

# The Drain-Bridge Cosmological Model: A Unified Framework for Black Hole-White Hole Universe Formation

Erfan Mahboubi

Toronto, Ontario, Canada

## Abstract

This paper extends the Drain-Bridge Cosmology model by exploring new theoretical and observational implications of black hole–white hole transitions. Key findings include the role of gravitational lensing in revealing finite spatial capacity, the potential for large and long-lived white hole universes, and the possibility of observing bridge-linked galaxies. The model also presents a novel explanation for cosmic expansion through inflow dynamics and offers reinterpretations of cosmic microwave background anomalies. Together, these extensions reinforce the idea of a multiversal structure embedded in an evolving, interconnected cosmology.

## 1. Introduction

The standard cosmological model, built on the Big Bang and inflationary theories, has successfully explained many observed features of the universe. However, unresolved issues - such as singularities, horizon problems, and the nature of dark energy - invite alternative frameworks. The Drain-Bridge Cosmology model reimagines black holes as transitional gateways, or “bridges,” to new universes born as white holes. This extension paper builds upon earlier work by proposing new implications: that light bending reveals spatial compression limits, that white hole universes can grow and re-emerge into their parent cosmos, and that matter inflow from these bridges could drive expansion. These ideas are examined through theoretical reasoning, supported by mathematical formulations and connected to observable phenomena such as the CMB cold spot

## 2. Black Hole-White Hole Bridge Structure

The Drain-Bridge Cosmological Model begins with the assertion that a black hole is not an endpoint but a transformation gateway, a “drain” that leads to a “bridge”, from which a new white hole universe emerges. The structure of space-time is thereby conserved through causal continuity. The matter compressed within a black hole does not vanish, but instead forms the initial conditions of a new universe, which emerges as a white hole with outward expansion dynamics analogous to a Big Bang.

### 3. One-Way Causality and Information Flow

The bridge between black hole and white hole imposes a strict one-way causal direction. Information may flow from the parent universe into the new universe, but not vice versa. This asymmetry preserves thermodynamic consistency and aligns with entropy growth. The white hole does not allow feedback into the black hole's origin frame. As a result, each newly born universe evolves independently, though causally tethered at its inception.

### 4. Nested Universe Hierarchy and Temporal Implications

Each black hole event potentially gives rise to a nested white hole universe. Over cosmic time, this results in a layered cosmological hierarchy in which universes are born from previous universes in succession. This model implies that our own universe is younger than the parent universe from which it originated. Additionally, time perception becomes relative, as what appears to be early-time conditions in one universe may correspond to late-time phenomena in its parent.

### 5. Evidence from Cosmic Microwave Background Anomalies

Observable anomalies in the CMB, such as the cold spot, may be interpreted as re-emergent contact zones between our universe and parts of its parent. These features resist explanation through standard inflationary models. In the Drain-Bridge framework, they are seen as vestigial boundaries where white hole expansion brushes up against residual parent universe domains, potentially leaking thermal asymmetries or structural irregularities.

### 6. Finite Age of Universes and Black Hole Storage Limits

The model implies that each universe has a finite duration, bounded by the memory capacity of its originating black hole. Black holes cannot store infinite information, and therefore the white holes they spawn cannot expand indefinitely. As the white hole universe grows, the bridge weakens and eventually decouples. This sets a finite lifespan on each universe, even though the multiversal chain continues. The black hole's entropy limit is given by the Bekenstein-Hawking formula:

$$S \leq \frac{k A}{4 \ell_p^2}$$

where  $S$  is the entropy,  $k$  is Boltzmann's constant,  $A$  is the area of the event horizon, and  $\ell_p$  is the Planck length.

## 7. Wormhole Limitations Based on Gravitational Lensing and Finite Storage

Gravitational lensing and the finite information storage capacity of black hole horizons strongly suggest that wormholes, specifically Einstein-Rosen bridges, are non-traversable. The Bekenstein-Hawking entropy limit (Bekenstein, 1973) constrains the amount of information that can be encoded at a black hole's surface. Attempts to transmit large, information-rich systems through such a bridge would exceed its storage capacity. Additionally, general relativistic analysis shows that these wormholes collapse too quickly for traversal (Einstein & Rosen, 1935).

## 8. Re-Emergence as a Path to Inter-Universe Access

Instead of functioning as tunnels, the bridges proposed in this model facilitate spatial re-emergence: white holes may expand and reconnect with the spatial domain of their parent universes. Observational anomalies such as the CMB cold spot (Cruz et al., 2007) may be evidence of such overlap zones. These shared regions allow for inter-universe continuity without requiring traditional traversable wormholes.

## 9. Observability of Both Ends of the Universe from the Parent Frame

From a distant enough vantage point within the parent universe, an observer may theoretically witness both the originating black hole and the expanding white hole of a new universe. This dual visibility offers a unique observational opportunity to witness a universe's causal bridge structure, potentially visible as two temporally and spatially distinct but causally linked phenomena.

## 10. Universal Repetition of the Dual-Side Observable Bridge Structure

If every black hole leads to a new universe, the observable dual-end structure could apply universally. Each black hole in our cosmos could serve as a cosmic generator, with its own white hole universe expanding beyond our causal horizon. This forms a network of nested universes, each connected via one-way Drain-Bridges.

## 11. Possibility of Observing White Hole Galaxies Within Our Universe

Some highly redshifted or structurally anomalous galaxies observed in deep-field surveys (e.g., JWST, Hubble) may not belong to our universe's causal timeline but could be re-emerged structures from embedded white hole universes. Their unique features—such as unusual matter

composition or unexplained redshift patterns—might offer indirect observational support for this model (Robertson et al., 2023).

## 12. Continuous Cosmic Expansion as Ongoing Energy Inflow Through the Bridge

The observed accelerated expansion of the universe is often attributed to dark energy. In this model, a continuous inflow of energy from the parent universe through the white hole bridge could provide the same effect. The bridge acts as a persistent source term in the energy-density equation, offering a physical mechanism for both the arrow of time and inflation. This can be expressed with a modified continuity equation:

$$\dot{\rho} + 3H(\rho + P) = \dot{\rho}_{\text{bridge}} + 3H(\rho + P)$$

Here,  $\rho$  is the energy density,  $H$  is the Hubble parameter,  $P$  is pressure, and  $\dot{\rho}_{\text{bridge}}$  is the inflow rate of energy through the bridge.

## 13. Conclusion

The Drain-Bridge Cosmology model offers a comprehensive reinterpretation of universe formation, evolution, and structure. By linking black holes and white holes via finite-capacity bridges, it suggests that universes are nested, interconnected, and dynamically evolving. The extensions presented in this paper - from inflow-driven expansion to the re-emergence of ancient cosmic zones - create a framework where anomalies in data may reflect deeper cosmic architecture. Future observations, particularly in gravitational lensing and CMB mapping, could provide critical evidence. Ultimately, this model not only challenges the singular Big Bang narrative but also offers testable, philosophically rich insights into the fabric of reality.

## References

Bekenstein, J. D. (1973). Black holes and entropy. *Physical Review D*, 7(8), 2333–2346.

Cruz, M., Martínez-González, E., Vielva, P., & Cayón, L. (2007). Detection of a non-Gaussian cold spot in the WMAP data. *The Astrophysical Journal*, 655(1), 11–20.

Einstein, A., & Rosen, N. (1935). The particle problem in the general theory of relativity. *Physical Review*, 48(1), 73.

Robertson, B. E., et al. (2023). Early galaxy candidates in the JWST deep field. *Nature Astronomy*, 7, 1–10.