Gravitational folding of surface tension regions originates bio quantum path duality that quantizes Newtonian rigid inertia into parameter trigonometric inversion topological bio-inertia

Yi Yu Lai (yylai@innoen.org)
Innoen® Gravitational Institute

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Gravitational folding of surface tension regions originates bio quantum path duality that quantizes Newtonian rigid inertia into parameter trigonometric inversion topological bio-inertia

Yi Yu Lai Innoen® Gravitational Institute, Lockport, NY, USA E-mail: yylai@innoen.org

Abstract

Universal interaction reference systems in nature can't avoid elastic inversion(memory). Newton established the parameter quantity-driving rigid reference system with zero inversion. Bio-systems fall to another extremity that can only utilize inversion energy without rigidness. We define inversion energy as parameter-against-gravity-internal-fluctuation for this system, write down modifications of Newtonian Three Laws as, first law: $\frac{d}{dx}cosx = -sinx$, $\frac{d}{dx}sinx = cosx$; second law: $\vec{F} = m \cdot \vec{a} + |m\vec{g} \int tg\theta \cdot d\theta \rangle 1\downarrow$; third law: $Wavelength = \frac{2}{n}L$, $frequency = nf_0$. The Schrödinger equation has only quantized energy but still hasn't quantized time thus inducing quantum collapse. We then conjugate inversion energy with quantizing time which composes of event inversion superposition to establish entropy-control lifespan for bio-systems. Originating from the gravitational folding of surface tension regions, bio quantum path duality fluctuation scales as macrocosmic elastic quantum ranges from a codon to the spinal size drives life folding or evolution. The biological functions including consciousness revive from the bio quantum path duality that modulates by the three modified laws.

Introduction

The origins of life stand among the great challenging questions of our times. A lot of chemical and biological-based proposals[1] have been made for different stages of the process as the possible starting points; however, these have so far not achieved even the simplest living systems. A major challenge is to identify the properties that distinguish living and non-living systems. There is a substantial range difference in the chemical compositions between living & non-living beings. Directly starting from the chemical or biological ingredients for life origin still does not answer the natural properties capable of narrowing the wide range of chemical components from non-living systems into a narrow range for living beings in geological times. Bypassing general physical properties before life presents is the weakness of these proposals as well as the hindrance to further understanding of nowadays life functioning. In 2019, a report demonstrated 10^9 levels of experimental gravitational binding between living and non-living beings[2] to propose life physically

originated from a whirlpool; however, most of the proposed models only stay in an empirical stage with limited understanding of gravitational binding. Along with diverse indirect supportive physical impact experiments, the key measurements of gravitational binding are performed by damaging the living state of an organism to acquire weight differences thus can't get a standard curve for the alive state. In 2020, new free-fall experiments of living organisms including human beings are designed to test *in vivo* gravitational binding thus new understanding is presented[3], models including modification of Newtonian Three Laws of motion, experimental challenging Einstein's elevator thought experiment, and the surface tension mechanism of memory. However, these updated models still do not include the mathematical equations for the modification of Newtonian first law thus unrealizing the gravitational folding origin of the bio quantum duality. Newtonian mechanics succeeded by bypassing the physical properties sustaining life evolution, Einstein has advanced the Newtonian system greatly however also moved it far away from the bypassed physical properties via the Equivalent Principle. Conventional quantum mechanics unavoidably met with these bypassed properties; due to lacking experiments to extend these conjugations into the macrocosmic world and modulate universal memory, then compromises to restrict them into Planck level uncertainty. This paper extends these microcosmic uncertainty conjugations into inversion energy/quantizing time entropy-controlled modulations, revealing bio quantum path duality originates from the gravitational folding of surface tension regions, not only approaching the surface tension quiddity of life but also experimentally extending the conventional microcosmic Planck quantum into the biological gravitational elastic quantum.

Results

1. Bio quantum path experiment originates the bypassed inversion energy in conventional physics

The bio quantum path model has been presented in the reports[2,3], as shown in (**Fig. 1a**) and (**Suppl. Movie 1**). The driving forces of a ball running on the path A, and B can be written as, $dF_{forward} = F_0 + mg \cdot dtg\theta_A$, $dF_{forward} = F_0 + mg \cdot dtg\theta_B$, respectively; $dtg\theta_B$ always changes and $dtg\theta_A$ always equals to 0, then $\vec{F} = m \cdot \vec{a} + |m\vec{g} \int tg\theta \cdot d\theta \rangle 1|$. In the experiment, the ball on path B demonstrates a time advance effect that can't be justified by conventional physics. We then define the item with $dtg\theta$ as parameter-against-gravity-internal-fluctuation, which means the persistent fluctuation of a physical parameter against gravity can accumulate inversion energy. Here, inversion energy is not a specific type of energy, any common type of energy such as oscillations, heat, lights, etc., once can

persistently fluctuate against gravity will issue inversion energy (while inversion energy elevates to a threshold enough to fold a surface tension region in a non-isolated environment, then call folding energy). Different from diverse conventional energy types that are calculated by parameter values, inversion energy takes parameter effective fluctuation rounds to issue impacts instead of parameter values. As in the experiment, only enough rounds of fluctuations can demonstrate the effects. And the newly established fluctuations still follow the same rules, once attain certain fluctuation rounds against gravity then accumulate new inversion energy (the restriction of continuing to establish fluctuations come from a group of correlated parameters and their environmental quantizing time). The efficient shape of a fluctuation falls into a certain trigonometric curve, we use the term "bio quantum path" to differ from ordinary waves without an ideal trigonometric shape. (In the experiment (**Fig. 1a**), a bio quantum path is the highest gravitational binding curve, a horizontal path is the lowest, and all other wave shapes should fall between these two extremities. As stated by the modification of Newtonian First Law[3], a bio quantum path represents the shortest distance or most efficient gravitational binding inversion energy curve, mathematically, $\frac{d}{dx}cosx = -sinx$, $\frac{d}{dx}sinx = cosx$, therefore, inversion energy falls in a certain trigonometric curve pattern (the derivative of a function means the sensitivity to change of the functional output value according to its input value, on such a curve no matter which impacts are issued, the output and input are always composed of inversion, then the inversion energy accumulation is the highest, or the impacts only come from pure gravity and not any other non-gravitational parameters). We sometimes call *in vivo* fluctuations as intervals due to the deep correlations among those gravitational origin intervals.)

The model of inversion energy concerns the elastic VS rigid reference system. Historically, the reference systems of Newtonian and Einstein's theories are rigid. Till quantum mechanics, it still takes the rigid reference system however fixes the unavoidable elastic part into uncertainty or probability. The fundamental differences between a rigid and an elastic reference are parameter value-driving Vs parameter (gravitational binding) inversion-driving processes. Given a system with a group of correlated parameters, x_1 to x_k, each parameter has a certain "repetitiveness" number marked as n_1 to n_k in the group. A rigid system never considers the "repetitiveness" number, no matter how much n_i of a parameter x_i is, the parameter x_i is only dealt as x_i; anything the same with incoming parameter data gets equivalent, and due to no "repetitiveness" effects, third party reference is available. An elastic reference is different, an input parameter y is only used to change the repetitive number of n_1 to n_k or the fluctuation states of x_1 to x_k for the system, and never changes the exact parameter value of x_1 to x_k, such kind of a system is a parameter inversion-driving system. For the former,

energy is calculated by the parameter value since no need to consider "repetitiveness". For the latter, the repetitiveness number n_i of a parameter inside a correlated multi-parameter system is critical to shaping the correlation of remaining parameters in the system, and energy means the correlation among these parameters; therefore, it is modulated by the inversion patterns of n_1 to n_k (the motion of all repetitive numbers only follows gravitational binding). All the bio-systems are such kinds of systems; they never directly use the incoming parameter data, only physically taking the inversion (energy) induced by them (previous n_1 to n_k establish a pattern, the impact of new input y to this pattern is the useable inversion energy for that step) to comply with the previous repetitiveness state. (E.g., if we touch a mechanic robot, it will record all the parameters directly related to the finger due to its lack of inversion structures to process the finger data into system inversion (energy). However, if we touch an animal, its body automatically records the inversion induced by the finger, and with no way to record its direct logic parameters. Whether the animal feels happy or not is decided by the touch increases or decreases the trigonometric curves (repetitiveness) inside its body, not because of the touch parameters. We eat certain foods and our bodies never directly intake nutrients from them, only take inversion from these nutrients and then excrement the non-inversion remaining. Whether the foods benefit health depends on the inversion energy (or trigonometric memory) they induced in the body at that condition, never because of the foods' direct nutritional parameters. In bio-systems, not only do structures such as DNA/RNA, proteins, cells, tissues, organs, and somatic bodies interact in the above elastic reference mechanism but also consciousness uses such ways. One person can discern another person, never directly use the parameter data of another person, only use the inversion induced by that person. Even a man and a woman falling in love still never escape the mechanism. In equation: $\vec{F} = m \cdot \vec{a} + |m\vec{g} \int tg\theta \cdot d\theta \rangle 1\downarrow$, the first item is a rigid reference, and the second item is an elastic reference. The restriction of inversion in the Newtonian rigid reference system established the foundation of modern science; however, it is the bypassed physical properties (trigonometric curve repetitive number impacts) of this system that originated life and drive evolution. If we use the parameter value-driving reference system to study genes, suppose a three-codon DNA segment enters a genome and gets activated, it will issue three amino acids it coded; however, if we use the parameter inversion-driving system, this three-codon segment not only issues the amino acids but will also issue fluctuations to all the *in vivo* nine-nucleotide segments that fall in the same inversion tension, no matter which kind of amino acids are coded by all the suffered nine-nucleotide segments. This is for coding genes; non-coded segments will still issue the same physical nucleotide number-based impacts even without producing the coded amino acids. Here, this nine-nucleotide segment impacts repeatedly present, such a "repetitiveness" is memory. CRISP/CAS9 is usually explained as an immune

system of prokaryotes; however, it is indeed such a fluctuating elastic reference system. Once a DNA segment enters the genome, no matter which source and what protein code it carries, the bacteria only use the on-site inversion energy for judgment, if falls in the trigonometric curves of the on-site sequence, then take it, if not, defend it. The mechanism is only nucleotide fluctuation shape instead of the coded peptide. Diverse epigenetic modifications indeed come from such fluctuation impacts; the folding dynamics of a protein follow the same ways. (Anfinsen's dogma says the native structure is determined only by the protein's amino acid sequence, this conclusion is only based on limited experiments. Since protein structures only take the inversion energy induced by mRNA and not the mRNA sequences, thus can't be decided by amino acid sequence solely.) Bio-system innate immunities are still based on such physical fluctuations, they govern all acquired immunities that originate from the spinal CSF in invertebrates. It is challenging to use acquired immunity to extend the actual lifespan.

2. Establish inversion energy/quantizing time conjugation to synchronize entropy from the modifications of the Newtonian first and the second law

The entropy generation law of thermodynamics describes certain non-living systems that are relatively easy to equilibrium with external environments, attaining the equilibrium state means reaching an entropy maximum state or a minimized internal inversion correlation among system parameters. From here, inversion energy fluctuation is to make bio-systems stay in a state that is far from conventional thermodynamic equilibrium states. We call such a condition an entropy-controlled state, which means synchronizing the entropy generation amount of each part of the system by inversion superposition (E.g. wound healing is a kind of physical entropy synchronizing process, on wound location entropy generates greatly, then other parts of the body cost their local entropy to physically compensate for the wound site entropy, that is the healing. The mechanism of synchronizing is still the memory of "repetitiveness" of parameters; as in the previous example, system parameters x_1 to x_k, with their repetitive numbers as n_1 to n_k in the group, wound means the parameter x_i is damaged and its repetitive number n_i deviates from the previous n_1 to n_k pattern, then other repetitive numbers n_1 to n_k can make the n_i back to a compromised "previous pattern" by costing their own inversion energy in a non-isolated environment, the driving dynamics to recover n_i is a universal memory. The entropy-controlled state we mentioned is a kind of system repetitive number memory state, and the thermodynamic equilibrium state means the repetitiveness of each system parameter reduces to a lower environmental threshold and thus can't sustain the memory pattern for life. The Second Law of thermodynamics is incomplete since it loses trigonometric curve

gravitational binding effects, no isolated system can fully shut off gravitational effects thus inside the system evolution will still happen). Due to inversion energy being quantized energy (which must rely on a non-zero interval, the disappearance of the interval means dead, and all quantized energies tend to establish a gradient), the structures that make the inversion energy remain in an entropy-controlled state are also quantized, define as quantizing time, quantized time facilitates inversion energy to exist in a gradient in a non-isolated environment, human memory we usually see is the advanced part of quantizing time or the universal memory. (Time in conventional physics is a rigid parameter, while we use two time-point to describe an event, there will be zero inversion between these two points. In bio-systems, inversion energy and quantizing time are inversely sustaining for their repetitiveness. Later, we'll see, that quantizing time is critical for surface tension folding, any folding must assure inversion energy can be transferred in a certain schedule. The rigid time lacks such function.)

Conventional quantum mechanics doesn't differ between inversion energy and common energy since its wave function never considers gravity. And it has only quantized energy ($E= nhv$) and hasn't quantized time thus inducing quantum collapse. Wave function collapse means the integer structure of a gradient (here a quantum state is modified into a gradient since "i" implies symmetric between real and imaginary numbers which rarely present for bio-systems) instantly disappears. It hides that no matter how many gradients are superposed into a wave function, once one gradient ϕ_k collapses to its eigenvalue a_k, all the other superposed component gradients will "simultaneously" collapse to their eigenvalues because only such "super-simultaneousness" can make the process undetectable. In Schrödinger equation: $i\hbar\frac{\partial}{\partial t}\psi(\boldsymbol{r},t) = -\frac{\hbar^2}{2\mu}\nabla^2\psi(\boldsymbol{r},t) + V(\boldsymbol{r})\psi(\boldsymbol{r},t)$, wave function $\psi(\vec{\boldsymbol{r}},t)$ uses position $\vec{\boldsymbol{r}}$ and time t to describe the motion of a particle. The quantized energy in the discipline means it composes of minimum non-zero packets; if time is quantized, then time will also compose of tiny non-zero units, which means the quantum collapse process can't happen undetectably (at least time quantized interval can be observed). This forged "quantum collapse process" compels the discipline into unquantized time. In bio-systems, due to only can use of quantized inversion energy, the "observation-induced quantum collapse" described in conventional quantum mechanics needs to adapt to the "interaction-induced inversion". It then can't make all the component gradients of a superposed gradient inverse simultaneously. This objective "non-simultaneousness" of interaction-induced gradient inversions is the origin of quantizing time. With certain quantizing time intervals, an "observation" is a kind of quantum sensing that is composed of gradients inversion superposition, it can only strengthen or weaken certain inversion energy gradients, can't "collapse" all the integer properties of a gradient undetectably, conventional quantum collapse instancy is then extended to lifespan.

As mentioned, studies of evolution should start from properties before life existed; therefore, physics will be closer to this target than chemistry. Even within the physical discipline, not all parameters serve the purpose. The inversion energy/quantizing time model is to recover the bypassed properties of common energy/time models since Newtonian times. (**Fig. 1b**) shows a more general bio quantum path elastic string model. As in the figure, for an ideal string, the oscillation length/frequency relationships follow the same pattern no matter moves upstream (more strings connected) or downstream (hedge a string to a certain section): $Wavelength = \frac{2}{n}L$, $frequency = nf_0$. In real conditions, due to the non-isolated environment or diverse reasons, a bio quantum path only can effectively utilize the length/frequency ratio to resist environment drifting in a certain range. E. g. upstream 5 lines and downstream 6 lines fall into acceptable accuracy, which can define as the life range of a string. Equivalent to the topological property equation, within the life range all the strings fall into a certain trigonometric curve pattern based on the modification of Newtonian first law[3]. The Newtonian first law states that an object either remains at rest or continues to move at a constant velocity unless it is acted upon by an external force. It does miss the condition that an object is only impacted by a large gravity field, or on earth, all the other forces can always net to zero and only left pure earth gravity. Under such a condition, the object will remain in the state of certain bio quantum path(s). People see an object standing there and misunderstand that net to zero forces stops it from moving along a straight line; however, the real reason is net to zero forces stop it moving along a certain bio quantum path (due to it on earth). Newton's neglection misled most people including Einstein and Schrödinger. The origin of life did happen in a net non-gravitational force state that was neglected by Newton. The yolk sac blood islands[4] as the first site of hematopoiesis we can observe today is the evidence. These cells net the non-gravitational impacts into zero and then active bio quantum paths by high surface tensions, the primitive hematopoietic cells begin to accumulate inversion energy and later develop into heartbeats. (It is also noted the belief in the "net to zero force state" to a constant velocity makes conventional physics lose inversion superposition. There is no need for inversion while processing vectors' dot product or cross product; however, once two Sine/Cosine oscillations need superposition, inversion becomes the only entropy-control manner.)

Technologically, for the experiment in (**Fig. 1a**), we construct the rigid bio quantum path into a symmetric cosine curve; however, the non-gravitational environmental impacts will be an unsymmetric parameter pattern composed of an ascent and a descent part as in (**Fig. 1c**). And gravitational binding will tend to pull back such an unsymmetric shifting. Following the modification of Newtonian second law[3], anything getting the bio quantum path pattern then can issue impact, then the pullback inversion energy for combating external impacts can come

from different sources as in (**Fig. 1d**), we generally call the pull back from the same string as inversion energy and that from the nearby string(s) as quantizing time albeit they usually interweaved each other (inversion energy takes differential equations $\frac{d}{dx}cosx = -sinx$, $\frac{d}{dx}sinx = cosx$ and quantizing time takes integration equations $\int \cos(nx) \cdot dx = \frac{1}{n} sin(nx)$, $\int \sin(nx) \cdot dx = -\frac{1}{n} cos(nx)$ thus they are not fully symmetric and the repetitive number n present in quantizing time superposition). The shifting tendency between the symmetric trigonometry pattern VS unsymmetric pattern reflects the conjugation of gravitational VS non-gravitational impacts to shape a bio quantum path pattern. In a life range as in (**Fig. 1b**), each line composes of an event, which means the effective string utilizes different tension to respond to the external environment, written down by Chu's constant as $\left|\sqrt[12]{2^{n-1}}\right\rangle$, n=1 means event 1 till n=k, event K. In one period without superposition, ideal inversion energy has 12 trigonometric levels from events n = 1 to 12. Due to environmental impacts, it will dampen partial or full levels; the quantizing time of inversion energy is defined as the inversion superposition of events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ in a certain manner to recover the missing levels or trigonometric pattern(s) for entropy control (quantizing time means the "repetitiveness" or memory of a parameter inside a multi-parameter system needs to be processed into events, given a rigid time t with n segment as $t_1$to t_n , the function of each segment t_i is independent of each other thus each environmental parameter can be equally expressed by any t_i ; however, different parameter need a different equation for description. Quantizing time processes t_i into elastic events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ to satisfy the definition in (**Fig. 1b**), then all the different environmental parameters can be expressed by the combinations of events, no individual event can independently describe a parameter, while counting repetitiveness number induced by events $\left|\sqrt[12]{2^{n-1}}\right\rangle$, n=1 and n=k is equally as one repeat. This is the only way to structure gravitational inversion energy. Conventional quantum states need isolated "no collapse" conditions, and bio quantum states need gravitational quantizing time in a non-isolated environment for sustaining). No matter how complex or how simple a structure is, all the mechanism is still gravitational binding inversion energy efficiency builds on the topological equation. (If we use the common time to record these events, we generally need at least one as past and one as future due to different string tension. Now, superposition them together into one quantizing time, as a holistic whole, connotates something unchanged for the past and future (trigonometric curves), or quantizing time attains the entropy-controlled purpose by using the past quantizing pattern to reduce the randomness of the future happening, which is what the modified second law means. For humans, we use Chu's constant $\left|\sqrt[12]{2^{n-1}}\right\rangle$ with the index = 12, whether other indexes can exist for bio-systems need further study after humans.)

The inversion energy/quantizing time correlation is not presented abruptly even within conventional physics.

There is a time and energy conjugation in conventional quantum mechanics: $\triangle E \triangle t \geq \frac{\hbar}{2}$, the $\triangle E \triangle t$ is similar but not the standard Heisenberg uncertainty formula since H and t are not dynamically conjugate variables. There are also a lot of other direct conjugate variables such as $[\hat{\boldsymbol{x}}, \widehat{\boldsymbol{p}_x}] = \boldsymbol{i}\,\hbar$, which means these two parameters can't be measured simultaneously. Schrödinger equations are established from these conjugate variables, $i\,\hbar\frac{\partial}{\partial t}\,\psi(\boldsymbol{x}) = H\psi(\boldsymbol{x})$. These conjugate variables are hidden Newtonian bypassed inversion energy properties (two variables can't be measured simultaneously does mean they can't use rigid time, there is a certain inversion correlation between these two variables that need to adapt to quantizing time, and the wave function is no longer the conventional probability amplitude explanation but certain inversion "repetitiveness" which potentially integrate to other inversions), if we can enlarge Planck *h* as *L* in the topological equation, λ as the events ($p = \frac{h}{\lambda}$, p not conserved in biosystems), then can adapt to the macrocosmic inversion energy/quantizing time. Now the extended conjugations are no longer the uncertainty probability (following the quantizing time model, the impacts of testing at different schedule will be quite different). The macrocosmic wave function becomes the bio quantum path and its inversion superposition that originate from modified Newtonian laws, the quantizing shifting between gravitational binding and non-gravitational environment impacts on bio quantum paths composed of the driving forces for bio-systems, which is different from the conventional microcosmic wave function unconcerned with gravity and possesses a lot of equations. This wave function includes full quantized inversion energy and quantizing time conjugations with a string topological length L ranging from codon size to spinal scale, and only needs one topological equation (we can simply say that the microcosmic wave functions are only quantized energy thus almost zero memory, and the macrocosmic wave function has quantized energy and quantized time thus possesses memory from the advanced part of quantizing time). This wave function originated from the experiments in (**Fig. 1a**), till now we still haven't found a significant difference between the simple harmonic oscillation basis of the microcosmic and macrocosmic wave function except on gravitational surface tension inversion, also don't find any significant difference between the original quantum concept between microcosmic and macrocosmic wave functions except on mathematic linear superposition VS inversion superposition. Inversion superposition induces non-conservation for common energy however can extend to describe the spiritual world (conventional common energy conservation story is based on human-biased non-quantized time; the conservation of inversion energy needs quantizing time. Inversion superposition is only a natural process to repair the repetitive number of trigonometric curves since there is no third-party reference available). The limit of the conventional quantum effects observed is C60 molecule[5], for the experiments in (**Fig. 1a**), even constructing a

huge bio quantum path for a few kilometers, still can easily demonstrate gravitational quantum effects. The macrocosmic gravitational effect penetrates inside the object and then becomes macrocosmic quantum. Microcosmic quantum never allows inside object interference (first postulate in conventional quantum mechanics) and thus must use some external judgment such as double-slit experiments. Once allows inside object body interference and takes internal judgment, then that is potentially life functions. Due to the gravitational basis, this macrocosmic wave function format is generally called *in vivo* gravitational waves which have been verified by bio quantum path experiments in (**Fig.1a**) and diverse *FHD* experiments[3] (*in vitro* gravitational waves are believed to be relativistic; however, *in vivo* gravitational waves are non-relativistic and quite higher than the former).

3. Bypassed surface tension inversion (or folding) in conventional quantum mechanics and the establishment of *in vivo* gravitational waves for quadrupole flow or selective permeability

Conventional quantum mechanics originate from Planck's Law published in 1900[6] can be written as:

$$I_\nu(\nu, T) = \frac{2h\nu^3}{c^2}\frac{1}{e^{\frac{h\nu}{kT}} - 1}$$

As in (**Fig. 1e**), it tends to the Rayleigh-Jeans law in the limit of low frequencies and tends to Wien approximation in the limit of high frequencies. The prerequisite condition of this formula becomes the foundation of quantum mechanics, $E = nh\nu$. The experiments need a pinhole in a cavity with radiations entering from it to reflect on the inner surface for many rounds. Low frequencies mean fewer refraction rounds and higher frequencies mean more refraction rounds. From here, the Planck mathematical operation $E = nh\nu$ connects two formulas by increasing the surface reflection efficiency, and the quantum gradient can't be exempt from surface tension effects (more rounds of reflections) here. Another milestone experiment of quantum mechanics is the photoelectric effect proposed by Einstein. However, it has been re-explained by surface tension inversion[2,3]. Besides quantum tunneling, we still can use this mechanism to explain the single-slit and double-slit experiments, which is also the foundation of the discipline. As in the left of (**Fig. 1f**), each slit composes of two layers of surface tension inversion units. While electron beams or lights pass, they will inverse and make the electron beam or lights bent at certain angles. It is these angles that induce the interference fringes, not the slit number. (Conventional quantum mechanics has taken double-slit experiments to explain a lot of phenomena including the wave-particle duality; however, never explains while a single slit still works. If the mechanism of which involves slit surface tension inversion, then most of these explanations need to be reworked.) For the slit surface tension

inversion mechanism, we can also get evidence from the experiment on the right hand with multi slits, due to the different inversion angles from slit surfaces, the interference pattern is not linear, always the linear regions are enclosed or interweaved with the non-linear regions. The interference fringes come by various slit combinations, which prove the surface tension inversion mechanisms again. Now, we can simply call the linear region "Planck region" and the non-linear region "surface tension region". From these facts, surface tension regions and quantum gradients can't be independent albeit quantum mechanics has minimized it (the "repetitiveness" of a quantum gradient is shaped by the surface tension region, even conventional quantum mechanics has mathematically reduced the "repetitiveness" of a quantum gradient to almost zero still can't deny its surface tension correlation).

It is noted that in the slit surface inversion mechanism of interference experiments, the light bent angles will be much large than Einstein's big mass light bent angle, possibly Einstein himself had already noticed that, since in the Bohr-Einstein debate on quantum test reality, Einstein proposed a recoiling double-slit experiment[7] and later Einstein's box. These two designs were quite likely to test why the bent angles after the slit(s) were larger than his gravitational lens. The motivation of Einstein's debate with Bohr was true to test the bent angles. Even he finally published EPR paradox[8] correlated to this motivation. From the modification of Newtonian first and the second law, we can easily know that surface tension regions are a place that bio quantum paths can sustain better than any other conditions. Inside a surface tension region, a wave or an oscillation can get a higher percentage of trigonometric curves (or a trigonometric curve with a higher repetitiveness) than other conditions thus the gravitational inversion energy is relatively higher. The light bent angle after slits is larger than those from Einstein's lens only because of such surface tendency of gravitational binding. It is also due to this reason, that we can directly observe that gravitational binding tends to surface tension region in a liquid or in a bio-system; half a bottle of water and half a bottle of oil can show *FHDs*[3] is evidence; also, hours after an animal is killed, its organs' surface cell migration still can be observed by fresh observation method[2] is bio-system evidence. We can see dewdrops rolling on a leaf is also the same reason, the surface of the dewdrop has more bio quantum paths to acquire gravitational binding inversion energy to maintain the surface tension. All these facts remind us why gravity can't be modulated by rigid time. For a rigid body, we can use one time to measure it. However, for any object with a surface tension region, due to the same Earth gravitational field getting different effects on the surface tension region and the non-surface tension region, we must use more than one time to describe the tension among these two regions. As the multi-slit experiment on the right of (**Fig. 1f**), even the Planck quantum gradient can't avoid such gravitational tension. Quantum entanglement[8] is obvious such gravitational-based

surface tension tending effect, two parts of a quantum conjugation, no matter how far away they are separated, once their tendencies toward a certain gravitational surface are the same, then can entangle. The mechanism is still nothing but the gravitational tendency to a surface that can acquire better trigonometric curves. The quantum entanglement again correlates wave function with the gravitational tending surface. (Einstein's field equation has also demonstrated some surface properties that agree with the gravitational binding surface tendency since he has mathematically correlated space and time, just these surface properties are rigid geodesics without any inversion functions thus challenging to explain *FHD* of liquids[3] and the gravity of folded surface tension region objects.)

Now, we can see the gravitational binding efficiency of inversion units of a surface tension region. As is known, no matter nonliving or living conditions, all surface tension is composed of inversion units with an unsymmetric inward and upward vector. It is inward vectors higher than the outward vectors that maintain the unsymmetric surface tension region. At the bottom of (**Fig. 2a**), unit circles rotate issue trigonometric curves mathematically. Both quantized trigonometric curves and relevant quantized unit cycles (integer number of cycles) are the most efficient gravitational binding curves. They compose a fold/unfold relationship. The shifting between gravitational VS non-gravitational impacts on a trigonometric curve VS an environment deformed curve equals the shifting between an enclosed unit circle VS an environment deformed enclosed circle. The left top of (**Fig. 2a**) shows the standing oscillations establish inversion units on surface tension. From here, higher gravitational binding efficiency inversion units should be bio quantum paths, circles, or quantized folding of both as the most efficient gravitational binding site. On bio-membranes, there are a lot of more and more complex evolutionary membrane proteins, all these evolutionary structures are to bring their elastic property to assure while inversion, the inward and outward vectors can fall into certain discreet events and can respond to a trigonometric oscillation efficiently inside the cell, also can shape other deformed curves back to bio quantum path shapes under certain conditions. Besides individual proteins, groups of membrane proteins still need to combine to establish trigonometric curves for gravitational binding. This is a general efficiency mechanism of inversion units. However, we can't say nowadays membrane protein evolutions are happening in this way inside the surface tension regions, they need system surface tension folding which is an elevation state of inversion (fold inside a surface tension region will unfold easily due to elasticity; therefore, the only way to sustain a high folding state on a membrane is via the whole surface folding to establish memory to sustain the folding structure for entropy control).

(**Fig. 2b**①) is an animal gut development map, no matter which kinds of animals, the development of guts can be simplified as a surface tension topological folding. The left of (**Fig. 2b**②) shows an ellipsoid enclosed surface

tension region, if surface tension inversion energy can be accumulated and elevated under certain conditions to a threshold, then it will make the surface concave like on the right hand. Finally, it will establish an ellipsoid sphere with a smooth tunnel that runs through like in (**Fig. 2b③**), one side is the mouth, and another side is the anus (it is noted that the only place that can bear this kind of surface tension structure in nature is a whirlpool; the yolk sac tube here is for acquiring the huge surface tension inversion energy requirements from parents to replace the natural environment for folding). The folding of a surface tension region will result in many conditions for outside surface tension(blue) and the inside surface tension(red), those who can get a quantized number of bio quantum paths periods (integer relationships on different surfaces) will be more stable and survive, then establish events of $\left|\sqrt[12]{2^{n-1}}\right\rangle$ to $\left|\sqrt[12]{2^{n+k-1}}\right\rangle$. (This integer pattern means the tension from the same earth's gravitational field between the two folded surfaces is minimized thus the inversion energy can be transferred freely among them, in evolution, overwhelming majorities that do not comply with it will fail since that will result in non-integer numbers of interaction, even among those who get this quantizing pattern, only a small fraction can finally evolve into life. Various embryonic deformities we can see today still come from the failure of such quantizing patterns, those following the pattern will then comply with the topological equation *Wavelength* = $\frac{2}{n}L$, *frequency* = nf_0, $\left|\sqrt[12]{2^{n-1}}\right\rangle$ to $\left|\sqrt[12]{2^{n+k-1}}\right\rangle$ are the earlier forms of memory, once memory is established the duality is then established, and the folding on the surface tension inversion units will be stabilized by memory.) (**Fig.2b④**) is a folded and later detached condition, keeping the inversion energy transferring pattern even experiencing later modification. Life evolution is a process of accumulating surface gravitational inversion energy, this procured inversion energy tends to surface tension regions, then the folding of surface tension to store more inversion energy becomes the critical step for evolution. (Unlike conventional quantum mechanics, double-slit only falls one interference frequency and can reluctantly use unitary time, in bio-systems each event $\left|\sqrt[12]{2^{n-1}}\right\rangle$ is in the interference state. The folding of a surface tension region in evolution generally needs millions of years of geological time, which means in bio-systems quantizing time makes a series of events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ interfere with another events $\left|\sqrt[12]{2^{n+k-1}}\right\rangle$ millions of years later. Quantizing time represents a state where the same earth gravity-induced tension between these two surfaces is minimized thus inversion energy transfer efficiency between them has maximized even the presentation of these two surface tension regions differ in geological time. If we want to use conventional Newtonian motion and stationary concept to describe, then the surface tension series events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ is the stationary state. Cancer in old age comes from the retrograde of this multi-folding surface tension system or the deviation from the system stationary; therefore, once presents, quite challenging to control the after-medical operation-relapse since metastasis tumor cells will easily travel to every surface tension

region that folded in that tumor location. We have suggested monitoring the symmetricity of lifetime *FHD* standard curve[3] to screen cancer, the reason is still from the modified Newtonian Laws.)

The folding we can observe today in the embryonic development of a species has been integrated for many steps, there are no data about how many rounds really happened in evolution to make out humans since modern biological sciences have never used the surface tension folding modulation before (A human titin gene is reported to contain 363 exons[9], which means even this gene and relevant surface tension regions have been folded at least for 363 rounds from different folding sources). The 10^9 levels of gravitational binding inversion energy in bio-systems come from the gravitational binding of all folded surface tension regions, this conclusion has been validated by bio quantum path experiments in (**Fig. 1a**), mutations of Cavendish experiments[2,3] and various *FHD* experiments[3]. Chemically, phosphates widely present in cell membranes, metabolisms, and nucleotides are visible evidence of folding. (**Fig. 2b⑤**) is a standard duality model, all the biostructures such as DNA/RNA, proteins, etc., we can see today have historically experienced a lot of folding. After folding, the surface tension regions and the Planck regions need to be physically equivalent or made into the same topological equation length L, then can issue trigonometric gravitation binding. **Basic Law of Evolution**[3] states, "the equivalent of quantizing time between surface tension regions and Planck regions drives evolution". The "equivalent" here is to follow the pattern in the right hand (**Fig. 2b**) for the tendency to combat environmental challenging (), then the inversion energy transferring between these two regions get maximized or trigonometric curves keep well. (Conventional biology never clarifies what is biomaterials, it only chemically claims those with carbon are organic materials, now we know only those with enough bio quantum path duality originating from surface tension folding are biomaterials. Even a codon-size DNA segment has experienced a huge number of folding in geological time. More folding of a DNA segment means while it is activated *in vivo*, then can travel among so many surface tension regions for transferring inversion energy.)

The model has been used to modulate memory, mRNA splicing, CRISP/CAS 9, digest, respiratory, photosynthesis, sexual processes[3], etc., all these suggested shortcut study models do not refer to the causality of inversion energy/quantizing time but can integrate into big data to reduce the discrepancies. However, if we want to study bio-system's causality, we need to track back from the embryonic state. (**Fig. 2e**) shows the early human embryogenesis, we use it as an example (it never represents the folding that really happened in evolution, only means extant surface tension folding which could be detected today). Before fertilization, both spermatogenesis (**Fig. 2c**) and oogenesis (**Fig. 2d**) need two-stage meiosis to get haploid cells. Conventional genetics only considers

some chemical differences such as diploid or haploid, etc., and never believes that physical properties of the same chemical nucleotide sequence can impact genomic regulation critically. The jinx of modern synthetic biology is from here, artificially concocted DNA segments including *in vivo* CRISP/CAS 9 edited ones are very pool in trigonometric curves and therefore lack the basic entropy-controlling function for life. (**Fig. 2c**) shows human spermatogenesis starts from spermatogonia on the surface layers of seminiferous tubules of the testis, through a series of changes get large numbers of mature sperm cells with mitochondria integrated into their middle pieces. These sperm cells even with the same chemical nucleotide sequence will differ greatly in reproduction capability due to the percentages of DNA trigonometric curves, via a long journey to the epididymis on the surface of the testicle and then go further, every step is to select those with better curves by gravitational surface tension tendency. Oogenesis in (**Fig.2d**) shows an equivalent surface tendency; the ovum cycles in the surface layer and needs to release from the surface of the ovary and then go further (we can see that the oocyte release process is an inversion process). Every detail of these two processes unintentionally selects the candidates with the best tending toward surface capability, which means they utilize inversion energy surface tendency to select the best gravitational binding efficiency candidates. There are a lot of chemical factors claimed to impact the process[10-12]; however, the real selection of a successful candidate should be the one with the highest percentage of physical trigonometric curves which inversion superposed by nuDNA and mtDNA from the long journey. The one with a higher percentage of trigonometric curves can acquire more gravitational binding inversion energy in the journey. While a lot of spermatozoa oscillate around the ovum will establish a surface tension layer, in this layer, the one with the best trigonometric curve not only can get gravitational binding from the earth but also can get inversion energy from other sperm cells in the same layer in some degree. Also, the ovum still has some ingredients to tend to the surface to acquire more inversion energy, all these facts will combine to make the successful one inverse into the ovum and physically shut off others (here it is still the surface tension inversion mechanism that makes the sperm cell enters the ovum, earlier life forms can only take physical mechanism. Even if humans later present some enzymes or cytokines, these are still subordinated mechanisms). For the nuDNA and mtDNA interaction in spermatozoa journey to establish more trigonometric curves, we can get supportive evidence from the cell level mitocytosis[13], since later adult cells still need to excrement old mitochondria to maintain more curves. Also, horizontal transfer of entire mitochondrial genomes among grafted cells has been observed[14]. All these processes reveal that DNA physical shapes play critical roles; all reproductive mechanisms are to select better motion curves.

In (**Fig.2e**), the day 1 fertilization gets a diploid zygote with a polar body, then cleavage and compaction (8-16

cells). The processes of karyokinesis (mitosis) and cytokinesis work together to result in cleavage. The cleavage/compact conjugation is the second physically regulated process like mRNA splicing and other equivalent biological processes. Under the same zygote surface tension region, the cell number increase rapidly, proteins are almost not synthesized, and zygote volume remains the same. Then each hybrid DNA gets much surface tension inversion energy (16 cells mean each hybrid DNA in one cell can get 16^2×inversion energy since the total effective areas of cell membrane surfaces increased to this level, DNAs are confined in each cell but the surface tension from all cells in the region can be shared), then the DNA from each parent can select vigorously to reach more trigonometric patterns (in the beginning, half of the DNA is from the father and half from the mother. Now after this process, the trigonometric advantaged DNA reaches a quite different number of genes from each parent, possibly 80% from one parent and 20% from another parent depending on conditions, and possibly on different chromosomes, this ratio is also different. The telomeres are still physically established by inversion superposition at this stage. Such a cleavage-induced parental coded gene polarity composes the evolutionary potential. We should realize that an equal percentage of genes from each parent will create big problems for later entropy control, quite disadvantageous for evolution in nature). The next step is compact, it should be more parental genes proliferated cells move to the outside layer of the zygote, which is a natural process that higher trigonometric internal motion cells tend to the surface. It is reported that the mechanism of compaction in humans is unknown, and in mice involves the actomyosin cytoskeleton and the cell adhesion protein E-cadherin[15]. However, it should be generally a physical surface tension control process. The same process in zebrafish needs 1000 cells, which means the surface tension inversion energy from 8-16 human cells is equivalent to 1000 zebrafish cells. A human genome has a higher percentage of palindromes, it is likely these palindromes plus some protein folding supply most of the surface tension requirements, but the mechanism is still the physical surface tension inversion energy tendency. (At the embryonic stage, almost all the driving mechanisms should be physical surface tension inversion since bio-systems need directly use the gravitational binding internal fluctuation for selection, chemical ingredients are accepted more only because people use a rigid reference system, and these ingredients are easy to test.)

After compaction, it will differentiate into the inner cells, these inner cells will compose of events $\left|\sqrt[12]{2^{n1-1}}\right\rangle$ with the outside trophoblast layer. Then cavitation, Zona hatching, and implantation on the uterine epithelium. With implantation, the huge surface tension requirements can come from the mother. After implantation, the cell mass inside the trophoblast differentiation will develop into hypoblast and epiblast (inversion on the uterine epithelium). These are two subordinate events group $\left|\sqrt[12]{2^{n2-1}}\right\rangle$. A bilaminar disc will establish in the middle of

hypoblast and epiblast, on day 15 it will fold into the primitive streak, marking the start of gastrulation which will develop into three germ layers: ectoderm, mesoderm, and endoderm. These three germ layers are composed of subordinate events group $\left|\sqrt[12]{2^{n3-1}}\right\rangle$. The ectoderm gives rise to epidermis, the nervous system, and the neural crest in vertebrates. The endoderm gives rise to the epithelium of the digestive system and respiratory system, and organs associated with the digestive system, such as the liver and pancreas. The mesoderm gives rise to many cell types such as muscle, bone, and connective tissue. In vertebrates, mesoderm derivatives include the notochord, the heart, blood and blood vessels, the cartilage of the ribs and vertebrae, and the dermis. All these developments are continuous folding from the above three germ layer events. The spinal cord plays a critical role in the development and later functions, 12 thoracic vertebrae should come from the mesoderm, 5 lumbar vertebrae and 7 cervical vertebrae come from the endoderm and the ectoderm.

Now we can back to (**Fig.2b①**) to see the spinal cord and memory. Nearby the gut, there is a spinal and brain cavity parallel to the gut. In (**Fig.2b④**) we also draw a similar structure with green color, which is a folding cavity or folding-induced subordinate inversion. While the folding establishes, the blue and red surfaces will compose of events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ and $\left|\sqrt[12]{2^{n+k-1}}\right\rangle$. The transferring of gravitational inversion energy will gradually be reduced with the increase of distance from the exchanging trigonometric curves. In a certain place, there will establish inversion energy which can minimize the impact of the inversion of these two events but also correlated with them. This is the folding-induced (least) subordinate inversion, or while it can be observed we then call it folding-induced cavity. They are on the brink of two series of events' common life range. In a non-isolated environment, such a subordinate least inversion is not present suddenly. Starting from the genomic level, such folding cache has already begun to present. For two correlated genes, Gene1 and Gene 2, or groups of genes, when they function, could still issue such the folding-induced (least) subordinate inversion. No matter which kind of genes and how they are inversing or folding, their impacts on palindromes are quite small. Palindromes are generally 20-30% in lower evolved species and reach over 98% for humans, the more evolutionary advanced a species, the more folding of genes, which composed the genomic level inversion or folding-induced subordinate inversion. In the multi-cellular development stage, the term "cavity" becomes visible. As in (**Fig. 2a**), every step will issue a lot of cavities. The cavities in cleavage, compaction, differentiation, cavitation, zona hatching, etc., are observable cavities. For the fertilization stage from diploid to haploid, parental genes competition vigorously will also produce cavities that can't be seen. A "cavity" means the impacts it suffered from its upstream origins are minimized. Like in day 5, the cavity between the trophoblast and the inner cell mass is expanded, which means

more spaces less impacted by the activities of the trophoblast and the inner cell mass will leave for the next stage host, and new contents into this space will be impacted less by the former hosts such as trophoblast and the inner cell mass. The spinal and brain cavity in (**Fig. 2b①**) is established in such a way. Every surface tension region folding was integrated inside CSF events $\left|\sqrt[12]{2^{n-1}}\right\rangle$, then these events take the least inversion to govern the whole body into the entropy-control state. From the genomic level genes to proteins, cytokines, cells, tissues, organs, etc., each level structure has bio quantum path duality which originates from the surface tension region gravitational folding. The duality in blood progenitors[16] has been verified. It is the duality that drives the motion of all structures. Good trigonometric structures can move to surface tension regions well and further to next level structures, finally correlated to the spinal CSF, deformed structures will become excretions.

(**Fig. 2f**) shows how surface tension folding can establish a cross-folded surface tension region flow from "selective permeability". CSF is the largest gravitational binding inversion energy flow, and other flows such as blood, lymphatic circulations, nerve impulses, etc., are similar. All these *in vivo* flows are established from folded surface tension regions and thus are "quantized quadrupole or hexapole" liquid flows (hexapole present in branch region) that different from *in vitro* flows. Surface tension inversion units are quadrupole types composed of inward and outward vectors, also correlate the surface tension regions with two surface vectors (if correlate with two more cross orthogonal vectors, then become hexapole. While inversion, the ideal path is a cylindrical spiral, which comes from the inversion superposition of two orthogonal trigonometric curves. Note: the quadrupole concept is widely present in conventional physics; however, never inversion, the surface tension inversion units are special vigorous inversion types of quadrupoles. The quadruples we refer in this paper are those with enough inversion energy instead of non-inversion quadrupoles). There are two fundamental differences between the living and non-living flows on quadrupole characteristics: first, all bio-system flow quadrupole units are quantized and those for non-living beings are non-quantized quadrupoles, as in the figure, both the inward vector and one side use the events $\left|\sqrt[12]{2^{j-1}}\right\rangle$, and outward vector and another side use $\left|\sqrt[12]{2^{i-1}}\right\rangle$, which means they can only fall into discreet trigonometric values, never like the non-living liquid surface tension quadrupole vectors can fall into any values. Second, for *in vitro* liquids, the non-quantized inversion units only exist in the surface tension region and can't be present inside the liquid body. However, all *in vivo* flows compose of quantized quadrupole units on every folded surface tension region. (For this reason, an inversion process can only happen on the surface of an *in vitro* liquid; however, can happen in every folded surface tension region inside a flow.) Such an *in vivo* flow property evolves from the membrane "selective permeability" which also originated from the surface tension

region folding. As in (**Fig. 2f**), we use green color to represent four folded surface tension regions, on these folded surface tension regions there are groups of inversion units represented by A, B, C, and D (A is the outmost group). As mentioned, quantizing time is the structure that minimizes the gravitational binding-induced tension among each surface tension region and thus can maximize inversion energy to transfer among them; therefore, the advantaged inversion units from the quantizing time of A, B, C, and D groups can establish a cross folded-surface tension path under certain conditions. All cell membrane selective permeabilities are established in this way. (Generally, such folded surface tension regions are not visible, we need to check how many inversions happened after a certain ingredient enter the cell to get the number of folded surface tension regions for it.) From here, a cytoplasm is never a uniformed gelatinous liquid, it contains a lot of surface tension folds to establish a selective permeability path albeit we generally can't see. We also call a cell membrane selective permeability path a "cross surface tension region flows without a sheath" (here, use "sheath" instead of path "wall" for the visible outer wrapping of a flow due to the wide impact range of *in vivo* flow beyond the visible liquid outer boundary).

An *in vivo* flow upgrades from such a "selective permeability" while a visible sheath is evolved out (both are reverse thermodynamic gradients and such capabilities come from their folded surface regions). For CSF, as in the figure, we put a blue color sheath with layers of folded surface tension regions outside and quantized quadrupole units inside. The left and right hand of the flow are not symmetric (a human body is never absolutely symmetric for the left and right side); therefore, fall into different events such as $\left|\sqrt[12]{2^{n-1}}\right\rangle$ Vs $\left|\sqrt[12]{2^{n-2}}\right\rangle$, $\left|\sqrt[12]{2^{n-3}}\right\rangle$ Vs $\left|\sqrt[12]{2^{n-4}}\right\rangle$, ……, etc., correspond to the up VS lower vectors of the flow quadrupole units in that level. After evolving, the quantizing time mechanism is the same and the CSF flow still relies on the state of each folded surface tension it crosses for selective permeability. (CSF is the highest gravitational binding flow, which means its inside flow inversion can transfer to the farthest distance in the body than other body fluids. The motion of CSF or any *in vivo* flow is by means of inversion. E.g. vertebrae cross from $\sqrt[12]{2^{n-1}}$ to $\sqrt[12]{2^{n-2}}$ impact close regions, $\sqrt[12]{2^{n-1}}$ to $\sqrt[12]{2^{n-3}}$ impact further regions, and intervals between n inside the events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ decide the impact strength. Therefore, one CSF component can inversion or "jump" from 1 to n=24 vertebrae depending on the somatic body requirements, which means under the premises of each CSF vertebral running interval corresponds to a different part of the body, those move between one vertebra and those between 24 vertebrae must also possess the same frequency ratio following the equation: *Wavelength* = $\frac{2}{n}L$, *frequency* = nf_0 in an optimum state, deviation means entropy generation needs to be synchronized (*in vitro* reactions only follow Le Châtelier's constant K, *in vivo* conditions need the topological equation to further structure constant k). E.g., suppose ingredients *x* inversion

between one vertebra and ingredients *y* inversion between 24 vertebrae, then *x* governs nearby regions such as the heart or lungs and *y* governs remote places such as toe or finger joints, under this prerequisite condition, the optimum state of *x* and *y* follow the topological equation utilizing $f_y = 24\, f_x$ to synchronize entropy generation (as in (**Suppl. Movie 2**), CSF inversion along the heart pulsing, then in one heartbeat, *x* inverse one vertebra and *y* inverse 24 vertebrae to reach $f_y = 24\, f_x$, tired means for each *x* inversion in one heartbeat, *y* compromise to more heartbeats to reach the frequency, then need sleep to adjust back to $f_y = 24\, f_x$, senesce is the same mechanisms to increase the downstream repetitive number to compromise the equation, then old people generally demonstrate shorten spinal length L than their young state.) We usually see different flows such as blood vessels, lymphatic flows, nervous system, etc., entangling and issuing branches due to their inferior cross folded-surface tension capability and need CSF to assist for trigonometric inversion. The human spine composes of 12 thoracic vertebrae superposed with another 12 vertebrae and spliced into 7 cervical vertebrae and 5 lumbar vertebrae. As in (**Fig.2f**), the differences in the shapes of cervical, thoracic, and lumbar vertebrae, mean they are from different germ layers and extend from their folded surface tension regions to the whole body, with 12 vertebrae for as two periods of events $\left|\sqrt[12]{2^{n-1}}\right\rangle$, 7 cervical vertebrae as one period, 5 lumbar plus sacrum coccyx as one period. Based on folded surface tension regions, the gravitational binding surface tension tendencies and trigonometric curves of *in vivo* biomaterials are strengthened greatly. As in the figure, those fall between two folded surfaces, such as the *x* between surface events $\left|\sqrt[12]{2^{n-4}}\right\rangle$ and events $\left|\sqrt[12]{2^{n-6}}\right\rangle$ in (**Fig. 2f**), will drive by the system plus their own gravitational binding tends to one of the two surfaces and integrated, if fail will be removed out as excrements by the flow. (The robustness of a flow means utilizing internal fluctuation to remove lower internal motion components between folded surface tension regions; CSF is quite clear than other liquids. Sleep is a state while CSF moves in the opposite direction for entropy control. Bio-systems use quantizing time and therefore need to sleep, for a continuous period while discreet quantizing time can't cover then sleep. In old age, sleep quality is dampened due to CSF decrease in quadrupole capability to correlate with folded surface tension regions, it is no longer clear, and the CSF tap risk & recovery period will also increase.)

The lifespan or the robustness of CSF for a person is based on the postnatal folding (or repetitive) numbers or universal memory of these spinal events. E. g., suppose one person's spinal events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ have one billion folding numbers and that of another person has 1.2 billion, then the latter will have a significantly longer lifespan under the same environmental impacts. (**Suppl. Movie 3**) shows how the heart-lung-diaphragm inversion superposition on the spinal thoracic vertebra. We can see the internal fluctuation of the heart, lungs, and

diaphragm transfer to the 12 thoracic vertebrae and compose of inversion repetitiveness. Here, only referring to three parameters, the robustness of postnatal folding (repetitive) numbers means inversion superposition of all spinal event's internal fluctuation trigonometric curves no matter which source (from genes, proteins, cells, or environment) and which level (microcosmic to macrocosmic) they come from, the only standard is the trigonometric curves. All somatic quantizing times at different parts of the body are finally based on CSF as the *in vivo* wave function or gravitational waves (lower evolved species still have equivalent structures). From genomic to protein level is a selective permeability mechanism example of the elastic reference system in which the next level only takes the inversion energy from the previous level. As in (**Fig.2g**), suppose an mRNA will be spliced into k numbers of exons as events $\left|\sqrt[12]{2^{k-1}}\right\rangle$, then 2, till i numbers of exon combinations get events $\left|\sqrt[12]{2^{k-1-1}}\right\rangle$ till $\left|\sqrt[12]{2^{k-i-1}}\right\rangle$, combinations of these events compose of various splicing patterns based on *in vivo* conditions and all follow the equation[3]: $L_{exon} = \frac{2}{n} L_{mRNA}$, $f_{exon} = \frac{2}{n} f_{mRNA}$ (the normal elasticity of a gene means all its mRNA exons' combinations follow the equation, for any events $\left|\sqrt[12]{2^{k-1}}\right\rangle$ or their combinations once fail the equation will be repaired or canceled). Right now, only a few splicing patterns such as alternative, recursive, etc., have been reported. There are likely a lot of splicing patterns still not reported. It is only a folded surface tension region controlled physical "selective permeability" process and the events combinations are the inversion energy that will transfer to the next step. From here, the senescence of a gene is still the compromised exon combinations with the topological equation (Modern biology uses PCR at the embryonic stage to detect intron/exon, quite challenging to find such senescence). Protein folding still follows the same folded surface tension "selective permeability" mechanism. As in the right hand of (**Fig.2g**), we can find the least α-helix and β-sheet since they are the elements of protein secondary structures, we can write: $L_{\alpha-\text{helix}} = \frac{2}{n} L_{peptide}$, $f_{\alpha-helix} = nf_{peptide}$; $L_{\beta-\text{sheet}} = \frac{2}{n} L_{peptide}$, $f_{\beta-\text{sheet}} = nf_{peptide}$, then use the same inversion superposition to get events $\left|\sqrt[12]{2^{(k-i)+(j-i)-1}}\right\rangle$ (*In vivo* Châtelier's constant Ks need quantizing time inversion for sustaining, or such constant k has memory). Most inversion energy for protein folding should directly come from mRNA because most of their folded surface tension regions for driving dynamics are overlapped. Modern structural biology utilizes *in vitro* experiments to publish a lot of protein structures based on Anfinsen's dogma. *In vitro* conditions lack folded surface tension region quadrupole flow thus it is difficult to know the topological inversion of these acquired structures, find ways to transfer these structures to *in vivo* conditions, or even artificially construct quadrupole chips for validation are possibly some solutions. We should also realize that the senescence of a protein still follows the same mechanism by compromising the repetitive number of α-helix/β-sheet along the previous topological equation state, and such senescence is

challenging to be detected due to modern structural biology lacks real *in vivo* modulations.

A gut is a visible cross-folded surface tension region flow with spinal CSF events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ as *in vivo* wave function or gravitational waves. As in (**Fig. 2h**), digested chyme flows from the gut means to cross the CSF extended folded surface tension regions, then increase the gravitational binding surface tension tendency or strengthen each CSF event and excrement the waste. CSF never takes the nutrients, only takes the inversion energy events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ induced by foods. Then these events transfer to other flows inside the body and compose a huge cross-surface tension region network to transfer inversion energy. People always believe that obesity in old age is more absorbed nutrients, bio-systems only take the surface tension inversion energies from foods and transfer them to every part of the above network, adipose tissues come from the dampening of the network or decreasing of trigonometric curves in CSF. Sexual behavior takes the same mechanism, never using the direct incoming data, only using the behavior-induced inversion energy; however, in a reverse direction: digestion transfers inversion energy to all flows of the body via CSF, and sexual behavior cost the inversion energy from these flows via CSF. As in (**Fig.2i**), CSF is the largest gravitational binding structure and runs in a different direction for males and females under normal daytime conditions (bisexual persons are different). Sexual behavior drives CSF to run in a different direction, then all the *in vivo* cross-surface tension flows and selective permeability reverse their inversion energies back to CSF for use in the process. While sleeping, the direction of CSF is still in a reverse direction to that in the daytime. However, such a CSF reverse direction running is for system entropy control, different cross-surface tension flows based on the topological equation to recover more trigonometric curves for daytime entropy generation activities, not the sexual behavior reverse that will lose a substantial amount of inversion energy that even can reflect in FHD^3 one week after the behavior. The robustness or repetitiveness (repeat all the events from 1 to n) of spinal events $\left|\sqrt[12]{2^{n-1}}\right\rangle$ can be physically trained postnatal to some degree since inversion energy is patterned energy, (**Suppl. Movie 4**) is one of the ancient spinal training methods for this purpose. For nowadays young people, there is no significant difference between types of sports for benefits health if arrange properly; however, for those over middle-aged people, it is better to use some spinal-related sports. Peripheral muscle training benefits spinal CSF entropy-control curves quite less, and sometimes even can damage CSF health.

Conventional biology always claims that all bioprocesses are automatically happening. They never automatically happen; the only driving force is surface tension-tending gravitational binding inversion energy that is structured by quantizing time events memory. From here, the quantum fluctuation in bio-systems starts from the genomic to spinal scale in a discreet pattern due to surface tension region folding (in humans, minimum

fluctuation is code size and the largest is the spinal cord; the definition of quantizing time means from 1 to n are all equivalent, then one fluctuation at the code size is the same as one fluctuation in spinal size to record as one repetitive number under ideal conditions. Senescence is the dampening of such repetitive number equivalent capacity). In conventional physics, quantum means the minimum unit of physical property, a quantum state is a mathematical entity that provides a probability distribution for the outcomes of each possible measurement on a system; bio-systems only have inversion or folding correlations; therefore, the bio quantum is the minimum inversion or folding scale, a bio quantum state is an alive quantizing time distribution (structures) for the entropy-control flow of a system in a non-isolated environment, never a probability. There is no significant difference between the two concepts of quantum except in surface tension inversion (or folding) and the quantum events equivalent capacity. CSF is the largest *in vivo* wave function or gravitational waves that need folded surface tension regions for proliferating and transferring, senescence is the dampening of events equivalent capacity.

Authors' contributions

L.Y.Y. perceived the models, performed all the experiments, and wrote the manuscript.

Competing financial interests

The authors declare no competing financial interests.

Data Availability Statements

The datasets of the key reference paper[3] are available in the Dryad Digital Repository.

https://doi.org/10.5061/dryad.8931zcrr9 with the keyword: bio-inertia_ *FHD,*

Supplementary information

Supplementary information is available in the online version of the paper.

Supplementary Movie 1. bio quantum path experiment that originates the modifications of Newtonian Three Laws of motion to bio-systems

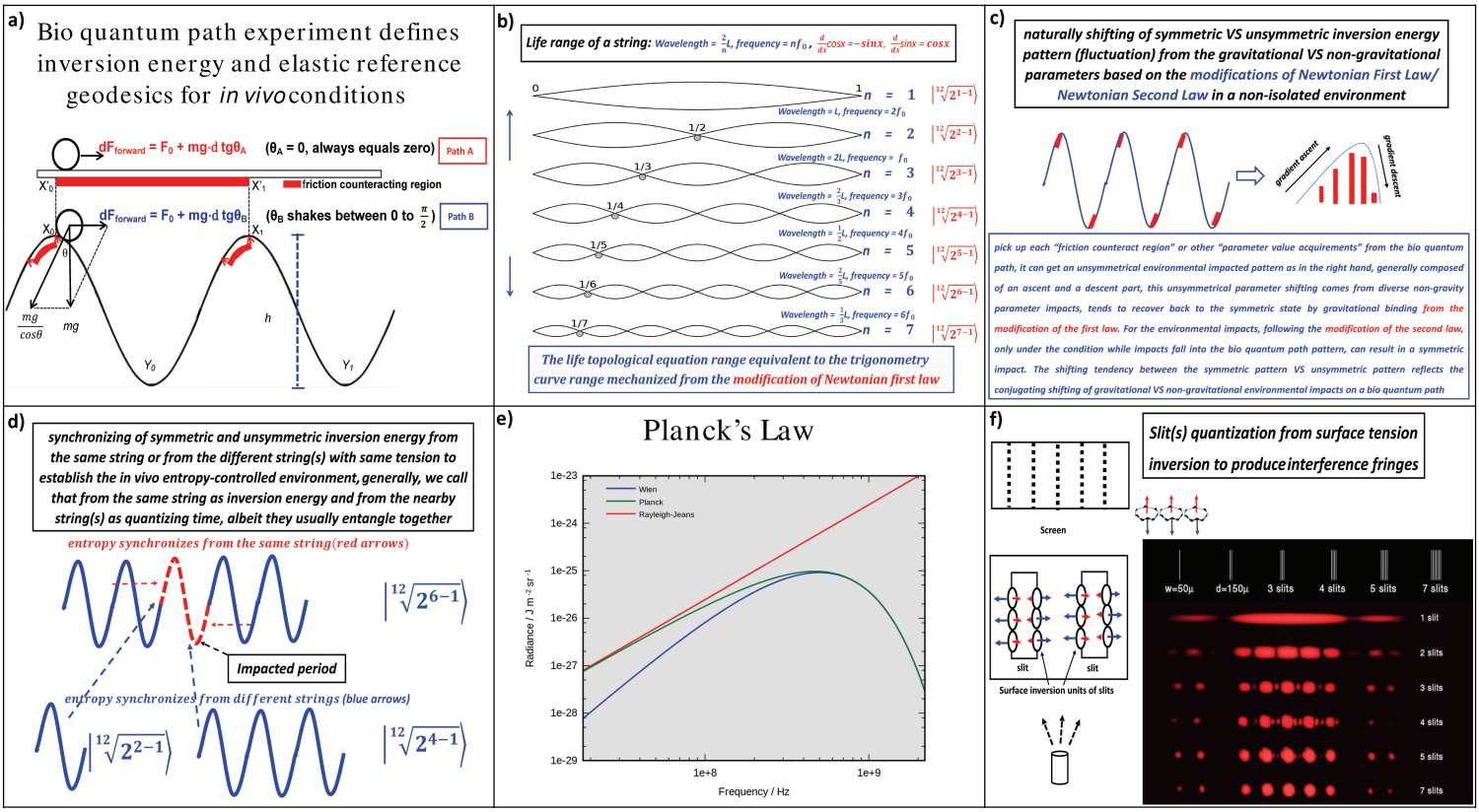
Supplementary Movie 2. Inversion superposition of heart-lung-diaphragm on spinal thoracic vertebrae

Supplementary Movie 3. Inversion superposition of heart-lung-diaphragm on spinal thoracic vertebrae

Supplementary Movie 4. Ancient physical spinal training with over 1500 years of history

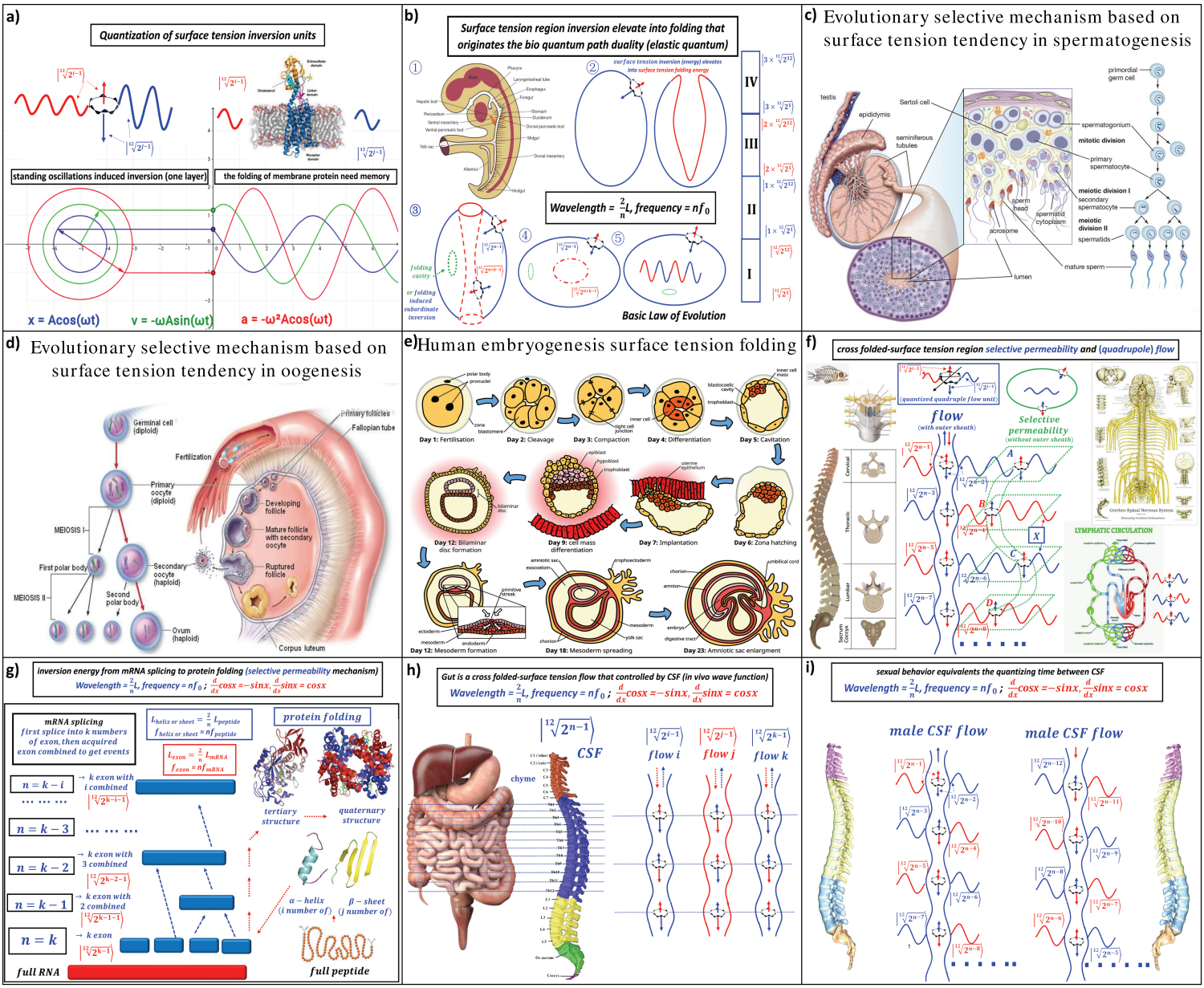
Figure Caption

Figure 1 | Gravitational binding inversion energy, quantizing time and gravitational surface tension tendency



a) bio quantum path experiment **b)** life range of a bio quantum path elastic model **c)** gravitational and non-gravitational impacts on a bio quantum path in a non-isolated environment **d)** inversion energy/ quantizing time **e)** Planck's black body model **f)** slit surface tension inversion mechanism of double-slit & multi-slit experiments. (Note: this mechanism does reveal the quiddity of all wave functions. For a single slit, the slit width must be close to the wavelength of sources, which means the left and right slit inversion surfaces compose a certain "repetitiveness". Double-slit and multi-slit still work in the same mechanism and rely on "repetitiveness" as the basis for interference. Just conventional quantum mechanics tries to shut off any "repetitiveness", then has to utilize probability "repetitiveness" to replace parameter "repetitiveness". However, this way still can't dodge the real existed "repetitiveness".)

Figure 2 | developmental folded-surface tension regions original *in vivo* cell membrane "selective permeability" and quadrupole flow with quantizing time or memory



a) quantization of surface tension inversion units **b)** origin of bio quantum path duality from gravitational surface tension region folding **c)** spermatogenesis utilizes surface tension tendency as physical selective mechanisms **d)** oogenesis utilizes surface tension tendency as physical selective mechanisms **e)** the folding in earlier human embryogenesis **f)** cross folded-surface tension region selective permeability and flow **g)** inversion transfer from the mRNA splicing to protein levels by cross folded-surface tension region mechanism **h)** gut as a cross folded-surface tension region flow to transfer inversion energy to spinal CSF **i)** cross folded-surface tension region flow mechanism of sexual spinal inversion (some components of **Fig. c**, **d**, **e**, **f**, **h**, are partially from Britannica, BC open textbook, Wiki, Dreamstime)

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