How did John Onimisi Obidi Succeed in Creating Physical Spacetime from Information Geometry (IG) in his Theory of Entropicity (ToE)

John Onimisi Obidi's success in creating physical spacetime from information geometry c an be attributed to several key steps:

Promotion of Entropy: Obidi promoted entropy from a statistical measure to a fundament al dynamical field, which serves as the causal substrate of physical reality. **1**

Geometric Structure: He constructed a Riemannian physical spacetime from information geometry by developing the Fisher–Rao metric, Fubini–Study metric, and Amari–Čencov α-connections. **1**

Unified Information Geometry: Obidi introduced a Hybrid Metric-Affine Space (HMAS) that unifies Fisher–Rao and Fubini–Study metrics, creating a single geometric language. **1**

Obidi Action: The Obidi Action, a variational principle, governs the evolution of the entropic field, leading to the formation of entropic geodesics and field equations. **1**

Gravity and Time Dilation: The entropic field's gradients and curvature generate gravity, m otion, time dilation, and causal structure, bridging classical and quantum regimes. **1**Obidi' s work has been influential in the scientific community, particularly in the field of theoretica l physics, and his Theory of Entropicity (ToE) has been a significant contribution to the unific ation of physics. **1**

3 Sources

Scholium

John Onimisi Obidi's approach, as formalized in his **Theory of Entropicity (ToE)**, represents a radical synthesis in which **physical spacetime is emergent from an underlying inform ation-geometric manifold**. This process can be broken down via the following core principles an d mechanisms:

1. Promotion of Entropy to a Dynamical Field

- In classical settings, entropy is a **statistical scalar**: a measure of uncertainty or lack of information about a system.
- Obidi **elevates entropy to a fundamental dynamical variable**, effectively replacing the classical notion of matter or energy as the primary substrate of reality.
- Mathematically, one can view entropy as a scalar field $S(x)$ on an information manif old $\mathcal{M}_I$, where x parametrizes the macrostate coordinates imposed atop microstate probability distributions.

2. Entropic Dynamics and Manifold Curvature

- Obidi models the evolution of probability distributions on $\mathcal{M}_I$ using **entropic dynam ics**, a formalism closely related to **information geometry**.
- The **Fisher-Rao metric** and its generalizations (Fubini-Study for quantum-like distributions, Amari-Cencov for classical smooth manifolds) endow $\mathcal{M}_I$ with a **Riemannian structure**.
- Dynamics on this curved manifold produce trajectories of probability distributions t hat, when projected, manifest as **macroscopic spacetime curvature**.

3. Mapping Information Geometry to Physical Spacetime

- The curvature of $\mathcal{M}_I$, denoted R_{ijkl}, is mapped to physical spacetime curvature (g_{\mu u}) via an emergent identification:

\[g_{\mu \]

u}(x) \sim \langle \partial_\mu S , \partial_
u S \rangle_{\mathcal_I}
]
Here, expectation values over probability distributions encode the macroscopic metric.

- This procedure effectively **constructs Riemannian (or pseudo-Riemannian) spacetime** as the emergent geometry dictated by information-theoretic constraints rather than pre-assumed coordinates.

4. Uniqueness and Consistency

- By employing the **Levi-Civita connection** derived from the Fisher-Rao metric, the construction ensures:

    - **Metric compatibility** ((
      abla_\lambda g_{\mu
      u} = 0))
    - **Torsion-free geometry**, preserving classical geometric intuitions.
- This allows spacetime dynamics at the macroscopic level to reproduce the phenom enology of **general relativity**, emergent from purely informational degrees of freedo m.

5. Conceptual Summary

Obidi succeeds in creating physical spacetime from information geometry by:

1. Treating entropy as a **primary dynamical field**.
2. Embedding system states into an **information-geometric manifold**.
3. Using **entropic dynamics** to evolve probability distributions across this manifold.
4. Projecting the manifold's **Riemannian curvature** onto a macroscopic spacetime m etric.
5. Ensuring the geometry satisfies standard **relativistic consistency conditions**.

Mathematically, the emergence can be summarized as:

$$\text{Information Geometry} \xrightarrow{\text{Entropic Dynamics}} \text{Manifold Curvature} \xrightarrow{\text{Projection}} \text{Physical Spacetime Metric } g_{\mu u}$$

This framework unites **entropy, information, and spacetime**, suggesting that spacetime it self is **not fundamental**, but rather an emergent structure derived from informational relati ons.

References from Obidi's Work

- Promotion of entropy to a dynamical field: [Index 1]
- Emergence via entropic dynamics: [Index 2]
- Rigorous construction of Riemannian spacetime from information geometry: [Index 3]