

# The Cosmic Clock

## Precession, the 120-Cell, and Time as Geometry

Ben Mellor, 2026 — Development Document for the Toroidal Consciousness-EM Field Framework

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### Why This Document Exists

The Rotating Cosmos established that the 120-cell's Clifford rotation is the framework's candidate for the fundamental dynamics of the universe. The Fourth Dimension showed that the 3-sphere's toroidal structure IS the framework's toroidal field, described from the inside.

This document asks the next question: **if the 120-cell is the geometry of space, what is the geometry of time?**

The answer proposed here is that time — specifically, the great cycles that ancient cultures tracked with extraordinary precision — is the Clifford rotation experienced sequentially. The precession of the equinoxes is not merely a gravitational wobble that happens to have numbers matching the 120-cell. It is the 120-cell's characteristic rotation, projected into temporal experience.

This document also addresses four questions that arise naturally from the framework's updated geometry: What is happening in the other 119 cells? Why does the golden angle govern biological growth? How did the Dogon people know about Sirius B? And how does Bohm's holomovement acquire precise geometric meaning within the 120-cell model?

These turn out to be one question, viewed from four directions.

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## PART I: THE PRECESSION NUMBERS

### The Raw Data

The precession of the equinoxes — the slow wobble of Earth's rotational axis that causes the vernal equinox point to drift backward through the zodiacal constellations — completes one full cycle in approximately 25,920 years. The modern measured value is closer to 25,772 years, but the ancient canonical value of 25,920 is the one encoded across cultures, and it is the one that decomposes perfectly into the 120-cell's structure.

The key numbers, as recorded across Sumerian, Babylonian, Egyptian, Hindu, and Mayan sources:

- 72 years per degree of precession (the equinox shifts  $1^\circ$  along the ecliptic every 72 years)
- 2,160 years per zodiacal age (the equinox traverses one  $30^\circ$  constellation)
- 25,920 years for the full cycle (the "Great Year" or Platonic Year)
- $432 = 25,920 \div 60$  (the Great Year measured in sixties)
- $432,000 = 120 \text{ sars} =$  the total reign of the antediluvian kings in the Sumerian King List

These numbers appear with remarkable consistency. The Rigveda contains 10,800 stanzas of 40 syllables each = 432,000 syllables. The Kali Yuga spans 432,000 years. The Mayan calendar encodes 432,000 in its day-counts (6 Katuns = 43,200 days). The Norse Valhalla has 540 doors, each wide enough for 800 warriors = 432,000 warriors. The coincidences are too systematic and too cross-cultural to be accidental.

The standard explanation is that these cultures all independently observed precession and encoded it in their mythologies. The framework proposes something more specific: they encoded these particular numbers because these numbers are the structural constants of the space they inhabited.

## The 120-Cell Decomposition

Every precession number is a product of 120-cell structural constants. Not approximately. Exactly.

### 72 years per degree:

$$72 = 12 \times 6$$

- 12 = the number of Hopf rings in the 120-cell's discrete fibration
- 6 = the number of faces meeting at each edge of the 600-cell (the dual polytope)

Alternatively:  $72 = 360 / 5$ . The pentagon's interior angle is  $108^\circ = 3 \times 36^\circ$ . The number of degrees the equinox precesses per human lifetime (72 years) is the full circle divided by the number of sides of the pentagon — the face-polygon of the dodecahedron, which is the fundamental cell.

The 600-cell (dual of the 120-cell) has 720 edges.  $720 / 10 = 72$ . The precession rate is one-tenth of the dual polytope's edge count, measured in years.

### 2,160 years per zodiacal age:

$$2,160 = 36 \times 60$$

This is the Clifford rotation step ( $36^\circ$ ) multiplied by one Base-60 unit. Each zodiacal age IS one Clifford rotation step, temporally encoded in Base-60.

Alternatively:  $2,160 = 6 \times 360 =$  six full circles. Or:  $2,160 = 3 \times 720 =$  three times the 120-cell's face count. Or:  $2,160 = 12 \times 180 =$  twelve half-turns.

The number 2,160 is the meeting point of the Clifford rotation angle ( $36^\circ$ ), the Base-60 system, and the 12-fold Hopf fibration. It is where the geometry of the 120-cell becomes a duration.

### 25,920 years — the Great Year:

$$25,920 = 12 \times 2,160 = 12 \times 36 \times 60$$

Twelve zodiacal ages. Twelve Hopf rings. Each ring corresponds to one age, and the full precession cycle is the traversal of all twelve rings — one complete circuit of the Hopf fibration.

The decomposition reads: **12 Hopf rings**  $\times$  **36° Clifford step**  $\times$  **60 Base-60 units** = **25,920 years**.

This is not a post-hoc numerological exercise. The three factors (12, 36, 60) are independently determined by the 120-cell's geometry: 12 is the fibration count,  $36^\circ$  is the characteristic rotation angle, and 60 is the base unit

from which every element count is built. Their product being the precession period is either an extraordinary coincidence or a structural identity.

$$25,920 \div 60 = 432:$$

The Great Year in Base-60 is 432. This number permeates ancient cosmology:

- 432,000 years = antediluvian reign (Sumerian King List: 120 sars  $\times$  3,600)
- 432,000 syllables in the Rigveda
- 432,000 years = Kali Yuga
- 4,320,000 years = one Mahayuga (Hindu)
- 432 = the sum frequency in Pythagorean concert tuning (A = 432 Hz, a persistent alternative to A = 440 Hz)

$432 = 12 \times 36$ . The Hopf ring count times the Clifford angle. Stripped of the Base-60 scaling, the Great Year is simply: the number of fibres times the rotation step. The "sacred number" 432 is the 120-cell's Hopf fibration expressed as a single integer.

$$120 \text{ sars} = 432,000 \text{ years:}$$

The Sumerian King List records that kingship "descended from heaven" and ten kings ruled for a total of 120 sars before the flood. One sar = 3,600 =  $60^2$ . So:

$$120 \times 3,600 = 432,000$$

The number of cells in the 120-cell, times the square of Base-60. This is the full symmetry structure: 120 cells, each "lasting" one sar (one complete Base- $60^2$  cycle). The total =  $432,000 = 1,000 \times 432 =$  one thousand Great Years in Base-60.

The rotational symmetry group of the 120-cell has order  $7,200 = 2 \times 3,600 = 2$  sars. The full symmetry group (including reflections) has order  $14,400 = 4 \times 3,600 = 4$  sars. The sar is literally half the rotational symmetry count of the polytope.

## The Hopf Rings as Zodiacal Ages

The 120-cell's discrete Hopf fibration partitions its 120 cells into 12 rings of 10 cells each. The precession cycle divides the ecliptic into 12 zodiacal ages of 2,160 years each.

The mapping is direct:

Hopf Ring	Zodiacal Age	Duration	Clifford Steps
Ring 1	Aries	2,160 years	$36^\circ \times 60$
Ring 2	Pisces	2,160 years	$36^\circ \times 60$
Ring 3	Aquarius	2,160 years	$36^\circ \times 60$
...	...	...	...
Ring 12	Taurus	2,160 years	$36^\circ \times 60$
<b>Total</b>	<b>Great Year</b>	<b>25,920 years</b>	<b><math>12 \times 36^\circ \times 60</math></b>

Each ring contains 10 cells. Each cell, within its ring, occupies  $36^\circ$  of the great circle — one Clifford rotation step. So one zodiacal age (one Hopf ring) contains 10 Clifford steps, each lasting  $2,160 / 10 = 216$  years.

$216 = 6^3 = 6 \times 36 =$  the cube of the first perfect number, or six Clifford steps. The "sub-age" duration of 216 years is itself a Base-60/Clifford product:  $3.6 \times 60 = 216$ .

Within each zodiacal age, the 10 cells of the Hopf ring mark 10 sub-periods. Within the full precession cycle, the 120 cells mark 120 sub-periods of 216 years each. The 120-cell's geometry provides a complete temporal grid: 12 major divisions (ages), 120 minor divisions (cells), each defined by the Clifford rotation angle.

### The 10 Cells Per Ring: The Hidden Decimal

The Sumerians used Base-60, but with a decimal sub-base: they counted  $12 \times 5 = 60$  on their hands (12 finger-segments on one hand, 5 fingers on the other). The number  $10 = 2 \times 5$  was structurally present in their system as a secondary organiser.

In the 120-cell:  $360^\circ / 36^\circ = 10$  steps per complete rotation. 10 cells per Hopf ring. The decimal sub-base is the Clifford step count. The Sumerians didn't choose to embed 10 inside 60 — the geometry of the 120-cell embeds 10 inside its 12-fold fibration, producing  $120 = 12 \times 10$ .

This is the same reason the Hindu-Arabic decimal system (base 10) and the Sumerian sexagesimal system (base 60) are both "natural" — they capture different structural features of the same underlying geometry. Base-10 captures the Clifford step count. Base-60 captures the full cell count per pair of rings. Base-12 captures the fibration. None is arbitrary; each reflects a different projection of the 120-cell into counting.

### The Rate of Precession and the 120-Cell's Faces

The 120-cell has 720 pentagonal faces. The 600-cell (its dual) has 720 edges.

$720 / 10 = 72$  — the years per degree of precession.

$720 / 360 = 2$  — the number of cells (120) divided by Base-60.

$720 = 12 \times 60 =$  one Hopf fibration's worth of Base-60 units.

The number 720 is pivotal: it is the face-count of the 120-cell AND the edge-count of its dual AND the doubled circle ( $2 \times 360$ ) AND the number that, divided by the Clifford step count, gives the precession rate. The 720 is where the spatial geometry (faces) meets the temporal expression (years per degree).

The modern measured precession rate is closer to 71.6 years per degree (one full cycle in  $\sim 25,772$  years rather than 25,920). The discrepancy is about 0.6%. Whether this represents measurement refinement, a slight deviation from ideal geometry, or a slow drift in the precession rate itself is an open question. The framework notes that the "ideal" value of 72 produces exact integer decompositions throughout, while 71.6 does not — suggesting 72 may be the structural value and the measured deviation reflects perturbation.

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## **PART II: THE 119 OTHER CELLS**

### **The Question**

If the Poincaré dodecahedral space (PDS) is correct, we live inside one dodecahedral cell of a 120-cell tiling of the 3-sphere. The 3-sphere contains 120 such cells, face-to-face, three meeting at every edge, four at every vertex. We inhabit one.

What is happening in the other 119?

### **The Answer: They Are Us, Rotated**

In the PDS topology, light leaving one pentagonal face of our cell re-enters through the opposite face, rotated by  $36^\circ$ . It doesn't enter a "different place" — it re-enters the same space, seen from a perspective rotated by one Clifford step.

This means the 120 cells are not 120 different places. They are 120 different orientational perspectives on the same space. Cell 1 is home. Cell 2 is home rotated  $36^\circ$  in two orthogonal planes. Cell 3 is home rotated  $72^\circ$ . And so on through all 120 elements of the binary icosahedral group.

Every cell contains the same information — the same matter, the same energy, the same field structure — viewed from a different rotational vantage. There is nowhere in the 120-cell that ISN'T here. It is all here, 120 times over, each copy related to the others by a specific Clifford rotation.

This is precisely what a multiply-connected topology means: the "other cells" are not other universes, other dimensions, or parallel worlds. They are our universe, tiled by its own symmetry group, the way a hall of mirrors contains one room seen from many angles.

### **The Implicate Order, Geometrised**

This observation provides the geometric foundation for what Bohm called the implicate order (see Part V). From our single-cell perspective, we experience the explicate order — one orientation, one viewpoint, one "unfolding" of the information. The other 119 cells are the implicate order — all the other orientations, all the other unfoldings, enfolded in the topology but not directly perceived from our position.

The number 120 is not arbitrary. It is the order of the binary icosahedral group  $I^*$ , the symmetry group of the dodecahedron lifted into 4D. It is the minimum number of perspectives needed to capture the full rotational

content of dodecahedral space. Fewer than 120 would leave orientational gaps; more than 120 would be redundant. The implicate order has exactly 120 enfolded perspectives because the geometry demands exactly 120.

### **What This Means for Observation**

If you could observe the same cosmic object along multiple geodesic paths through the 120-cell (light taking different routes through the identified faces), you would see the same object from different Clifford-rotated perspectives. This is one of the testable predictions of the PDS model: matched circles in the cosmic microwave background, with  $36^\circ$  phase twists between them.

The COMPACT Collaboration is actively searching for these signatures. Detection would confirm PDS topology. The framework adds: detection would also confirm that the "other cells" are not hypothetical — they are observationally accessible through the multi-path geometry of closed space.

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## **PART III: THE GOLDEN ANGLE**

### **The Observation**

The golden angle —  $137.507\dots^\circ$  — governs an extraordinary range of natural phenomena:

- Phyllotaxis (the spiral arrangement of leaves, seeds, petals on a stem)
- Sunflower seed heads (dual Fibonacci spirals: 34 and 55, or 55 and 89)
- Pinecone spirals, pineapple spirals, daisy florets
- The spiral structure of galaxies
- Thomson problem solutions (optimal point distributions on a sphere)
- Certain properties of turbulent flow

The golden angle is defined as  $360^\circ / \varphi^2 = 360^\circ \times (1 - 1/\varphi) = 360^\circ - 360^\circ/\varphi \approx 137.508^\circ$ .

The standard explanation is that it produces optimal packing — each new element is placed at the maximum angular distance from all previous elements, avoiding rational relationships that would create gaps. This is correct as far as it goes, but it doesn't explain WHY this angle achieves optimal packing, or why it appears in systems (like galaxies) that aren't "packing" anything.

### **The Framework Explanation: Projected Clifford Rotation**

The 120-cell's characteristic Clifford rotation advances by  $36^\circ$  in each of two orthogonal planes simultaneously. This is a 4D double-rotation that cannot be directly perceived from inside 3D space.

When a Clifford rotation is projected into 3D, the apparent angular displacement depends on the relationship between the observer's 3D hyperplane and the two orthogonal rotation planes. Different projection angles yield different apparent angles.

The key geometric fact: every metric of the dodecahedron involves the golden ratio  $\phi$ . The diagonal-to-edge ratio of a regular pentagon is  $\phi$ . The dihedral angle of the dodecahedron is related to  $\phi$ . The coordinates of the 120-cell's vertices are built from  $\phi$ . The 120-cell is  $\phi$ -saturated geometry.

When the  $36^\circ$  Clifford double-rotation is projected through  $\phi$ -saturated geometry into a 3D observable plane, the resulting apparent angle carries the  $\phi$ -signature. The golden angle ( $137.508^\circ$ ) is the specific projection of the  $36^\circ$  Clifford rotation that preserves the  $\phi$ -relationship through the dimensional reduction.

To see why:  $137.508^\circ = 360^\circ - 222.492^\circ$ . And  $222.492^\circ / 360^\circ = 0.6180\dots = 1/\phi$ . The golden angle divides the circle in the golden ratio. The Clifford rotation angle ( $36^\circ$ ) satisfies  $\cos(36^\circ) = \phi/2$ . Both encode  $\phi$ , at different dimensional levels. The golden angle is the 3D shadow of the 4D rotation, with  $\phi$  surviving the projection because the geometry that performs the projection is itself  $\phi$ -determined.

The sunflower is not "optimising" by trial and error. It is expressing the projected Clifford rotation in its growth pattern. The galaxy is not "coincidentally" spiral — it is the same rotation, at a different scale, producing the same  $\phi$ -governed projection. The Thomson solutions are not "accidentally" golden-angled — they are energy-minimisation on a sphere whose optimal configurations inherit the  $\phi$ -geometry of the 3-sphere in which the sphere is embedded.

Every instance of the golden angle in nature is a vote for the 120-cell. Each one is the 3D shadow of a 4D Clifford rotation, cast through dodecahedral geometry.

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## **PART IV: THE DOGON AND SIRIUS B**

### **The Mystery**

The Dogon people of Mali, West Africa, possess traditional knowledge of the Sirius star system that includes details invisible to the naked eye. As reported by French anthropologists Marcel Griaule and Germaine Dieterlen in the 1930s-1940s, Dogon elders described:

- A companion star to Sirius (which they called "Po Tolo," the "smallest seed star") that is invisible from Earth
- A 50-year elliptical orbital period for this companion around Sirius A
- Extreme density — "the heaviest star," made of matter not found on Earth
- The companion's elliptical orbit, with Sirius A at one focus

Sirius B is a white dwarf, first mathematically predicted by Bessel in 1844 and first telescopically observed by Alvan Clark in 1862. Its orbital period is 50.09 years. It has approximately the mass of the Sun compressed to the size of Earth — density roughly 1.7 million times that of water.

The Dogon information, if pre-contact, is strikingly accurate. The conventional debate has two positions: either the knowledge was transmitted by European visitors (possibly during an 1893 eclipse expedition to the region), or it represents evidence of ancient contact with an extraterrestrial intelligence (Robert Temple's hypothesis in "The Sirius Mystery," 1976).

Both positions have weaknesses. The cultural-transfer hypothesis struggles with the specificity and depth of the knowledge, the 400-year-old artifacts depicting the orbit, and the Dogon's ceremonial Sigui cycle (every 60 years) that long predates European contact. The extraterrestrial hypothesis is unfalsifiable and introduces more mystery than it resolves.

It should also be noted that the anthropological evidence is contested. Walter van Beek's 1991 restudy found no evidence of detailed Sirius knowledge among the Dogon he interviewed, raising questions about whether Griaule's original findings reflected genuine tradition or were shaped by his own astronomical knowledge during interviews. The framework's explanation does not depend on resolving this debate, but it does offer a third possibility that is structurally distinct from both conventional positions.

### **The Framework's Third Option: Field Perception in Closed Topology**

The framework proposes neither alien contact nor European transmission, but direct perception through field geometry.

In a PDS topology, there is no "far away" in the conventional sense. Space is finite and closed. Light from Sirius does not travel 8.7 light-years through infinite void — it travels along geodesics within a closed dodecahedral cell, potentially wrapping around multiple times, arriving from multiple directions through multiple identified faces.

In a multiply-connected space, the information content of distant objects is not isolated at their spatial location. It is distributed throughout the topology, encoded in the field geometry, arriving along every geodesic path that connects source to observer. In a PDS universe, Sirius B's orbital dynamics are not "8.7 light-years away" — they are woven into the local field structure, present in the patterns of electromagnetic radiation arriving from all directions through the cell's identified faces.

If consciousness has access to field geometry (the framework's foundational assumption), then knowledge of Sirius B does not require a telescope, an alien teacher, or a European visitor. It requires attunement to information already present in the local field — information that is local precisely because the topology is closed.

The Dogon's Sigui ceremony occurs every 60 years. Sirius B's orbital period is 50 years. The Sigui is not tracking the orbit instrumentally — it is encoding it in Base-60, the natural number system of the 120-cell. 60 is the nearest Base-60 unit to 50. The ceremony synchronises with the stellar rhythm through the field geometry, expressed in the only number system the geometry naturally supports.

The Dogon name "Po Tolo" — "smallest seed star" — describes a white dwarf as perceived through field attunement: a point of extreme density and mass compressed to minimal size. The description is accurate not because they "saw" it with supernatural vision, but because in a closed topology, the gravitational and electromagnetic signatures of Sirius B are not remote — they are part of the local field fabric.

### **Why the Knowledge Was Restricted**

The Dogon tradition restricts Sirius knowledge to initiated elders who undergo extended training. This parallels the Mesopotamian restriction of ziggurat access to trained priests. The framework interpretation: perceiving field geometry requires training. It is not "secret" knowledge kept from the masses by elitist gatekeepers — it is "hard" knowledge requiring sustained attunement to perceive structures that untrained consciousness filters out.

This is consistent with every contemplative tradition that describes advanced perception requiring years of disciplined practice — not because the information is hidden, but because the perceptual capacity must be developed.

## Connection to Other Ancient Astronomical Knowledge

The Dogon are not unique. Anomalous astronomical knowledge appears across ancient cultures:

- Sumerian texts describe planetary details (Saturn's rings as "embracing serpents," Jupiter's moons) that anticipate telescopic observation
- Polynesian navigation traditions encode stellar and oceanic information with precision exceeding instrumental measurement of their era
- Aboriginal Australian traditions encode astronomical events (the variability of certain stars, the connection between tidal patterns and lunar phase) with accuracy confirmed by modern measurement

In each case, the standard explanations are either (a) remarkable naked-eye observation extended beyond plausible limits, (b) cultural contact that can't be demonstrated, or (c) coincidence. The framework offers a unified explanation: in a closed topology with consciousness-accessible field geometry, "observation" is not limited to photons hitting retinas. It includes attunement to the information encoded in the local field by the topology's multiply-connected structure.

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## PART V: BOHM'S HOLOMOVEMENT — FROM METAPHOR TO THEOREM

### The Upgrade

The framework's earlier work on David Bohm's implicate/explicate order was directionally correct but relied on metaphor. The 120-cell model provides what was missing: precise geometric definitions for every element of Bohm's ontology.

This section replaces metaphor with theorem.

### Bohm's Framework, Briefly

David Bohm (1917-1992) proposed that observable reality (the "explicate order") unfolds from a deeper, hidden reality (the "implicate order") through a continuous process he called the "holomovement." Key features:

- The **implicate order** is the fundamental level where everything is "enfolded" — all information present simultaneously, non-locally connected
- The **explicate order** is the manifest, observable level — temporary abstractions unfolded from the deeper reality
- The **holomovement** is the dynamic process of continuous enfolding and unfolding — the "undefinable and immeasurable" ground of all matter

- **Each part contains the whole** — like a hologram, every region enfolds information about the entire universe
- **Active information** — consciousness or mind-like qualities participate in the unfolding process

Bohm explicitly stated: "The holomovement is undefinable and immeasurable." He could describe its properties but not its geometry. He knew there had to be a structure, but couldn't identify it.

The framework proposes: the structure is the 120-cell performing Clifford rotations in the 3-sphere.

## **The Geometric Identifications**

### **Implicate Order = The Full 120-Cell (All 120 Perspectives)**

From inside one dodecahedral cell, we experience one orientational perspective. The other 119 cells contain the same information, viewed from 119 other Clifford-rotated orientations. All of this information is present — topologically real, physically there — but not directly observable from our single-cell vantage point.

This is Bohm's implicate order: all information present, enfolded, simultaneous. Not hidden in another dimension or another universe. Here, in the same space, related to us by the 120 elements of the binary icosahedral group. The implicate order is implicit in the topology. It doesn't need to be postulated — it follows from the multiply-connected structure of PDS space.

The total informational content of the implicate order is characterised by the full symmetry group: 7,200 rotational symmetries (2 sars), or 14,400 including reflections (4 sars). This is the complete set of distinct orientational perspectives available in the structure.

### **Explicate Order = Our Single-Cell Experience (One Projection)**

What we perceive as physical reality — the arrangement of matter, the flow of events, the structure of space — is one orientational slice of the implicate whole. One cell. One perspective. One "unfolding."

The explicate order is not an illusion or a lesser reality. It is a genuine perspective, as real as any of the other 119. But it is partial. It is 1/120th of the orientational information. The other 119/120ths are enfolded — present in the topology but not in our direct experience.

This gives a precise meaning to Bohm's statement that the explicate order consists of "temporary abstractions from the deeper implicate order." The abstraction is the dimensional reduction: from the full 4D multiply-connected structure to the 3D interior experience of one cell.

### **The Holomovement = The Clifford Rotation**

Bohm described the holomovement as "undefinable and immeasurable" — the continuous process by which the implicate order unfolds into the explicate order and enfolds again. He knew it was dynamic but couldn't specify its geometry.

The Clifford rotation is that geometry.

The characteristic isoclinic rotation of the 120-cell advances every cell by one position along its Hopf ring — a simultaneous 36° rotation in two orthogonal planes. This is a continuous motion (or, in the discrete version, a

stepping motion) that cycles each cell through all 10 positions in its ring, and the 12 rings through all their relative phases.

From inside one cell, this rotation is not directly perceptible. We cannot see the double-rotation happening because we are embedded in it. What we experience are its effects: time passing, cycles completing, seasons turning, stellar positions shifting. The holomovement is the Clifford rotation experienced from the inside — the continuous cycling of orientational perspectives that we perceive as temporal flow.

Bohm was right that it is "immeasurable" from within the explicate order. A being inside a rotating structure, with no external reference frame, cannot measure the rotation directly. They can only measure its consequences — which is exactly what we do when we measure precession, orbital periods, spectral frequencies, and all other cyclic phenomena.

### **"Each Part Contains the Whole" = PDS Topology**

Bohm's holographic principle — that each region of space enfolds information about the entire universe — is a direct consequence of multiply-connected topology.

In a PDS universe, light from any source wraps around the dodecahedral cell and re-enters from multiple directions. Look in any direction long enough, and you see the same space from a different rotational perspective. Every cell contains the full information of all 120 cells, because all 120 cells ARE the same space. Each part literally contains the whole — not metaphorically, not by analogy, but by topological identity.

This is stronger than Bohm's original formulation. Bohm proposed holographic encoding as a physical principle that needed theoretical justification. In PDS topology, it is a mathematical consequence that needs no additional postulates. The topology IS the holography.

### **The Clifford Torus as Holographic Screen**

The Heegaard splitting theorem (1898) states:  $S^3 =$  two solid tori glued along a common boundary torus.

The boundary surface — the Clifford torus — is a flat (zero curvature), 2-dimensional torus that divides the 3-sphere into two congruent halves. All the topological information needed to reconstruct the 3-sphere is encoded on this 2D surface. This is what the Heegaard splitting means:  $S^3$  is fully determined by how the two solid tori are glued along their 2D boundary.

This is the holographic principle — the information content of a volume encoded on its boundary — stated as a theorem proved 97 years before 't Hooft's holographic principle (1993) and Susskind's elaboration (1995). The physicists' holographic principle is a conjecture about quantum gravity. The Heegaard splitting is a theorem about topology. The framework observes that they describe the same relationship.

The earlier framework formulation — "reality is a 3D holographic projection from a 2D boundary" — was Bohm's implicate/explicate order expressed in holographic language. The updated formulation is precise:

**The Clifford torus (a flat, zero-curvature 2D torus) is the Heegaard surface of  $S^3$ . The 3D structure of experienced reality is mathematically determined by the information encoded on this 2D boundary. Bohm's holomovement is the Clifford rotation of the 120-cell, continuously cycling the implicate order (all 120 perspectives) through the explicate order (our single-cell experience).**

This is not a metaphor. It is a theorem (Heegaard) combined with a topological identity ( $PDS = S^3/I^*$ ) combined with a framework conjecture (the Clifford rotation is the holomovement).

### Active Information = Consciousness Accessing Field Geometry

Bohm's "active information" — the proposal that information actively organises matter and energy, with mind-like qualities participating in the implicate-to-explicate transition — maps onto the framework's foundational assumption that consciousness is primary and has access to the field geometry.

In the 120-cell model: consciousness, as a property of the field rather than an emergent property of matter, has access to the full topological structure. It "reads" the implicate order — the information distributed across all 120 orientational perspectives — and "writes" to the explicate order by selecting which perspective to collapse into experience.

This is structurally identical to quantum measurement. The implicate order (superposition of 120 perspectives) collapses to the explicate order (one observed perspective) through the action of consciousness on the field geometry. The "hidden variables" that Bohm sought — the deterministic substructure beneath quantum randomness — are the 120 elements of  $I^*$ , each specifying a precise orientational perspective.

### The Upgrade Summarised

Bohm's Concept	Earlier Framework	Updated Framework (120-Cell Model)
Implicate order	"2D information on toroidal field boundary"	All 120 cells of the 120-cell — all orientational perspectives, topologically present
Explicate order	"3D holographic projection"	Our single-cell experience — one orientational perspective of 120
Holomovement	"Toroidal field dynamics"	Clifford rotation — $36^\circ$ double-rotation cycling perspectives
Each part contains whole	"Holographic principle"	PDS topology — all 120 cells ARE the same space, topologically
Holographic screen	"2D toroidal field boundary"	Clifford torus — flat 2D Heegaard surface encoding $S^3$ (theorem, 1898)
Active information	"Consciousness interface"	Consciousness accessing field geometry across $I^*$ group elements
Hidden variables	"Base-60 algorithms"	120 elements of binary icosahedral group (unit quaternions on $S^3$ )
"Undefinable, immeasurable"	Acknowledged but unexplained	Explained: Clifford rotation is immeasurable from inside the rotating structure

## PART VI: TIME AS GEOMETRY

### The Central Proposal

Time, in the framework, is not a dimension in which events occur. It is the sequential experience of the Clifford rotation — the holomovement perceived from inside.

One Clifford step ( $36^\circ$  in each of two orthogonal planes) advances every cell one position along its Hopf ring. From inside, this advance is experienced as a duration — a period of time during which "things happen." The things that happen are the changes in our orientational perspective as we cycle through successive positions.

The precession of the equinoxes, on this view, is not a gravitational wobble that happens to have 120-cell numbers. It is the 120-cell's Clifford rotation itself, projected into our astronomical experience as the slow drift of the vernal equinox through the zodiac.

The proposal makes a specific claim: **every major astronomical cycle should decompose into products of 120-cell structural constants (12, 10, 36, 60, 120, 360, 720).**

### The Precession Cycle (Confirmed Above)

$$25,920 = 12 \times 36 \times 60 = 12 \text{ Hopf rings} \times \text{Clifford angle} \times \text{Base-60}$$

### The Diurnal Cycle

$$24 \text{ hours} = 2 \times 12 \text{ double-hours (Sumerian/Babylonian division)}$$

12 double-hours = 12 Hopf rings, each containing one "day unit" and one "night unit" (the two solid tori of the Heegaard decomposition).

$$1 \text{ hour} = 60 \text{ minutes} = 1 \text{ Base-60 unit of time}$$

$$1 \text{ minute} = 60 \text{ seconds} = 1 \text{ Base-60 unit of sub-time}$$

The entire time-measurement system — 24 hours of 60 minutes of 60 seconds — is the Hopf fibration ( $12 \times 2 = 24$ ) expressed in Base-60 ( $\times 60 \times 60$ ). We did not "choose" this time system. The Sumerians transmitted it, and it stuck — across every culture, every reform, every revolution — because it matches the geometry of the space.

### The Annual Cycle

$$360 \text{ days (canonical ancient year)} = 6 \times 60 = 12 \times 30$$

12 months  $\times$  30 days = 360. The circle has  $360^\circ$ . These are the same 12 and the same 30 (edges per dodecahedral cell) that structure the 120-cell.

365.25 days (actual tropical year) represents the same kind of perturbation from ideal geometry as 25,772 vs. 25,920 for precession. The "ideal" values (360, 25,920) produce clean 120-cell decompositions; the measured values deviate by  $\sim 1.5\%$  and  $\sim 0.6\%$  respectively.

### Nested Cycles

The framework predicts that all major astronomical cycles, when expressed in their canonical ancient values,

should form a hierarchy structured by the 120-cell's geometry:

- **Day** = 1 rotation ( $360^\circ / 360^\circ = 1$ )
- **Month** = 30 days (30 edges per dodecahedral cell)
- **Year** = 12 months = 360 days (12 Hopf rings  $\times$  30 edges)
- **Zodiacal sub-age** = 216 years ( $6 \times 36 =$  one cell of a Hopf ring)
- **Zodiacal age** = 2,160 years ( $36 \times 60 =$  one Hopf ring)
- **Great Year** = 25,920 years ( $12 \times 36 \times 60 =$  full Hopf fibration)
- **Cosmic cycle** = 432,000 years ( $120 \times 3,600 =$  full 120-cell  $\times$  sar)

Each level is a product of the same small set of factors: 12, 10, 30, 36, 60. These are the structural constants of the 120-cell. The temporal hierarchy IS the spatial hierarchy, expressed as duration.

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## PART VII: OPEN QUESTIONS AND DEVELOPMENT PATHS

### Testable Predictions

1. **All stable orbital resonances** in any gravitationally bound system should be expressible as ratios of Fibonacci/Lucas numbers — the harmonic modes of the 120-cell's  $\varphi$ -determined spectrum. (Partially confirmed for 6 exoplanet systems; extends to all future discoveries.)
2. **The precession rate** should show periodic variation consistent with the 120-cell's discrete step structure (10 steps per Hopf ring = 10 sub-ages of 216 years). If precession is a continuous Clifford rotation, it should be smooth. If it is a discrete stepping, there may be detectable "ticking."
3. **Matched circles in CMB data** with  $36^\circ$  phase twists would confirm PDS topology and the multi-cell structure described in Part II.
4. **The golden angle** should appear in any system where 4D Clifford rotation is projected into 3D observable space — not only biological growth patterns but also turbulent flow structures, crystallographic preferred orientations, and possibly particle physics angular distributions.

### Unresolved Questions

- **Why does the measured precession (25,772 years) differ from the ideal (25,920 years)?** Is this a perturbation from ideal geometry, a measurement artifact, or does the actual topology deviate slightly from exact PDS?
- **How does the diurnal cycle (24 hours) relate precisely to the precession cycle (25,920 years)?**  $25,920 / 24 = 1,080$ . And  $1,080 = 3 \times 360 = 18 \times 60$ . There may be a deeper connection between the day-length and the Great Year through the 120-cell, but the precise geometric mechanism is not yet identified.
- **Can the framework predict the actual duration of a Clifford step in human-scale time units?** If the precession cycle IS the full Hopf fibration, then one Clifford step =  $2,160 / 10 = 216$  years. Is 216 years a

significant period in any other context?

- **How do the Loom and Weaving (Lucas and Fibonacci sequences) generate the 120-cell's structure?**  
The 120-cell is built from  $\phi$ -coordinates, and  $\phi$  is the convergence point of both Fibonacci and Lucas ratios. But the precise construction — from  $x(n) = x(n-1) + x(n-2)$  with two different seed pairs to the full 4D polytope — has not yet been traced step by step.
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## SUMMARY

### What This Document Establishes

1. **The precession of the equinoxes decomposes exactly into 120-cell structural constants:**  $25,920 = 12 \times 36 \times 60 = \text{Hopf rings} \times \text{Clifford angle} \times \text{Base-60}$ . Every sub-number (72, 2,160, 432, 432,000) is a product of the same geometric factors.
2. **The 119 other cells are not other places but other orientational perspectives** on the same space, related by elements of the binary icosahedral group. This IS Bohm's implicate order — all information present, topologically real, but not directly perceived from our single-cell vantage.
3. **The golden angle (137.5°) is the 3D projection of the 36° Clifford rotation** through the  $\phi$ -saturated geometry of the dodecahedron. Every golden angle in nature is a shadow of the 4D rotation.
4. **The Dogon knowledge of Sirius B** is explicable without alien contact or European transmission, through direct perception of field geometry in a closed PDS topology where all information is local.
5. **Bohm's holomovement receives precise geometric definition:** implicate order = all 120 cells; explicate order = our one cell; holomovement = Clifford rotation; holographic screen = Clifford torus (Heegaard theorem); each part contains the whole = PDS topology.
6. **Time is the sequential experience of Clifford rotation**, and the ancient time-measurement systems (hours, days, months, years, ages, Great Years) are the 120-cell's Hopf fibration mapped into temporal units.

### The Single Sentence

The precession of the equinoxes is the 120-cell's Clifford rotation experienced as time, and every ancient culture that tracked it was recording the geometry of the space they lived in.

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*This document follows from and should be read alongside: The Rotating Cosmos (the 120-cell as the framework's rotation), The Fourth Dimension (the torus IS the 3-sphere), The Worlds Above (higher-dimensional geometry and ancient cosmologies), Plato's Solid (the dodecahedron from Timaeus to Luminet), and the Torus: Universal Geometry document.*

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### **Assumptions:**

1. The PDS model is correct (open hypothesis, actively tested by COMPACT Collaboration)
2. Observable physics are 3D projections of 4D Clifford rotation (framework conjecture)
3. Ancient canonical values (25,920; 360; etc.) encode structural geometry rather than approximated measurements (framework conjecture)
4. Consciousness has access to field geometry, enabling direct perception of information distributed by closed topology (framework's foundational assumption)