Research Article

Rhythmic Oscillations and Resonant Information Transfer in Biological Macromolecules

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This manuscript is a concise review of a selection of key concepts concering *rythmic oscillations in proteins to human cognition*. All matter has an associated frequency, characterized by $\upsilon = (mc^2)/h$ (derived from the equivalency $E = mc^2 + pc$, and $E = h\upsilon$). In large organic macromolecules and biopolymers of the living system, there are multiple vibrational modes and oscillatory frequencies, the resonances of which can facilitate molecular recognition, coupling with field modes, electromagnetic and Van der Waals interactions. Via harmonic rhythmic oscillations and resonances nanosecond-scale intermolecular interactions are highly coordinated to orchestrate the myriad complex biochemistry pathways of the cell. Importantly, this field-like interaction is integral in information processing and exchange occurring at the molecular level that underlie cellular intelligence, network intelligence, and perhaps even sentience and consciousness. We will review here the *resonant recognition model* of Irena Cosic and the scale-invariant acoustic information code of a superfluid quantum space described by Meijer.

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Introduction

In the book *Rhythmic Oscillations in Proteins to Human Cognition* [1], a compendium of avant- garde researchers takes a fresh look at the mechanics of nature to emphasize the importance of cyclical, harmonic interrelationships of oscillatory phenomena, especially in biophysics and biochemistry. The book is part of a larger series of publications set to explore and document fundamental research carried out globally from astrophysics to particle physics, from stock market to economic theories, and from plant biology to consciousness. The editors Anirban Bandyopadhyay, a senior Scientist at the National Institute for Materials Science (NIMS) in Tsukuba, Japan— whose patents include a time crystal model for building an artificial human brain [2]— and Kanad Ray, professor and Head of the Department of Physics at the Amity School ofApplied Sciences— explain that their objective in the book series is to leave no stone unturned as they investigate and compile research to answer the fundamental inquiry: “are all events in the universe periodic, such that random and linear events are only an illusion due to a poor understanding of the underlying phenomena?”

The Resonant Recognition Model

A perfect example of this inquiry is provided in the book by emeritus professor of biophysics Irena Cosic, whose research and experimentation has shown that of the myriad biochemical interactions taking place within the cell (several billion a second) there are specific resonant electromagnetic frequencies that guide protein-protein, protein-substrate, and DNA-protein cognate interactions via resonant recognition. These findings contradict the conventional model that views such biochemical interactions as initiating randomly when macromolecules and / or substrates happen to randomly collide with each other within the cellular milieu with just the right orientation and timing for a reaction to take place. Dr. Cosic describes her findings and research into guided macromolecular electromagnetic signaling as the Resonant Recognition Model (RRM):

> *Proteins and DNA/RNA are the main macromolecules in any living organism that are crucial for control and execution of majority biological processes within any living organism. Proteins are the main work forces, while DNA keeps all information about any biological organism and transfers this information through RNA to proteins. The Resonant Recognition Model (RRM) represents whole new view to biomolecular interactions, in particular protein–protein and protein–DNA interactions* [3][4]

The RRM is based on the finding that certain periodicities (frequencies) within distribution of energies of delocalized electrons along a protein molecule are critical for protein biological function and/or interaction with its target. The RRM enables these frequency characteristics to be calculated, and Dr. Cosic has had significant successes in predicting protein-protein and protein to target interactions based solely on the electromagnetic signature frequencies of the delocalized electrons of several polypeptide polymers. Dr. Cosic’s research is pivotally important for understanding the controlled orchestrated mode of biomolecular interactivity within the cell, fundamentally utilizing field interactions and signaling, which fully enables long-range molecular interactivity (for

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instance spanning hundreds of nanometers versus short-range interactions like van der Waals that may only span 10 nanometers or so), multi-system coherence, and even possible non-local signaling.

Scale-Invariant Acoustic Information Code of a Superfluid Quantum Space

The importance of this field-like communication, interactivity, and organization of molecules within the cellular system is extended in the profound work of Professor Dirk K.F. Meijer (*et alia*), who describes Quantum Consciousness being guided by Hydrodynamic Mechanisms from a Superfluid Quantum Space [5]. His chapter in the book *Rhythmic Oscillations in Proteins to Human Cognition* can be accessed online in 3 parts here [6], here [7], and here [8]. Professor Meijer's research is highly synergistic with that of the Resonance Science Foundation, and indeed in the book he cites our papers, such as the Unified Spacememory Network, which describes

mechanisms of consciousness being expressed within the biological system via coupling with the quantum vacuum [9]. We have discussed Professor Meijer's important work in some of our previous RSF articles such as: A New Study Examines How Consciousness in the Universe is Scale Invariant and Implies an Event Horizon of the Human Brain (Brown, 2017).

As Professor Meijer describes:

> *Superfluid quantum space theory (SFQS-T), sometimes known as the BEC vacuum theory, is an approach in theoretical physics and quantum mechanics where the fundamental physical vacuum (non-removable background) is viewed as super- fluid or as a Bose-Einstein condensate (BEC). An ultimate goal of this approach is to develop scientific models that unify quantum mechanics (describing three of the four known fundamental interactions) with gravity, making this theory a candidate for defining of quantum gravity and describing all known interactions in the Universe, at both microscopic and astronomic scales, as different manifestations of the same entity, superfluid vacuum.*

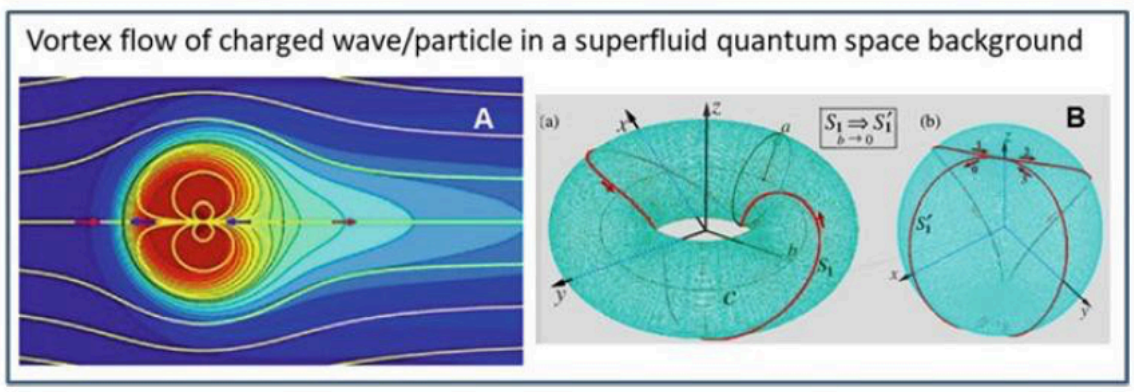

Figure 1. (A) vortex avenue confined by transfer flow with a dipole source inside and a uniform background flow outside. Yellow streamlines outside of the vortex area represent possible Bohmian trajectories. (B) Transformations of torus shown in a to the tori when the radius b tends to the radius a, or to the double surface sphere shown in b when the radius b tends to zero. Pilot waves of Bohm can be envisioned as motion of vortices guiding a particle along the optimal trajectory, in which the torus bears a wave pattern that accommodates all the information about the environment by reflection and therefore can fully simulate the particle until its final destination.

Meijer's research supports the Haramein-Rauscher solution [10] and the Unified Spacememory Network model of consciousness as his research team describes torus operators (fractal toroidal geometry) mediating information flux in a super-fluid quantum space by forming a wormhole communication network. The work described in the book collates and synthesizes together an encompassing model of mechanisms of quantum consciousness spanning from Hameroff and Penrose's model of orchestrated objective reduction in microtubules to Lex Neal's unified model of integral relativity of awareness and energy [11].

Discussion

Harmony, frequency, and resonance of sub-systems in the Planck vacuum plasma are fundamental and integral mechanisms of ordering matter and energy and giving rise to coherent structured systems in nature. These fractal chains of resonant harmonic networks extend from the Planck scale of quantum harmonic oscillators to atoms, molecules, and proteins in the biological domain. The musical harmony of the system is what engenders much of the order and dynamics within the cell, and indeed extends to the oscillatory rhythms of entire cellular systems like the heart or neuronal networks of the brain, the

information transduction of which is an integral component of our consciousness and awareness. What is important is to remember that these oscillatory rhythms and resonant harmonics connect us to the fundamental field of interaction that is the superfluid vacuum plasma of space, through the molecular dynamics occurring within our cells— dynamics that are anything but random and linear.

Further Reading on the Acoustic Quantum Code of Coherence (AQCC):

- Meijer D K F, Wong K W, 2022. How the Universe Orchestrated the Conditions for First Life, using an Informational Quantum Code. The Concerted Action of Magnetic Monopole and Photon/Phonon Fields through a 5D Symmetry Breaking.
  - **Providing a comprehensive theory on the creation of first life conditions on the basis of current physics and cosmology, on the basis of AQCC.** https://www.researchgate.net/publication/357312383_How_the_Universe_Orchestrated_the_Conditions_for_First_Life_using_an_Informational_Quantum_Code_The_Concerted_Action_of_Magnetic_Monopole_and_PhotonPhonon_Fields_through_a_5D_Symmetry_Breaking
- Meijer D K F and Geesink H J H, 2022. Primordial Configuration Space: Discrete Frequency Patterns of Phonons Reveal a Phase Space with a Chern-Invariant Metrics and Acoustic Signature,
  - **Showing a remarkable fit with topological invariant Chern numbers and frequency values of zero-point energy field, confirming the idea that creation of the cosmos is guided by a primordial quantum field.**
  - https://www.researchgate.net/publication/359843726_Primordial_Configuration_Space_Discrete_Frequency_Patterns_of_Phonons_Reveal_a_Phase_Space_with_Invariant_Metrics_and_Acoustic_Signature
- Meijer D K F, 2023. To Be or Not to Be in a Super-Deterministic Universe: the Concept of a Retro- causal Reconstructive Universe Influenced by Human Choices
  - **Discussing the potential deterministic character of reality, the role of mankind in building a reconstructive universe, with an escape route for free will.**
  - (10) (PDF) To Be or Not to Be in a Super-Deterministic Cosmos. The Concept of a Retro-causal Reconstructive Universe, in a Self-learning Mode (researchgate.net)
- Meijer D K F, Ivaldi F, 2023. The Elemental Intelligence of the Cosmos and the Acoustic Quantum Code of Resonant Coherence. Gravitational Connection and the Role of Artificial Intelligence in the Ultimate Fate of our Universe.
  - **Treating the evolution of cosmological intelligence from AI and gravity connection perspectives.**
  - https://www.researchgate.net/publication/366030609
- Meijer D K F, 2023. The Concept of Integral Holographic Consciousness: Relation with Predictive Coding, Phi-Based Harmonic EEG Coherence as Perturbed in Mental Disorders,
  - **Showing that human consciousness is mediated by an integral holographic workspace, that neuronal microtubule oscillations are AQCC compatible and that human EEG signals exhibit AQCC pattern, being disturbed in various mental disorders.**
  - (2) (PDF) Concept of Integral Holographic Consciousness: Relation with Predictive Coding, Phi- Based Harmonic EEG Coherence as Perturbed in Mental Disorders (researchgate.net)

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4. *Cosic I, 1997. The resonant recognition model of macromolecular bioactivity: theory and applications. Birkhauser Verlag, Basel*
5. *Meijer D K F, I Jerman, A V Melkikh, and V I Sbitnev, 2021. "Biophysics of Consciousness: A Scale-Invariant Acoustic Information Code of a Superfluid Quantum Space Guides the Mental Attribute of the Universe," in Rhythmic Oscillations in Proteins to Human Cognition, A. Bandyopadhyay and K. Ray, Eds. Singapore: Springer Singapore,, pp. 213–361. doi: 10.1007/978- 981-15-7253-1_8.*
6. *Meijer D K F, Jerman I, Melkikh AV and Sbitnev V I, 2020. Consciousness in the Universe is Tuned by a Musical Master Code. Part 1: A Conformal Mental Attribute of Reality: Quantum Biosystems | 2020 | Vol 11 | Issue 1 | Page 1-71. https://c998b915-8f5b-41ca-bc9b-2749477fac38.filesusr.com/ugd/f152fa_74f949c7d405405789a7637d161201b4.pdf*

7. ^*Meijer D K F, Jerman I, Melkikh A V and Sbitnev V I, 2020. Consciousness in the Universe is Tuned by a Musical Master Code, Part 2: The Hard Problem in Consciousness Studies Revisited. Quantum Biosystems, Vol 11, Issue 1, Page 31-71 https://c998b915-8f5b-41ca-bc9b-2749477fac38.filesusr.com/ugd/f152fa_20acb738c24b47e0bd319e209ff3e0f0.pdf*
8. ^*Meijer D K F, Jerman I, Melkikh A V and Sbitnev V I, 2020. Consciousness in the Universe is Tuned by a Musical Master Code, Part 3: A Hydrodynamic Superfluid Quantum Space Guides a Conformal Mental Attribute of Reality. Quantum Biosystems, Vol 11, Issue 1, Page 72- 107 https://c998b915-8f5b-41ca-bc9b-2749477fac38.filesusr.com/ugd/f152fa_74f949c7d405405789a7637d161201b4.pdf*
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Declarations

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