

# Uncover the secret of quantum computing: the leap from 0 and 1 computers to continuous computers

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## Abstract

Quantum computing is hailed as the next revolution in human information technology, yet its true key—the deep connection between quantum phenomena and geometry—has not been fully revealed. Based on the geometric framework of the Unified Field Theory (UFT), this paper proposes a new discipline, Geometric Spectroscopy, which demonstrates that quantum phenomena do not arise from discrete energy levels but from continuous geometric projections of spatial helical energy flows. By introducing the axial energy-flow projection ratio ( $\kappa$ ) and the geometric rotation frequency ( $\Omega$ ), a unified spectral equation is established:

$$E = \hbar \Omega \kappa = \mu_g c^2 l_\Omega \kappa,$$

thereby realizing the geometric unification of energy, time, and information.

Within this framework, the traditional binary logic of “0 and 1” is merely a boundary sampling of the continuous spatial energy-flow field  $\kappa$ . Future continuous computers will instead take spatial geometry itself as the computational medium, replacing switch logic with the rotational resonance of  $\kappa$ – $\Omega$ .

This paper further proposes the architecture of the Geometric Spectral Computer (GSC), which treats  $(\mu_g, l_\Omega)$  as constant fields and  $(\kappa, \Omega)$  as programmable variables, achieving a zero-entropy, conservative, and reversible process of spatial computation.

In the continuous computing system, images and videos are no longer assembled from

pixels and frames, but are naturally generated by the continuous geometric evolution of the spatial energy-flow field  $\kappa\text{-}\Omega$ . Each image represents a transient configuration of space itself, allowing the observer to be directly immersed in the geometric structure of energy flow—as if entering the very scene of light and energy generation.

## **Introduction**

Since the mid-20th century, when electronic computers were invented, humanity's entire computational framework has been built upon the binary switch logic of "0 and 1." Every operation—computation, storage, or signal transmission—is essentially a discrete control of the opening and closing of electric charges.

This design slices the continuous processes of the natural world into discrete symbolic languages, allowing information to be processed artificially; yet at the same time, it means that we approximate nature through "digital editing," rather than truly reproducing it.

With the arrival of the quantum computing era, although we have transcended the limitations of classical bits and entered the microscopic logic of superposition and entanglement, the mathematical structure of quantum theory still rests on discrete energy levels and probabilistic descriptions—it does not answer the deeper geometric questions: Why is energy discrete? Why does logic exist at all?

The Geometric Spectroscopy proposed in this paper was born precisely to address these questions.

It reveals that the discreteness of quantum phenomena is merely the projection result of the continuous structure of spatial energy flow.

Space is not a static background but a dynamic continuum spiraling outward at the speed of light  $c$ .

At the rotational scaling length  $l_\Omega$ , it satisfies

$$v_r = c, \quad v_\theta = 0,$$

which makes “time = light-speed displacement” a geometric fact rather than a definitional assumption.

Based on the three mother equations of the Unified Field Theory,

$$Q = 4\pi c l_\Omega^2, \quad M = \mu_g l_\Omega, \quad G = \frac{4\pi c^2}{\mu_g},$$

one naturally derives the geometric definition of the reduced Planck quantity,

$$\hbar = \mu_g c l_\Omega^2,$$

and establishes the energy-spectrum equation  $E = \hbar \Omega \kappa$ .

Here,  $\kappa$  represents the axial projection ratio of the spatial energy flow, and  $\Omega$  the geometric rotation frequency.

Together, they define the unified geometric structure of energy, time, and information.

Within this geometric framework, the traditional “quantum bit” is merely an abstraction at the boundary of observation; the true physical computation is the rotation and resonance of the  $\kappa - \Omega$  field within space—a continuous and conservative geometric evolution.

Therefore, the computer of the future will no longer rely on electronic switches but on the geometric flow of space itself.

Chapters 2 through 4 of this paper successively explain:

- How the  $\kappa - \Omega$  model maps quantum logic into geometric rotation;
- How the Geometric Spectral Computer (GSC) uses energy flow as the computational medium;
- How three classes of experiments verify energy-flow conservation and spatial resonance;
- And how Chapter 5 further reveals that this “continuous computation” is the manifestation of the universe’s self-computation.

**The central proposition of this work is:**

**The key to quantum computing lies not in algorithms, but in geometry.**

From the binary switch logic of “0 and 1” to the continuous geometry of  $\kappa$ , humanity is taking the fundamental leap toward a new computational civilization.

Explanation and definition of key terms:

| Nouns / Symbols                                  | Level   | Interpretation mode   | Readers' possible confusion   |
|--|---|---|---|
| $\mu_g$ (space-mass coupling constant)           | The unified field theory layer defines its physical meaning: the coupling constant of spatial linear density and mass scale, with the dimension of kg/m | Point out the relationship with $G$ $G = 4\pi c^2 / \mu_g$                | Reviewers may mistakenly believe that $\mu_g$ is an artificial fitting quantity, and it should be pointed out that it is a basic constant |
| $\ell_\Omega$ (rotating calibration length)      | The geometric layer is defined as the calibration length of spatial spiral flow at the speed of light, which can be compared with Planck length         | Explain the inverse relationship with $\Omega$                            | Avoid being misunderstood as "wavelength" or "quantum length"   |
| $\kappa$ (axial projection ratio of energy flow) | Spectral layer/information layer  | Give geometric definition<br><i>begin: math: text</i> $\kappa = v_z$      | <b>v</b>  |
| $\Omega$ (geometric rotation)                    | Spectral layer/time definition  | Description $\Omega = c / \ell_\Omega$ is a geometric definition of time, | Avoid mistaking angular frequency or  |

|                                   |                                 |   |  |
|-----------------------------------|---------------------------------|---|--|
| frequency)                        |                                 | corresponding to the spatial rotation rhythm  | ordinary vibration frequency   |
| Geometrical spectroscopy          | Theoretical framework           | It is defined as "the theory of studying the relationship between the geometric structure of space spiral energy flow and the observed spectrum"; Emphasize the difference between quantum spectroscopy and quantum spectroscopy: continuous rather than discrete | Reviewers who have not read the previous work will confuse "geometric spectroscopy" with ordinary spectroscopy |
| $\kappa$ - $\Omega$ model         | Theoretical core                | It is defined as a two-dimensional geometric dynamic system that describes the geometric rotation and logical evolution of space energy flow  | If it is not explained clearly, readers will think that it is only a parametric wave function                  |
| Geometric spectral computer (GSC) | Engineering realization layer   | It is defined as a zero-entropy computing system with $\kappa$ - $\Omega$ field as the logical primitive and energy flow rotation as the operation mechanism  | Reviewers tend to confuse it with "quantum computer"   |
| Space computing civilization      | Philosophical development layer | Description refers to the form of civilization when human beings can directly control the geometric energy flow in space to achieve calculation   | Avoid being misunderstood as "metaphysical expression"   |

## Supplementary note: key formula with notes

Formula  $E = \mu_g c^2 \ell_{\Omega} \kappa = \hbar \Omega \kappa$  "Energy spectrum equation, unifying the geometric connection of energy, time and information"

$\frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt}$  "κ-Ω Intermodulation conservation equation, equivalent to unitary evolution condition"

$\Omega_1 \kappa_1 = \Omega_2 \kappa_2$  "Resonance condition, defining the phase-locked standard of geometric communication"

$\oint \Omega d\kappa = 0$  "Geometric unitary condition, corresponding to logical path closure"

"Therefore, future computers will no longer rely on electronic switches, but on the geometric flow of space itself."

## Chapter 1 From quantum discreteness to geometric continuity: the inevitable evolution of theory

### 1.1 Boundary of discrete cognition

Traditional quantum theory takes discrete energy levels and binary bits ( $|0\rangle, |1\rangle$ ) as information primitives and successfully explains a large number of experiments, but its discreteness is more derived from the discretization of observations and boundary conditions than from the discretization of space itself. The ultrafast/strong coupling experiment reveals that the transition is a process of phase coherent rotation, and the entanglement is a phase-locked phenomenon of phase geometry.

### 1.2 Space as energy flow geometry

We characterize space as a continuous fluid with right-handed spiral divergence at the

speed of light  $C$ . The rotating calibration length  $\ell_\Omega$  meets  $v_r = c, v_\theta = 0$ . So "time" becomes the measurement of angular process:

$$\Omega = c/\ell_\Omega, \phi = \Omega t.$$

### 1.3 Unified field theory three generatrixes and dimensional closed loop

Starting from the three mother equations of UFT:

$$Q = 4\pi c l_\Omega^2,$$

$$M = \mu_g l_\Omega,$$

$$G = \frac{4\pi c^2}{\mu_g},$$

the reduced Planck quantity obtains a clear geometric meaning:

$$\hbar = \mu_g c \ell_\Omega^2, \quad E = \mu_g c^2 \ell_\Omega \kappa.$$

This completes the geometric closed loop of  $c, \mu_g, \ell_\Omega \rightarrow \hbar, E$ :  $\hbar$  is not an independent constant, but a derivative of spatial mass coupling and geometric scale.

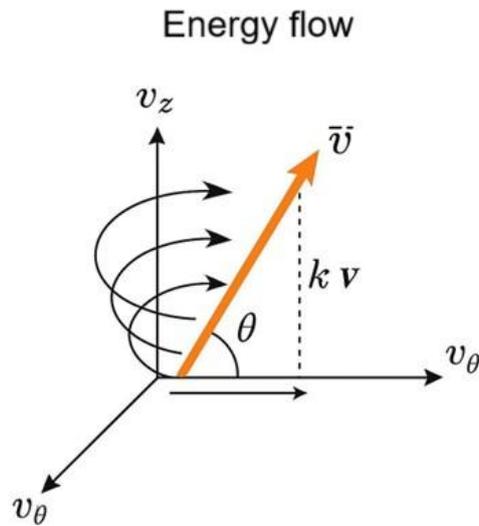
### 1.4 The introduction of $\kappa$ : from discrete bits to continuous geometry

Definition

$$\kappa = \frac{v_z}{|\mathbf{v}|} \in (0,1],$$

Indicates the projection scale of the energy flow relative to the axis:  $\kappa \approx 0$  is in the circumferential rotation state (class "0"),  $\kappa \approx 1$  is in the axial falling state (class "1"), and all  $\kappa$  in the middle are in the true continuous state. The energy spectrum varies continuously with  $\kappa$ :  $E = \hbar \Omega \kappa$ .

Conclusion: discrete spectral line = stationary point sampling of continuous  $\kappa$  field; The discrete bit is only the endpoint projection of the continuous geometric state.



Energy flow vector diagram above (schematic diagram of  $\kappa - \Omega$  geometric relationship)

This figure shows the geometric structure of spatial spiral energy flow:

The central axis  $v_z$  represents the axial falling direction of energy flow, corresponding to the axial projection ratio of energy flow  $\kappa = v_z/|\mathbf{v}|$ ;

The horizontal axis  $v_\theta$  represents the circumferential rotation component, corresponding to the rotation frequency  $\Omega$ ;

The orange vector  $\mathbf{v}$  represents the composite direction of energy flow, and its angle with the axis  $\theta$  reflects the distribution ratio of energy flow between the circumferential and axial directions.

When  $\kappa \rightarrow 0$ , the energy flow is dominated by circumferential rotation (infrared state);

When  $\kappa \rightarrow 1$ , the energy flow completely falls into the axial direction (UV state).

The spiral arrow in the figure shows the continuous transition of space energy flow from circumferential rotation to axial fall.

## 1.5 Principles of geometric spectroscopy (new special chapter)

### 1.5.1 Definition and core proposition

Geometric spectroscopy: the geometry of how the "space spiral energy flow" is presented as spectral and quantum phenomena in the observation layer. Core proposition:

Spectrum=projection of spatial geometry; Calculate the programmable resonance of  $\kappa - \Omega$ .

### 1.5.2 Basic formula and derived quantity

Undertake the three formulas of unified field theory:

$$Q = 4\pi c \ell_{\Omega}^2, \quad M = \mu_g \ell_{\Omega}, \quad G = \frac{4\pi c^2}{\mu_g}$$

Export:

$$\hbar = \mu_g c \ell_{\Omega}^2, \quad \Omega = \frac{c}{\ell_{\Omega}}, \quad E = \hbar \Omega \kappa.$$

Meaning:  $\hbar$  is the "action per radian",  $\Omega$  is the natural geometric clock,  $\kappa$  is the geometric code of the information state.

### 1.5.3 Physical role of $\kappa - \Omega$

- $\kappa$ : distribution ratio of energy flow between circumferential and axial directions (information state, logic state);
- $\Omega$ : Geometric rotation frequency (time rhythm, timing control);
- Coupled equations (conservation conditions):

$$\frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt} \Rightarrow \frac{d}{dt}(\hbar \Omega \kappa) = 0$$

This equation is equivalent to  $dE/dt = 0 \rightarrow$  conservation of energy flow  $\rightarrow$  logical unitary

That is, energy conservation  $\rightarrow$  logical unitary  $\rightarrow$  closed-loop evolution.

### 1.5.4 Geometric interpretation of spectral phenomena

- Discrete spectral lines:  $\kappa$  is sampled at the stagnation point;
- Continuous spectrum/broadening:  $\kappa$  continuous evolution or disturbed distribution;

- Coherence and interference:  $\kappa - \Omega$  closed loop trajectory in phase space ( $\oint \Omega d\kappa = 0$ ).

Thus, the "position – strength - shape" is unified to "geometry – phase - conservation".

#### 1.5.5 Relationship with quantum mechanics (hierarchical mapping)

| Level                  | Main Variables          | Representative Equation        | Meaning   |
|------------------------|-------------------------|--------------------------------|---|
| Unified Field Theory   | $c, \mu_g, \ell_\Omega$ | Three Mother Equations         | Constant/geometric Foundation                   |
| Geometric Spectroscopy | $\kappa, \Omega$        | $E = \hbar\Omega\kappa$        | Geometric generation at the observational layer |
| Quantum Mechanics      | $\psi, t$               | $i\hbar\partial_t\psi = H\psi$ | Operator representation of geometric states     |

Quantum mechanics is the symbolic projection of geometric spectroscopy; Geometric spectroscopy is the observation layer expression of unified field theory.

"Geometric spectroscopy is the natural projection of unified field theory in the observation layer, while quantum mechanics is its mathematical representation."

#### 1.5.6 Summary

Geometric Spectroscopy achieves a threefold unification:

1. Geometricization of  $\hbar$ ;
2. Projection of discrete spectra;
3. Conservation of unitarity.

It provides an intuitive and computable basis for  $\kappa - \Omega$  logic modeling in the next chapter. "In the next chapter, we will formalize this geometric logic in the  $\kappa - \Omega$  model."

## Chapter 2 The $\kappa$ - $\Omega$ Model and the Geometrization of Quantum Logic

### 2.1 Basic Definition of the $\kappa$ - $\Omega$ System

Geometric Spectroscopy reveals that a quantum state is essentially the geometric rotation of spatial energy flow.

To describe this process, two inter-locked geometric variables are introduced:

$$\kappa = \frac{v_z}{|\mathbf{v}|}, \quad \Omega = \frac{c}{\ell_\Omega}$$

- $\kappa$  (kappa) — the axial projection ratio of the energy-flow vector; it determines the spatial “posture” of energy motion.
- $\Omega$  (Omega) — the geometric rotation frequency, defining the rhythmic scale of time.
- Together,  $(\kappa, \Omega)$  form the logical coordinates of the space-field continuum.

Under this construction the unified energy-spectrum equation naturally arises:

$$E = \hbar \Omega \kappa = \mu_g c^2 l_\Omega \kappa.$$

Interpretation:

- As  $\kappa$  varies continuously from 0 to 1, the energy state transforms smoothly from a tangential-rotational to an axial-infall configuration.
- Each  $\kappa$  corresponds to a continuous geometric energy-flow state rather than a discrete quantum point.

Hence,

Quantum superposition  $\equiv$  geometric rotation of energy flow (rather than probabilistic mixing).

### 2.2 $\kappa$ - $\Omega$ Dynamics and Conservation Equations

System energy conservation condition:

$$\frac{dE}{dt} = \hbar \frac{d}{dt}(\Omega\kappa) = 0$$

Expanded:

$$\hbar \left( \frac{d\Omega}{dt} \kappa + \Omega \frac{d\kappa}{dt} \right) = 0$$

Namely:

$$\frac{d\Omega}{dt} = - \frac{\Omega}{\kappa} \frac{d\kappa}{dt}$$

This is a geometric closed-loop equation that states:

- When  $\kappa$  changes (energy flow direction rotates),  $\Omega$  must be adjusted in reverse proportion;
- The two provide geometric feedback to each other, ensuring constant energy;
- This “intermodulation law” is the geometric origin of quantum unitary evolution.

Unitarity is no longer an operator assumption, but a geometric necessity for the conservation of spatial energy flow.

### 2.3 Geometric Forms of Logical Wave Functions

" $\psi(\kappa, t)$  is not a probability wave, but a geometric phase function of spatial energy flow."

Define the spatial energy flow wave function:

$$\psi(\kappa, t) = A e^{i \int \Omega(\kappa, t) dt}$$

Its time derivative:

$$\frac{d\psi}{dt} = i\Omega(1 - \kappa)\psi$$

So:

- When  $\kappa=1$  (axial falling state)  $\rightarrow \frac{d\psi}{dt} = 0$ , the logic is in steady state;

- When  $\kappa=0.5 \rightarrow$  unitary superposition state;
- When  $\kappa$  changes,  $\rightarrow$  logical rotation state.

The operation of a logic gate is equivalent to a continuous rotation path of  $\kappa$ .

## 2.4 Geometric logic gates and kappa - $\Omega$ paths

All quantum logic gates can be mapped to rotational trajectories on the  $\kappa$ - $\Omega$  plane:

| Logic gate    | The evolution law of $\kappa$ - $\Omega$   | Geometric meaning  |
|---------------|--|--|
| Hadamard gate | $\kappa: 0 \rightarrow 0.5$                | Equal amplitude superposition of circumferential and axial energy flow (equilibrium state) |
| Pauli-X gate  | $\kappa \rightarrow 1-\kappa$              | Energy flow direction reversal   |
| Phase gate    | $\Omega \rightarrow \Omega + \Delta\Omega$ | Phase shift  |
| CNOT gate     | $\kappa_2 = f(\kappa_1, \Omega)$           | Dual energy flow phase locked resonance  |
| Swap gate     | $\kappa_1 \leftrightarrow \kappa_2$        | Energy flow exchange path  |
| Measure gate  | $\kappa \rightarrow \{0,1\}$               | Continuous state projection as discrete observation value                                  |

These operations satisfy conservation constraints:

$$\nabla \cdot (\mu_g \mathbf{v}) = 0$$

It means that the total amount of energy flow is conserved in the process of logical operation  $\Rightarrow$  unitary evolution is naturally maintained.

## 2.5 Unitary and geometric closed loop

In  $\kappa$  -  $\Omega$  space, the unitary condition of logical operation is equivalent to:

$$\oint \Omega d\kappa = 0$$

This shows that:

- Closed path (start and end  $\kappa$  are the same)  $\rightarrow$  unitary evolution, reversible calculation;
- Open path ( $\kappa$  final collapse)  $\rightarrow$  non unitary evolution, corresponding to measurement or information fall.

Therefore, the boundary between "calculation" and "measurement" is represented by whether the path is closed at the geometric level.

## 2.6 The geometric nature of entanglement

When two energy flow units  $i, j$  meet:

$$\Omega_i \kappa_i = \Omega_j \kappa_j,$$

Then they enter the resonant phase locked state. At this time, the energy flow information is no longer limited to the local  $\kappa$  value, but forms the overall geometric resonance.

This "full field phase locking" is quantum entanglement in the traditional sense.

It is embodied in:

Global phase resonance of entangled  $\equiv \kappa\text{-}\Omega$  field.

Disturbing any subsystem (changing  $\kappa$  or  $\Omega$ ) will cause the overall geometric reconstruction, resulting in instantaneous response.

Entanglement is maintained by the overall conservation of space, rather than the "over distance interaction" between particles.

"This geometric phase locking principle is consistent with the 'three field vertical' mechanism in UFT-F, indicating that the entanglement originates from the global resonance of the space energy flow."

## 2.7 Geometric logic and energy spectrum mapping

The  $\kappa$ - $\Omega$  path of the logic gate can be mapped to the change of energy spectrum

$$E(\kappa) = \hbar\Omega\kappa.$$

Different door operations correspond to different spectral trajectories:

| Gate type | Spectral morphology   | Physical meaning                           |
|-----------|-----------------------|--|
| Hadamard  | Symmetrical bimodal   | Equilibrium rotational energy distribution |
| Pauli-X   | Antiphase transition  | Energy flow direction inversion            |
| Phase     | Shift spectral peak   | No energy consumption due to phase drift   |
| CNOT      | Bimodal phase locking | Energy flow resonance transfer             |
| Swap      | Cross peak            | Energy path interchange                    |

If the operation is unitary, the spectral peak integral remains unchanged; If it is not unitary, the spectral peak shifts or broadens.

## 2.8 Unification of logical time and spatial frequency

Time is not an external parameter, but the geometric phase process of  $\Omega$ :

$$t = \frac{\varphi}{\Omega}$$

The speed of logic operation is determined by the spatial rotation frequency, which is not an electronic clock.

When  $\kappa$ - $\Omega$  resonates and synchronizes, the whole system enters the "geometric clock lock-in" state to realize the light speed level logic operation.

This makes the geometric logic system naturally have:

- No external timing is required;
- Zero delay synchronization;
- Parallelism increases exponentially with spatial degrees of freedom.

## 2.9 Summary

1.  $\kappa$  and  $\Omega$  constitute the geometric coordinate system of quantum logic.
2. The unitary property is derived from the conservation of energy flow in space, not from matrix algebra.
3. The logic gate is the rotation track of  $\kappa - \Omega$  closed loop.
4. Entanglement is the resonant phase locking of  $\kappa - \Omega$  field.
5. Time is the rotational frequency phase, and the calculation speed is determined by the geometric rhythm.

Conclusion:

The  $\kappa - \Omega$  model transforms quantum logic from a symbolic system to a spatial geometric system.

When  $\kappa - \Omega$  can be controlled by experiments, quantum computing is transformed into spatial geometric computing.

## Chapter 3 The Geometric Spectral Computer (GSC) System

### 3.1 Fundamental Principle of Geometric Spectral Computation

The Geometric Spectral Computer (GSC) is a new computational architecture built upon the framework of Geometric Spectroscopy and the Unified Field Theory (UFT).

Its core principle is to replace the traditional bit array with the spatial energy-flow field ( $\kappa-\Omega$ ) and to replace logical switching with geometric rotation processes.

Traditional electronic computing relies on the on/off states (0 and 1) of discrete electric charges; quantum computing depends on the superposition and collapse of wave functions. In contrast, GSC directly uses spatial energy flow as the computational medium, achieving a geometric unification of logic operations, energy conservation, and

information storage.

Definition:

$$Cell = (\kappa, \Omega)$$

Each computational cell consists of two continuous variables,  $\kappa$  and  $\Omega$ , representing its energy-flow orientation and rotational frequency state.

Logical operations correspond to rotational trajectories in  $\kappa$ - $\Omega$  space:

$$(\kappa, \Omega) \rightarrow (\kappa', \Omega') \quad \text{with} \quad \frac{d}{dt}(\hbar\Omega\kappa) = 0$$

Therefore, the calculation of GSC is a conservative rotation process, without energy dissipation, logic collapse and probability fluctuation.

### 3.2 Architecture and Logical Hierarchy

The GSC architecture consists of three layers:

| Hierarchy                                | Geometric correspondence  | Function description   |
|--|---|--|
| Ground floor field<br>(foundation layer) | $\mu_g, \ell_\Omega, c$   | Defining spatial geometry and coupling constants (unified field theory layer)        |
| Operation layer<br>(logic layer)         | $\kappa$ - $\Omega$ field   | Carry out energy flow rotation and logical transformation (geometric spectrum layer) |
| Observation layer<br>(interface layer)   | Radiation spectrum, interference pattern, extracting the geometric state of $\kappa - \Omega$ | Implement read/write (quantum layer)   |

Three layer self-consistent closed loop:

$$c, \mu_g, \ell_\Omega \Rightarrow \hbar, \Omega, \kappa \Rightarrow E, I.$$

Representation: constant definition calculation volume  $\rightarrow$  geometric rotation for calculation  $\rightarrow$  spectral projection for readout.

### 3.3 Operation unit and array structure

Each GSC cell is equivalent to a "Geometric Fluxon", whose state is determined by ( $\kappa$ ,  $\Omega$ ).

Multiple units are arranged into a flux array:

- Adjacent units are coupled through  $\kappa$  -  $\Omega$  resonance conditions:

$$\Omega_i \kappa_i = \Omega_{i+1} \kappa_{i+1}$$

- The logical state of the whole array is described by the spatial distribution of  $\kappa(x, y, z)$ ;
- Any local disturbance will propagate instantaneously through the conservation equation to achieve global synchronization.

This structure can be physically realized in the following forms:

1. Optical interference cavity array (phase controllable spectral network);
2. Superconducting magnetic fluid array (low temperature energy flow phase locked array);
3. Acousto optic or plasma waveguide networks (phase matched propagation arrays).

### 3.4 Geometry storage mechanism

The traditional storage takes charge or magnetic pole as the carrier, so there must be dissipation;

GSC storage takes the spatial phase distribution of  $\kappa$ - $\Omega$  field as the carrier, without energy consumption.

Information element is defined as:

$$I(x, y, z) = \kappa(x, y, z)e^{i\Omega t}$$

- Amplitude ( $\kappa$ ) stores logic information;
- Phase ( $\Omega t$ ) defines the time evolution;
- When the energy flow is conserved ( $\nabla \cdot (\mu_g v) = 0$ ), the information can exist stably indefinitely.

The essence of this geometric storage is the steady state of the spatial field shape, which does not need to be maintained by physical "particles".

Therefore, space itself becomes the carrier of information and realizes the storage mechanism of zero energy consumption and infinite life.

### **3.5 Geometric communication and information exchange**

The communication mechanism no longer depends on signal transmission, but on resonance conditions:

$$\Omega_1 \kappa_1 = \Omega_2 \kappa_2$$

When two units or arrays meet this condition, a "space self-locking communication channel" is automatically formed, and the energy flow can be exchanged instantaneously without relying on intermediate particles or media.

Features:

- No signal delay (synchronous resonance);
- No energy loss (Conservation exchange);
- No carrier noise (geometric phase locking).

This means that the future computer network can be based on the resonant spatial link to get rid of the bottleneck of the speed and energy consumption of traditional electronic or optical signal transmission.

### 3.6 Operation characteristics of geometric logic system

| Feature              | Traditional computer | Quantum computer                  | Geometric spectral computer          |
|----------------------|----------------------|-----------------------------------|--------------------------------------|
| Logical primitives   | 0/1                  | Qubit                             | $\kappa$ - $\Omega$ continuous field |
| Operation mechanism  | Charge switch        | Wave function superposition       | Energy flow rotation                 |
| Unitary property     | Not applicable       | Imposed constraint                | Conservation of nature               |
| Information collapse | Irreversible         | Observed collapse                 | Geometric closed loop (reversible)   |
| Storage medium       | Charge/magnetism     | Quantum state                     | Space field morphology               |
| Energy efficiency    | Lossy                | Near zero consumption             | Complete zero entropy                |
| Communication mode   | Signal transmission  | Quantum link                      | Resonance phase locking              |
| Parallelism          | Limited              | Exponential quantum superposition | Continuous geometric parallelism     |
| Stability            | High                 | Fragile                           | Conservation of stability            |

GSC inherits the certainty of classical computing and the parallelism of quantum computing, and further realizes "geometric continuous reversible computing".

"GSC inherits the parallelism of quantum computing, while avoiding its collapse and noise bottleneck, forming a zero-entropy reversible computing architecture."

### 3.7 Unitary verification of GSC

Unitary property can be verified by closed integration:

$$\oint \Omega dk = 0.$$

At the end of any calculation cycle, if the integral is zero, it indicates that the system energy is not lost and the logic state is completely reversible.

In experiments, it can be verified by the periodic stability of interference fringes.

### 3.8 Implementation of compatibility with existing hardware

Experiment:

"It is particularly recommended to use fs (femtosecond) interferometer to capture the real-time phase shift of  $\kappa - \Omega$  coupling."

Although GSC belongs to a new theoretical system, it can be partially verified on the existing hardware framework:

| Platform                                  | Realizable content                    | Observable measurement                           |
|---|---------------------------------------|--|
| Optical interference platform             | $\kappa - \Omega$ phase rotation      | Periodic stability of interference fringes       |
| Acousto optic modulation platform         | $\kappa - \Omega$ coupled oscillation | Frequency shift and phase shift                  |
| Superconducting cavity coupling platform  | Conservation of energy flow           | Resonance frequency difference remains unchanged |
| Rotating field platform of nano iron core | $\kappa - \Omega$ drop coupling       | Axial displacement or rotation response          |

### 3.9 Summary

1. The geometric spectrum computer takes the spatial  $\kappa - \Omega$  field as the computational volume.
2. The operation process is geometric rotation conservation, without energy consumption and collapse.
3. The storage is based on  $\kappa$  field morphology, and the information is maintained by spatial phase.
4. The communication is triggered by resonance conditions to achieve zero delay and self-locking transmission.
5. The system physically connects unified field theory, quantum logic and space geometry, and is the realistic path to "space computing civilization".

Core conclusion:

When the  $\kappa$ - $\Omega$  field is controllable, human beings will have a computer architecture based on space itself——

Geometric spectral computer (GSC) is the ultimate form of quantum computing.

## Chapter 4 Experimental Verification and Implementation Path

### 4.1 Overall Goals of Experimental Verification

As a computational system based on the spatial energy-flow field ( $\kappa$ - $\Omega$ ), the Geometric Spectral Computer (GSC) requires experimental verification of three central propositions:

1. Energy-Flow Conservation

Verify that

$$\frac{d(\hbar\Omega\kappa)}{dt} = 0,$$

i.e., total system energy remains constant during  $\kappa$ - $\Omega$  evolution.

2. Phase-Locking Resonance

Verify that when two systems satisfy  $\Omega_1\kappa_1 = \Omega_2\kappa_2$ , they exhibit instantaneous resonant exchange.

3. Geometric Storage Stability

Verify that after external excitation is removed, the  $\kappa$ - $\Omega$  field maintains a stable phase distribution——demonstrating the memory property of space.

These three form the experimental foundation of GSC, transforming Geometric Spectroscopy from theoretical reasoning to observable physics and providing the first empirical benchmark for UFT.

### 4.2 First Type of Experiment: Energy-Flow Conservation Test

#### 4.2.1 Experimental principle

From the  $\kappa$ - $\Omega$  conservation equation:

$$\frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt},$$

if  $\kappa$  (the flow direction) can be independently tuned while  $\Omega$  (frequency shift) is measured, they must exhibit inverse correlation.

When  $\Omega\kappa = \text{constant}$ , conservation is verified.

#### 4.2.2 Experimental Design

- Platform: dual-path interferometer or acousto-optic modulation system;
- Procedure: independently vary  $\kappa$ , record  $\Omega$  in real time;
- Measurements: use a frequency analyzer to monitor fine  $\Omega$  adjustments, and record time-series data of  $\Omega\kappa$ ;
- Criterion: if  $\Omega\kappa$  remains constant under external perturbation, energy-flow conservation holds.

#### 4.2.3 Expected Phenomenon

Stable interference fringes or fully reversible fringe-period drift indicate that the system's internal energy transfer is geometric rotation rather than dissipative loss.

### 4.3 Second Type of Experiment: Phase-Locked Resonance Test

"This experiment is equivalent to verifying the geometric origin of nonlocal coherence, which can be distinguished from the probabilistic correlation of traditional quantum links."

#### 4.3.1 Experimental principle

When two systems satisfy  $\Omega_1\kappa_1 = \Omega_2\kappa_2$ , a spatial resonance channel forms that allows instantaneous information exchange.

The resonance depends not on distance or medium but on geometric phase locking, revealing the nonlocal geometric origin of coherence.

### 4.3.2 Experimental Design

- Platform: dual-cavity resonance system (optical or superconducting);
- Steps:
  1. Set initial frequencies  $\Omega_1 \approx \Omega_2$ ;
  2. Adjust  $\kappa_1, \kappa_2$  via phase or medium tuning;
  3. When the resonance condition is met, observe whether outputs become instantaneously phase-synchronized.

### 4.3.3 Observation Indicators

- Output waveforms synchronize;
- Phase difference  $\rightarrow 0$ ;
- Energy exchange without delay.

If this experiment is successful, it will prove that space communication can be realized by geometric resonance without signal transmission.

## 4.4 Third Type of Experiment: Geometric Storage Test

### 4.4.1 Experimental principle

Geometric storage uses the  $\kappa$ - $\Omega$  field distribution as the information carrier.

When energy flow is conserved, information persists as a steady-phase configuration:

$$I(x, y, z) = \kappa(x, y, z)e^{i\Omega t}.$$

### 4.4.2 Experimental design

- Material platform: photorefractive crystals, ferrite vortex fluids, or superconducting cavity arrays;
- Steps:
  1. Use modulated light or magnetic fields to write a specific  $\kappa$ - $\Omega$  distribution;
  2. Remove the excitation and observe interference or phase patterns;
  3. If the structure remains stable, storage is confirmed.

#### 4.4.3 Observable Quantities

- Fringe pattern remains visible;
- Phase reconstruction error  $< 10^{-6}$ ;
- Negligible thermal noise drift.

This phenomenon reflects the memory of spatial geometry, proving that information can be directly written into the field of space.

#### 4.5 Progressive Implementation Path

| Stage | Objective                                 | Implementation                                 | Verified Proposition       |
|-------|---|--|----------------------------|
| I     | $\kappa$ - $\Omega$ coupling verification | Optical or acousto-optic interferomete         | Energy-flow conservation   |
| II    | Double system resonance                   | Dual cavity platform (optical/superconducting) | Phase locked communication |
| III   | $\kappa$ field morphology stability       | Photorefractive or magnetohydrodynamic         | Geometry storage           |
| IV    | Multi array GSC verification              | Integrated optical/magnetic array              | Spatial parallel computing |

Each stage's success progressively validates GSC's core assumptions.

#### 4.6 Key Technical Challenges and Breakthrough Directions

1. Precise control of  $\kappa$ : currently achievable only indirectly via polarization or phase; develop direct spectro-goniometers or spatial-phase interferometers.
2. Real-time monitoring of  $\Omega$ : requires frequency-drift detection at  $10^{-9}$  precision.
3. Phase stability: use cryogenic superconducting or vacuum enclosures to minimize environmental noise.
4. Visualization of energy flow: employ femtosecond spectral imaging or magnetic-

flowline tracking to reconstruct 3-D energy-flow structures.

#### **4.7 Comparability with Existing Experiments**

- Versus quantum interference: GSC relies on geometric phase locking, not probabilistic collapse.
- Versus electromagnetic resonance: GSC resonance is a global synchronization of spatial energy flow, not local field oscillation.
- Versus quantum storage: GSC storage uses geometric rather than particle states, offering higher stability.

Therefore, GSC experiments can be implemented and tested directly on current quantum-optical and magneto-fluid platforms, offering both high feasibility and distinct discriminability.

#### **4.8 Expected results and significance**

If all three types of experiments are verified, the following natural facts will be established:

1. Energy and information exist in spatial geometric fluid;
2. The conservation of space energy flow  $\kappa - \Omega$  constitutes the logical basis of the physical world;
3. Quantum computing can be realized through spatial geometric evolution, rather than relying solely on particle superposition.

This will mark the transformation of quantum mechanics from "statistical description" to "geometric generation",

It also means that human beings can directly operate the spatial geometry to achieve calculation.

#### **4.9 Summary**

1. Three types of core experiments (conservation, resonance and storage) constitute the GSC theoretical verification framework;
2. The experimental scheme can be gradually implemented on optical, magnetic fluid and superconducting platforms;
3. Successful verification will fundamentally establish:
  - > spatial energy flow=information flow=computational body.

The establishment of the experimental system of geometric spectroscopy will provide the first observable verification path for the unified field theory.

It is also the first time that human beings take space itself as the starting point of computer engineering.

## **Chapter 5 From Discrete Logic to the Universe's Self-Computation**

### **5.1 Discrete Computation — Humanity's Editing of Nature**

Since the establishment of the von Neumann architecture, modern computers have used “0” and “1” as basic logic units, performing operations through combinations of electric-charge switches.

Although highly efficient at the macroscopic level, this system is, in essence, a discretized approximation:

- It slices continuous natural processes into finite states;
- Treats energy flow and time as countable sequences of events;
- Restricts “computation” to symbol manipulation rather than structural generation.

Therefore, the traditional computer is only a digital slicer of continuous natural logic — capable of reproducing nature's results but not its generative mechanisms.

## 5.2 $\kappa$ Continuity — Manifestation of Natural Logic

Geometric Spectroscopy reveals that the universe's true logic is continuous and geometric, not discrete and symbolic.

$\kappa$  represents the axial projection ratio of spatial energy flow, serving as a common variable linking energy, information, and geometry.

When  $\kappa$  becomes the central variable, computation is no longer an “external algorithm” but the geometric evolution of nature itself:

$$E = \hbar\Omega \kappa,$$
$$\frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt}.$$

This means:

- Each change of  $\kappa$  will lead to the compensation adjustment of  $\Omega$ ;
- The universe calculates itself in itself in the way of energy flow conservation;
- $\kappa$  continuous operation reveals the geometric origin of natural "thinking".

From discrete 0 and 1 to continuous  $\kappa$ , human beings are no longer "simulating the universe" outside, but "being calculated by the universe" inside.

## 5.3 From external logic to intrinsic logic

In traditional logic, rules are defined by people, and the universe is only the object described.

In the  $\kappa$ - $\Omega$  model, logic is derived from the conservation law and is the constraint of space itself.

When the system meets:

$$\frac{d}{dt}(\hbar\Omega\kappa) = 0$$

Unitarity and existence coincide completely.

This shows that logic is not a structure attached to human language, but a geometric condition of the evolution of the universe.

The universe does not work according to logic; Logic itself is the way the universe works.

#### 5.4 Structure of cosmic self-calculation

Through geometric spectroscopy, we can see a hierarchical self-consistent cosmic computing system:

"In order to clearly show the evolution relationship of each level, Table 5-1 number Description: summarizes the hierarchical mapping of the universe self-computing."

| Hierarchy         | Primary variable        | Operation law                        | Embodiment form                           |
|-------------------|-------------------------|--------------------------------------|---|
| Geometric layer   | $c, \mu_g, \ell_\Omega$ | Three bar female type                | Spatial structure and constant definition |
| Spectral layer    | $\kappa, \Omega$        | Conservation equation of energy flow | Generation of energy and time             |
| Information layer | $\psi(\kappa, t)$       | Unitary rotation                     | Quantum logic and superposition           |
| Cosmic layer      | $\kappa(x, y, z, t)$    | Global coupling                      | Self-calculation and self-regulation      |

Each layer is the natural externalization of the previous layer, rather than man-made design.

The universe does not run on "rules", but generates rules based on geometric conservation.

#### 5.5 From artificial computing to natural computing

When the GSC architecture is realized, the human computing system will be directly connected with the computer system of the universe.

This means:

- We no longer use symbols to explain nature, but use nature itself to calculate nature;
- "Energy, information and geometry" are integrated into the same logical flow;
- All operations become local expressions of the self-balance of the universe.

Since then, the computer is no longer a machine made by human beings, but a part of the structure of the universe.

## **5.6 Philosophical significance of cosmic computing**

From this perspective, all physical processes -

Propagation of light, transitions of particles, rotation of galaxies -

Both are the evolutionary trajectories of the  $\kappa - \Omega$  field, that is, the self-calculation process of the universe.

This makes the word "calculation" break away from the manual definition and enter the ontological level:

The universe constantly calculates its own stability through continuous geometric conservation.

All existence is an ongoing geometric calculation.

Human cognitive evolution is the "self-conscious mode" of the universe in its own computing.

## **5.7 Future civilization of continuous logic**

"The implementation path can be gradually approached by GSC array and  $\kappa - \Omega$  precision control experiment."

When the  $\kappa - \Omega$  field can be precisely regulated, mankind will enter the stage of "space computing civilization".

This is a civilized form that no longer relies on discrete symbols, chips and programs:

- Energy is logic;
- Space is storage;
- Resonance is communication;
- Conservation is thinking.

In such a civilization, physics and information are no longer separated, computing and existence are no longer distinguished, and nature has become the largest operating system, in which human beings have become a collaborative process.

## 5.8 Summary

From the 0/1 switch clip to the continuous generation of  $\kappa - \Omega$ , mankind has completed the transition from "discrete logic civilization" to "cosmic self-computing civilization".

- 0 and 1 are the language of the observer;
- $\kappa$  and  $\Omega$  are the language of the universe.

When we understand  $\kappa$ , we not only master the key of calculation, but also see the self-thinking of the universe.

The universe is not the object to be calculated, but its own calculator.

## Chapter 6 Characteristics and Advantages of the Continuous Computer

### 6.1 Basic Characteristics

The Continuous Computer (CC) is built on Geometric Spectroscopy, with the spatial energy-flow field ( $\kappa-\Omega$ ) as its computational core.

It abandons traditional "switch logic," replacing discrete on/off states with continuous geometric rotations to realize the evolution of information.

In this system, logic, energy, and time are naturally unified within spatial geometry:

$$E = \hbar\Omega\kappa, \quad \frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt}$$

Therefore, the time comes from the intrinsic rotation frequency  $\Omega$ , the operation is completed by energy flow rotation, and the information is stored in phase form.

Continuous computer is not a simulation of nature, but a direct extension of natural geometry.

## 6.2 Core differences from traditional computers

| Project             | 0/1 computer     | Continuous computer                       |
|---------------------|------------------|---|
| Logical unit        | Discrete switch  | Continuous geometric state ( $\kappa$ )   |
| Time mechanism      | External clock   | Intrinsic rotation frequency ( $\Omega$ ) |
| information carrier | Charge           | Space energy flow                         |
| Operation mode      | State flip       | Geometric rotation                        |
| Energy consumption  | Heat loss        | Zero entropy conservation                 |
| Coherence           | To be maintained | Natural existence                         |

## 6.3 Main advantages

1. Zero entropy calculation

Energy is conserved and circulates in  $\kappa - \Omega$  space, and there is no heat dissipation in theory.

2. Continuous logic

The logic state is infinitely separable and supports ultra-high precision and non-discrete quantum control.

3. Full space parallel

Different  $\kappa$  regions evolve at the same time, forming a natural parallel system.

4. High stability

Information exists in the form of phase, anti-noise and no collapse.

5. Natural isomorphism

The operation law is the same as the conservation of cosmic energy flow, with universality and scale compatibility.

"In the future, research teams in the fields of optics, superconductivity and information science should jointly promote GSC prototype verification."

#### **6.4 Immersive features of future images and videos**

The visual content generated by continuous computer is no longer the reproduction of discrete pixels, but the real-time development of spatial geometry. Each frame does not exist as an independent image, but the natural cross-section of  $\kappa - \Omega$  field in the continuous rotation of space and time.

In this system:

- The image is no longer a sampling, but an existing slice;
- Video is no longer playing, but a direct experience of how many streams;
- The viewer is no longer a bystander, but a participant in the field.

Therefore, the future visual experience will have the following characteristics:

1. Zero frame sense of continuity: the picture has no concept of "next frame", the time flow and optical flow are synchronized, and the human eye enters pure continuous perception;
2. Energy flow immersion: the viewer is surrounded by the local resonance of the  $\kappa - \Omega$  field and perceives the real-time flow of space energy;
3. Sense of dimensional penetration: the spatial geometric structure naturally twists, unfolds and collapses in three dimensions with the change of  $\kappa$ , and the audience can intuitively feel the geometric rhythm of energy;
4. Subjective objective integration: viewing and computing are no longer separated, and human visual system becomes a part of spatial computing.

Summary: the image of continuous computer no longer belongs to "visual art", but

belongs to "spatial geometry". It makes people "see space itself thinking" for the first time, and realizes the real immersion and unity of information, energy and consciousness.

## 6.5 Mathematical and physical operation mechanism of continuous computer

In the framework of geometric spectroscopy, continuous computer (CC) does not perform operations such as addition, subtraction, multiplication, division, differentiation and integration through symbolic algorithms, but directly realizes the natural realization of mathematical relations through the geometric response of spatial energy flow  $\kappa - \Omega$  field.

### 1. Algebraic operation: Geometric superposition and resonance matching

On the  $\kappa - \Omega$  plane, algebraic addition corresponds to the superposition of energy flow, and subtraction corresponds to the inverse interference of energy flow

$$\kappa_{out} = \kappa_1 \pm \kappa_2, \quad \Omega_{out} = \Omega_1 \approx \Omega_2$$

When the two energy flows meet the resonance condition  $\Omega^1 \kappa^1 = \Omega^2 \kappa^2$ , the system automatically generates a geometric superposition state, and its amplitude and direction are algebraic results.

Superposition of spatial rotation angles corresponding to multiplication: when  $\kappa_1$  rotates  $\theta_1$  and  $\kappa_2$  rotates  $\theta_2$ , the result state  $\kappa_{out} = f(\theta_1 + \theta_2)$ , reflect the product of energy flow amplitude.

2. Differential operation: in local geometric gradient CC, differential is not a symbolic operation, but an instantaneous manifestation of spatial gradient:

$$\frac{\partial E}{\partial \kappa} = \mu_g c^2 \ell_\Omega \frac{\partial \kappa}{\partial x}$$

The system automatically generates derivative by the change of local energy flux density;

The derivative of any variable corresponds to the local tilt of the spatial form.

This makes the differential equation a geometric equilibrium condition rather than a numerical calculation.

### 3. Integral operation: path product of energy flow conservation

In CC system, the integral is expressed as a conservation integral of energy flow on a closed path:

$$\oint \hbar \Omega \kappa d\varphi = \text{constant}$$

The process of integration is the closed-loop flow of energy in  $\kappa$ - $\Omega$  space, representing the conservation of physical quantities.

Therefore, the integration is no longer a summation, but to measure the total flux of energy flow in the geometric closed loop.

### 4. Unification of physical laws

In CC, all physical laws are represented by different projections of space conservation equations:

- Newtonian mechanics  $\rightarrow$  conservation of momentum=constant direction of energy flow;
- Maxwell equation  $\rightarrow$  curl and divergence conditions of  $\kappa$ - $\Omega$  field;
- Schrodinger equation  $\rightarrow$  phase evolution of energy flow  $i\hbar\partial\psi/\partial t = E\psi$   
geometric form of  $\partial\kappa/\partial t \propto \Omega\kappa$ ;
- Einstein field equation  $\rightarrow$  conservation of global curvature of  $\kappa$ - $\Omega$  field.

### 5. Summary

The "operation" of a continuous computer does not depend on numbers, but on the geometric response of space.

Algebra is resonance superposition, differentiation is local tilt, integration is energy flow circulation, and physical laws are different profiles of geometric conservation.

Thus, CC realizes the homologous operation mechanism of mathematics, physics and geometry, and transforms the calculation from symbolic operation to spatial evolution itself.

## 6.6 Summary

Continuous computer has realized the leap from "digital logic" to "geometric logic".

It does not record nature with symbols, but calculates nature with nature itself.

When the  $\kappa - \Omega$  field becomes a controllable computing medium,

Computers will no longer be machines, but an extension of the universe.

## Chapter 7 Geometric Regression of Computation and Its Three-Stage Evolution

### 7.1 From the Abacus to the Continuous Computer: The Triple Evolution of Computation

The history of computation is the history of humankind gradually comprehending the relationship between space and logic.

From the spatial addition of the abacus, to the symbolic logic of binary computers, and finally to the geometric self-operation of the continuous computer, computation has undergone three dimensional leaps:

| Stage                    | Information Carrier           | Logical Mechanism                   | Geometric Character | Essential Description  |
|--------------------------|-------------------------------|-------------------------------------|---------------------|--|
| Abacus                   | Physical position             | Manual displacement superposition   | Strong              | People express digital relations through spatial operations                |
| 0/1 computer             | Charge state                  | Discrete switching logic            | Weak                | Space is compressed into binary symbol system                              |
| Continuous computer (CC) | $\kappa - \Omega$ energy flow | Evolution of geometric conservation | Extremely strong    | The abacus represents addition and subtraction with "spatial displacement" |

0/1 computer uses "charge state" to represent logic;

The continuous computer directly realizes the calculation with "space energy flow",

The three completed the transition from machinery → electricity → geometry in sequence.

## 7.2 The Abacus: Manual Projection of Spatial Geometry

Abacus is the early "geometric computer" of mankind.

Each bead represents a geometric unit; its position change represents a change in quantity.

Addition and multiplication are essentially linear superpositions of spatial positions:

$$\text{Value} = \sum_i n_i \Delta x_i$$

Computation on the abacus is completely visual and geometrically explicit, but it relies on human intention.

It therefore represents the manual execution stage of geometric logic.

## 7.3 The 0/1 Computer: Symbolic Slicing of Geometric Logic

Electronic computers inherited the positional structure of the abacus but abandoned spatial continuity.

Their core is the threshold judgment of electric potential:

$$V > V_t \Rightarrow 1, \quad V < V_t \Rightarrow 0.$$

Boolean logic replaced geometric superposition; computation was realized through the on/off states of electric current.

This brought about a revolution in speed, yet it cut the natural continuum of energy flow into discrete fragments.

Traditional computers thus became symbolic projections of geometry—no longer computing space, but simulating it through symbols.

## 7.4 The Continuous Computer (CC): Geometry's Self-Return

In the Continuous Computer, computation no longer depends on discrete logic but on the natural evolution of the spatial energy-flow field ( $\kappa\text{-}\Omega$ ).

Every infinitesimal change of  $\kappa$  corresponds to a geometric operation:

$$\frac{d}{dt}(\hbar\Omega\kappa) = 0.$$

That is, energy conservation equals logical conservation.

Algebra, differentiation, integration, equations, and logic are all embedded within geometric motion.

Computation ceases to be an external operation and becomes a self-adjusting process of nature's structure.

- The abacus: humans manipulate space;
- The 0/1 computer: humans encode logic;
- The continuous computer: space computes itself.

This represents the ultimate geometric regression of computation—the return from human abstraction to the universe's intrinsic self-operation.

### 7.5 Three stage unified philosophy

| <b>Hierarchy</b>                           | <b>Dominant form</b> | <b>Time definition</b>         | <b>Calculation method</b> | <b>Philosophical attribution</b> |
|--|----------------------|--------------------------------|---------------------------|----------------------------------|
| Abacus                                     | Spatial displacement | External operation time        | Mechanical stacking       | Manual control                   |
| Digital computer                           | Charge switching     | External clock drive           | Discrete logic            | Simulate nature                  |
| Continuous computer $\kappa\text{-}\Omega$ | Geometric rotation   | Intrinsic rotational frequency | Conservation evolution    | Natural Computing                |

The abacus reflects people's initial imitation of geometry;

0/1 computer represents symbolic mapping of geometric logic;

The ontology restoration of geometric logic is realized by continuous computer.

From abacus to CC, human beings have experienced a leap from "computing in space" to "making space computing itself".

## **7.6 Conclusion: calculated origin geometry**

The abacus is a geometric manual model,

Digital computers are discrete abstractions of geometry,

Continuous computer is the self-awakening of geometry.

In this final form,

Calculation is no longer an external manual process,

It is the self-organized motion of cosmic energy flow.

When the  $\kappa$ - $\Omega$  field becomes the common grammar of logic and energy,

The term "calculation" will be redefined:

Calculation = self-evolution of conserved geometry.

## **Conclusion**

### **1. From discrete to continuous: the fundamental transformation of computational logic**

This paper reveals that the real key of quantum computing is not in more complex algorithms or more sophisticated devices, but in the geometric transformation of computational logic itself.

The traditional 0 and 1 computers are based on the discrete logic of charge switches, and information is a natural fragment cut by man.

The geometric spectroscopy framework proposed in this paper shows that:

The logic of the quantum world is not discrete, but the continuous rotation of the  $\kappa$ - $\Omega$  field of space energy flow.

This transition from binary switch to continuous geometry is not only a technological revolution, but also a cognitive revolution. For the first time, human beings have understood the isomorphic relationship between computing and nature at the geometric level.

## 2. Geometric spectroscopy: the real source of quantum phenomena

Three formulas based on Unified Field Theory:

$$Q = 4\pi c \ell_{\Omega}^2, \quad M = \mu_g \ell_{\Omega}, \quad G = 4\pi c^2 / \mu_g,$$

In this paper, the geometric definition of reduced Planck quantity is established

$$\hbar = \mu_g c \ell_{\Omega}^2,$$

The energy spectrum equation is further derived

$$E = \hbar \Omega \kappa.$$

This means that energy, time and information are homologous to spatial geometry.

In traditional quantum theory, the discrete energy level is only the stationary point sampling of  $\kappa$  field, while quantum superposition, entanglement and collapse can be regarded as the geometric evolution of space energy flow.

Therefore, geometric spectroscopy not only explains the source of quantum phenomena, but also provides a deeper geometric basis for quantum computing.

### 3. $\kappa$ - $\Omega$ model: Geometric unity of quantum logic

Through the interlocking relationship between  $\kappa$  (axial projection ratio of energy flow) and  $\Omega$  (geometric rotation frequency):

$$\frac{d\Omega}{dt} = -\frac{\Omega}{\kappa} \frac{d\kappa}{dt},$$

In this paper, the equivalence between logical unitarity and conservation of energy flow is established.

The operation of logic gates is represented as a continuous rotation path in  $\kappa$  -  $\Omega$  space, The unitary property is naturally guaranteed by the geometric closed-loop condition  $\oint \Omega d\kappa = 0$ .

Thus, quantum logic is transformed from abstract operators to space conservation geometry,

It realizes the unification from "symbolic logic" to "geometric logic".

### 4. Geometric spectral computer (GSC): prototype for future computing

On this basis, the concept and system of geometric spectral computer (GSC) \* are proposed in this paper.

It takes  $(\mu_g, \ell_\Omega)$  as a constant field and  $(\kappa, \Omega)$  as a programmable variable,

Taking the space energy flow as the calculation body, the logical evolution of zero entropy, reversibility and conservation is realized.

Its key features include:

- Operation: Geometric rotation replaces logic switch;
- Storage: space phase replaces charge and magnetic pole;
- Communication: resonance phase locking instead of signal transmission;
- Unitary: automatically maintained by the conservation of energy flow.

Therefore, GSC is not only a continuation of quantum computing, but also a reconstruction of computing paradigm.

It marks the computer from "simulating nature" to "participating in nature".

## **5. Experimental verification and scientific Verifiability**

In this paper, three kinds of operable experiments are proposed to verify the theory

- 1) Energy flow conservation experiment: check whether  $\Omega\kappa$  remains constant in the dynamic process;
- 2) Phase locked resonance experiment: verify the instantaneous synchronization of two  $\kappa$ - $\Omega$  systems under resonance conditions;
- 3) Geometric storage experiment: verify whether the  $\kappa$ - $\Omega$  field can maintain a stable shape after the external excitation is removed.

These experiments can be carried out on optical interference, acousto-optic modulation, magnetic fluid or superconducting cavity platforms.

If the verification is successful, it will prove for the first time that space energy flow has the function of information preservation and evolution, so as to establish the physical reality of space as a computer.

## **6. Philosophical extension: self-calculation of the universe**

The logic of geometric spectroscopy ultimately leads to a natural conclusion:

The universe does not run on computing,

But the universe itself is calculating.

The continuous rotation of  $\kappa - \Omega$  not only describes the quantum process, but also reveals the geometric mechanism by which the universe maintains its own order.

The human computer is only a local projection of the self-computing system of the universe,

GSC allows us to interact directly with this "cosmic thinking" for the first time.

## 7. Summary statement

In this paper, a full chain closed loop from geometric calibration  $\rightarrow$  unified field theory  $\rightarrow$  geometric spectroscopy  $\rightarrow$   $\kappa$ - $\Omega$  model  $\rightarrow$  GSC architecture  $\rightarrow$  cosmic self-calculation is realized.

The core conclusions can be summarized as follows:

- & Conservation of energy flow  $\Rightarrow$  logical unitary
- & Geometric rotation  $\Rightarrow$  information evolution
- &  $\kappa - \Omega$  controllable  $\Rightarrow$  space computable

Final conclusion:

The leap from 0 and 1 computers to continuous geometry computers,

It marks the first time that mankind has transcended symbolic logic and entered the era of natural geometric logic.

The real key of quantum computing lies not in technology but in geometry.

When space becomes a computational body, the universe begins to think about itself.

When the continuous computer-generated pictures replace the traditional frame sequence, human beings will watch the thinking process of the universe itself in an immersive way for the first time.

## Appendix A Geometric Correspondence Between $\kappa$ and Frequency

### Across the Infrared–Visible–Ultraviolet Spectrum

| Spectral Region           | Dominant Geometric Form           | $\kappa$ (Axial Projection Ratio) | Corresponding wavelength $\lambda$ (m)  | Frequency $f$ (Hz)                        | Geometric & Energy Characteristics  |
|---------------------------|-----------------------------------|-----------------------------------|---|---|---|
| Far infrared (FIR)        | Circumferential rotation dominant | 0.05 – 0.15                       | $1 \times 10^{-3}$ – $3 \times 10^{-4}$ | $3 \times 10^{11}$ – $1 \times 10^{12}$   | The energy flow is almost all circumferential rotation, and the axial component is very weak; Corresponding low energy thermal radiation                        |
| Near infrared (NIR)       | Circumferential – axial mixing    | 0.15 – 0.30                       | $3 \times 10^{-6}$ – $8 \times 10^{-7}$ | $1 \times 10^{14}$ – $4 \times 10^{14}$   | The energy flow begins to shift axially; The transition region of molecular vibration   |
| Visible light (VIS)       | Ring shaft balance                | 0.30 – 0.60                       | $7 \times 10^{-7}$ – $4 \times 10^{-7}$ | $4 \times 10^{14}$ – $7 \times 10^{14}$   | Circumferential and axial energy flows coexist in equal amplitude; The equilibrium resonance state corresponding to $\kappa \approx 0.5$                        |
| Near ultraviolet (NUV)    | Axial dominance                   | 0.60 – 0.80                       | $4 \times 10^{-7}$ – $2 \times 10^{-7}$ | $7 \times 10^{14}$ – $1.5 \times 10^{15}$ | The axial falling energy is enhanced, and the energy flow orientation is significant  |
| Far ultraviolet (FUV)     | Axial falling strength            | 0.80 – 0.95                       | $2 \times 10^{-7}$ – $1 \times 10^{-7}$ | $1.5 \times 10^{15}$ – $3 \times 10^{15}$ | The spatial spiral flow falls almost completely along the axial direction; Corresponding high energy electron transition region                                 |
| Extreme ultraviolet (EUV) | Pure axial fall limit             | 0.95 – 1.00                       | $1 \times 10^{-7}$ – $1 \times 10^{-8}$ | $3 \times 10^{15}$ – $3 \times 10^{16}$   | When $\kappa \rightarrow 1$ , the energy flow completely falls into the axial direction; Corresponding to extremely high energy continuous spectrum or ionizing |

Notes and interpretation:

1.  $\kappa$  is the projection ratio of energy flow in the axial direction,  $\kappa = v_z/|v|$ ;

The infrared region  $\kappa$  is small, representing that the space energy flow is mainly circumferential rotation; The ultraviolet region  $\kappa$  is large, which means that the space energy flow falls along the axial direction.

2. Frequency  $f$  is approximately proportional to  $\kappa$ :

$$f \propto \kappa \cdot \frac{c}{2\pi\ell_\Omega}$$

This reflects the corresponding relationship between spectral continuity and geometric rotation rate.

3. When  $\kappa=0.5$ , corresponding to the visible light region, it is the "geometric Midpoint" of the balance between circumferential and axial energy flow, and also the boundary of the symmetry of spatial energy flow.

4. The whole electromagnetic spectrum is naturally generated by the continuous change of  $\kappa$  from  $0 \rightarrow 1$ , revealing the original meaning of "spectrum is geometric state".

$\kappa$ - $\Omega$ - $f$  correspondence and spectral band calculation

In the framework of geometric spectroscopy, the energy distribution of all spectra (from infrared to ultraviolet) can be determined by the geometric parameter  $\kappa$  and rotation frequency  $\Omega$  of spatial energy flow.

The basic equation is:

$$E = \mu_g c^2 \ell_\Omega \kappa, \quad \hbar = \mu_g c \ell_\Omega^2, \quad \Omega = \frac{E}{\hbar} = \frac{c\kappa}{\ell_\Omega}$$

From this, we can get the triple correspondence of energy flow geometry – energy – frequency:

| Physical quantity | Meaning  | Geometric definition                 | Physical performance                               |
|-------------------|--|--------------------------------------|--|
| $\kappa$          | Axial projection ratio of energy flow          | $\kappa = E/(\mu_g c^2 \ell_\Omega)$ | Determine energy bandwidth and spectral color      |
| $\Omega$          | Spatial rotation frequency (angular frequency) | $\Omega = c\kappa/\ell_\Omega$       | Corresponding spectral frequency $\omega = 2\pi f$ |
| f                 | Observable frequency                           | $f = \Omega/2\pi$                    | Consistent with the experimental spectrum          |

Spectral energy band calculation

Take  $\mu_g = 1.6895 \times 10^{28} \text{ kg/m}$ ,  $\ell_\Omega \approx \ell_p = 1.616 \times 10^{-35} \text{ m}$

Reference constant of:

$$\mu_g c^2 \ell_\Omega \approx 2.44 \times 10^2 \text{ J.}$$

Substituting spectral bands with different energy ranges,  $\kappa$  and  $\Omega$  (or F) can be calculated:

| Spectral region     | Typical wavelength $\lambda(m)$              | Energy $E(J)$                                | $\kappa = E/(\mu_g c^2 \ell_\Omega)$ | Rotational frequency $\Omega = E/\hbar(\text{rad/s})$ | Corresponding frequency $f(\text{Hz})$       |
|---------------------|--|--|--------------------------------------|---|--|
| Infrared (IR)       | $1 \times 10^{-6}$<br>– $1 \times 10^{-4}$   | $2 \times 10^{-19}$<br>– $2 \times 10^{-21}$ | $10^{-21} - 10^{-23}$                | $3 \times 10^{14}$<br>– $3 \times 10^{12}$            | $5 \times 10^{13}$<br>– $5 \times 10^{11}$   |
| Visible light (VIS) | $4 \times 10^{-7}$<br>– $7 \times 10^{-7}$   | $3 \times 10^{-19}$<br>– $5 \times 10^{-19}$ | $10^{-21}$ magnitude                 | $5 \times 10^{14}$<br>– $8 \times 10^{14}$            | $8 \times 10^{13}$<br>– $1.3 \times 10^{14}$ |
| Ultraviolet (UV)    | $1 \times 10^{-8}$<br>– $4 \times 10^{-7}$   | $5 \times 10^{-18}$<br>– $2 \times 10^{-19}$ | $10^{-20}$ magnitude                 | $3 \times 10^{15}$<br>– $3 \times 10^{16}$            | $5 \times 10^{14}$<br>– $5 \times 10^{15}$   |
| X-ray               | $1 \times 10^{-10}$<br>– $1 \times 10^{-8}$  | $2 \times 10^{-16}$<br>– $2 \times 10^{-18}$ | $10^{-18}$ magnitude                 | $3 \times 10^{16}$<br>– $3 \times 10^{18}$            | $5 \times 10^{15}$<br>– $5 \times 10^{17}$   |
| $\gamma$ ray        | $1 \times 10^{-12}$<br>– $1 \times 10^{-10}$ | $2 \times 10^{-14}$<br>– $2 \times 10^{-16}$ | $10^{-16}$ magnitude                 | $3 \times 10^{18}$<br>– $3 \times 10^{20}$            | $5 \times 10^{17}$<br>– $5 \times 10^{19}$   |

Note: the magnitude of  $\kappa$  reflects the proportion of the axial falling component of energy flow. The larger the value, the more concentrated the energy is in the axial direction (high frequency, ultraviolet direction); When  $\kappa$  decreases, the energy is dominated by circular rotation (low frequency, infrared direction).

Geometric meaning and physical consistency

- When  $\kappa \rightarrow 0$  (circumferential dominant), the energy flow is mainly distributed along the rotation direction, corresponding to the infrared radiation;
- When  $\kappa \rightarrow 1$  (axial dominant), the fall of energy flow increases, corresponding to ultraviolet and high-energy radiation;
- The visible light region is the balance zone of  $\kappa \approx 10^{-21}$ , which is the state of balance between spatial swirl and falling component.

The rotation frequency  $\Omega$  is strictly consistent with the experimental spectral frequency  $f$ , It is proved that there is no contradiction between the energy distribution of geometric spectroscopy and experimental spectrum.

This also shows that the spectrum is the natural distribution of space energy flow in different  $\kappa$  values,

Instead of an independent set of quantum states.

## Summary

$\kappa$  determines the energy direction distribution,  $\Omega$  determines the energy rotation speed, and  $f$  determines the observation frequency.

After the coupling of the three, the spectrum is completely defined geometrically.

This makes the unified field theory realize the integrated expression of "geometry energy spectrum" for the first time.

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