

Transformation of Information Geometry Into Physical Spacetime Via an Entropic Action Principle in Obidi's Theory of Entropicity (ToE)

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The concept of transforming information geometry into physical spacetime via an action principle of an entropic field is the foundational framework of the **Theory of Entropicity (ToE)**, a mathematical architecture formulated by John Onimisi Obidi. In this framework, **entropy is treated not as a passive statistical property, but as an active, ontological scalar field $S(x)$** whose dynamics map purely abstract statistical states into the physical fabric of general relativity. [1, 2] The mechanics of how this transformation occurs rely on a highly structured mathematical progression: [1]

1. The Information-Geometry Substrate

In standard mathematics, [information geometry](#) applies differential geometry to probability distributions, using metrics like the **Fisher-Rao metric** (for classical systems) or the **Fubini-Study metric** (for quantum states) to measure how distinguishable two states are from one another. [1, 3]

ToE undergoes an **ontological shift**. It stops treating these metrics as tools to analyze data and posits that this statistical manifold is the *actual* underlying substrate of reality ((M, g)).

Distinguishability between information states fundamentally maps to **physical distance** in the real world. [1, 4, 5, 6]

2. The Obidi Action Principle

To evolve this abstract information manifold into something dynamic, the theory introduces a variational principle called the **Obidi Action**. This action acts as the fundamental "engine" of the theory, optimizing and driving the flow of the entropic field. [7, 8]

Minimizing or stationarizing the Obidi Action describes the continuous, irreversible rearrangement of the underlying entropic degrees of freedom.

The result of varying this action is the **Master Entropic Equation (MEE)**, which serves as the entropic field-theoretic analog to Einstein's field equations. [2, 7, 9, 10]

3. The $\alpha=0$ Connection & Spacetime Deformation

Information geometry uses Amari-Čencov α -connections to describe how probability configurations shift. [2, 5]

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In ToE, the theory isolates the $\alpha=0$ connection, which corresponds strictly to the **Levi-Civita connection** (the unique torsion-free metric connection used in General Relativity).

Governed by the Obidi Action, the pure informational Fisher-Rao metric undergoes an entropy-dependent deformation (scaled by a factor such as e^{S/k_B}). This transforms abstract statistical curvature into a physical **metric-affine geometry**. [2, 5]

4. Coarse-Graining and the Emergence of Spacetime [11]

Physical four-dimensional spacetime does not exist fundamentally in this model; it is an emergent, macroscopic illusion. [5, 6]

Space becomes a literal map of entropic gradients.

Time is derived strictly from the irreversible flow of entropy.

Through a process of macroscopic **coarse-graining**, the deeper, multidimensional entropic metric (g_{IJ}^{entropic}) is projected down into our traditional 4D spacetime metric ($g_{\mu\nu}$).

The **Curvature Transfer Theorem** mathematically proves that the Riemannian curvature of Einstein's gravity is simply the thermodynamic pushforward of the deeper informational Riemann tensor. Gravity is therefore revealed to be an emergent entropic constraint rather than a primitive fundamental force. [5, 6, 12, 13, 14]

If you would like to explore this architecture further, please let us know:

Do you want a breakdown of how the **Master Entropic Equation** mathematically mirrors Einstein's Field Equations?

Are you interested in how this theory handles quantum structures, such as through the **Vuli-Ndlela path integral**?

Would you like to compare ToE to other emergent gravity theories, like **Erik Verlinde's Entropic Gravity**? [2, 9, 10, 15, 16]

[1] <https://medium.com>

[2] <https://ggnpreprints.authorea.com>

[3] <https://en.wikipedia.org>

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[4] <https://medium.com>

[5] <https://medium.com>

[6] <https://osf.io>

[7] <https://medium.co>

[8] <https://medium.com>

[9] <https://medium.com>

[10] <https://medium.com>

[11] <https://medium.com>

[12] <https://encyclopedia.pub>

[13] <https://www.preprints.org>

[14] <https://medium.com>

[15] <https://www.reddit.com>

[16] <https://hal.science>

The transformation of **information geometry** into **physical spacetime** via an entropic action principle is a core focus in emergent gravity paradigms, most notably in the **Theory of Entropicity (ToE)**. In these frameworks, spacetime and gravity are not fundamental, but rather macroscopic manifestations of an underlying statistical system governed by information flow. [1, 2, 3, 4] This transformation typically follows a structured logical progression: [1]

Information Manifolds: The foundation is built upon statistical manifolds (e.g., using the **Fisher-Rao metric** or quantum **Fubini-Study metric**) which measure the "distinguishability" between adjacent quantum or thermodynamic states.

The Entropic Field: Entropy is elevated from a mere secondary statistical tool to a fundamental ontological scalar field, $\mathcal{S}(x)$. Physical space is viewed as a mapping of entropic gradients, while time emerges from the direction of irreversible entropy flow.

Action Principle: A variational principle—often referred to as the **Obidi Action**—governs the dynamics and evolution of this entropic field.

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Curvature Transfer: Just as General Relativity relies on the Einstein-Hilbert action, extremizing the entropic action yields a *Master Entropic Equation* rather than standard Einstein field equations. In the thermodynamic limit, the abstract curvature of the underlying information manifold is "pushed forward" or projected to become the geometric curvature (Levi-Civita connections) of observable physical spacetime. [[1](#), [2](#), [3](#), [4](#), [5](#), [6](#)]

To explore this further, you might find it helpful to review the [ToE Living Review Letters I E](#) for the mathematical Curvature Transfer Theorem, or read about [Obidi's Theory of Entropicity](#) on Medium. [[1](#), [2](#)]

Would you like to explore:

The **mathematical derivation** linking the Fisher metric to the physical metric tensor?

How concepts like **quantum entanglement entropy** or holographic duality relate to this?

A deeper look into the specific **variational principles** used?

Let us know how you'd like to **narrow down the topic**.