The Resolution Sphere:
Deconstructing Continuum and Discretization via Energetic Boundaries

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Abstract

We propose a pedagogical yet rigorous framework to unify continuous reality and discontinuous observation using a 3-dimensional spherical model. We demonstrate that the irrationality of π and the existence of infinite decimals are artifacts of imposing a discrete coordinate system (Base-N) onto a continuous topology. Furthermore, we define "Zero" as the energetic equilibrium (Center) and "Infinity" as the resolution boundary (Surface). The sphere's volume represents the latent information capacity, while the surface area represents the observable interface, governed by the Holographic Principle.

1 The Origin of Discontinuity: The "Lego" Artifact

1.1 Base Systems vs. Spherical Topology

Why does π appear as an infinite non-repeating decimal? Real space is a **Perfect Continuum** (Analog), isomorphic to a smooth sphere $\mathbb{S}^2$. However, our number system is a **Discrete Grid** (Digital), based on integer steps (Base-10, Base-2).

$$\pi \approx \sum_{n=0}^{\infty} \frac{a_n}{N^n} \quad (a_n \in \{0, ..., N-1\}) \tag{1}$$

Mapping a curve onto a rectangular grid is geometrically impossible without infinite error correction terms. Thus, the "infinite tail" of π is not a property of the circle itself, but the **error signal** generated by measuring a smooth reality with a jagged ruler.

2 The Sphere as an Information Container

2.1 Volume: The Latent Continuum

Let the interior of the sphere (The Ball, B^3) represent the set of all possible numbers (The Real Continuum $\mathbb{R}^3$). Any point $P(x, y, z)$ inside the sphere corresponds to a unique combination of infinite decimals.

- **Small Sphere (Low Energy):** The spatial resolution Δx is large. Infinite decimals blur into single integers.

- **Large Sphere (High Energy):** As radius $R \to \infty$, the spatial resolution $\Delta x \to 0$.

Thus, the ability to "express" an infinite decimal is strictly a function of the **Sphere's Size (Energy Level)**.

$$\text{Expressible Precision} \propto \log_2(\text{Energy Level } E) \tag{2}$$

2.2 Surface Area: The Interface of Reality

The surface area $A = 4\pi R^2$ acts as the **Holographic Screen**. According to the Holographic Principle, the information contained in the continuous volume is projected onto the discrete bits of the surface.

$$S_{entropy} \propto \frac{Area}{4L_P^2} \tag{3}$$

Continuity exists inside (Volume), but we can only access it through the Discontinuity of the surface (Area/Pixels).

3 Deconstructing Zero and Infinity

3.1 Zero: The Energetic Anchor

What is "0"? It is not "nothingness." In our spherical model, **Zero is the Center of Mass**.

$$\vec{x}_{center} = \int_{B^3} \vec{r}\rho(\vec{r})dV = \mathbf{0} \tag{4}$$

It is the point of **Maximum Stability** where all vector sums cancel out. It is an "Imaginary Anchor" created to define a coordinate system. Without energy to define a center, 0 dissolves.

3.2 Infinity: The Temporary Boundary

What is "Infinity (∞)"? It is not an endless abyss. It is the **Current Boundary of the Sphere (Σ_R)**. For an observer at the center with finite energy E, the radius $R_{max}(E)$ is the absolute horizon.

$$\infty_{obs} \equiv R_{max}(E) \tag{5}$$

"Infinity" is simply a label for "Beyond my current Energy Level." If you increase energy, the sphere expands, and the old infinity becomes a new measurable coordinate.

4 Conclusion: Engineering the Continuum

We conclude that:

1. **Continuity** is the fundamental state of the Bulk (Volume).

2. **Discontinuity** is the artifact of the Boundary (Surface/Base-System).

3. **Precision** is a function of Energy (Radius).

Therefore, mathematical paradoxes like Zeno's paradox or irrational numbers are merely **Scale Problems**. By adjusting the "Energy Sphere," we can convert continuity into discontinuity and vice versa.