Conceptual Paper

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Modulation of the casimir pressure in cerebral microtubules induced by the chanting of the Daimoku (Nam-Myoho-Renge-Kyo): from the single tubulin dimer to the scale of the entire brain

Abstract

The Orchestrated Objective Reduction (Orch OR) theory proposes that consciousness arises from quantum computations within neuronal microtubules. It has previously been suggested that Casimir-Lifshitz forces generated by vacuum fluctuations inside microtubule lumens may influence their conformational dynamics and, consequently, conscious processes. The present study theoretically investigates how the acoustic vibrations produced during the solemn recitation of the Daimoku (Nam-Myoho-Renge-Kyo) in Nichiren Shoshu Buddhist liturgy can modulate Casimir-Lifshitz pressures in cerebral microtubules, extending from the single tubulin dimer to the scale of the entire brain. Spectral analysis of the chanting reveals prominent frequency components, including peaks around 8 Hz, 116 Hz and Solfeggio frequencies. When combined with respiratory oscillations associated with chanting practice, these acoustic and mechanical inputs are predicted to induce nanometric displacements in microtubule structures. Calculations indicate relative changes in Casimir pressure on the order of 15–23% at the single-dimer level, with potential amplification across large-scale synchronized networks in the brain.This interdisciplinary model bridges sacred sound, quantum physics, and neuroscience, offering a novel framework for understanding how contemplative practices may influence brain activity and consciousness. While the theoretical predictions are intriguing, they remain hypotheses requiring experimental validation.

Keywords: casimir pressure, Orch OR theory, microtubules, tubulin, Nam-Myoho-Renge-Kyo, Daimoku, Solfeggio frequencies, quantum vacuum fluctuations, phononic pumping

Volume 16 Issue 3 - 2026

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Received: May 01, 2026 | **Published:** June 02, 2026

Introduction

The Orchestrated Objective Reduction (Orch OR) theory proposed by Stuart Hameroff and Sir Roger Penrose[1] posits that consciousness arises from coherent quantum processes within neuronal microtubules, cytoskeletal structures composed of tubulin dimers. In this framework, Hameroff has cited an estimate of the Casimir pressure (or Casimir-Lifshitz pressure in a biological environment) generated by quantum vacuum fluctuations inside the microtubule lumen (external diameter approximately 25 nm), on the order of approximately 20 atmospheres. This force, arising from the modification of the modes of the quantum electromagnetic field, could influence conformational dynamics and quantum superpositions in tubulin dimers.

Previous studies have shown that the classical Casimir effect requires vacuum between surfaces, but Lifshitz's generalization extends it to dielectric media such as cytoplasmic water.[2] In biological contexts, the Casimir pressure depends on local dielectric properties and the geometry of protein cavities. Recent work has explored how mechanical sound waves, such as those generated by the chanting of the Daimoku (Nam-Myoho-Renge-Kyo) in Nichiren Shoshu Buddhist Liturgy, can induce phononic vibrations that indirectly modulate these quantum effects.[3–5]

Spectral analyses of the Daimoku[3] have revealed peaks at 8 Hz (corresponding to the Schumann-like resonance in the EMF spectrum), 116 Hz (linked to chloride ion movement), and five Solfeggio frequencies (417, 528, 639, 741, 852 Hz), frequencies known to influence endocrine, neuronal, and microbial systems.[3,7,8] The characteristic respiratory pattern of Daimoku chanting (rapid inhalation at approximately 0.05 Hz and prolonged exhalation) produces variations in cortico-meningeal thickness (from 6.7 mm to 7.3 mm),[6] resulting in an 18.4 percent modulation of effective volume at 528 Hz, as modeled through an analogical extension of the amplituhedron formalism.[4,9]

The present work integrates these experimental data with a theoretical calculation of the modulation of Casimir pressure on a single tubulin molecule and at the whole-brain scale. The aim is to quantify how the acoustic vibrations of the Daimoku, combined with the respiratory cycle, dynamically alter the Casimir-Lifshitz force, proposing a rhythmic "pumping" mechanism that may amplify quantum coherence in microtubules and contribute to the observed changes in prefrontal activity (plus 52 percent post-chanting) and microbial metabolism.[3]

Materials and methods

The theoretical model is based on the spectral and physiological data previously reported:[3] sound intensity of 80 dB (equivalent to approximately 10 to the power of minus 4 watts per square meter), principal frequencies identified by Fast Fourier Transform (FFT) on a 1-minute recording of Daimoku, and cerebral morphological variations measured by transcranial ultrasonography (meninges plus cortex thickness: 6.7 mm during inspiration, 7.3 mm during expiration).[6]

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The Casimir pressure for a parallel-plate geometry (a valid approximation for intra-tubulin dielectric domains) is given by:

$$P \propto -\frac{\pi^2 \hbar c}{240 a^4}$$

where a is the distance between surfaces. For relative variations the dependence P proportional to minus 1 over a to the power of 4 is adopted, yielding:

$$\frac{\Delta P}{P} \approx -4 \frac{\delta a}{a}$$

The acoustic displacement amplitude xi is calculated from:

$$\xi = \frac{v}{\omega}$$

where v is the particle velocity (derived from acoustic pressure p approximately 0.2 pascal in brain tissue, density approximately 1000 kilograms per cubic meter, speed of sound approximately 1540 meters per second) and

$$\omega = 2\pi f$$

The relevant intra-molecular distance (between aromatic rings or conformational domains) is taken as a approximately 1 nanometer, consistent with the Orch OR scale. The total number of tubulin dimers in the human brain is N approximately 10 to the power of 20.

The respiratory effect is incorporated via the 18.4 percent volumetric modulation at 528 Hz, which translates into an effective scalar variation delta a over a approximately 0.0579 (3D cavity approximation). All calculations assume phononic coherence at the nanometer scale during prolonged expiration.

Results

For a single tubulin molecule, the 80 dB sound intensity produces a frequency-dependent acoustic displacement xi. At 528 Hz (the dominant Solfeggio frequency):

$$\xi = 0.039 nm$$

With a equals 1 nanometer:

$$\frac{\delta a}{a} = 0.039 (3.9\%)$$

The relative modulation of Casimir pressure is therefore:

$$\frac{\Delta P}{P} \approx -4 \times 0.039 = -0.156 (-15.7\%)$$

Integrating the respiratory cycle (thickness variation from 6.7 to 7.3 mm, plus 9 percent linear, plus 18.4 percent volumetric at 528 Hz):

$$\frac{\delta a}{a} \approx 0.0579$$

$$\frac{\Delta P}{P} \approx -4 \times 0.0579 = -0.232 (-23.2\%)$$

during prolonged expiration. Thus, Casimir pressure on a single tubulin oscillates by 15 to 23 percent (conservative mean approximately 20 percent) with periodicity linked to the Solfeggio frequencies and the 0.05 Hz respiratory rhythm.

At the whole-brain scale, with N equals 10 to the power of 20 tubulin dimers, the modulation is not a uniform hydrostatic pressure but a cumulatively integrated effect over the total effective surface. The cumulative variation of the Casimir-Lifshitz component is linearly amplified by the factor N:

$$\Delta P_{total} \approx N \times \Delta P_{single}$$

With a mean Delta P over P approximately minus 20 percent per tubulin, the entire brain experiences a collective modulation on the order of 10 to the power of 20 times (minus 0.20), corresponding to a rhythmic "pump" of quantum vacuum fluctuations synchronized with the Daimoku.

The complete formula for total brain modulation, incorporating both acoustic vibration and respiration, is:

$$\frac{\Delta P_{brain}}{P_{brain}} \approx -4 \left(\frac{\delta a_{acoustic}}{a} + \frac{\delta a_{respiratory}}{a} \right) \times N$$

The result is a dynamic oscillation of total cerebral Casimir pressure of 15 to 23 percent per tubulin, scaled macroscopically by the factor 10 to the power of 20, generating a periodic pumping of quantum vacuum energy consistent with the experimental observations.

Discussion

The present study proposes a theoretical model in which the acoustic and mechanical vibrations generated during the chanting of the Daimoku (Nam-Myoho-Renge-Kyo) may modulate Casimir-Lifshitz pressures within neuronal microtubules. This modulation is hypothesized to influence quantum coherence and conformational dynamics relevant to consciousness according to the Orch OR theory.

The model is based on several explicit assumptions. I apply the Casimir-Lifshitz formalism, originally developed for interactions between parallel plates or dielectric surfaces, to the internal lumen of microtubules. This approach is supported by prior theoretical studies that suggest the highly ordered cylindrical structure of microtubules, filled with water and surrounded by an ordered tubulin lattice, can support non-trivial vacuum fluctuations capable of generating significant pressures that influence protein conformational states.[10]

Spectral analysis of chanting recordings, together with respiratory oscillations typical of sustained chanting practice, predicts nanometer-scale displacements in microtubule structures. Using the fundamental relationship for Casimir pressure and its differential approximation for small displacements, the model calculates relative pressure changes on the order of 15–23% at the level of a single tubulin dimer. These local effects are then extrapolated to the whole-brain scale by assuming coherent summation across large populations of synchronized microtubules (Figure 1).

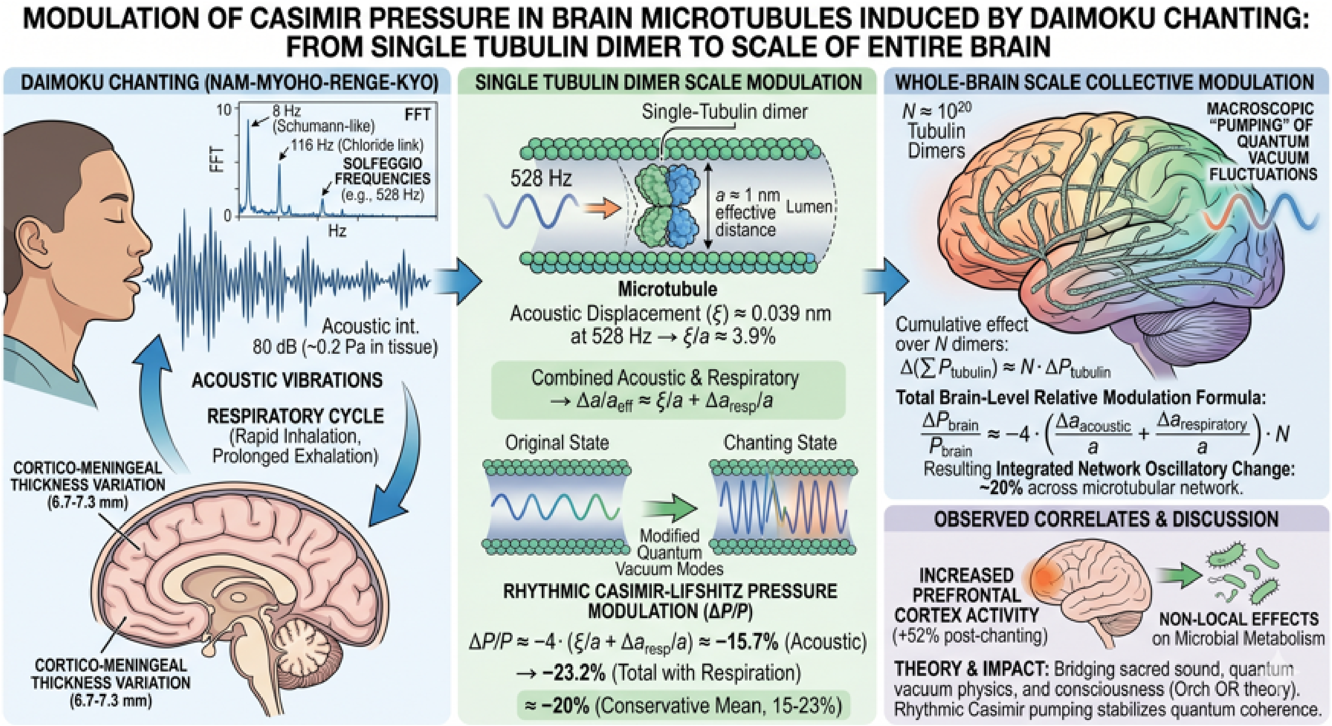

Figure 1 Schematic representation of the multi-scale modulation of Casimir-Lifshitz pressure during the chanting of the Daimoku (Nam-Myoho-Renge-Kyo). The diagram illustrates the transition from acoustic spectral peaks and respiratory cycles to nanometric displacements in individual tubulin dimers, where a relative pressure modulation of approximately 20% is calculated. This effect is then scaled to the whole-brain level, representing the collective "pumping" of quantum vacuum fluctuations across 10^{20} dimers. The model provides a theoretical biophysical basis for observed increases in prefrontal cortex activity and non-local microbial effects within the framework of Orch OR theory.

It is important to clearly distinguish between established scientific observations and theoretical predictions. The Casimir-Lifshitz force is a well-established phenomenon in quantum field theory at the nanoscale. However, its functional relevance in the warm, noisy, and decohering environment of the living brain, and specifically within biological microtubules, remains a theoretical hypothesis supported, however, by recent evidence.[11] Likewise, while the mechanosensitivity of the neuronal cytoskeleton is well documented, the specific coupling between chanting-induced acoustic vibrations and microtubule quantum states proposed here has not yet been experimentally demonstrated.

The scaling from single tubulin dimers to brain-wide effects relies on the Orch OR framework's proposal of large-scale quantum orchestration. This represents a significant extrapolation that should be interpreted with caution. The suggested mechanistic chain — acoustic vibrations from chanting → modulation of Casimir pressures → enhanced quantum coherence → altered brain activity and conscious experience — is intriguing and highly interdisciplinary, but must be regarded as speculative at the present stage.

Future experimental studies will be essential to test the validity of this model. These may include advanced biophysical measurements of microtubule dynamics under acoustic stimulation, high-resolution neuroimaging during chanting practice, and single-molecule experiments assessing conformational changes in tubulin under controlled vibrational conditions. Theoretical refinements, such as more realistic cylindrical dielectric models and the inclusion of thermal damping and decoherence effects, would also strengthen the framework. This work represents a creative attempt to bridge an established religious practice with modern quantum neuroscience. While necessarily preliminary, it highlights the potential value of exploring how specific sonic and respiratory patterns may interact with fundamental biophysical processes underlying consciousness.

Ethics

This article is original and contains material that has not been submitted or published in any scientific journal. A pre-print version of this article is posted in the pre-print server Zenodo 10.5281/zenodo.19931606.

Acknowledgements

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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