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The Collapsing Wormhole and the Vanishing White Hole Hypothesis

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Abstract

This hypothesis presents a new perspective on the potential formation and instability of wormholes and white holes within a closed universe. Considering the universe as a spherical spacetime fabric, it suggests that extreme black hole gravitational warping may lead to temporary wormhole creation, whose instability explains the absence of observed white holes in nature.

1. Introduction

The concepts of wormholes and white holes have fascinated theoretical physicists and cosmologists for decades. Wormholes are often imagined as tunnels through spacetime, while white holes are hypothesized as the time-reverse of black holes, ejecting matter rather than absorbing it. Despite their strong theoretical presence, neither wormholes nor white holes have been observed. This paper introduces the idea that their fleeting existence within a closed, globe-shaped universe might explain their absence in observational data.

2. Theoretical Framework

2.1 Closed Universe Model

Instead of picturing the universe as an infinite plane, consider it as a globe-shaped closed system, where spacetime bends back onto itself. Within this curved spacetime, black holes act as massive dents, pulling the fabric inward.

2.2 Opposite Poles of Spacetime

Imagine two black holes situated at opposite poles of this cosmic globe. As they warp spacetime, the tips of their distortions could theoretically meet through the folded geometry, creating a temporary tunnel—a wormhole. Matter entering one black hole might emerge from the other side as a white hole.

3. Wormhole–White Hole Transition

At the point where singularities connect, a tunnel forms.

One end functions as a black hole entrance, the other as a white hole exit.

However, the structure is unstable: the same gravitational pull that connects the singularities also tears the tunnel apart.

The white hole collapses back into a black hole almost instantly.

Thus, wormholes and white holes may exist, but only for a fleeting moment—too short to be observed.

4. Simplified Calculation of Instability

For a black hole of mass M, the Schwarzschild radius is:

$$R_s = \frac{2GM}{c^2}$$

Let’s assume a stellar-mass black hole:

where .

$$R_s = \frac{2 (6.67 \times 10^{-11})(2 \times 10^{31})}{(3 \times 10^8)^2}$$

$$R_s \approx 30 \, \text{km}$$

This shows the region of spacetime distortion is only tens of kilometers wide, despite containing a mass many times greater than the Sun. When two such distortions meet, the tunnel formed would be incredibly small and under immense pressure. The collapse time can be estimated from the light-crossing time:

$$t \approx \frac{R_s}{c}$$

$$t \approx \frac{30 \times 10^3}{3 \times 10^8} \approx 10^{-4} \, \text{seconds}$$

This means the wormhole would last less than a millisecond before collapsing.

5. Implications

Wormholes may form naturally but collapse before detection is possible.

White holes, being unstable, may vanish almost instantly, explaining their absence in nature.

This framework aligns with general relativity but also suggests observational limitations in detecting exotic spacetime structures.

6. Conclusion

The hypothesis provides a reason for the invisibility of white holes and wormholes: their existence is too unstable and too short-lived for observation. Even though mathematically possible, physical reality restricts them to vanishing events in the cosmic fabric.

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