Redundant Temporal Computing Clusters and Local Entropy Reversal in Cauchy Horizons

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Date: May 2026
Subject: Quantum Computing, General Relativity, Thermodynamics

Abstract

This paper proposes a theoretical framework for performing large-scale computational processes through Closed Timelike Curves (CTCs). We introduce the concept of the "Temporal Computing Cluster," where multiple processing units are placed in a standby state in the past, within a Cauchy Horizon. It is proposed that transmitting data via quantum entanglement to these nodes allows for the instantaneous receipt of results in the present, effectively shifting the computational cost to the past. Furthermore, a mechanism of local entropy arrow reversal ($dS/dt < 0$) is analyzed as a means of avoiding causal paradoxes, arguing that the thermodynamic collapse of the system functions as a self-correcting information filter.

1. Introduction

The computational complexity of NP-hard problems often requires execution times that exceed the useful life of traditional silicon processors. Utilizing CTCs offers a radical alternative: shifting processing power to prior time frames. This theory is based on the possibility of "Temporal Offloading," allowing for the collection of informational gain in the present while the energy cost is paid in the past.

2. Cauchy Horizon and Geometric Stabilization

A Cauchy Horizon is defined as the boundary beyond which causality ceases to be predictable within general relativity. To maintain the stability of a temporal gate without the need for macroscopic quantities of exotic matter, the use of Casimir Micro-stabilization is proposed.

2.1 Casimir Mechanism

The negative pressure generated between two conducting plates at the femtometer scale allows for the creation of "pulses" that stabilize the Global Entanglement Line. The mathematical description is based on the equation:

P_Casimir = - (hbar * c * pi^2) / (240 * d^4)

3. Redundant Cluster Architecture

To address statistical errors and maintain Quantum Coherence over long periods, a configuration of N=1000 independent computational nodes is proposed.

Feature	Description
Temporal Phase Locking	Tuning each node to a slightly different phase of the Casimir vacuum.
Stochastic Resonance	Filtering the "white noise" signal from the past through pre-tuned nodes.
Node Isolation	Utilization of Quantum Faraday Cages to prevent premature wave function collapse.

4. Thermodynamic Self-Correction and the "Eraser" Mechanism

The primary obstacle to implementing CTCs is the emergence of causal paradoxes. This paper proposes the theory of "Thermodynamic Self-Correction" (The Eraser Mechanism). In the event of logical inconsistency, the system reacts through a violent local reduction in entropy ($\Delta S << 0$), which "erases" the information that caused the anomaly.

- **The Anomaly:** An attempt to change the past that creates infinite information curvature.
- **The Reaction:** Instantaneous local reversal of the arrow of time.
- **The Result:** Cancellation of the observer's existence in that specific frame (Causal Neutralization) and restoration of self-consistency.

5. Conclusions and Future Research

The implementation of temporal computing clusters renders the past a potentially infinite processor. Future research will focus on the computational simulation of the model on high-performance computing (HPC) architectures with NVIDIA Grace Hopper processors, to measure the "Entropy Shadow" and the limits of temporal offloading.

References

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