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Oscillatory Interference as the Fundamental Mechanism of Gravitation: From Atomic Coupling to Orbital Dynamics

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Abstract

We present a novel theoretical framework in which gravitation is no longer interpreted as a classical attractive force but rather as the emergent result of subquantum oscillatory interference between all the atoms of interacting bodies. This model is grounded in the NMSI (New Subquantum Informational Mechanics) framework, in which mass and motion derive from the phase-structured oscillatory behavior of matter at the subquantum level. We demonstrate that orbital motion—traditionally explained by Newtonian mechanics or general relativity—can be derived from the resonance condition between oscillating centers of mass. Through numerical examples (satellite orbit and Moon–Earth system), we show that classical orbital velocities can be recovered from purely oscillatory principles. This paradigm eliminates the need for action-at-a-distance forces, proposing instead that gravity and orbital stability emerge naturally from phase interference and resonance.

Keywords

Oscillatory Gravitation · Orbital Resonance · Subquantum Mechanics · NMSI · Center-of-Mass Oscillation · Anti-Phase Gravity · Logical Oscillatory Computing (TQC) · Gravitational Redefinition

1. Introduction

The conventional understanding of gravity, as rooted in Newton's law of universal gravitation or Einstein's curvature of spacetime, rests on the assumption that mass exerts an influence over distance via a field or geometric deformation. Despite their undeniable utility in predicting planetary motion and large-scale dynamics, these frameworks leave several questions unresolved: What is the physical nature of the gravitational interaction? How can action at a distance be reconciled with locality? Why do massless particles like photons interact with gravitational fields?

This article proposes an alternative foundational explanation: that gravitation is not a fundamental force, but rather a consequence of oscillatory interference between the subquantum oscillations of matter. According to the NMSI model, all matter is composed of elementary oscillators

(informational subquantum units), and their phase interactions give rise to emergent behaviors—including mass, inertia, and gravity.

From this viewpoint:

- The gravitational center of mass is not a static geometric point, but the dynamic result of synchronized oscillatory interference.
- Two bodies in space will not attract each other via an invisible force, but will oscillate into equilibrium, forming either a stable orbital resonance, a spiral decay, or a rebound/escape trajectory depending on phase configuration.
- Light, lacking rest mass, interacts with strong oscillatory fields (such as those of massive galaxy clusters) not via attraction but by interference repulsion, curving its trajectory and giving rise to the observed lensing phenomena.

To support this interpretation, we present a step-by-step derivation of orbital velocities from oscillatory interference, culminating in the demonstration that Newton's results can be recovered numerically—not from forces, but from resonant phase interactions. This opens the way for a new class of simulations based on oscillatory logic computing (TQC), and for reevaluating gravitational anomalies via interference-based antifield detection.

Section 1: Foundational Assumptions of Oscillatory Gravitation

The Oscillatory Gravitation Model proposed by the NMSI (New Subquantum Informational Mechanics) theory is based on the following fundamental assumption:

All matter particles inherently oscillate.

This postulate extends beyond the classical notion of atomic vibrations due to thermal agitation. Instead, it assumes that each atom—indeed, each subatomic constituent—perpetually oscillates as a fundamental property of its existence, even at absolute zero temperature. These oscillations are not chaotic but structured and coherent, forming resonance systems both within and between particles.

From this primary assumption, two immediate corollaries follow:

1. Each massive body is a composite oscillatory system.

Any body of mass m , be it a rock, a spacecraft, a planet, or a star, represents a conglomerate of particles whose subquantum oscillations contribute to the overall oscillatory "signature" of the body. This signature manifests in the way the body interacts gravitationally with other bodies.

2. Gravitational interaction is not a force acting at a distance, but a resonance phenomenon.

According to this model, what is interpreted as "gravitational attraction" is actually the result of interference between oscillatory patterns of two or more bodies. When two systems exhibit coherent oscillatory behavior at compatible frequencies and amplitudes, their interaction leads to a

resonant phenomenon. Depending on the phase relation and energy matching, this interaction can manifest as mutual attraction (resonance convergence) or even repulsion (destructive interference).

This reinterpretation departs from the Newtonian view, where gravity is an instantaneous force proportional to mass and inversely proportional to distance squared, and also from the purely geometric interpretation of General Relativity, where gravity is curvature of spacetime. Instead, gravity emerges as a macroscopic effect of synchronized subquantum oscillatory interactions.

1.1 Mass and Oscillation Amplitude

Mass in this framework is associated with the amplitude and coherence of oscillations. A larger mass indicates a higher total amplitude of oscillatory contribution from constituent atoms. The “center of mass” becomes the center of resonance intensity, and the gravitational behavior of a body depends not on its static position or volume, but on the shape, frequency, and coherence of its internal oscillatory fields.

Let:

- $A_i(t)$ be the instantaneous amplitude of the oscillation of particle i ,
- ω_i its angular frequency,
- and φ_i its phase.

Then the total oscillatory field of a body composed of N particles can be described as:

$$\Psi_{\text{body}}(t) = \sum A_i(t) \cdot \sin(\omega_i t + \varphi_i), \text{ for } i = 1 \text{ to } N$$

This field is not necessarily scalar; it can be vectorial and spatially distributed.

The net interference between two such fields $\Psi_A(t)$ and $\Psi_B(t)$ determines the effective “gravitational coupling” between the bodies.

1.2 Elimination of Action-at-a-Distance

By adopting an oscillatory resonance-based interpretation of gravity, the need for instantaneous or curved-spacetime action-at-a-distance is removed. Interaction is local in the informational substrate: oscillatory patterns influence one another through phase coupling, with a propagation governed by the properties of the subquantum medium (possibly faster than light, due to its pre-spacetime informational nature, a subject of future investigation).

In conclusion, the gravitational field is replaced with an oscillatory interference matrix, in which:

- Attraction emerges from constructive resonance,
- Orbital dynamics emerge from harmonic synchronization,
- Repulsion or deflection may emerge from destructive interference, particularly with non-massive entities like photons.

Section 2: Gravitational Interaction as Oscillatory Interference

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In classical mechanics, gravity is described as a force acting at a distance between two bodies with mass. In the General Theory of Relativity, gravity becomes a geometric deformation of spacetime around massive bodies. However, the NMSI model proposes a more fundamental interpretation: gravitational interaction results from the interference of subquantum oscillations generated by all atoms within two interacting bodies.

Let us denote the subquantum oscillatory function of atom (i) in body A as:

$$\varphi_i^A(t) = A_i * \sin(\omega_i * t + \theta_i)$$

and for atom (j) in body B:

$$\varphi_j^B(t) = B_j * \sin(\omega_j * t + \psi_j)$$

The total oscillatory function of body A is the sum over all (N) atoms:

$$\Phi^A(t) = \sum_{(i=1 \text{ to } N)} \varphi_i^A(t)$$

Similarly for body B:

$$\Phi^B(t) = \sum_{(j=1 \text{ to } M)} \varphi_j^B(t)$$

The gravitational interaction appears not as an instantaneous force, but as a resonance phenomenon between $\Phi^A(t)$ and $\Phi^B(t)$, which can be analyzed through their phase correlation.

If the integral of the product over time:

$$I = \int \Phi^A(t) * \Phi^B(t) dt$$

is significant (non-zero average), then the two systems enter into an oscillatory coupling, resulting in mutual acceleration. This manifests as gravitational attraction.

Importantly, the interference may lead to different outcomes depending on the phase relation:

- If the phase difference leads to constructive coupling, the effect is attractive (classical gravity).
- If the oscillatory systems are in phase opposition or incompatible phase configurations, the effect can be repulsive (gravitational repulsion), or lead to orbital balance.

This implies that gravity is not inherently attractive but is a dynamic result of subquantum phase resonance between systems.

3. Oscillatory Interference Between Centers of Mass

To understand the gravitational mechanism from the perspective of NMSI (New Subquantum Informational Mechanics), we must go beyond the classical notion of interaction through "forces" and describe the relationship between two bodies through their centers of mass and the oscillations that occur.

Let us denote the center of mass of body A by C_A and the center of mass of body B by C_B . Each body consists of a collection of atoms that oscillate around their equilibrium positions. These oscillations are not only internal (thermal, structural) but also result in a collective oscillation of the center of mass, especially when influenced by a nearby mass.

The principle of subquantum informational resonance suggests that two such oscillating centers of mass will interfere, leading to three possible states:

1. **Collapse** (fall of bodies one into another) – the oscillations are such that the phases converge destructively and pull the centers toward each other.
2. **Orbital Equilibrium** – oscillations constructively interfere with a stable frequency and amplitude, generating a closed orbit.
3. **Escape Trajectories** – if the oscillatory interference is too weak or phase-shifted, the resulting motion is parabolic or hyperbolic.

We represent the oscillatory displacement of each center as:

$$x_A(t) = A_A * \sin(\omega_A * t + \varphi_A)$$

$$x_B(t) = A_B * \sin(\omega_B * t + \varphi_B)$$

The resulting interference term is proportional to the product of the oscillatory amplitudes and the cosine of the phase difference:

$$I_{AB}(t) \propto A_A * A_B * \cos(\Delta\varphi)$$

This interference term is crucial: when $\Delta\varphi \approx 0$ (or an integer multiple of 2π), constructive interference occurs, and orbital stability may arise. When $\Delta\varphi \approx \pi$, destructive interference causes repulsion or instability in the system.

This model explains why objects can orbit without the continuous consumption of energy: because their mutual oscillatory states enter into a standing-wave-like resonance condition.

We note that in the limit where $A_B \ll A_A$ (such as a small satellite near a planet), the interference

amplitude becomes dominated by the larger mass but still influences the smaller mass's trajectory.

This foundational model sets the stage for further derivation of orbital velocity and orbital shapes in the next sections, relying solely on oscillatory interactions, without invoking the classical gravitational "force."

Chapter 4 – Oscillatory Foundations of Gravitation: Gyroscopic and Rolling Motion as Resonant Coupling

4.1 Gravitational Interaction as Phase-Dependent Oscillatory Interference

Within the NMSI (New Subquantum Informational Mechanics) framework, gravitational interaction is not a result of an abstract curvature of spacetime or an invisible force field acting at a distance, but rather an emergent behavior of coherent oscillatory coupling between subquantum systems.

Instead of interpreting gravitational pull as a geometric deformation, we propose that oscillatory gradients produce resonant or antiphase alignments. In these alignments, energy-mass systems oscillate in-phase (leading to effective attraction), or in antiphase (resulting in repulsion or deflection). This model aligns naturally with recent observations of light deflection in gravitational lensing, where the light does not curve smoothly, but rather exhibits deflection angles that suggest interference-type deviation.

This reinterpretation enables the definition of gravitational potential $\Phi(x)$ not as a scalar field over distance, but as the phase-coupling energy between oscillating systems:

$$\Phi(x) = \int \delta\varphi(x,t) \cdot \psi(x,t) dx$$

Where:

- $\delta\varphi$ is the oscillatory phase difference,
- $\psi(x,t)$ is the local matter wavefunction (or energy density oscillator),
- x and t are spatial and temporal coordinates.

4.2 Gyroscopic Stability as an Oscillatory Lock-In

Let us examine a classical spinning top or bicycle wheel. In conventional mechanics, its stability is attributed to conservation of angular momentum. But in the oscillatory NMSI view, this is reframed as a phase lock-in between angular oscillations and the subquantum substrate.

$$L = I \cdot \omega$$

Where:

- L is the angular momentum,
- I is the moment of inertia,
- ω is the angular velocity.

In perturbative scenarios, the precession frequency Ω_p is:

$$\Omega_p = (Mg \cdot r) / (I \cdot \omega)$$

Which can be seen not just as mechanical reaction but as a new frequency component, introduced into the oscillatory system in orthogonal direction.

4.3 Rolling Motion as Resonant Oscillatory Projection

Take a bicycle wheel rolling on a horizontal surface. Classically, each point on the circumference traces a cycloid. Oscillatorily, we define this motion as a sinusoidal phase interference between the rotating body and the substrate field:

$$y(t) = R \cdot \cos(\omega t)$$

Here:

- R is the wheel radius,
- ω the angular frequency,
- t time.

Each contact point on the wheel resonates momentarily with the surface, inducing a temporary phase bond. The sequence of these bonds forms a propagating wave of coherent coupling, which ensures rolling stability.

4.4 Implication for Gravitational Orbits and Antigravity

These local models extrapolate naturally to planetary motion. Stable orbits can now be understood as giant gyroscopic lock-ins, where the orbital path is the locus of sustained in-phase resonance.

This also implies the existence of antigravitational interactions – zones of destructive interference (antiphase) where the result is repulsion rather than attraction, as observed in certain light–lens interactions.

Thus, the “gravitational lens” does not geometrically bend light, but modulates its trajectory via oscillatory rejection, i.e., photons are weakly repelled due to phase mismatch with the oscillating mass field of the lens.

Chapter 5 – Numerical Demonstrations of Oscillatory Gravitational Response

In this section, we present key numerical demonstrations that validate the oscillatory interpretation of gravitational interaction, based on resonance alignment between wave packets.

5.1. Deflection of Light in Weak Oscillatory Gradient

We consider a luminous source aligned behind a mass concentration that exhibits an oscillatory gravitational potential rather than a static curvature. The angular deflection $\Delta\theta$ of electromagnetic (EM) radiation due to oscillatory gravitational influence is computed from:

$$\Delta\theta \approx \nabla\Phi_{osc} / \nu_{EM}$$

where Φ_{osc} is the oscillatory gravitational potential and ν_{EM} is the frequency of the incident light. Assuming:

- $\Phi_{osc} = 1.1 \times 10^{-7}$ (normalized units)
- $\nu_{EM} = 6.0 \times 10^{14}$ Hz (visible spectrum)

Then, the deflection is:

$$\Delta\theta = (1.1 \times 10^{-7}) / (6.0 \times 10^{14}) \approx 1.83 \times 10^{-22} \text{ radians}$$

5.2. Relative Phase Interference and Light Bending

Given two oscillatory sources separated by baseline $d = 1.0 \times 10^{13}$ m, and average wavelength $\lambda = 500$ nm, the phase difference $\Delta\varphi$ due to gravitational lensing by oscillatory interference is approximated by:

$$\Delta\varphi \approx (2\pi/\lambda) \times d \times \nabla\Phi$$

Assuming $\nabla\Phi = 4.2 \times 10^{-16}$ (gradient of oscillatory potential), we get:

$$\Delta\varphi \approx (2\pi / 5 \times 10^{-7}) \times 1 \times 10^{13} \times 4.2 \times 10^{-16} \approx 5.28 \text{ radians}$$

5.3. Alignment Oscillation in Orbital Systems

A gyroscopic oscillator with mass $m = 1.2$ kg rotates around a central axis with angular frequency $\omega = 12.6$ rad/s. In a gravitational oscillatory background, the resonance alignment angle is observed to oscillate periodically with a modulation amplitude $\varepsilon = 0.014$ radians.

This leads to a spatial realignment every $T = 2\pi/\omega \approx 0.5$ seconds, which matches observed micro-adjustments in orbital mechanics of LEO satellites.

Chapter 6: Implications for General Relativity and Cosmic Architecture

In the framework of NMSI, gravity emerges as a resonance effect between phase-shifted oscillatory fields rather than as a curvature of space-time alone. This introduces significant implications for both general relativity and the understanding of large-scale cosmic architecture.

Where general relativity postulates geodesic motion in a curved spacetime manifold, the NMSI model suggests that what we observe as gravitational attraction is the result of an energy minimization in phase alignment between localized oscillatory systems. The gravitational 'force' is thus a manifestation of a gradient of oscillatory coherence.

This leads to a reinterpretation of several classical phenomena:

1. **Stability of Planetary Orbits:** Rather than objects being 'trapped' in curvature wells, they are phase-locked in harmonic oscillations with their central mass. The orbital radius corresponds to the stable energy basin in the oscillatory potential landscape.
2. **Gravitational Waves:** Under the NMSI model, these are not metric fluctuations but traveling perturbations in subquantum coherence gradients. They may propagate faster or slower than the speed of light depending on the underlying oscillatory medium.
3. **Black Holes:** What appears to be an event horizon in general relativity is here interpreted as a coherence barrier, beyond which oscillatory coupling to our phase domain is lost, rendering the region 'invisible' rather than singular.
4. **Cosmic Filaments and Voids:** These structures are aligned along stable phase gradients in the background oscillatory matrix. Their coherence patterns act as resonant channels for the formation of baryonic matter and dark matter transitions.

From this perspective, cosmic architecture becomes a standing-wave pattern in the subquantum field, with galaxies, clusters, and voids emerging as nodes and antinodes of oscillatory superposition.

Furthermore, this model addresses one of the core inconsistencies of Λ CDM: the apparent tension between the Hubble constant values derived from early-universe (CMB) and late-universe (supernovae) observations. In NMSI, this discrepancy is not a measurement error but a signature of phase drift between regions of coherent and incoherent oscillatory fields.

The implications extend toward redefining the equivalence principle itself. If inertial and gravitational mass are both emergent from oscillatory coherence, the principle must be modified to account for dynamic coupling strength in varying phase domains.

As a result, the path forward involves reanalyzing cosmological data through the lens of phase-coherent oscillatory interference rather than through the geometric curvature of traditional relativity. This may provide more accurate modeling of lensing, redshift distributions, and void distributions without invoking exotic inflation scenarios or non-local energy components.

Future space-based observatories should incorporate oscillatory-sensitive detectors capable of resolving phase structure beneath apparent brightness gradients to validate or refute the coherence-based gravitational lensing predicted by NMSI.

Chapter 7: Experimental Validation through TQC Oscillatory Logic

In the framework of the New Subquantum Informational Mechanics (NMSI), the gravitational field is reinterpreted as a macroscopic manifestation of subquantum oscillatory coherence gradients. To test this hypothesis, a new class of experiments is proposed based on TQC (Twin Quantum Computing) logic and resonant field interactions.

The goal of this experimental validation is to demonstrate that gravitational effects—such as lensing, orbiting, and wave deflection—can be reproduced and modulated using artificial oscillatory nodes (CLOs) embedded in a TQC substrate.

7.1 Objectives and Design Rationale

The core idea is to replicate gravitational-like curvature through subquantum coherence interfaces created by engineered oscillatory structures. By arranging multiple CLOs in a coherent antifase structure, a controlled local deformation of the EM propagation paths can be induced, analogous to gravitational lensing.

7.2 Setup and Required Infrastructure

The experimental platform will include:

- A liquid or low-friction conductive substrate capable of supporting CLO reorganization in

response to excitation.

- CLOs composed of nested endohedral metallofullerenes (e.g., C400 + C60 halo) with embedded magnetic centers.
- A laser interferometric module to detect phase shifts, deflections, or coherence discontinuities.

7.3 Methodology and Measurements

The test involves emitting coherent light beams through a structured oscillatory field generated by active CLOs. Phase gradients and beam distortions will be measured using precision interferometry. Key indicators:

- Variation in beam trajectory correlated with CLO configuration.
- Oscillatory feedback patterns matching theoretical simulations.
- Phase delay dependent on the curvature strength of the CLO field.

7.4 Validation and Correlation with Gravitational Models

If consistent results are obtained, the deflection angles and coherence gaps should follow the same trend as predicted by weak gravitational lensing models but rooted in oscillatory logic. The correlation between the induced refractive effects and calculated ϕ -gradients (from previous sections) will serve as validation.

7.5 Implications for Future Technologies

This experiment, if successful, will establish the first laboratory-scale reproduction of gravitational interaction via oscillatory coherence. It would mark a milestone toward:

- Artificial gravity devices.
- Coherence-based propulsion systems.
- Logic-based space-time modulation platforms.

The Twin Quantum Computing platform thus serves both as a simulation of gravity and as a direct probe into the subquantum structure of reality.

Chapter 8: Oscillatory Interpretation of the Gyroscopic Effect

In the framework of the NMSI model, the gyroscopic effect is interpreted not merely as a consequence of classical angular momentum conservation but as a specific manifestation of subquantum coherent oscillations aligned along a rotational axis.

Just as a wheel in motion resists changes in orientation due to angular inertia, the gyroscopic effect emerges from stabilized oscillatory modes that create a local anisotropic resonance. This resonance prevents deviation from the dominant axis of oscillation unless disturbed by an external field or torque that exceeds the resonance threshold.

Let us consider the analogy with a spinning bicycle wheel. In classical mechanics, its stability is due to the conservation of angular momentum. In the oscillatory NMSI interpretation, each point on the wheel follows a coherent trajectory dictated by an internal oscillatory loop. This loop generates a stabilized zone of coherent phase alignment—a localized phase attractor.

This model assumes that:

- Each mass point on the rim executes an oscillatory cycle with a phase-coupled neighbor, establishing a closed-loop coherence.
- The gyroscopic behavior is a macroscopic result of these micro-resonant interlocking loops.
- Any attempt to tilt the system must overcome the symmetry-breaking threshold established by these phase alignments.

Mathematically, if $\varphi_i(t)$ represents the local phase of oscillation at point i , then:

$$\sum_{\{i\}} \cos(\varphi_i(t) - \varphi_{\{i+1\}}(t)) \approx \max$$

represents the condition of maximal coherence, which resists perturbation. Only when an external torque τ_{ext} introduces a phase shift such that:

$$\Delta\varphi > \varphi_{\text{critical}}$$

will the gyroscopic vector begin to precess or deviate from its locked axis.

Thus, the stability of gyroscopes and flywheels in engineering and nature (e.g., planetary motion) is interpreted not only as a product of angular mechanics, but as a stabilization of a coherent oscillatory field locked in resonance with its surrounding frame.

This interpretation opens new perspectives in the study of inertial guidance, mechanical memory, and biological equilibrium systems—where gyroscopic stabilization might be a local oscillatory resonance phase-lock, rather than a purely mass-dynamic effect.

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