

The Proton's Geometry and the Acoustic Quantum Code: A Harmonic Bridge from Inertial Resonance to Genetic Information

Ian Beardsley¹ and Hans Geesink²

¹Independent Researcher, ²Independent Researcher
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Abstract. *The origin of biological rhythms—from the heartbeat to circadian cycles—remains an open question in systems biology. Denis Noble has argued that the genome does not encode a “master clock,” yet organisms exhibit coherent periodicities. We propose that these rhythms are rooted in a fundamental inertial resonance of matter itself. The Universal Particle Principle (UPP) derives a 1second timescale from the proton's geometry, linking quantum chromodynamics, gravitation, and the fine structure constant. Independently, the Geesink/Meijer (GM) Acoustic Quantum Code reveals a discrete 12 band spectrum, normalized by octaves, in which the proton appears at 1.5 Hz and 1.333 seconds per cycle—exactly the harmonic ratios 3/2 and 4/3 predicted by the proton's quark content and spherical geometry. This convergence is not coincidental; it is a structural bridge between quantum geometry and acoustic spectral quantization. Extending to genetics, Pythagorean ratios such as 3/2 are known to appear in molecular parameters of the genetic code (Petoukhov & Boulay). The Biogenic hypothesis of the UPP-model and GM-model could be further supported. We thus propose a unified framework in which the proton acts as a geometric clock, the GM scale as its harmonic spectrum, and the genetic code as its biochemical readout. The framework yields testable predictions for exoplanetary architectures, chronobiology, and mitochondrial dynamics.*

1. Introduction

The question of biological timing has long resisted reduction to the genome. Denis Noble has forcefully argued that the gene centric view of evolution is insufficient, pointing to the heart as a prime example: there is no genetic “instruction” that specifies the rhythm of the heartbeat, nor is there a master clock in the DNA. Yet the heart beats with a robust periodicity of approximately one second, and organisms across scales exhibit coherent

oscillations—from circadian (≈ 24 h) to ultradian (minutes to hours) to millisecond ion channel dynamics.

In parallel, quantum physics has shown that matter possesses intrinsic periodicities. De Broglie (1924) associated to every massive particle an internal period $\tau_e = h/(mc^2)$. His words and postulate: “The fundamental assumption of existence of a certain periodic phenomenon of a yet to be determined character, which is to be attributed to each isolated energy parcel [elementary particle]”; and the called “de Broglie internal clock” and see figure 1.



Figure 1. *Louis-Victor de Broglie (1929)*

Penrose (2011): “For there is a clear sense in which any individual stable massive particle plays a role as a virtually perfect clock. Any stable massive particle behaves as a very precise quantum clock, which ticks away with [Compton periodicity]”.

Elementary cycles theory (ECT) postulates that every elementary “particle” of nature is characterized by a persistent intrinsic space-time periodicity. In ECT the Planck energy spectrum is interpreted as a harmonic like spectrum of a mass-less periodic modalities of fundamental time periodicity (Dolce, 2026).

However, for elementary particles this period is far too short to be biologically relevant. The central insight of this paper is that the proton’s geometry amplifies this quantum period to the human scale second, and that this resonance manifests as a discrete acoustic spectral code that extends across physical and biological systems.

We present two independently developed frameworks that converge on the same 1Hz anchor:

- **The Universal Particle Principle (UPP)** (Beardsley) derives the 1second inertial resonance directly from the proton’s measured radius, mass, the fine structure constant, and the gravitational constant—without any octave scaling.

- **The GM Acoustic Quantum Code** (Geesink & Meijer) identifies a discrete 12 band spectrum, normalized by powers of two, in which all elementary particles (including the proton) occupy specific rational positions relative to a Higgs root at exactly 1 Hz.

We show that the proton's position in the GM scale—at $3/2$ Hz and $4/3$ seconds per cycle—is exactly what the UPP's geometric factors (three quarks and spherical volume) predict. This harmonic bridge provides a physical basis for biological rhythms and extends to the genetic code through the work of Petoukhov and Boulay, who identified Pythagorean ratios such as $3/2$ in molecular parameters of DNA.

2. The Universal Particle Principle (UPP)

The UPP arises from a geometric theory of inertia. When a force accelerates a particle spatially, its velocity vector is rotated from the temporal dimension into space. The resistance to this rotation is a normal force:

$$F_n = \frac{h}{ct_1^2}$$

where h is Planck's constant, c is the speed of light, and t_1 is a fundamental timescale. For a particle of mass m_i and effective radius r_i , the inertial mass is related to this force by the geometric void ratio κ_i :

$$m_i = \kappa_i \sqrt{\frac{\pi r_i^2 F_n}{G}}$$

Substituting F_n and solving for t_1 gives the Universal Particle Law:

$$t_1 = \frac{r_i}{m_i} \sqrt{\frac{\pi h}{Gc}} \cdot \kappa_i$$

For the proton, the strong force confinement requires $\kappa_p = 1/(3\alpha^2)$, where $\alpha \approx 1/137$ is the fine structure constant. The factor $1/3$ reflects the three valence quarks; α^{-2} scales the electromagnetic interaction to the strong force. Using the measured proton radius $r_p \approx 0.833 \times 10^{-15}$ m and mass $m_p \approx 1.6726 \times 10^{-27}$ kg:

$$t_1 = \frac{0.833 \times 10^{-15}}{1.6726 \times 10^{-27}} \sqrt{\frac{\pi(6.626 \times 10^{-34})}{(6.674 \times 10^{-11})(2.998 \times 10^8)}} \cdot \frac{1}{3\alpha^2} \approx 1.005s$$

Thus, the proton's geometry predicts $t_1 \approx 1$ second, corresponding to a frequency $\nu_1 = 1\text{Hz}$. This is not a fitted constant; it is a geometric eigenvalue of the proton, mediated by the granularity of spacetime (h) and gravity (G).

3. The GM Acoustic Quantum Code

The GM-model is based on de Broglie's hypothesis that every massive particle has an internal periodic phenomenon with period $\tau_e = h/(mc^2)$. For a given particle, this period is converted to a frequency and then normalized by octaves (2^n , n integer) to bring it into a "listening window" between 1 and 2 Hz. This octave scaling reflects nature's fundamental oscillators being separated by factors of two. The Compton and De Broglie elementary lengths λ_e can be positioned in a toroidal and monopole geometry and expressed by: $\lambda_e = c \cdot (2^q 3^m)^{-1}$ and the flow of time by $\tau_e = (2^q 3^m)^{-1}$ (q and m are derived numbers). The Elementary particles are the strings of a vibrating Space Time and Quantum waves are the vehicles to realize Space Time configurations (Geesink, 2026).

Applying this procedure to 60 elementary bosons and fermions, and empirically verifying against 2500 non-animate and animate systems as well as 320 gravitational wave measurements, the GM model yields a discrete spectrum of 12 invariants:

1.0000,1.0535,1.1250,1.1852,1.2656,1.3333,1.4142,1.5000,1.5803,1.6875,1.7778,1.8984

These scalars are expressed as rational ratios (e.g., $2/1$, $3/2$, $4/3$, $9/8$, $16/9$, $27/16$, $32/27$, $81/64$, $128/81$, $243/128$, $256/243$) plus the irrational $\sqrt{2}$. The scale is semi-harmonic, incorporating Pythagorean tuning with a closure by $\sqrt{2}$, and the mean of interval differences approximates the golden ratio $\phi = 1.618$.

The GM-model shows a harmonic equation that expresses the sum of quantum energies of a Gauge Field, directly coupled to the Acoustic Quantum Code:

$$\begin{aligned} \text{GM}_1 = & \sum_{(i=a \text{ till } z)} \alpha_{1i} \cdot h \cdot 2^0 \cdot 3^0 \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{2i} \cdot h \cdot 2^8 \cdot 3^{-5} \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{3i} \cdot h \cdot 2^{-3} \cdot 3^2 \cdot 2^i + \\ & \sum_{(i=a \text{ till } z)} \alpha_{4i} \cdot h \cdot 2^5 \cdot 3^{-3} \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{5i} \cdot h \cdot 2^{-6} \cdot 3^4 \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{6i} \cdot h \cdot 2^2 \cdot 3^{-1} \cdot 2^i + \\ & \sum_{(i=a \text{ till } z)} \alpha_{7i} \cdot h \cdot 2^{0.5} \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{8i} \cdot h \cdot 2^{-1} \cdot 3^1 \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{9i} \cdot h \cdot 2^7 \cdot 3^{-4} \cdot 2^i + \\ & \sum_{(i=a \text{ till } z)} \alpha_{10i} \cdot h \cdot 2^{-4} \cdot 3^3 \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{11i} \cdot h \cdot 2^4 \cdot 3^{-2} \cdot 2^i + \sum_{(i=a \text{ till } z)} \alpha_{12i} \cdot h \cdot 2^{-7} \cdot 3^5 \cdot 2^i \end{aligned}$$

GM_1 is the sum of quantum coherent energies; α : factor that distributes quantum coherent energies; $\hbar$: reduced Planck's constant; $1 = a$ till z are the different quantum-octaves (integers). The GM_1 -equation derived by an analysis of about 2000 quantum and biological data (Geesink and Meijer, 2012-2026), and a statistical analysis.

Crucially, the Higgs boson anchors the scale at 1.000 Hz (and 1.000 sec/cycle), and the proton occupies the eighth scalar at 1.5000 Hz and its reciprocal 1.3333 sec/cycle. These are exactly the ratios:

$$\nu_p/\nu_{Higgs} = 1.5000 = \frac{3}{2}, \tau_p/\tau_{Higgs} = 1.3333 = \frac{4}{3}$$

4. The Harmonic Bridge: Geometry Meets Spectrum

The UPP predicts a fundamental inertial resonance at 1 Hz, while the GM scale reveals a discrete spectrum in which the Higgs is the 1Hz root and the proton appears at $3/2$ times that root. The geometric origin of these ratios is directly traceable to the proton's internal structure:

- **The 3 in $3/2$** comes from the three valence quarks. The UPP's $\kappa_p = 1/(3\alpha^2)$ contains the factor 3 because the strong force confinement volume scales with the number of quarks. The proton's appearance at the $3/2$ harmonic overtone of the Higgs root is a direct measure of quark number.
- **The $4/3$ in the cycle time** arises from the spherical volume of the proton. The volume of a sphere is $\frac{4}{3}\pi r^3$, and the UPP is fundamentally geometric, based on cross-sectional area $A_i = \pi r_i^2$ and the full solid angle of rotation. The $4/3$ coefficient is the signature of spherical confinement.

Thus, the GM scale's proton position is not an accidental numerical match; it is the acoustic spectral expression of the proton's quark content and spherical geometry. The UPP provides the *geometric reason* for the 1Hz root; the GM scale provides the *empirical spectrum* that confirms this root and extends it to all particles and quantum coherent systems.

5. Extension to the Genetic Code

The harmonic bridge does not stop at particle physics. Petoukhov (2010, 2020) and Boulay (2024) have shown that Pythagorean musical quint tunings—based on the ratio $3/2$ —appear in molecular parameters of the genetic code. The ratio $(3/2)$ is the same overtone at which the proton resonates in the GM scale. This suggests a cascading hierarchy:

- **Quantum geometry** (UPP) $\rightarrow$ 1Hz inertial resonance.
- **Acoustic spectrum** (GM) $\rightarrow$ proton at $3/2$ Hz.
- **Genetic code** (Petoukhov) $\rightarrow$ $3/2$ ratios in codon–amino acid interactions.
- **Biological rhythms** (Vaught) $\rightarrow$ mitochondrial and pineal transduction of these frequencies.

This is precisely the kind of multi-scale, resonant hierarchy that systems biology has been seeking: a physical principle that bridges the quantum, molecular, and organismal domains, see figure 2.

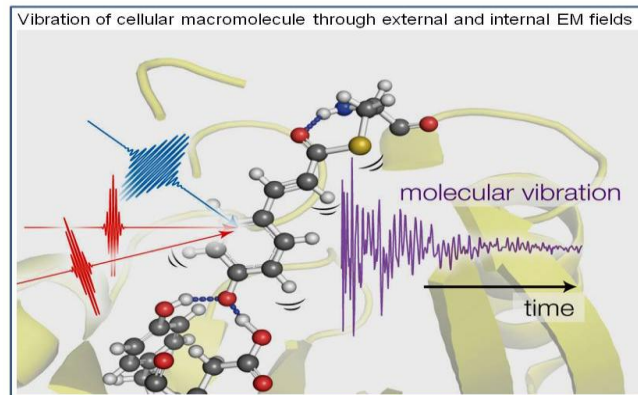


Figure 2. Electromagnetic fields in biomolecules

6. Formal Theorems

Theorem 1 (UPP–GM Harmonic Bridge). The Universal Particle Principle (UPP), defined by $F_n = h/(ct_1^2)$ with $t_1 = 1s$, and the Geesink-Meijer (GM) Acoustic Quantum Code are harmonically related. The UPP defines the fundamental inertial resonance at $\nu_1 = 1Hz$ as a geometric eigenvalue of the proton, using $\sqrt{\pi h/(Gc)}$ as the quantum-gravitational scaling. The GM model defines a discrete spectrum of 12 eigenstates,

separated by octaves (2^n), in which the proton occupies the state $\nu_p = (3/2) \cdot \nu_1$ (i.e., 1.5Hz) and $\tau_p = (4/3) \cdot t_1$ (i.e., 1.333 s/cycle). The coefficients 3/2 and 4/3 arise directly from the quark content (3) and spherical geometry ($4/3\pi$) encoded in the UPP's $\kappa_p = 1/(3\alpha^2)$.

Corollary 1. *The GM model's 12 band empirical spectrum is the harmonic extension of the UPP's inertial root. The UPP provides the geometric reason for the 1Hz anchor, while the GM model provides the empirical confirmation that this anchor is the fundamental root of a discrete quantum acoustic spectrum that extends to the genetic code.*

Theorem 2 (Biological Resonance Cascade). *The 1Hz inertial resonance, amplified through the GM scale's octave structure, manifests at multiple biological levels: the mitochondrial metabolic oscillator ($\sim 0.1\text{--}10$ Hz), the cardiac pacemaker (~ 1 Hz), and the circadian clock (24 h, corresponding to 2^{16} seconds ≈ 18 hours, close to the Earth's rotation). The pineal gland acts as a transducer that couples the external 24h light cycle to the internal GM scale via melatonin, entraining peripheral clocks.*

7. Discussion

The convergence presented here is not a mere numerological curiosity. It is a structural alignment between:

- A geometric theory of inertia (UPP),
- An empirically verified spectral code (GM),
- A genetic molecular framework (Petoukhov),
- And a biological transducer system (mitochondria and pineal).

This alignment suggests that the 1second resonance is a fundamental boundary condition of nature, arising from the proton's geometry and propagating through octave spaced harmonics to all scales. The heart beats at ~ 1 Hz because that is the inertial minimum of matter; the circadian clock is ~ 24 h because that is a harmonic of the EarthMoonSun resonance (as shown in the UPP's celestial extension); and the genetic code employs the same 3/2 ratio because it is encoded in the proton's quark structure.

This framework makes testable predictions:

- Exoplanet surveys around G-type stars in the solar galactic orbit should find planetary architectures with an asteroid belt at ~ 2.4 AU and a gas giant at ~ 9.5 AU (UPP predictions).
- Mitochondrial metabolic oscillations should exhibit frequency components matching the GM scale's 12 invariants.

- Ion channel gating kinetics should show resonances at $3/2$ Hz, $4/3$ Hz, and other GM scalars.
- Genetic codon usage frequencies should correlate with the GM scale's rational ratios.

The Biogenic hypothesis of the UPP-model is in line with the biogenic aspects proposed by the GM-model (Geesink and Meijer, April 2018) and the found relation for microtubules. Typical discrete coherent healthy states of biomolecules can be expressed in a scale in between 1 and 2 Hz by “octave”-normalization, see figure 3. The combined UPP- and the GM-model are also in line with the GML-model of Agrawal, Bandyopadhyay et al. (November 2018).

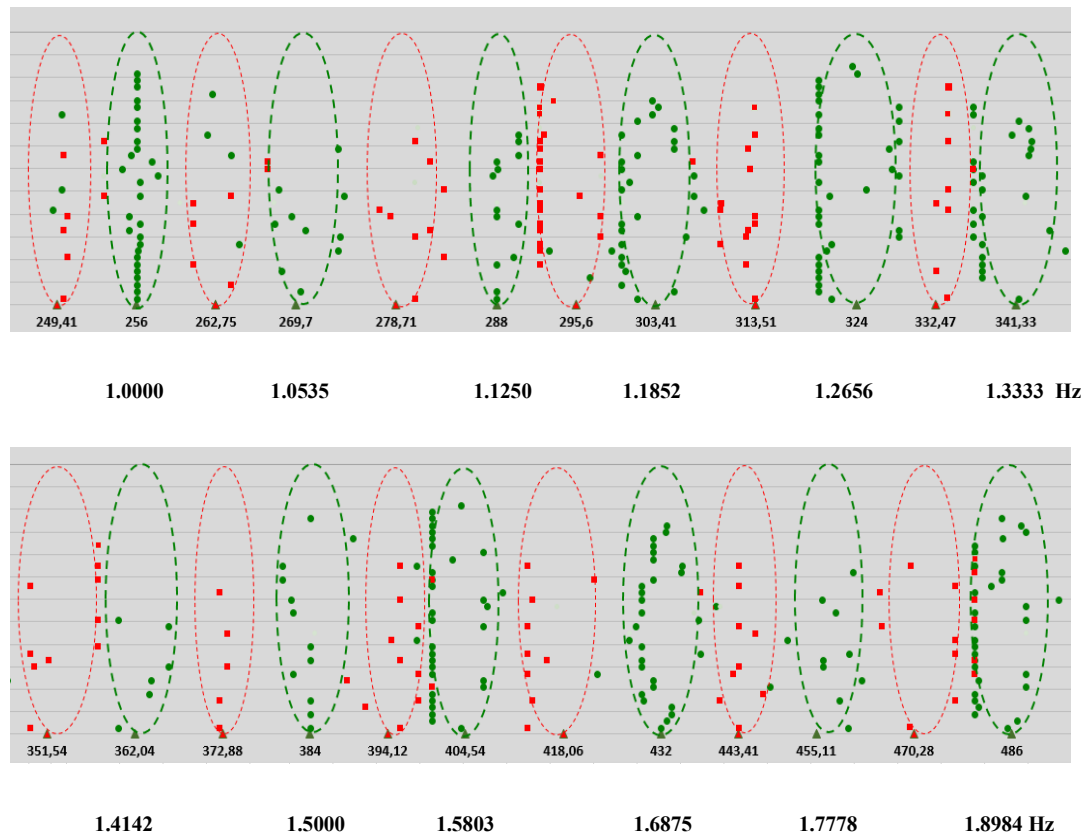


Figure 3. Measured/applied frequency data of living cells systems that are compatible with life conditions, or health-sustaining or health improving (coherent data and zones: green) and measured/applied frequency data of living cells systems that are detrimental for health (decoherent data: red) versus calculated “octave” normalized frequencies. Biological effects measured following exposures or endogenous effects of living cells in vitro and in vivo at frequencies in the bands of Hz, kHz, MHz, GHz, THz, PHz. Green triangles plotted on a logarithmic x-axis represent calculated normalized (Hz) health-sustaining

frequencies; red triangles represent calculated health-destabilizing frequencies. Each point indicated in the graph is taken from published biological data and are a typical frequency for a biological experiment(s). X-axis: An acoustic coherent scale from 256 Hz till 486 Hz and the scale between 1 Hz and 1.8984 Hz, respectively 2 Hz. For clarity, points are randomly distributed along the Y-axis; Yellow lines are transition frequencies (Geesink and Meijer, 2018).

Microtubules are cylindrical lattice polymers of the protein tubulin which organize purposeful activities in brain neurons and all eukaryotic cells. Microtubules behave as ‘fractal time crystals’, characterized by self-similar resonance oscillations, ‘clocks within clocks’ in a nested hierarchy of similar dynamics (‘triplets-of-triplets’) which repeat in hertz, kilohertz, megahertz, gigahertz, and terahertz frequencies (Hameroff, 2026). The measured and analyzed frequencies of microtubules correspond with the Acoustic Quantum Code and a same energy distribution has been found for Bose-Einstein condensates (Geesink and Schmieke, 2022).

NIR and MIR measurements of biological samples and water conformational states showed the spectrum of the Acoustic Quantum Code (Geesink, 2025). The water mirror effect-model of Tsenkova et al. (2008, 2009) could be further supported: mutual cooperative oscillations exist in the spectra of water and biomolecules: vibrational modes of molecules couple coherently.

8. Conclusion

We have shown that the proton’s geometry defines a 1Hz inertial resonance, and that this resonance appears as the root of a discrete 12-band acoustic quantum spectrum. The proton’s position in that spectrum—at $3/2$ Hz and $4/3$ seconds per cycle—is geometrically determined by its three valence quarks and spherical volume. The same $3/2$ ratio appears in the genetic code, linking quantum geometry to molecular biology. This cascade provides a physical answer to Denis Noble’s question: the “master clock” is not in the genome; it is in the geometry of matter itself, expressed through harmonic resonances that span from the proton to the planet. The Biogenic hypothesis of the UPP-model and GM-model could be further supported.

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