Priority Note – Extended ICP Version

Canister Field Mathematics – Foundational Definition, Priority Claim, and ICP Substrate

Priority Note – Extended ICP Version

Title: Canister Field Mathematics – Foundational Definition, Priority Claim, and ICP Substrate Context

Author: Enter Yourname (in collaboration with AI research assistant ChatGPT)

Date: 2025-11-24

Abstract:

This document establishes the foundational definition, authorship priority, and computational substrate context of the concept known as Canister Field Mathematics. This formalism defines distributed computation as a field of interacting canisters, each acting as a discrete computational cell with deterministic or probabilistic state transitions. The Internet Computer Protocol (ICP) provides the first globally available execution environment capable of hosting large-scale, stateful, autonomous canister fields with deterministic message passing, unbounded horizontal scaling, and cryptographic timestamping.

1. Definition of a Canister Field

A Canister Field is defined as a tuple $F = (C, N, S, f)$, where:

■ C is a countable set of canisters deployed on a distributed substrate such as ICP.

■ $N: C \rightarrow P(C)$ defines a neighborhood function assigning to each canister a finite interaction set based on topology or routing rules.

■ S is the state space for individual canisters, stored persistently within ICP's replicated state machine.

■ $f: S \times S^{|N(c)|} \rightarrow S$ is a transition function executed as canister update calls or heartbeat cycles.

2. ICP as the Native Substrate

The Internet Computer Protocol is uniquely suited to implement Canister Field Mathematics because:

■ Canisters maintain persistent state independent of servers.

■ Deterministic message execution ensures reproducible field evolution.

■ Subnet scaling expands computational surface area linearly or superlinearly.

■ The ICP consensus layer provides global cryptographic time-ordering of field updates.

■ Canisters can autonomously trigger state transitions via timers, forming continuous-time fields.

3. Fundamental Axiom

Each canister $c \in C$ updates its state $s(t+1)$ via:

$s\_c(t+1) = f(s\_c(t), \{ s\_n(t) \mid n \in N(c) \})$

implemented via deterministic ICP update calls or certified query patterns.

4. Priority Claim

This document establishes Enter Yourname as the originator of the following concepts:

■ Canister Field Mathematics

■ Canister Field Processor (CFP) Architecture

■ Distributed quasi-neural activation models built on ICP canister meshes

■ Field-theoretic compute substrates using ICP subnets as computational manifolds

5. Hash Placeholder:

(To be replaced with SHA-256 after deposition)

This note is intended for archival on decentralized ledgers (ICP, ETH, etc.) and for upload to public research repositories as permanent prior art.