The Fundamental Mechanisms of Consciousness

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▶ Publications:

▶▶ "A new perspective on the functioning of the brain and the mechanisms behind conscious processes"
Frontiers in Psychology 4:242. doi: 10.3389/fpsyg.2013.00242 (April 2013)

▶▶ "A Conceptual Framework for Consciousness Based on a Deep Understanding of Matter"
Philosophy Study 2, 689-703 (October 2012)

▸ … brain activity "produces" consciousness,

▸ … conscious experiences "emerge" from networks of neurons.
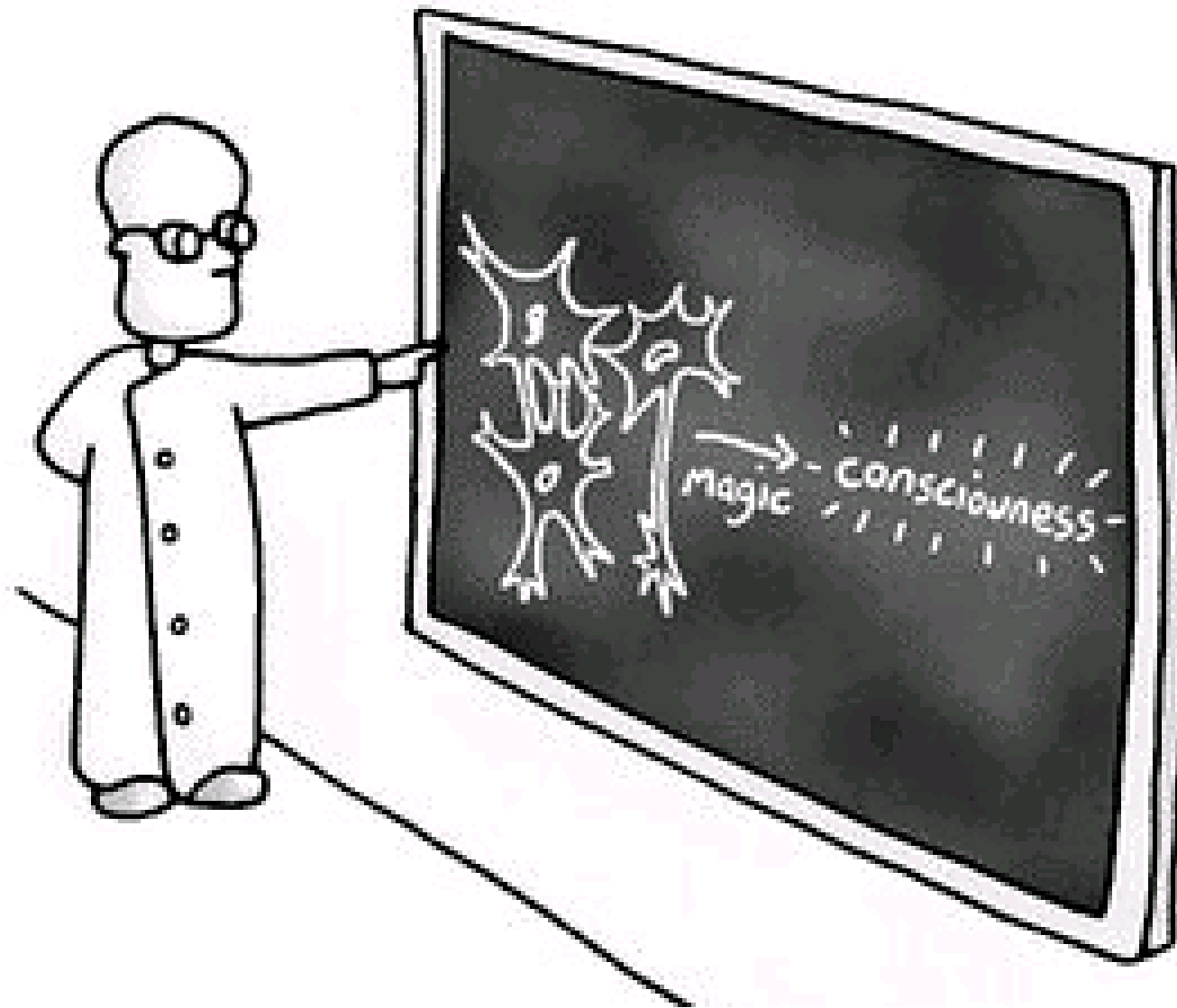
▸This dogma prevents the breakthrough in consciousness research!

All-pervasive substrate of consciousness

1
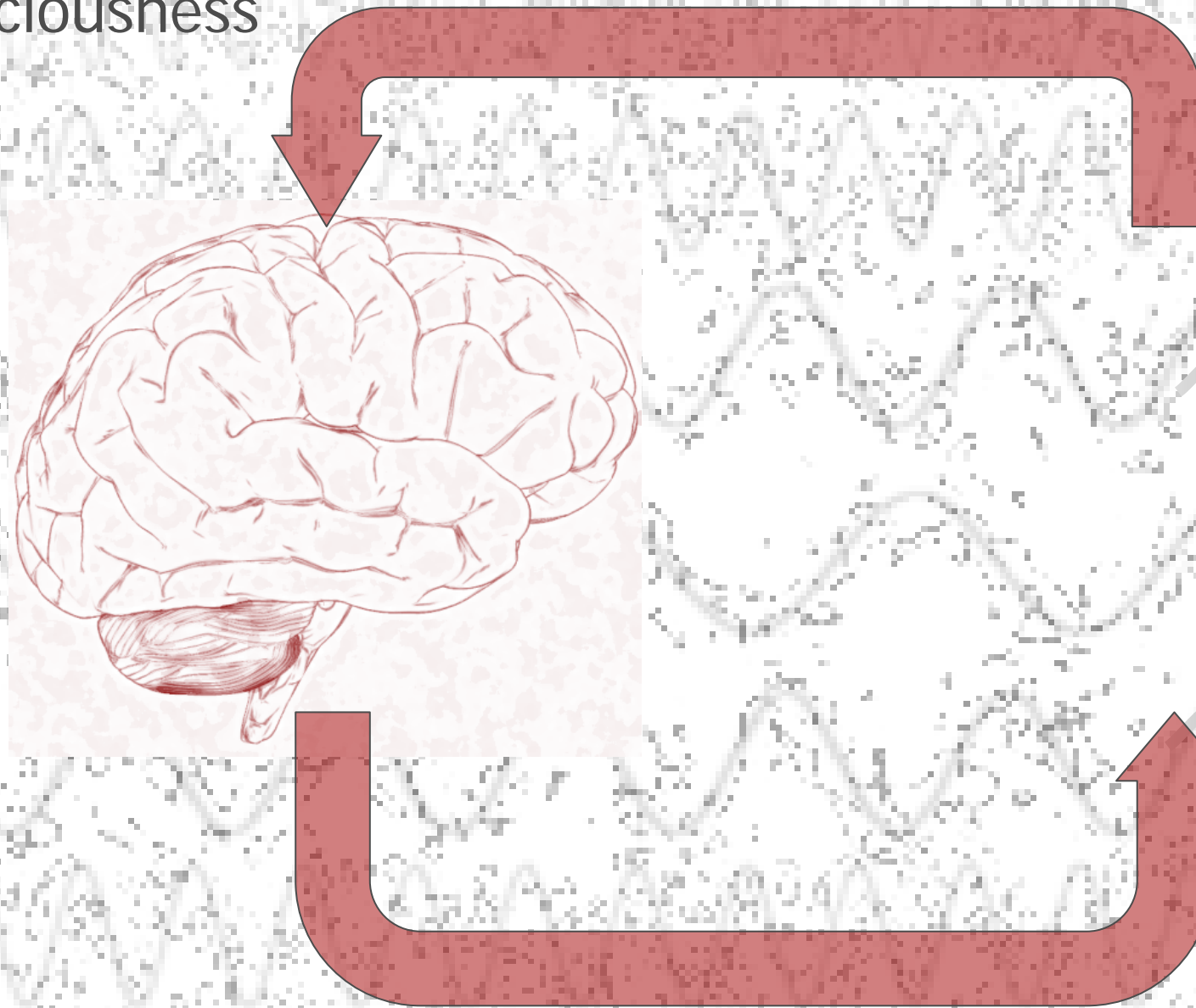
Ordered states go along with conscious states

4

**2**

Permanent interaction between brain and substrate

3

Interaction mechanism results in local modifications of the substrate (ordered states)

Physics (Stochastic Electrodynamics) provides an excellent candidate for the substrate of consciousness: Zero-Point Field (ZPF).

▸ Fundamental backbone of the universe,
▸ All-pervasive stochastic radiation field,
▸ Ocean of permanent activity,
▸ Ubiquitous sea of light.
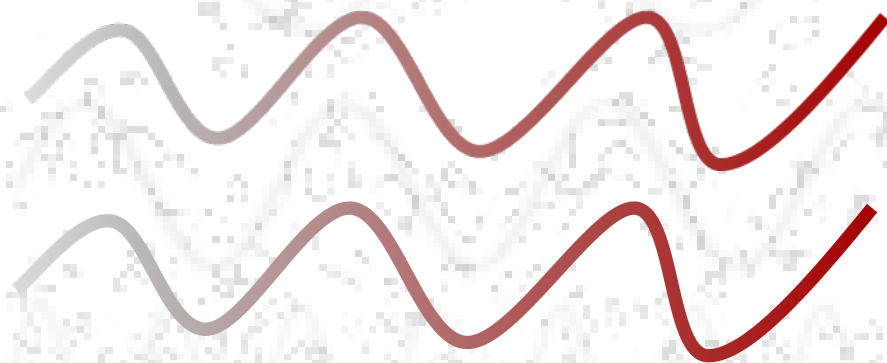
$$E_{ZP}(r,t) = \sum_{\lambda=1}^{2} \int d^3k \left(\frac{\hbar\omega}{2\pi^2}\right)^{1/2} \varepsilon(k,\lambda)\cos(k*r - \omega t + \theta(k,\lambda))$$

random phase

$$B_{ZP}(r,t) = \sum_{\lambda=1}^{2} \int d^3k \left(\frac{\hbar\omega}{2\pi^2}\right)^{1/2} (k \times \varepsilon(k,\lambda))\cos(k*r - \omega t + \theta(k,\lambda))$$
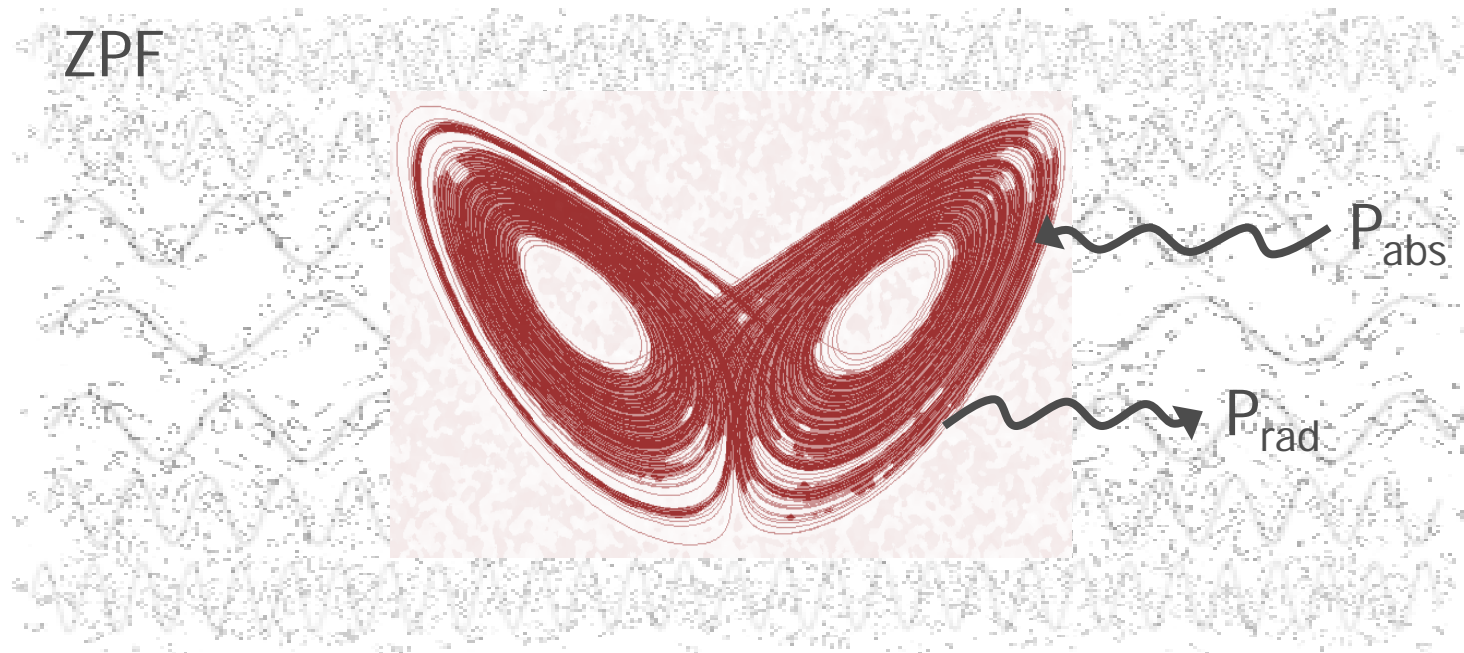
$$\rho_{ZP}(\omega) = \frac{\hbar\omega^3}{2\pi^2 c^3}$$

characteristic power spectrum

It is natural to assume that the fundamental backbone of the universe (ZPF) is charged with consciousness.

▶ Quantum systems function as resonant stochastic oscillators
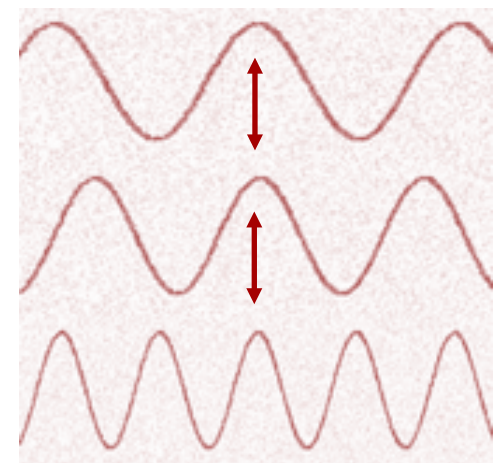
ZPF

P_{abs}

P_{rad}

The stability and physical properties of a system are created dynamically as soon as the energy exchange between the system components and the ZPF reaches equilibrium.

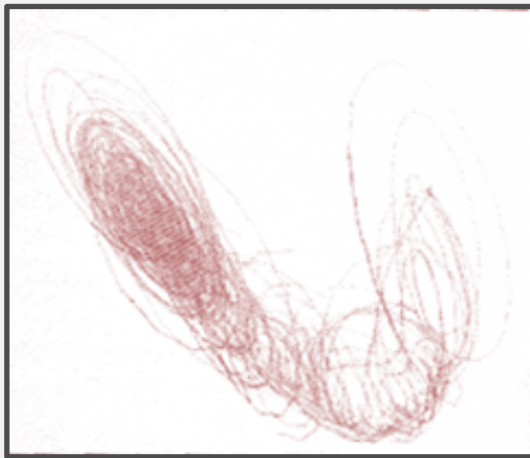▶ ZPF is modified as soon as a systems reaches a stable attractor

ZPF

Resonance frequencies   Phase correlations
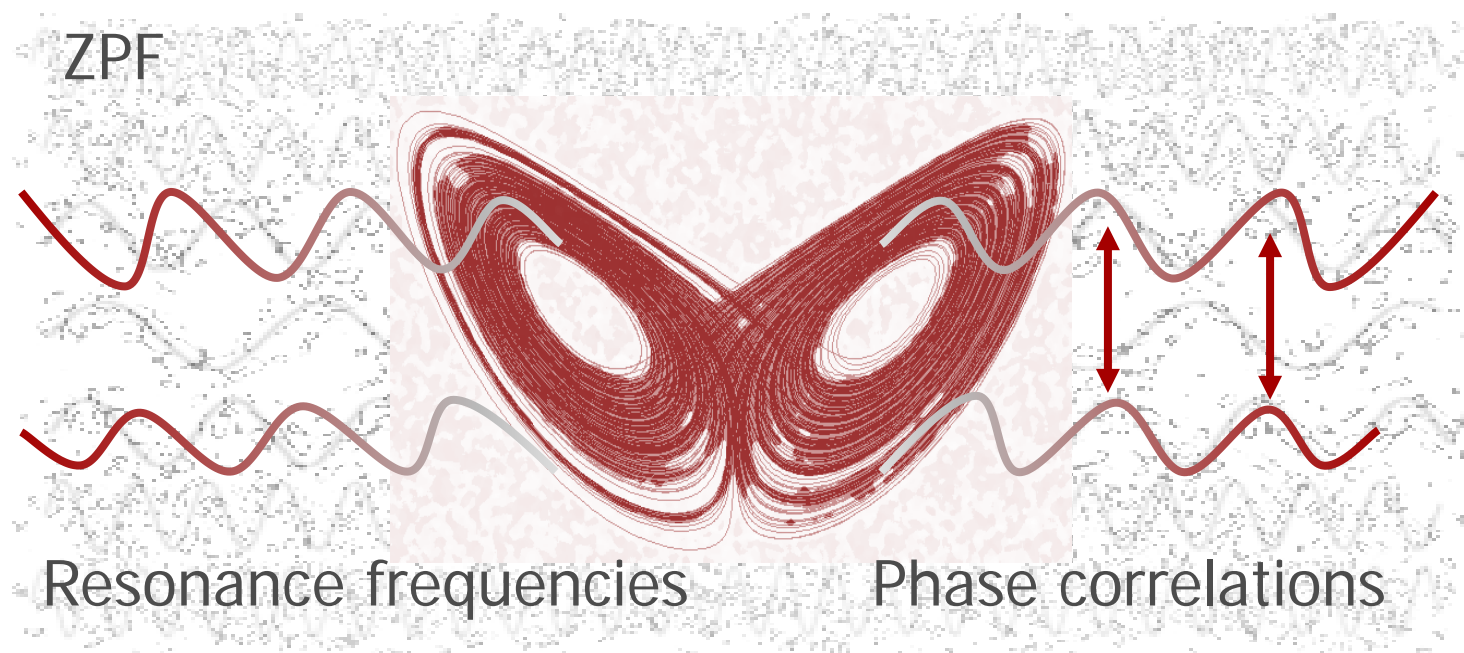
Every attractor generates a specific pattern in the ZPF

Disordered phase /
unconscious phase

Brain operates near a
critical point of a phase transition

Ordered phase /
conscious phase

Irregular dynamics
Spontaneous activity
1/f scaling behavior
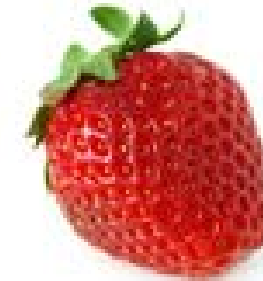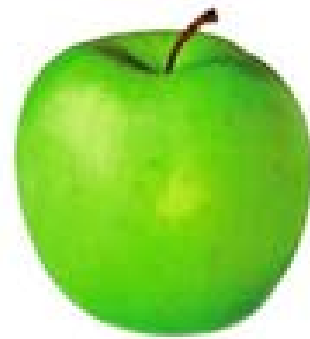
Appropriate stimulus induces
an abrupt phase transition
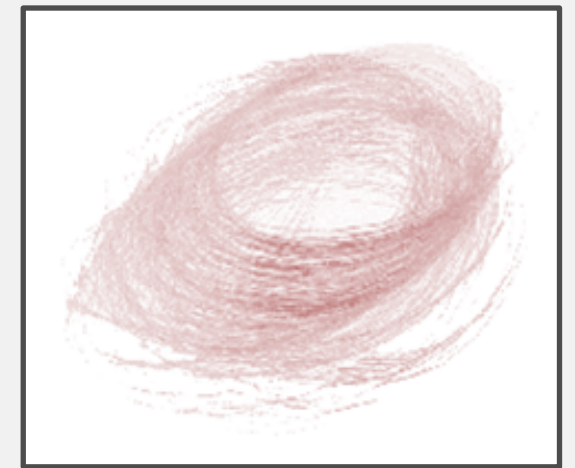
Long-range correlations
(gamma synchrony)

Stable attractors

Dynamics can only be understood on the basis of quantum physics

▸ The brain is a resonant stochastic oscillator driven by the ZPF.

▸ Every attractor generates a specific correlation pattern in the ZPF.

Stimuli

Gamma synchrony   Gamma synchrony   Gamma synchrony

NCC in the brain
(macroscopic activity
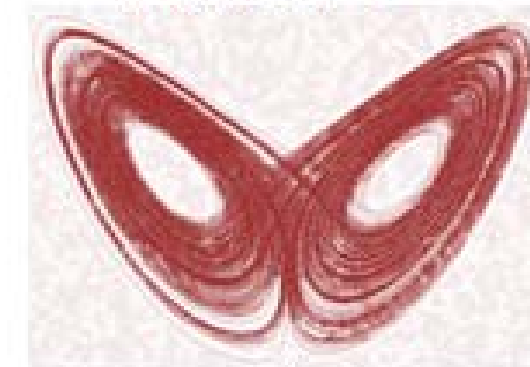patterns displaying
long-range coherence)
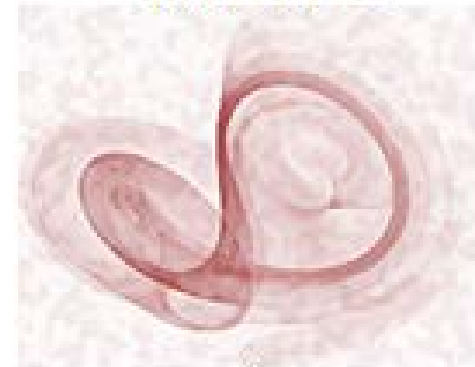
Desynchronization   Desynchronization
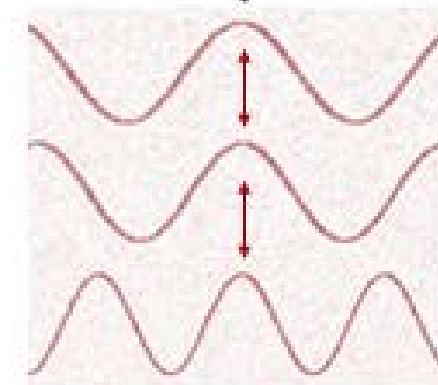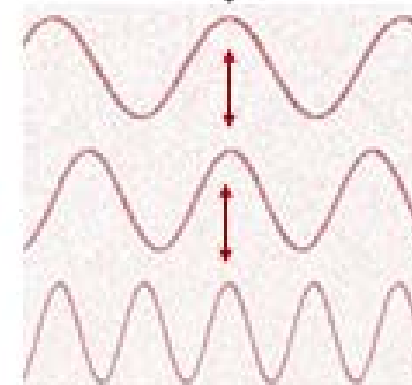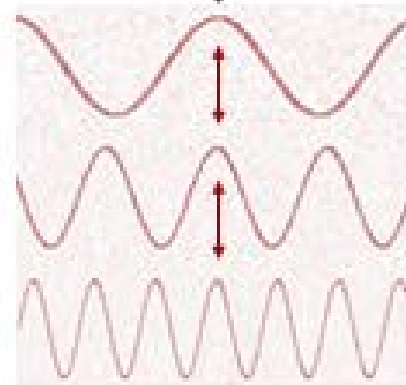
Attractor 1   Attractor 2   Attractor 3

Information states
in the ZPF
(ordered states in
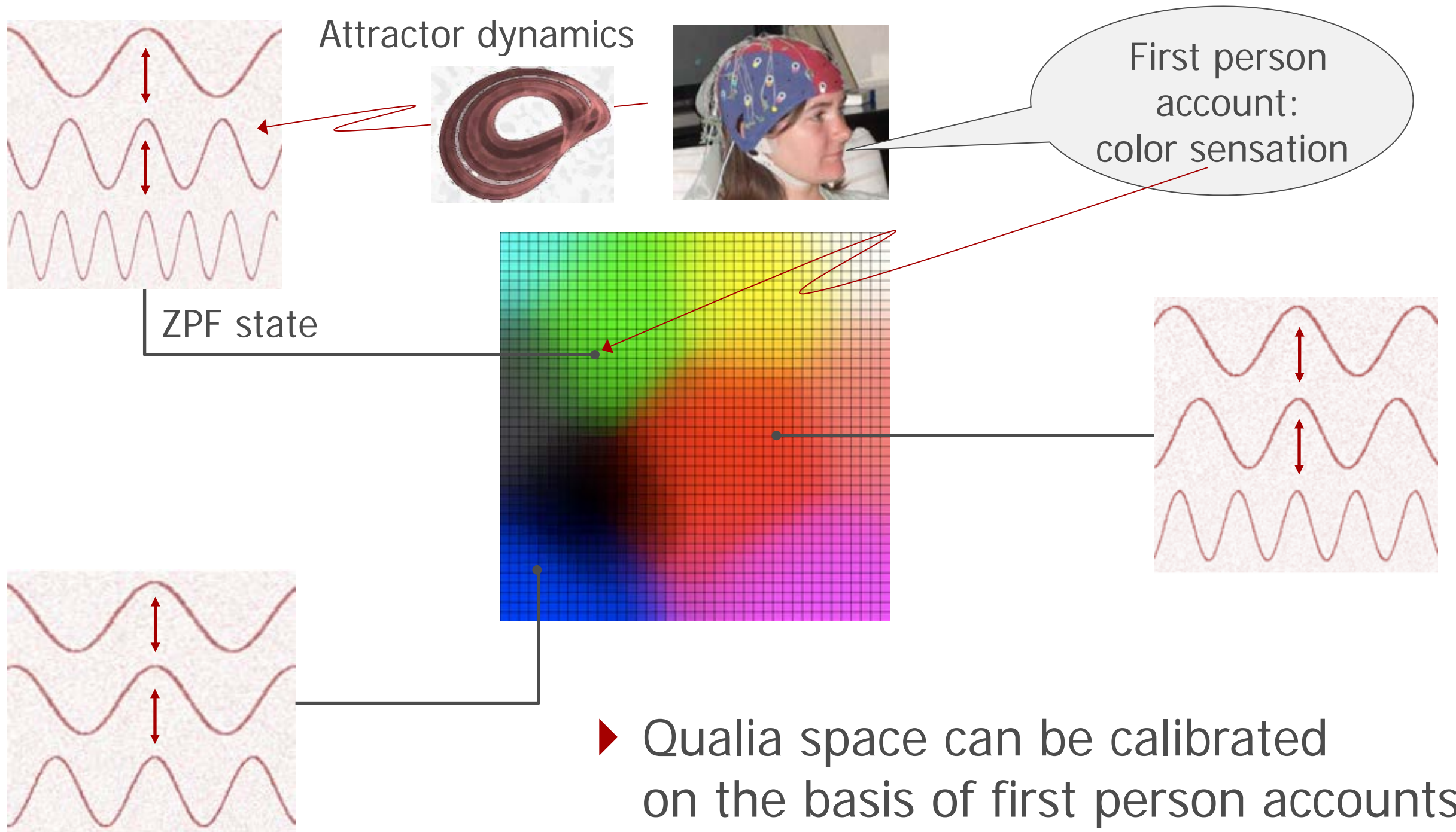the substrate
of consciousness)

ZPF state 1   ZPF state 2   ZPF state 3

Calibration of ZPF Information Space

▶ Every correlation pattern in ZPF information space corresponds to a phenomenal state in qualia space.

Attractor dynamics

ZPF state

First person account: color sensation

▶ Qualia space can be calibrated on the basis of first person accounts

8 Conclusions

Approach provides an elegant solution to the mind-body problem:

▶ Physical phenomena and conscious experiences are based on one and the same standardized substrate.

▶ By one and the same mechanism a system acquires not only its physical properties, but also its phenomenal qualities.

The approach ...

▶ ... avoids the "magic steps" required in Materialism and Dualism and explains how brain and consciousness interact in a causally closed functional chain.

▶ ... solves the combination problem of Panpsychism: our vast array of phenomenal qualities is selectively filtered out of the full spectrum (continuum) of universal qualities.