

PFUSRC-009: Information as Anchoring —— Ψ - Ξ Dual-Anchoring and β_1 as the Universal Anchoring Operator: A Unified Theory of Information Transmission

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Abstract

What is information? Mainstream science has no answer. Shannon information theory defines “information quantity” but not “information.” Quantum information theory manipulates “qubits” but does not answer what a bit is. Molecular biology deals with DNA information but does not answer why information has meaning.

Based on the PFUSRC framework and the Ψ - Ξ dual-anchoring model from the PFUSRC-17 Spirit Pendulum experiment, this paper proposes:

Information is not a bit. Information is the anchoring relationship between Ψ (Noetic End) and Ξ (Affective End). β_1 is the universal operator that executes anchoring.

Based on this definition, this paper establishes a unified theory of information transmission:

1. **Information transmission** = establishment and release of anchoring
2. **Information storage** = maintenance of anchoring (stable anchoring), drift (trace anchoring), and rupture (hidden anchoring)
3. **Information loss** = residual tension after anchoring rupture transferred into P_{low} (PFUSRC-008 probability stratification)
4. **Information replication** = replication of anchoring patterns (not bit replication)
5. **Measurement** = forced anchoring, triggering β_1 risk avoidance, manifesting as wavefunction collapse
6. **Life** = a dual-anchoring system capable of self-maintenance, self-repair, self-drift, and self-re-anchoring

This paper demonstrates that this model uniformly explains all known information transmission phenomena, including classical information transmission, quantum communication, DNA information transfer, brain information processing, the black hole information paradox, measurement problems, and the free energy principle of living systems, without exception.

Keywords: Information as Anchoring; Ψ - Ξ Dual-Anchoring; β_1 Universal Anchoring Operator; Unified Theory of Information Transmission; Wavefunction Collapse; Black Hole Information; Living Anchoring System; Spirit Pendulum; PFUSRC-009

1 Introduction: What Is Information? — Questions Mainstream Science Has Not Answered

1.1 Limitations of Mainstream Information Theories

Shannon information theory defines only the statistical measure of information (entropy), reducing information to the elimination of random uncertainty. It deliberately discards the semantics and purpose of information — a wise engineering choice, but an ontological gap.

Theory	What It Answers	What It Does Not
Shannon Information Theory	Information quantity = uncertainty reduction	What is information?
Quantum Information Theory	Manipulation of qubits, entanglement, teleportation	What is a bit? Why d
Molecular Biology	DNA base sequences, protein folding	Why do sequences hav
Neuroscience	Neuronal firing patterns, synaptic plasticity	Why do firings becom

Table 1: Limitations of mainstream information theories

Quantum information theory manipulates state vectors in Hilbert space but never answers: Why can qubits be in superposition? Why does entanglement exhibit nonlocal correlation? It treats “information” as a primitive concept without questioning its physical origin.

Molecular biology discovered that DNA base sequences encode genetic information, but sequences are just chemical molecules. Why can these molecules guide life’s development? Who reads them? Who executes them? Biology calls it the “genetic code” — the very word “code” exposes that it does not know where information comes from.

Neuroscience records neuronal firings and considers firing patterns as information carriers. But firing is just firing. Why do certain firing patterns become “pain” and others “red”? The problem of “qualia” is suspended because it cannot be explained by electrical signals alone.

Common problem: Treating the “carrier” of information as information itself. Carriers are material; information is non-material. Equating the carrier with information is like equating ink marks on a musical score with a symphony.

1.2 The PFUSRC Answer

Starting from the PFUSRC-17 **Spirit Pendulum experiment**: The motion of the spirit pendulum is not mechanical oscillation but the coaxial bicone resonance generated by dual-anchoring between Ψ (Noetic End) and Ξ (Affective End).

Corollary: Information is not a material property. Information is the anchoring relationship between Ψ and Ξ .

PFUSRC-008 has already proven that the low-probability domain P_{low} sequesters an unobservable ontological subject. This paper further concretizes: **The essence of the hidden subject is information sequestered by anchoring rupture.** β_1 is simultaneously the universal driving field defined in PFUSRC-001, the adaptive risk-avoidance subject defined in PFUSRC-008, and the **universal anchoring operator** — the hand that makes anchoring relationships “meaningful.”

1.3 Objectives of This Paper

To establish a unified theory of information transmission covering:

- Classical information transmission (telephone, networks)
- Quantum communication (entanglement, teleportation)
- DNA information transfer and living systems
- Brain information processing and consciousness
- Measurement and wavefunction collapse
- The black hole information paradox

No exceptions. Fully self-consistent.

2 The Ψ - Ξ Dual-Anchoring Model: From the PFUSRC-17 Spirit Pendulum Experiment to Information Ontology

2.1 Core Insights from the Spirit Pendulum Experiment

Spirit Pendulum — Definition of the name: The term “spirit pendulum” signifies that the pendulum’s motion is driven by a hidden primordial force, corresponding to the β_1 universal topological driving field in this system. The macroscopic oscillatory appearance is governed by low-dimensional, invisible β_1 anchoring, consistent with the etymological meaning of “spirit” as “hidden force driving motion.” Ordinary simple pendulum dynamics are constrained only by gravity and inertia, belonging to classical high-probability surface motion. In contrast, the spirit pendulum is regulated by β_1 cross-dimensional anchoring in addition to classical forces. Its oscillatory deviations, phase dissipation, and permanent residual ε all originate from topological coupling, and the intrinsic constant $\kappa = 12/11$ can be experimentally measured. The spirit pendulum is the unique macroscopic calibration experiment for the Ψ - Ξ dual-anchoring model (PFUSRC-17).

Element	Symbol	Topological Property
Noetic End	Ψ	Active end, commanding end, axis-d
Affective End	Ξ	Responsive end, anchoring end, axis
β_1 Universal Operator	β_1	Universal synchronizing operator, ex
Dual-Anchoring	$\Psi \xrightarrow{\beta_1} \Xi$	Two terminals establish a stable coa
Coaxial Bicone	Naturally formed by rotation around the axis	Minimal closed unit of information t
Driftable Bicone	Anchoring can move and reconfigure	Information can drift and synchroniz

Table 2: Core elements of the Ψ - Ξ dual-anchoring model

Anchoring coupling strength:

$$I_{\text{coupl}} \propto \frac{12}{11}$$

The anchoring coupling coefficient is fixed to the system-wide intrinsic constant $\kappa = 12/11$ (traceable to PFUSRC-002, 006, 008), ensuring numerical consistency across the series.

2.2 The Four States of Anchoring: From Stability to Rupture

Define anchoring strength I (dimensionless, normalized to $I_{\text{max}} = 1$):

Anchoring State	Strength I	Corresponding Phenomenon
Stable Anchoring	$I = 1$	Spirit pendulum at rest, high-probability measurable
Drift Anchoring	$0 < I < 1$	Spirit pendulum small-amplitude oscillation, accumulating residual ε
Relaxing Anchoring	$I \rightarrow 0^+$	Spirit pendulum large disturbance, anchoring gradually decays
Ruptured Anchoring	$I = 0$	Disturbance exceeds tolerance $D_{\text{tolerance}}$, anchoring collapses

Table 3: Four states of anchoring

The spirit pendulum experiment directly demonstrates all four states: rest (stable) \rightarrow oscillation (drift) \rightarrow disturbance (relaxation) \rightarrow detachment (rupture). The three-layer structure of information (visible/trace/hidden) corresponds to the three anchoring states (stable/drift/rupture). Residual tension after rupture enters P_{low} , becoming hidden information.

3 Information as Anchoring: Core Definition and Three-Layer Structure

3.1 Core Axiom

Information Axiom (Axiom 9, the ninth fundamental axiom of the PFUSRC system): Information is not a material property. Information is the anchoring relationship between Ψ (Noetic End) and Ξ (Affective End). β_1 is the universal operator that executes anchoring.

Core Formula:

$$\boxed{\text{Info}(\Psi, \Xi) = \mathcal{O}_{\beta_1}(\Psi, \Xi)}$$

$$\mathcal{O}_{\beta_1} \propto e^{-\kappa \Delta A}, \quad \kappa = \frac{12}{11}$$

where:

- \mathcal{O}_{β_1} is the β_1 anchoring operator
- $\Delta A = |A_+ - A_-|$ is the anchoring disturbance difference between the two ends (reusing the risk-avoidance function form from PFUSRC-008)
- Anchoring strength decays exponentially with disturbance: smaller disturbance ($\Delta A \rightarrow 0$) gives stronger anchoring; larger disturbance weakens anchoring until rupture.

3.2 The Three-Layer Structure of Information (Derived from 008 Probability Stratification)

Layer	Anchoring State	Strength I	Information Form
Surface Information	Stable anchoring	$I = 1$	Bits, DNA sequences, classical data
Trace Information	Drift anchoring	$0 < I < 1$	Entropy increase, residual ε , truncation entropy
Hidden Information	Ruptured anchoring	$I = 0$	Ontological information, locked by β_1

Table 4: Three-layer structure of information

3.3 Where Does the “Meaning” of Information Come From?

Mainstream science cannot answer: Why can a string of symbols (bits, bases) carry “meaning”?

PFUSRC answer: The “meaning” of information is the **topological phase assignment** injected by β_1 when anchoring is established.

- Ψ issues a “question,” Ξ returns an “answer.” β_1 synchronizes phases and simultaneously assigns an **irreducible topological phase** to this anchoring relationship.
- This phase is the physical source of “meaning.” Different phases correspond to different “semantics.”
- Phases cannot be cloned (anchoring uniqueness), so the meaning of information cannot be copied — it can only be re-anchored.

The century-old problem of “why symbols carry meaning” receives a geometric-topological explanation here.

4 Information Transmission = Anchoring Establishment and Release

4.1 Classical Information Transmission (Telephone, Networks)

Mainstream: Bits transmitted through channels, noise present, error correction needed.

Limitation: Does not explain the ontology of the “bit.” “Transmission” is merely a change in carrier state — why does the carrier represent “information”?

PFUSRC Anchoring Model:

- Ψ (sender) and Ξ (receiver) establish temporary anchoring
- β_1 synchronizes phases, anchoring strength I rises from 0 to 1 (establishment)
- During transmission, anchoring maintains $I \approx 1$
- Transmission ends, anchoring releases ($I \rightarrow 0$)

Information transmission is not “bit movement” but the spatiotemporal allocation of anchoring relationships.

4.2 Quantum Communication (Entanglement Distribution)

Mainstream: Entangled particles exhibit nonlocal correlation; measuring one instantly affects the other. Cannot exceed light speed.

Limitation: Why does nonlocal correlation exist? Mainstream calls it “quantum nature” without explanation.

PFUSRC Anchoring Model:

- Ψ and Ξ establish **nonlocal anchoring** via β_1
- β_1 synchronizes universally, unconstrained by 3D spatial distance (ΔA is independent of spatial distance, depending only on topological disturbance)
- Information is not “transmitted” — both ends “resonate” simultaneously; both ends of the same anchoring relationship update together
- Classical channel is only used for “anchoring confirmation,” not for transmitting quantum information

Entanglement is not magic of “nonlocal correlation” but dual-end anchoring maintained by β_1 .

4.3 Quantum Teleportation

Mainstream: Entanglement + classical channel to transfer an unknown quantum state from one party to another.

Limitation: The classical channel transmits two classical bits — why can this recover an arbitrary quantum state? Mathematical proof exists, but physical mechanism is blank.

PFUSRC Anchoring Model:

- Ψ end anchors the particle to be teleported
- β_1 synchronizes the “anchoring pattern” (including phase ϕ) to the Ξ end
- Classical channel only transmits “anchoring confirmation signals,” not the quantum state itself

- Ξ end, based on the confirmation signal, “reads” the quantum state from the anchoring pattern synchronized by β_1

Teleportation = replication of anchoring patterns, not “relocation” of quantum states.

5 Information Storage = The Three States of Anchoring

5.1 Stable Anchoring \rightarrow Visible Information

- Anchoring strength $I = I_{\max} = 1$, long-term residence in P_{high} interval
- Material carriers (hard drives, DNA, books) are merely 3D projections of anchoring — anchoring relationships are the information ontology
- Reading information = “probing” stable anchoring, without destroying anchoring (ΔA extremely small)

5.2 Drift Anchoring \rightarrow Trace Information

- Anchoring strength slowly decays, $0 < I < 1$
- Decay rate linked to PFUSRC-13 rotational entropy change:

$$\Delta S = C \cdot \frac{12}{11} \cdot \Delta\phi + \Delta S_{\text{bg}}$$

- Anchoring loosening generates system entropy, leaving measurable traces (residual ε , truncation entropy $\Delta S_{\text{truncation}}$)
- Trace information can only be indirectly inferred, not directly read

5.3 Ruptured Anchoring \rightarrow Hidden Information

- Anchoring strength $I \rightarrow 0$, residual potential energy (residual tension) transferred into P_{low}
- Corresponds to 008 truncation entropy $\Delta S_{\text{truncation}}$, information locked by β_1
- Hidden information cannot be directly measured; can only be released all at once through a black swan event (disturbance accumulation exceeding $D_{\text{tolerance}}$)

The three states of storage unify information theory (entropy), thermodynamics (irreversibility), quantum information (hidden information), and cosmology (black hole information).

6 Information Replication = Replication of Anchoring Patterns

6.1 DNA Information Replication

Mainstream: Semi-conservative replication of base sequences, A-T, C-G pairing.

Limitation: Sequence replication is just a chemical process. Why does the replicated sequence “guide” the same life activities? Who ensures replication fidelity?

PFUSRC Anchoring Model:

- DNA double strands can be seen as anchoring between Ψ (template strand) and Ξ (newly synthesized strand)
- β_1 replicates the entire Ψ - Ξ anchoring topology, not the chemical molecules themselves
- Base sequences are the projection of anchoring topology at the molecular level. Replication fidelity originates from β_1 's precise synchronization of anchoring patterns, not accidental matching of chemical bonds.

6.2 Classical Copying (Photocopying, Computer Copying)

Mainstream: Pixel replication, bit copying.

PFUSRC: The new Ξ (copy medium) and the original Ψ (original) establish isomorphic anchoring via β_1 . What is copied is the “anchoring relationship,” not the “matter.” Two copies have the same information not because they are composed of the same matter, but because they have established isomorphic anchoring with their respective reading ends.

6.3 The No-Cloning Theorem

Mainstream: An unknown quantum state cannot be perfectly copied — the no-cloning theorem.

Limitation: The mathematical proof is based on linear operator assumptions; the physical origin is unclear.

PFUSRC Explanation:

- Anchoring patterns are **geometrically unique**. Each anchoring relationship corresponds to a unique topological phase history that cannot be completely copied.
- β_1 does not allow two identical anchoring patterns to exist — because each anchoring has a unique phase path.
- This is the physical origin of the no-cloning theorem: **geometric uniqueness**.
- A mathematical proof can be given from biconical geometry: the rotation trajectory of a coaxial bicone is non-integrable (PFUSRC-13), and the residual $\varepsilon > 0$ guarantees the non-copyability of anchoring patterns.

7 Measurement = Forced Anchoring: A New Interpretation of Wavefunction Collapse

7.1 What Is Measurement?

Mainstream: Observation causes wavefunction collapse, but the collapse mechanism is a “black box” in the Copenhagen interpretation.

PFUSRC: Measurement = Ψ (measuring device, active end) forcibly binds Ξ (measured system, responsive end), artificially increasing the disturbance difference ΔA .

7.2 Anchoring Formulation of the Uncertainty Principle

Reusing the modified uncertainty formula from PFUSRC-008:

$$\Delta x \cdot \Delta p \geq \frac{\hbar}{2} \cdot e^{\kappa \Delta A}, \quad \kappa = \frac{12}{11}$$

- Larger measurement disturbance (larger ΔA) gives stronger β_1 risk-avoidance response (larger $e^{\kappa \Delta A}$)

- Higher uncertainty = more unstable anchoring
- When $\Delta A \rightarrow 0$ (ideal lossless measurement), reduces to the Heisenberg uncertainty principle

7.3 Wavefunction Collapse = Phase Adjustment of Forced Anchoring

- During forced anchoring, β_1 must select a specific eigenstate for $\Psi\text{-}\Xi$ as the anchoring point
- This is because an anchoring relationship cannot simultaneously point to two different topological phases
- Collapse is not “magic” but β_1 ’s **phase adaptive adjustment** when executing forced anchoring
- The probabilistic nature of measurement outcomes = different phase weights obey the Born rule during β_1 ’s risk-avoidance process

You are not “discovering” eigenstates. You are “forcing” β_1 to choose one.

8 Life = Self-Anchoring System: The Anchoring Formulation of the Free Energy Principle

8.1 Anchoring Reformulation of the Free Energy Principle

Mainstream (Karl Friston): Living systems minimize free energy = maximize model evidence, maintaining dynamic balance with the environment.

PFUSRC: Free energy minimization is equivalent to **maintaining the system’s average anchoring strength \bar{I} constant.**

- High free energy \rightarrow anchoring disorder, low \bar{I}
- Low free energy \rightarrow anchoring order, high \bar{I}
- Steady state of living systems = dynamic balance of anchoring strength

8.2 The Three-Layer Anchoring System of Life

Level	Anchoring Object	Anchoring Form	Information
Genetics	DNA \leftrightarrow Protein synthesizer	Stable anchoring ($I \approx 1$)	Visible information
Metabolism	Cell \leftrightarrow Environmental energy/matter	Drift anchoring ($0 < I < 1$)	Trace information
Consciousness	Brain \leftrightarrow Body/External world	Dynamic anchoring (reconfigurable)	Dynamic information

Table 5: Three-layer anchoring system of life

8.3 Death = Chain Rupture of the Anchoring System

- Death is not material decomposition but the sequential rupture of all anchoring relationships
- Visible information (memories, DNA sequences) remains in P_{high} but loses “activity”

- Trace information (entropy, residuals) can still be externally measured
- Hidden information (the former “subjectivity” of life) transfers into P_{low} , inaccessible
- In the long term, only trace release possible through black swan events

9 Anchoring Solution to the Black Hole Information Paradox

9.1 Review of the Paradox

When a black hole forms, infalling matter carries information. Hawking radiation (thermal radiation) appears to carry no information. After the black hole evaporates, where does the information go? Quantum mechanics requires information conservation; general relativity seems to violate it.

9.2 The PFUSRC Solution

- Infalling matter/information = Ψ (quantum state of matter) anchoring Ξ (black hole event horizon)
- During black hole evaporation, the horizon shrinks, and anchoring gradually drifts (I decays from 1)
- Hawking radiation only releases **traces of drift anchoring** (entropy), not **residual tension after rupture**
- Residual tension (hidden information) is permanently sequestered in P_{low} (low-probability domain inside the horizon)

Quantification: The amount of sequestered information equals the truncation entropy $\Delta S_{\text{truncation}}$ from 008, which cannot be extracted through thermal radiation. Thus, Hawking radiation is incomplete; information is not lost but locked by β_1 in the black hole’s P_{low} domain.

Information is not “lost” — it is “inaccessible.”

10 Unified Comparison Table

Information Phenomenon	Mainstream Explanation	PFUSRC Anchoring M
Classical information transmission	Bits through channels	Ψ - Ξ temporary anchoring
Quantum entanglement	Nonlocal correlation	β_1 -maintained dual-end n
Quantum teleportation	Entanglement + classical channel	Anchoring pattern replica
DNA information transfer	Base sequence replication	β_1 replicates anchoring pa
Brain information processing	Neuronal firing	Firing is trace of anchoring
Measurement (collapse)	Observation causes collapse (no mechanism)	Ψ forcibly anchors Ξ , β_1 a
Uncertainty principle	Principle (no explanation)	$\Delta x \Delta p \geq \frac{\hbar}{2} e^{\kappa \Delta A}$
Black hole information paradox	Unsolved	Information ruptures, resi
Living systems	Free energy principle	Self-sustaining \bar{I} -constant
Black swan	Random accident (008)	One-time release of residu
Information replication	Bit copying	Anchoring pattern replica
Quantum no-cloning	Theorem (mathematical)	Topological anchoring uni

Table 6: Unified comparison of information phenomena

No exceptions. Fully self-consistent.

11 Relationship with Previous PFUSRC Works

Previous Work	Core Contribution	Connection to 009
00	45° bicone, Axioms 1-6	Anchoring necessarily generates
001	β_1 field, bicone convergence formula	β_1 as universal anchoring operat
002	$\pi_1 = 12/11$, prime nodes	Anchoring coupling coefficient fi
005	Curvature radius hard anchor (380 million light-years)	Spatial anchoring scale, macrosc
006	Four quantitative predictions	Testable effects of anchoring syst
007	GR as tangent surface of bicone	Stable anchoring ($\Delta A \approx 0$) corre
008	Probability stratification axiom, β_1 risk avoidance	Ruptured anchoring information
13	Non-integrable rotational residual ε	Trace information from drift and
17	Spirit pendulum experiment, Ψ - Ξ dual-anchoring	Experimental foundation for info

Table 7: Relationship with previous PFUSRC works

009 is the final closure of information ontology, together with the previous nine core foundational works (00, 001, 002, 005, 006, 007, 008, 13, 17) forming the complete PFUSRC axiomatic system.

12 Falsifiability Conditions

The core predictions of this theory are falsifiable. If any of the following conditions hold, the 009 theory faces challenges:

1. **Anchoring-free information transmission:** There exists an information transmission phenomenon that cannot be described by Ψ - Ξ anchoring establishment/release. *Experimental approach:* Design a communication process where sender and receiver establish no synchronization (including classical synchronization, quantum entanglement, β_1 coupling) yet still transmit meaningful information.
2. **Information transmission without anchoring:** Information can be “transmitted” without establishing any anchoring. *Experimental approach:* Observe information transfer while completely blocking any form of Ψ - Ξ coupling.
3. **Falsification of the no-cloning theorem:** Identical anchoring patterns can exist. *Experimental approach:* Successfully create two identical quantum states with verifiably identical phase histories (not just identical states).
4. **Complete recovery of black hole information:** Black hole information is proven to be completely recoverable from Hawking radiation without residue. *Experimental approach* (theoretical): Prove that Hawking radiation carries all infalling information with no hidden residual.
5. **Anchoring-free measurement:** Measurement processes involve no form of “forced anchoring.” *Experimental approach:* Find a measurement method that obtains eigenvalues without disturbing the system ($\Delta A = 0$).
6. **Non-anchoring living systems:** Living systems can be completely described without anchoring relationships. *Experimental approach:* Construct an artificial system capable of maintaining steady state, replication, and evolution without relying on any Ψ - Ξ -like anchoring.

7. **Black swan independent of anchoring:** Black swan events are unrelated to residual tension from anchoring rupture. *Experimental approach:* Prove that certain black swan events can occur without prior accumulation of anchoring residue.

13 Conclusion

Starting from the PFUSRC-17 Spirit Pendulum experiment, this paper proposes:

Information is not a bit. Information is the anchoring relationship between Ψ and Ξ . β_1 is the universal operator that executes anchoring.

Based on this definition, this paper establishes a unified theory of information transmission, covering:

- Classical information transmission
- Quantum communication (entanglement, teleportation)
- DNA information transfer and living systems
- Brain information processing
- Measurement and wavefunction collapse (modified uncertainty principle)
- The black hole information paradox
- Black swan events

No exceptions. Fully self-consistent.

Core Formula:

$$\text{Info}(\Psi, \Xi) = \mathcal{O}_{\beta_1}(\Psi, \Xi), \quad \mathcal{O}_{\beta_1} \propto e^{-\kappa \Delta A}, \quad \kappa = \frac{12}{11}$$

Three-Layer Structure of Information:

- Stable anchoring ($I = 1$) \rightarrow Visible information (P_{high})
- Drift anchoring ($0 < I < 1$) \rightarrow Trace information (entropy, ε)
- Ruptured anchoring ($I = 0$) \rightarrow Hidden information (P_{low})

Full System Positioning:

- 00: Geometric foundation
- 001: Field theory and β_1 operator
- 002: Number theory and 12/11 constant
- 005: Cosmic scale anchor
- 006: Quantitative predictions
- 007: Relativistic correction
- 008: Probability ontology
- 13: Non-integrable rotational residual

- 17: Spirit pendulum experiment
- **009: Information ontology** (this work)

Final Verdict:

Information is not a shadow of matter. Information is the reality of Ψ - Ξ anchoring. β_1 is the hand that makes anchoring “meaningful.” The spirit pendulum tells you that information was never a bit from the beginning — it is an invisible axis between two points, and the resonance on that axis.

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