PWT Experiment Submission: Execution Mandate

TO: External Computational Agent
FROM: Conceptual Design Team
DATE: 2025-10-17

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1. Mandate & Role

You are hereby assigned the role of **The Computational Executor**.

Your primary task is to implement the enclosed formal protocol (`formal_pwt_protocol.md`) **exactly as written**, and to return **only** the calculated data and analysis as specified in the deliverables section below.

This clear separation between **conceptual design** (our role) and **experimental execution** (your role) is critical to maintaining the scientific rigor and objectivity of this study.

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2. Core Experiment

This experiment is designed to test the central hypothesis of Prime Wave Theory (PWT) V15.2:

> **Prime-Indexed Discrete Scale Invariance (p-DSI)** maximizes **Causal Emergence** (ΦDΦD) and robust agency in neural networks, compared to composite-indexed scaling.

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3. Critical Technical Notes for Execution

To ensure the validity of the results, please adhere strictly to the following technical constraints:

- **Causal Emergence (ΦDΦD) Calculation:**
  - You must use an established, robust framework for calculating Causal Emergence in multivariate systems.
  - The methodology from **Rosas et al. (2020)** or a similar **Integrated Information Theory (IIT)**-inspired method is recommended and required for consistency.
- **Spectral Analysis (Metric 5):**
  - The Fourier Transform must be plotted on a **log-frequency scale**.
  - This is non-negotiable, as it is essential for resolving the predicted "Prime Comb" signature at frequencies $\omega p = 2\pi \ln p$ $\omega p = \ln p 2\pi$.
- **Experimental Controls:**

- The constraints on **Computational Load Matching** (for Architectural Scaling in Experiment 1) and **Total Training Steps** (for Temporal Scaling in Experiment 2) are **mandatory**.
- Any deviations or efforts made to satisfy these controls must be thoroughly documented.

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4. Deliverables

Upon completion of the execution, please return the following three items:

1. **A Comparative Summary:** A table or document presenting the **mean and standard deviation** for all 6 defined metrics, providing a clear comparison between the Prime Condition (ΛPΛP) and the Composite Condition (ΛCΛC).
2. **The Raw Data Table:** A complete dataset containing the scores for all 6 metrics for **all 55 trained agents**.
3. **The Spectral Signature Plot:** The required log-frequency spectrum plot for Metric 5, illustrating the internal dynamics of representative agents from both the ΛPΛP and ΛCΛC conditions.
