

RCIRCUIT Simulation v0.2 — Resonance Tracking  
Public Prototype Summary — Phase Computing /  $\Delta$ Signal Architecture

1. Purpose

v0.2 extends v0.1 by adding a simple resonance metric per node.

- v0.1  $\rightarrow$   $\Delta$ signal propagation + stabilization
- v0.2  $\rightarrow$   $\Delta$ signal + resonance tracking (coherence over time)

Goal: Measure how local  $\Delta$ signal propagation increases global coherence without global synchronization.

2. Key Concepts

PhaseNode: A node holding a phase value (float).

$\Delta$ signal: Only meaningful change is propagated.

Local Propagation: Node updates using  $\Delta$ signal from neighbors.

Resonance Score:  $\text{res}_i = 1 / (1 + |\text{phase}_i - \text{mean\_phase}|)$

This is a prototype-safe public metric.

3. What v0.2 Tests

1. Random initialization
  2.  $\Delta$ signal computation
  3. Noise filtering
  4. Phase update across neighbors
  5. Compute global mean phase
  6. Resonance score per node
4. Expected Behavior

- $\Delta$ signal spikes early then decay
- Nodes drift toward coherence
- Resonance score stabilizes
- No global lockstep required

5. Output Files

config\_v0.2.json — experiment configuration

results\_v0.2\_example.csv — iteration, node\_id, phase, delta\_signal, resonance\_score

6. Next Steps

- Circular phase distance
- Coherence heatmap
- $\Delta$ signal + resonance visualization
- Multi-config comparisons

About

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