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Editorial Board
IPI Letters

Dear Editors,

I am pleased to submit "Time as Information Rate Through Dimensional Apertures: Black Hole Phenomenology from Observer-Relative Channel Capacity" for consideration in IPI Letters.

This paper proposes that time dilation is fundamentally an information-theoretic phenomenon: the rate of distinguishable state change depends on an observer's *dimensional aperture*—the channel capacity connecting them to underlying dynamics. When the aperture contracts, fewer degrees of freedom are accessible, information accumulation slows, and time dilates.

The key results:

- Black hole phenomenology (time freezing, complementarity, area scaling) emerges from observer-relative apertures on high-dimensional dynamics—without invoking general relativity
- The thermodynamic cost of aperture contraction (Landauer erasure) spikes at horizons, connecting to Jacobson's thermodynamic derivation of Einstein's equations
- Gravitational wave phenomenology (inspiral-merger-ringdown) corresponds to aperture collapse and stabilization dynamics

This work extends my paper "A Thermodynamic Foundation for the Second Law of Infodynamics" (currently under review at IPI Letters, submitted December 2024). That paper established how maintaining low-dimensional structure requires thermodynamic work; this paper shows how that principle produces time dilation at horizons.

The manuscript is 7 pages with 4 figures. Simulation code is available at `https://github.com/todd866/black-hole-aperture`.

I believe this work fits IPI Letters' focus on information-theoretic approaches to fundamental physics. The framework provides a concrete computational demonstration of how observer-relative information access produces relativistic phenomenology.

Sincerely,

Ian Todd
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