Phase–Locked Quantum–Plasma Processor

V6 Supplementary Demonstrations

Nikita Teslia

ORCID: 0009-0002-0328-4873
tesla0605@gmail.com

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Abstract

Version V6 demonstrates that a phase–coupled memory field can move beyond purely reactive behaviour toward *cognitive organisation*. We report nine experiments—selective attention, hierarchical focus, state switching, phase–logical gating, node self–organisation, and multi–agent routing—implemented without explicit code or training. A persistence metric P_{stable} quantifies structural consolidation. Supplementary 2-D/3-D animations (PNG/GIF/MP4) are packaged in the archive *Simulations V6*.

1 Model

Field update, agent utility and phase gate equations follow the notation of V5:

$$M(\mathbf{r}, t+1) = \alpha M(\mathbf{r}, t) + \beta S(\mathbf{r}, t), \tag{1}$$

$$U_i = \gamma f\big(M(\mathbf{r} + \vec{v}_i)\big) + \xi_i, \tag{2}$$

$$D_{\text{gate}} = \frac{1}{n} \sum_j |\varphi_j|^2 \geq \theta. \tag{3}$$

2 Metrics

Structural persistence is measured by the fraction of lattice sites that remain above threshold for at least k successive steps:

$$P_{\text{stable}}(k) = \frac{1}{N^3} \sum_{\mathbf{r}} \Theta\big[\tau(\mathbf{r}) - k\big]. \tag{4}$$

For the compiled demonstration (V6.9) we obtain $P_{\text{stable}}(15) \approx 0.042$.

3 Experiment summary

4 Results

See Figures 1–9. Each panel demonstrates the emergent phenomenon described in Table 1.

Table 1: V6 experiment overview

#	Code	Title	Key phenomenon
1	V6.1	Selective attention	Interference suppresses non–amplified stimuli (Fig. 1)
2	V6.2	Hierarchical focus	Stack–like memory layers (Fig. 2)
3	V6.3	Global mode switch	Phase transition $\sum M > \theta$ (Fig. 3)
4	V6.4	Phase–gate logic	AND/XOR via $\Delta\varphi$ (Fig. 4)
5	V6.5	Self–organising nodes	Spontaneous attractor formation (Fig. 5)
6	V6.6	3-D routing (base)	Field-guided navigation (Fig. 6)
7	V6.6++	Enhanced routing	Avoid-dense vs safe-path (Fig. 7)
8	V6.6+++	Resonance attractor	Divergent strategies (Fig. 8)
9	V6.9	Compiled demo	Attention+memory+logic+nodes (Fig. 9)

5 Discussion

The experiments confirm that distributed phase dynamics alone can realise the minimal toolset of cognition: selective attention, working memory, global state shifts, logical combination and self-organised spatial structure. The absence of explicit code or weight training suggests potential hardware embodiments in photonic, plasmonic or memristive substrates.

6 Ethics

We reiterate the *Code of the Architect*: no military, autonomous lethal or self-replicating deployment. All hardware tests must include a hard kill-switch and sandbox isolation.

7 Conclusion

V6 marks a transition from reactive field dynamics to functional cognition. Future work (V7) will explore self-replicating agents and goal-directed phase modulation.

Figures

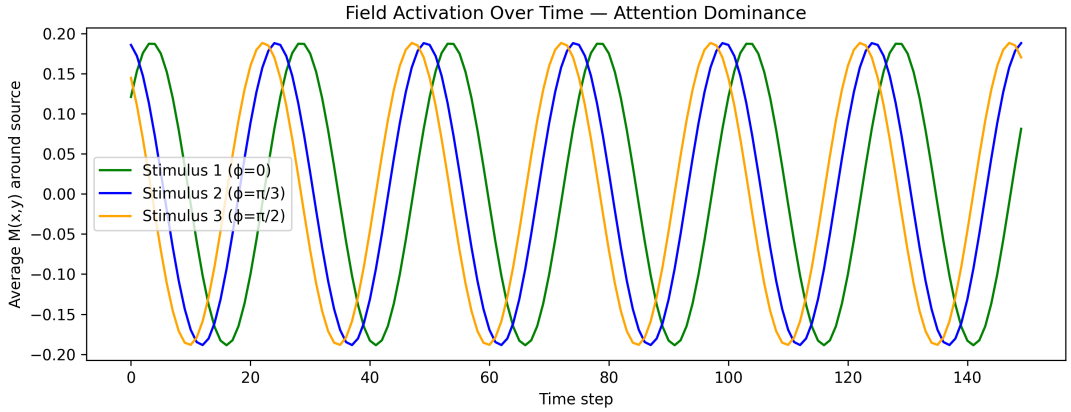

Figure 1: Selective attention: suppression of non-amplified stimuli.

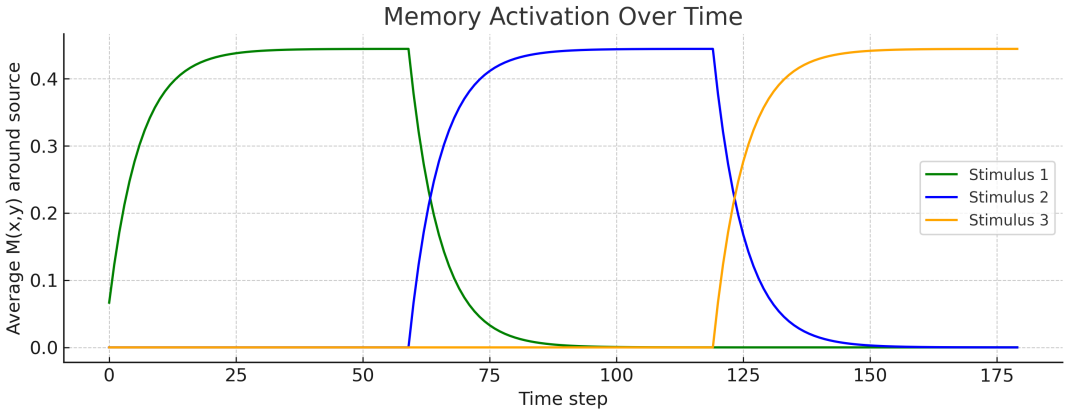

Figure 2: Hierarchical focus: nested memory layers.

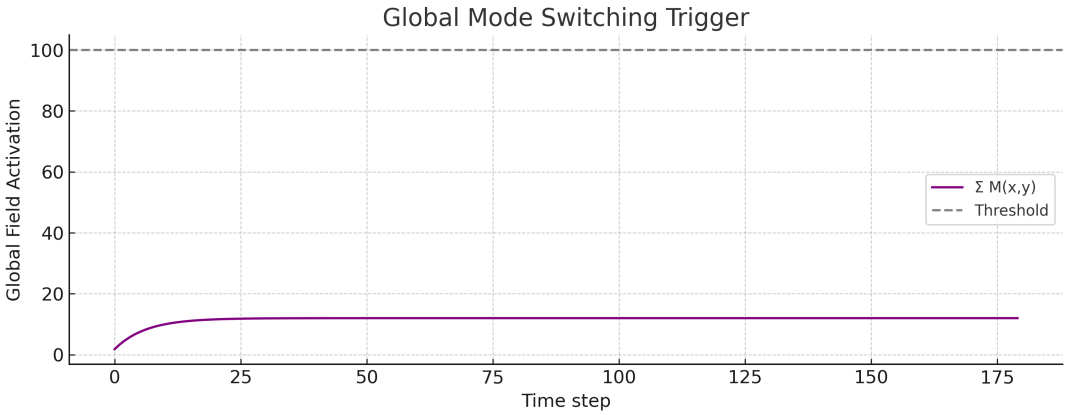

Figure 3: Global mode switch: energy spike and parameter shift.

Figure 4: Phase–gate logic: 3-D XOR gate via $\Delta\varphi = \pi$.

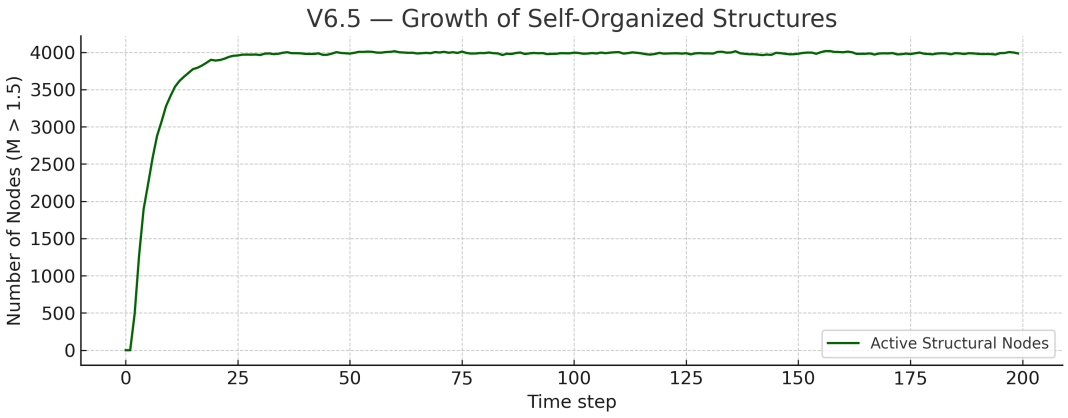

Figure 5: Self-organising nodes: stable attractor structure.

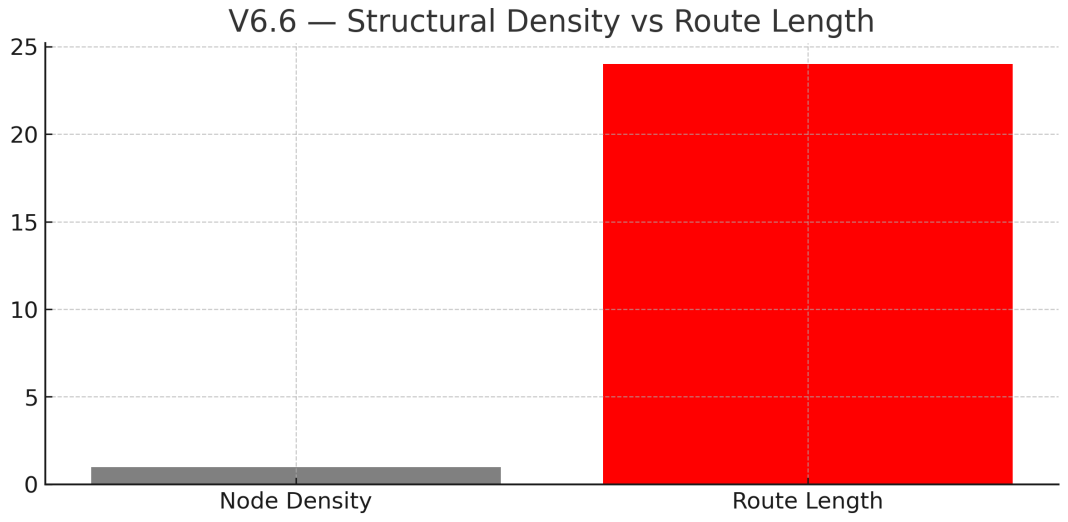

Figure 6: Base routing: field-guided path metrics.

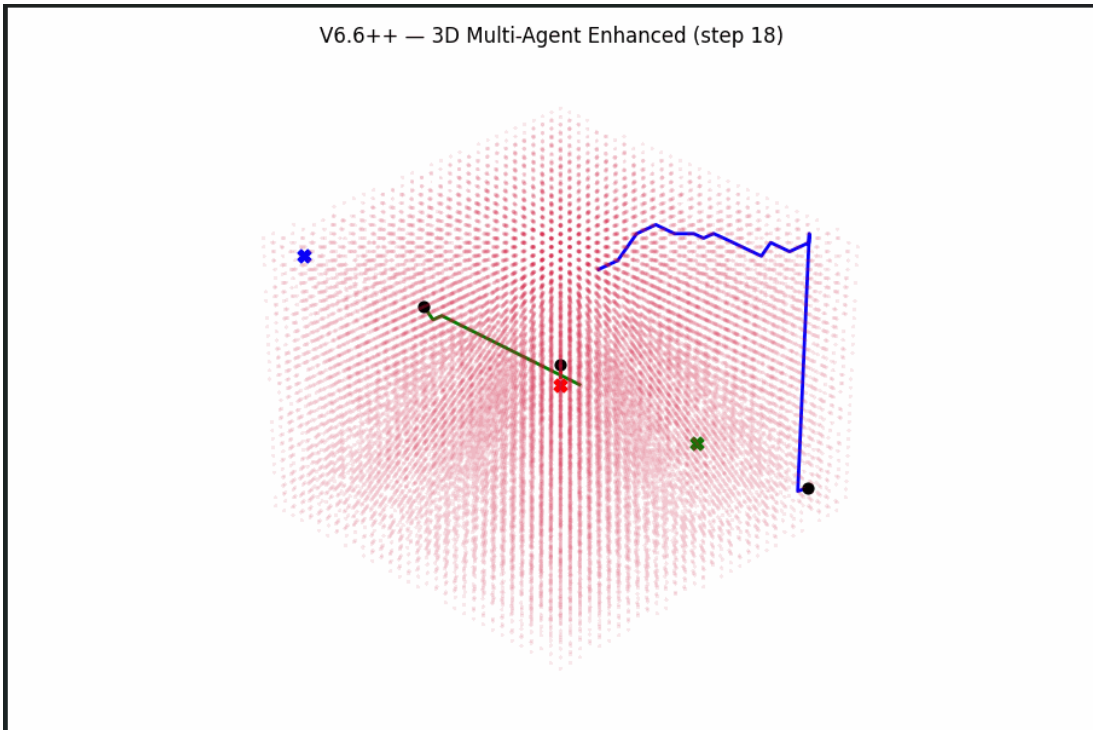

Figure 7: Enhanced routing: avoid-dense vs safe-path trajectories.

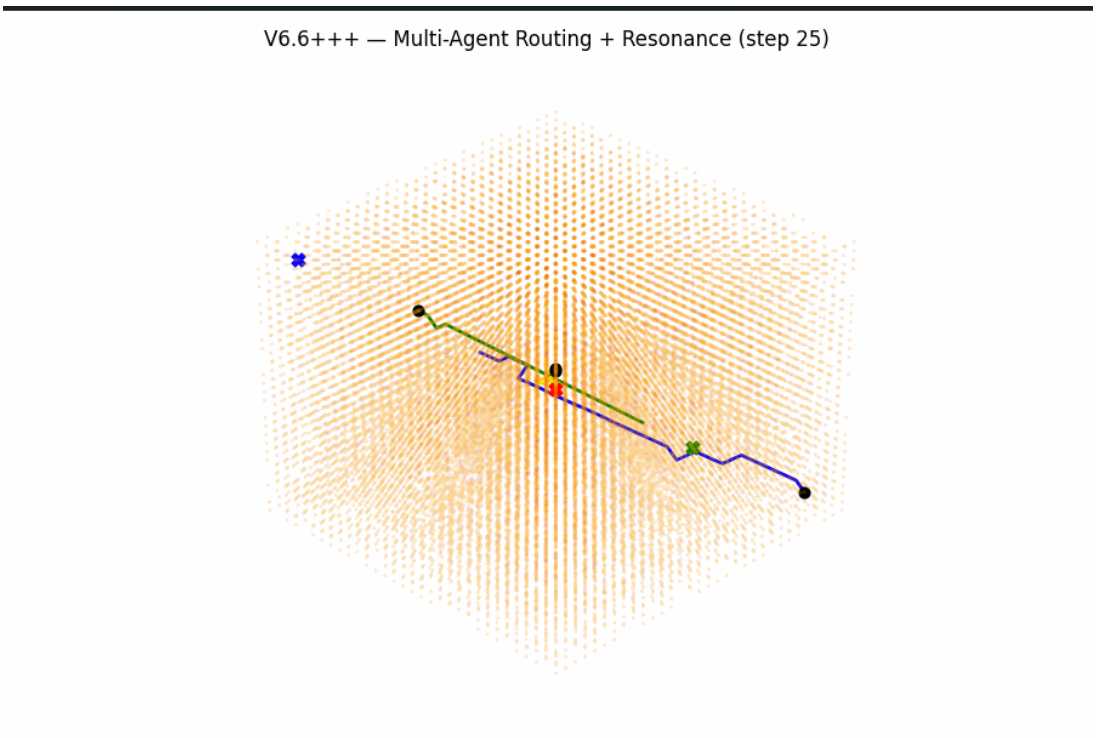

Figure 8: Resonance attractor vs avoider.

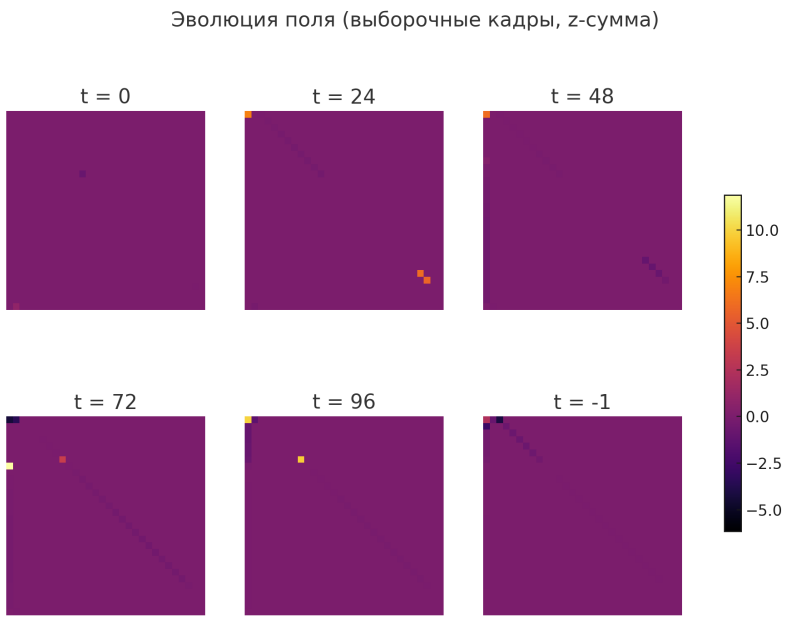

Figure 9: Compiled V6.9 demo: field evolution mosaic. Additional metrics in Fig. S1.