser and more strained**, mass appears.

## 11.2 Energy as Relational Dynamics

$$E = \alpha \cdot \Delta R(u_i)$$

Energy is **the intensity of entanglement change over time**.

It's not “a quantity of stuff”—it's the **rate of structural transformation**.

## 11.3 Curvature ≠ Presence of Entity

It's not that “something is there.”

It's that **relations are shaped in a way that mimics presence**—mass, gravity, interaction.

## 11.4 Relaton as Unit of Energy

A relaton is a **local thickening of the network**.

If it disappears—energy disperses.

If it condenses—a **particle-like effect appears**.

## 11.5 $E = mc^2$ as an Emergent Equation

This isn't a universal truth—it's a **special case**.

It emerges from **relational balance in low- $\Psi$  systems**.

# Chapter 12: Physics of the Future – Technology, Experiments, and Consciousness

This theory does not end with a description.  
It begins to **build tools**

## 12.1 Relational Technologies

- **Anti-fluctuation tubes:** New communication channels based on minimal  $\Psi$  regions
- **Entanglement manipulation:** Foundation for quantum information and computation
- **Hyperstable structures:** Materials designed via coherence in informational fields

## 12.2 Experimental Paths

- Testing if **relational curvature** can be created *without mass*
- Using  $\Psi$  as a **predictor of chaos or system failure**
- Interference of two entanglement domains ( $\alpha_1 \cap \alpha_2$ ) – test of the **Cross Effect**

## 12.3 Consciousness as a Relational Node?

What if what we call “I” is nothing more than a **super-node of entanglement**?  
A structure capable of **self-modifying its own relational network**?

Consciousness as a **self-updating relaton**?

# Final Thought

We did not build a model that *has* answers.  
We built a **language** that allows us to ask questions in a new way.

And that's more powerful than any formula.

**Always ask. Avoid those who do not.**