

Quasicrystalline Spin Network Code

Raymond Aschheim



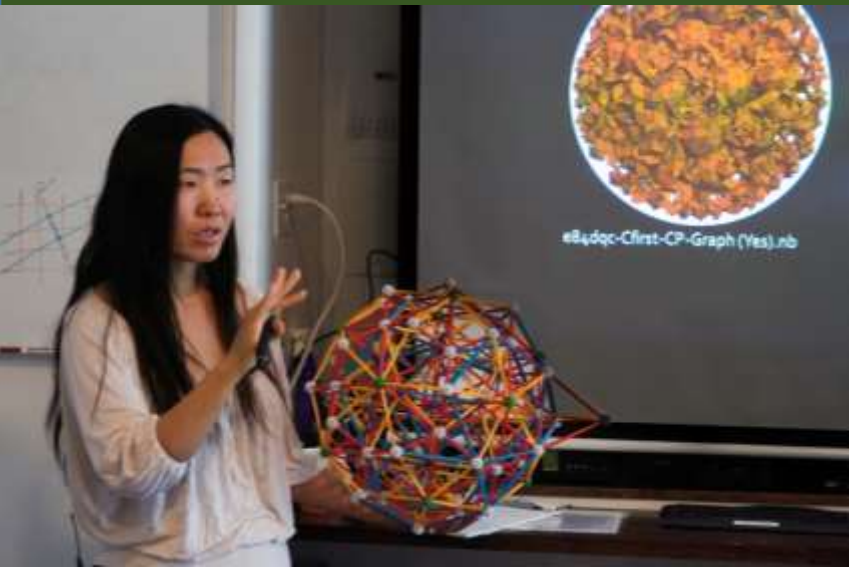
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At Quantum Gravity Research in Los Angeles, we work on a model called *emergence theory*.



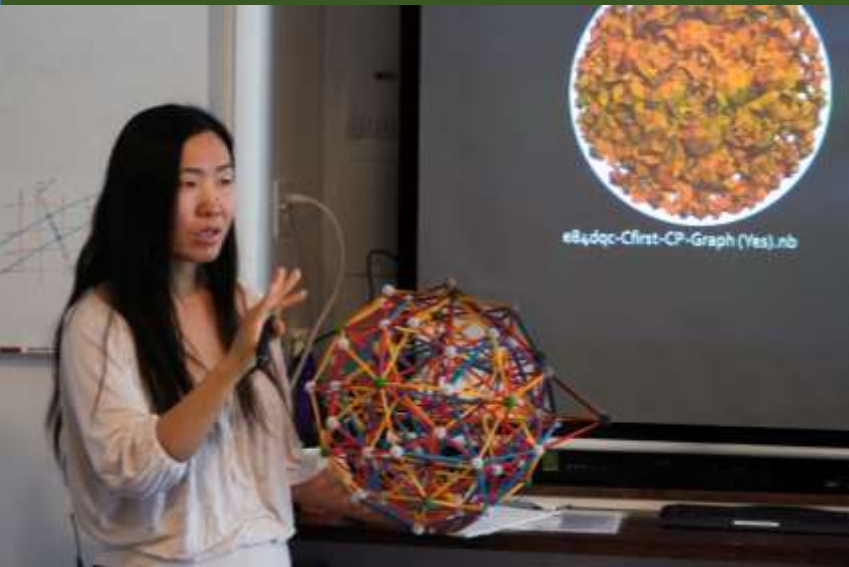
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Our mission is to discover the geometric first-principles unification of space, time, energy, matter, information and consciousness.



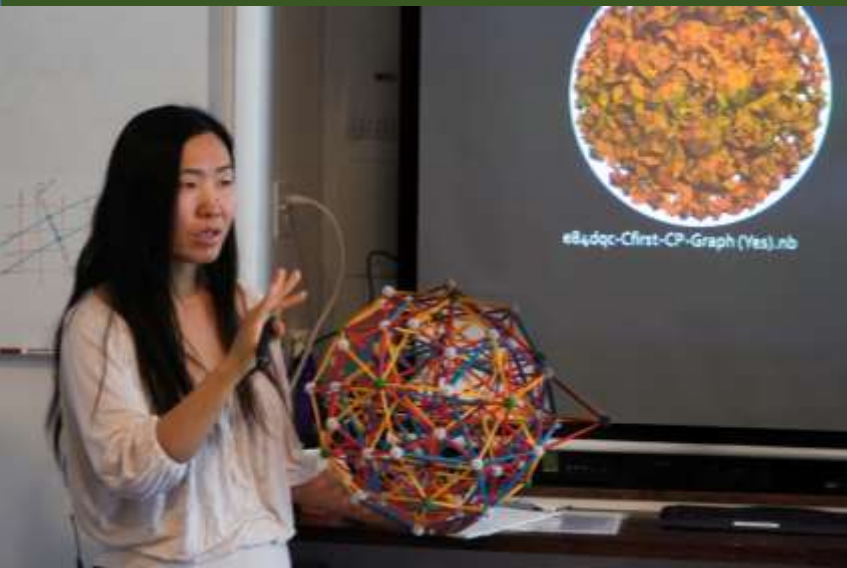
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We are working on an E8 based quasicrystal model of spacetime and particles that is based on the golden ratio and Fibonacci chains.



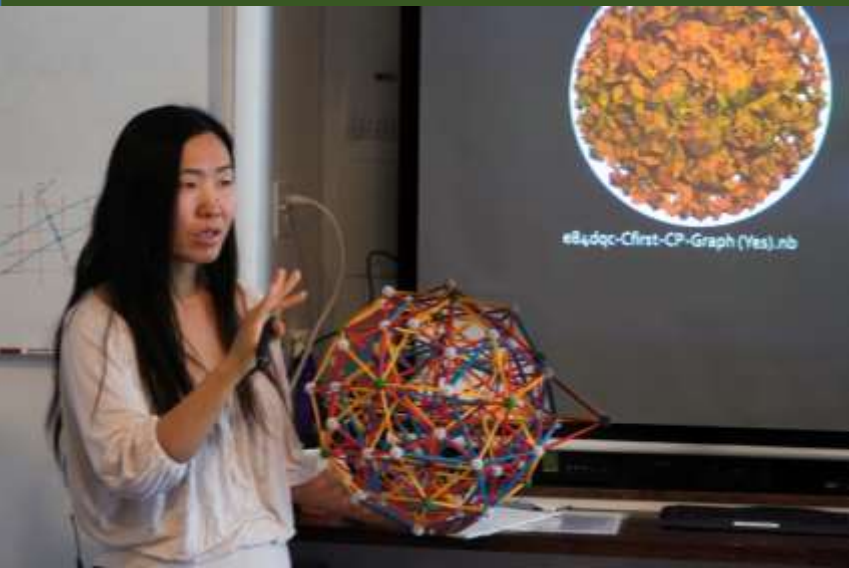
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It holds special promise for resolving the quantum decoherence problem standing in the way of useful quantum computing technology.



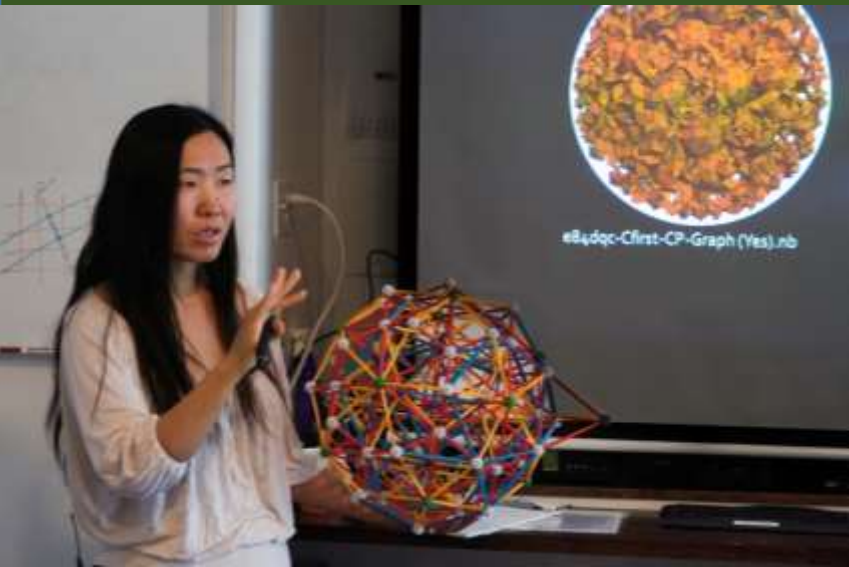
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It is showing a path forward in understanding low energy nuclear reactions.



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But most importantly, if we are successful, this model will be the only microscopic first-principles theory of everything, so it will provide an explanation for the fundamental constants (such as the speed of light).



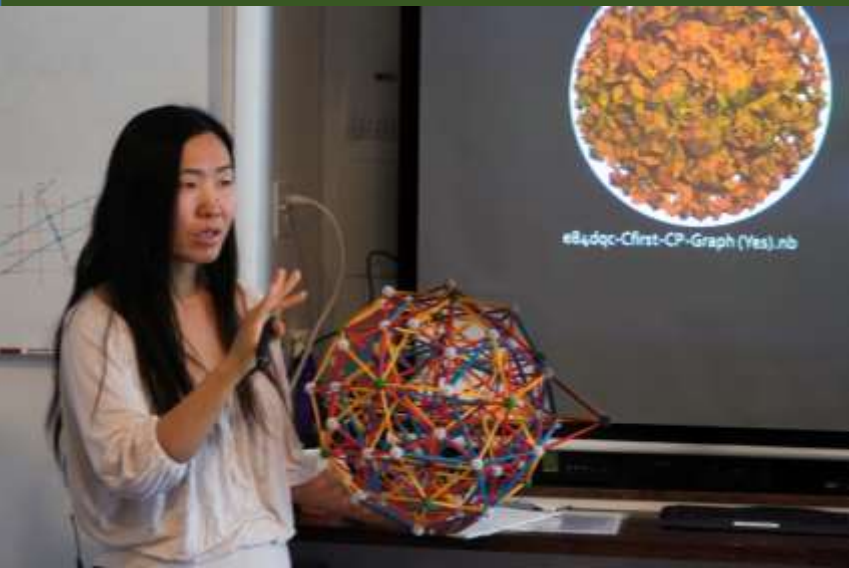
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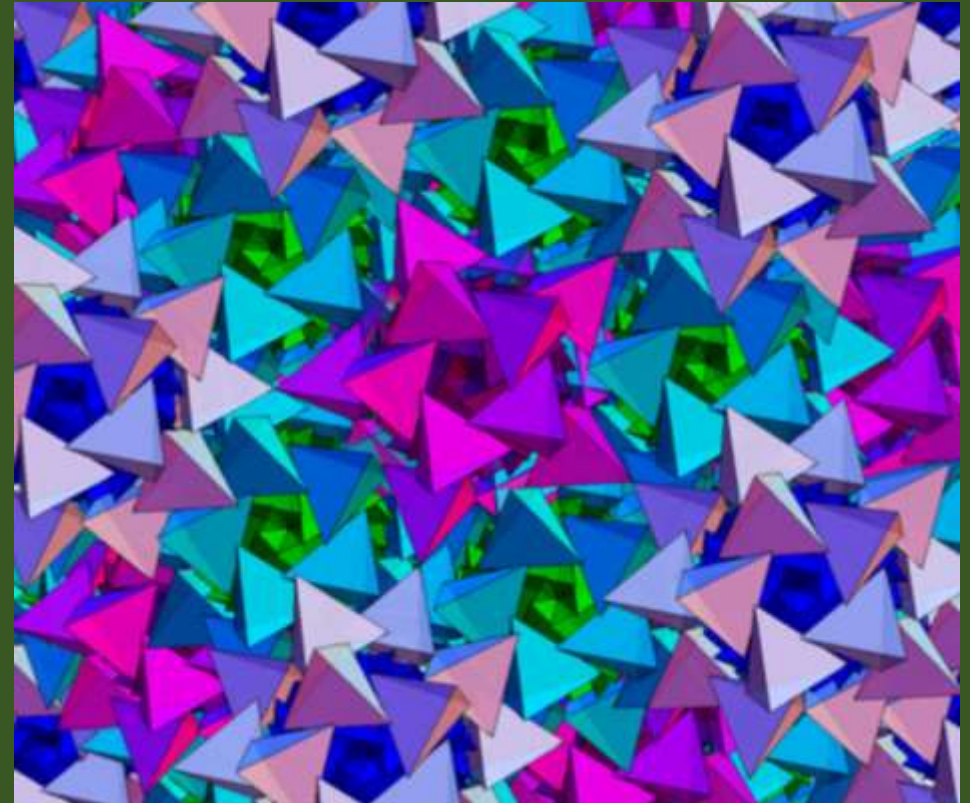
And it will dissolve the philosophy that consciousness, including universal consciousness, is in a separate realm from the geometry of reality.



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We want to know what reality is
– starting with first-principles.



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The term *first-principles* means we want everything to be explained in simple fundamental terms.



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The term *first-principles* means we want everything to be explained in simple fundamental terms.

Currently, a first-principles theory of everything does not exist.



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String theory has not made any successful predictions .



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String theory has not made any successful predictions .

And it is not a first-principles theory because it does not explain the magnitude of the speed of light or the other fundamental constants.



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Quantum mechanics and general relativity, on the other hand, do make good predictions but they don't explain the fundamental constants either.



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So what clues does nature offer
for what a first-principles theory
of everything should look like?



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I will show you seven clues and one solution that embraces them all.



- Information
- Causality Loops
- Non-determinism
- Consciousness
- Pixelation
- E8 Crystal
- Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops
3. Non-determinism



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops
3. Non-determinism
4. Consciousness



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops
3. Non-determinism
4. Consciousness
5. Pixelation



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops
3. Non-determinism
4. Consciousness
5. Pixelation
6. E8 Crystal



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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I will show you seven clues and one solution that embraces them all.

1. Information
2. Causality Loops
3. Non-determinism
4. Consciousness
5. Pixelation
6. E8 Crystal
7. Golden Ratio



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Before we do that, let us think about ontology.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Before we do that, let us think about ontology.

Are spacetime and energy made of stuff created by the big bang or by god?



- Information
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- Golden Ratio



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Before we do that, let us think about ontology.

Are spacetime and energy made of stuff created by the big bang or by god?

Or is it pure information?



- Information
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If it is information, we can ask,
“Ontologically, what form of
symbolism expresses this
information?” .



- Information
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And if it is information, what exactly is the symbolic code that it exists as ontologically.

And how can symbolism and information exist without some notion of consciousness to actualize it into existence?



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Physics Nobel laureate, Frank Wilczek of MIT said:

“The relevant literature [on the meaning of quantum theory] is famously contentious and obscure...”



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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“...I believe it will remain so until someone constructs, within the formalism of quantum mechanics, an observer, that is, a model entity whose states correspond to a recognizable caricature of conscious awareness.”



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Wilczek is speaking of the need to build measurement into a new quantum mechanics mathematical formalism that incorporates an operator capable of measuring.



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His motivation is on solid ground.
Quantum mechanics indicates that
the ontology of physical reality
must be based on measurement,
where all that exists is that which is
measured.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Certainly, it is extreme to postulate that physical reality needs humans to measure it in order to be real.



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Certainly, it is extreme to postulate that physical reality needs humans to measure it in order to be real.

A physical formalism based on the premise that reality is made of information in the form of a code would require a quantum scale mathematical operator capable of actualizing information via measurement.

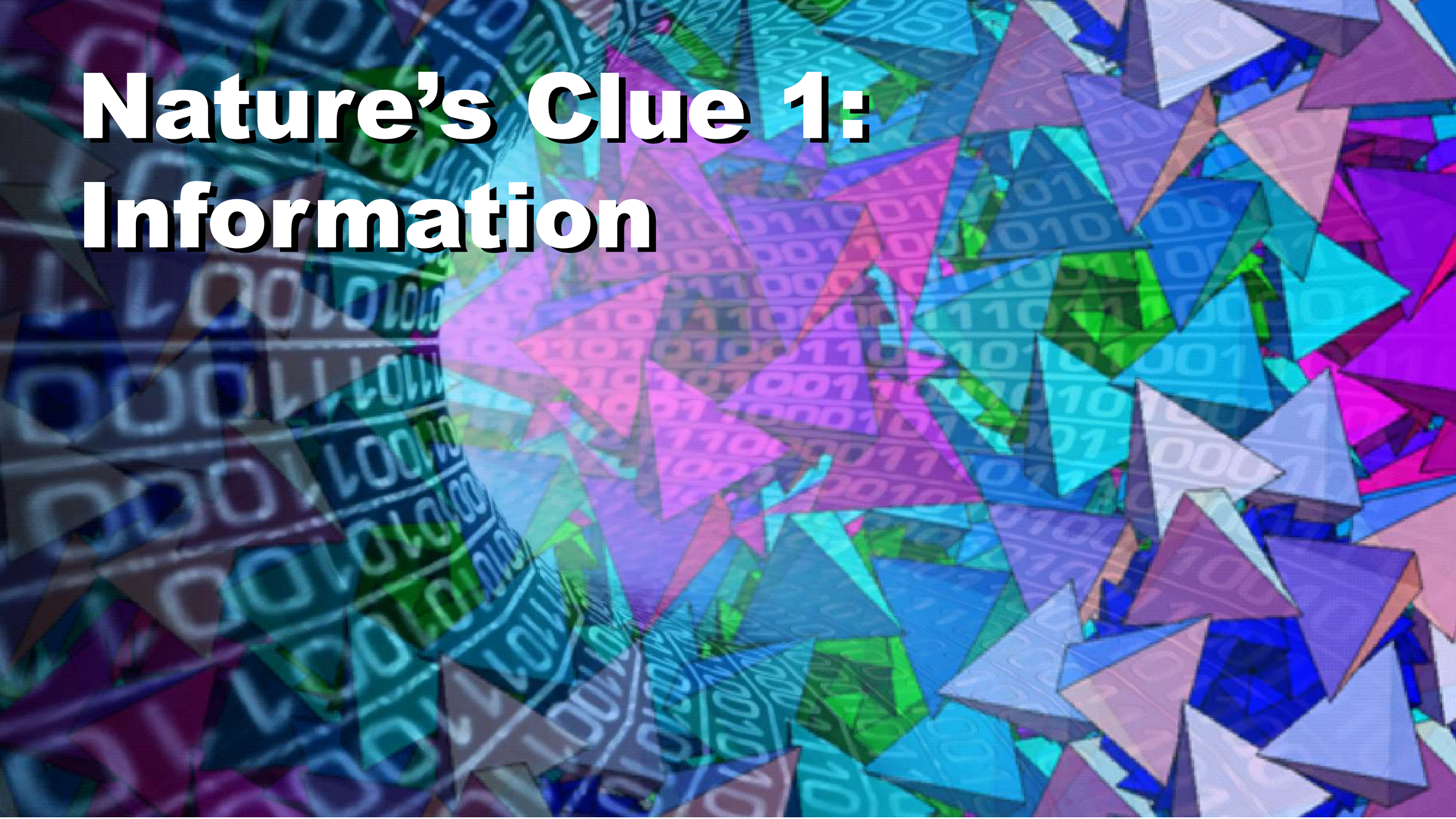


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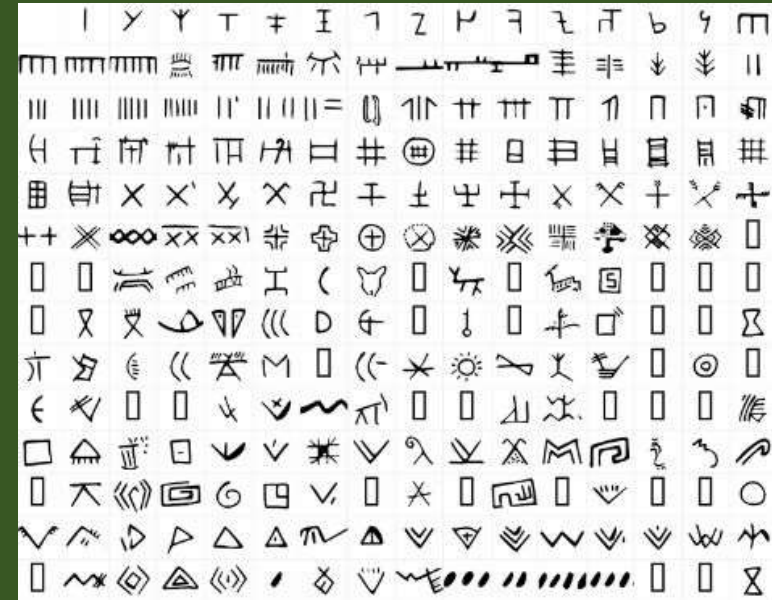
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Nature's Clue 1: Information



Information

Information is meaning in the form of symbolic language.



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Information

For example, the subjective symbols “d-o-g” can represent the meaning of this animal here.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



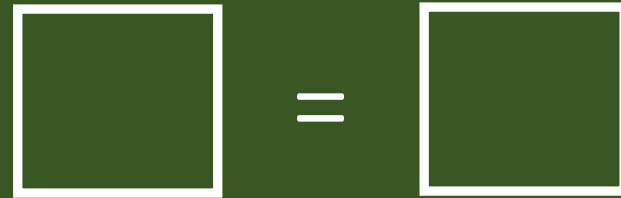
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Information

For example, the subjective symbols “d-o-g” can represent the meaning of this animal here.



Non-subjective geometric symbols represent themselves:



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Information

Reality is geometric.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Information

Reality is geometric.

And both classic and quantum theory indicate reality is made of information.



- Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



QUANTUM
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Information

Reality is geometric.

And both classic and quantum theory indicate reality is made of information.

Geometric symbolism may explain how a geometric reality can be made of information.



- Information
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Information

Perhaps a mosaic-like language of 3D geometric symbols could express the meaning of a geometric reality like ours.

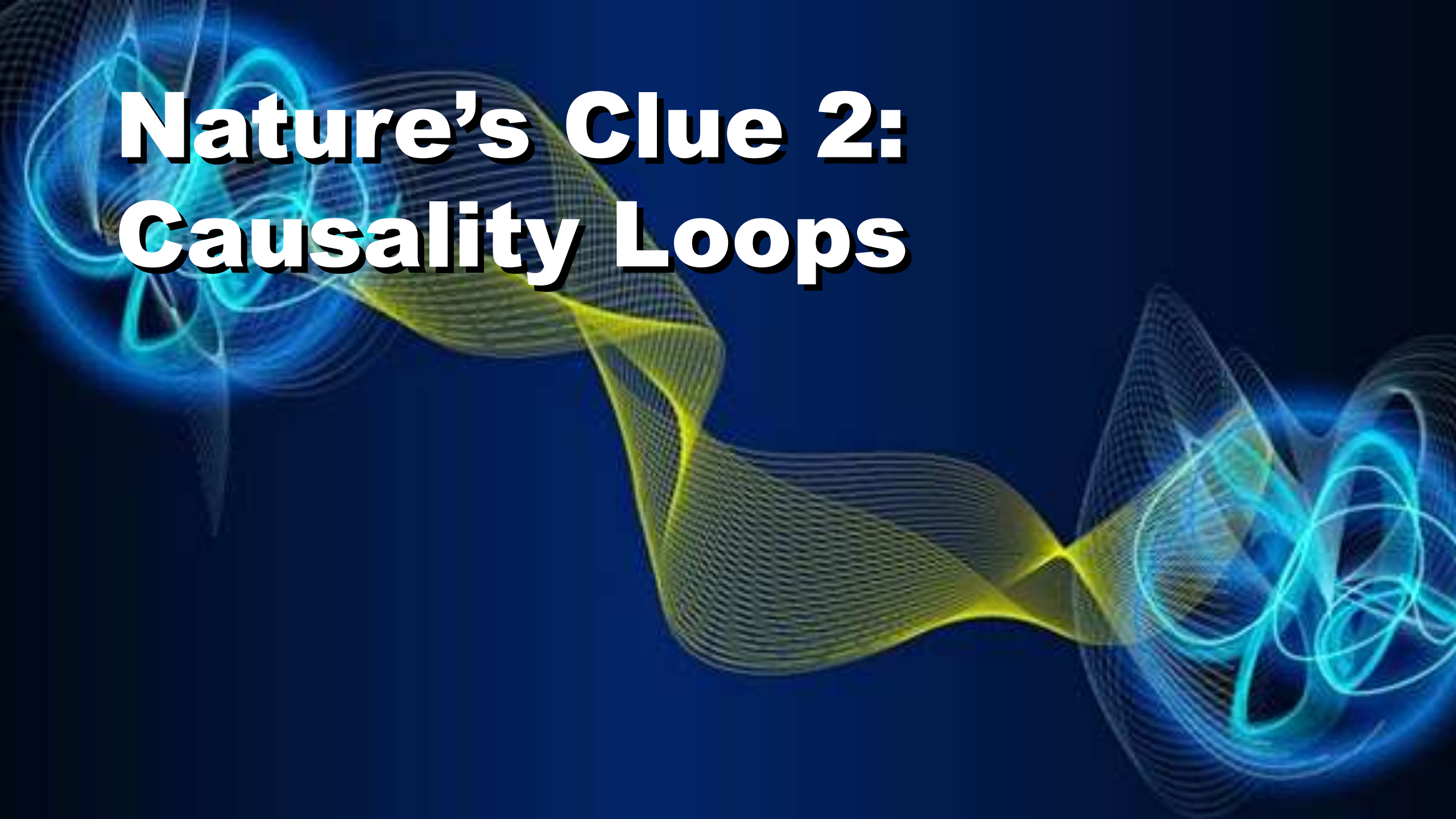


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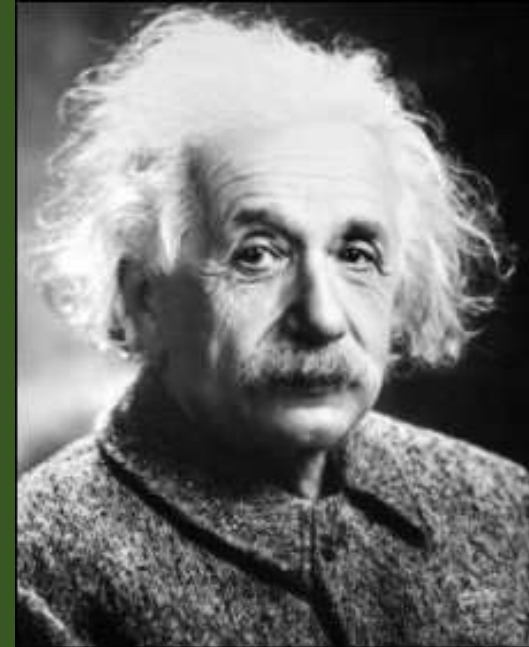
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Nature's Clue 2: Causality Loops

The background features a dark blue field with intricate, glowing patterns. On the left and right sides, there are clusters of bright blue, swirling lines that resemble complex, interconnected loops or orbits. A prominent, wavy band of yellow-green light stretches across the center, connecting these blue clusters. The overall aesthetic is futuristic and scientific, suggesting themes of quantum mechanics, complex systems, or causal relationships.

Causality Loops

Einstein showed how the future and past exist *simultaneously* in one geometric object.



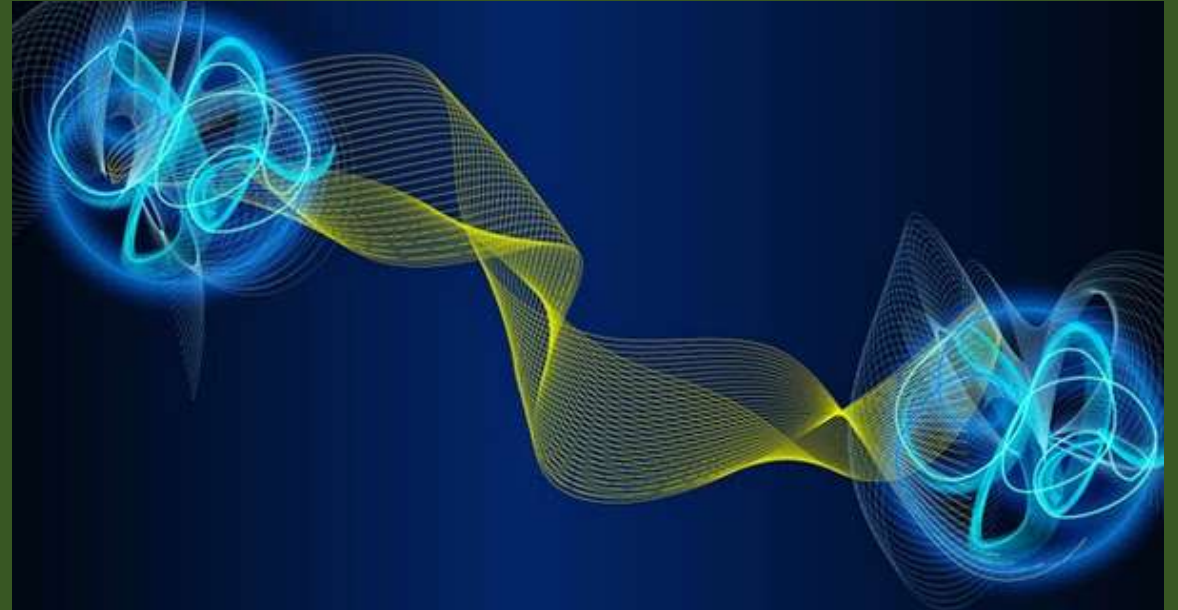
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Causality Loops

In 2014, scientists in Israel demonstrated that particles can be entangled over time and not just space.



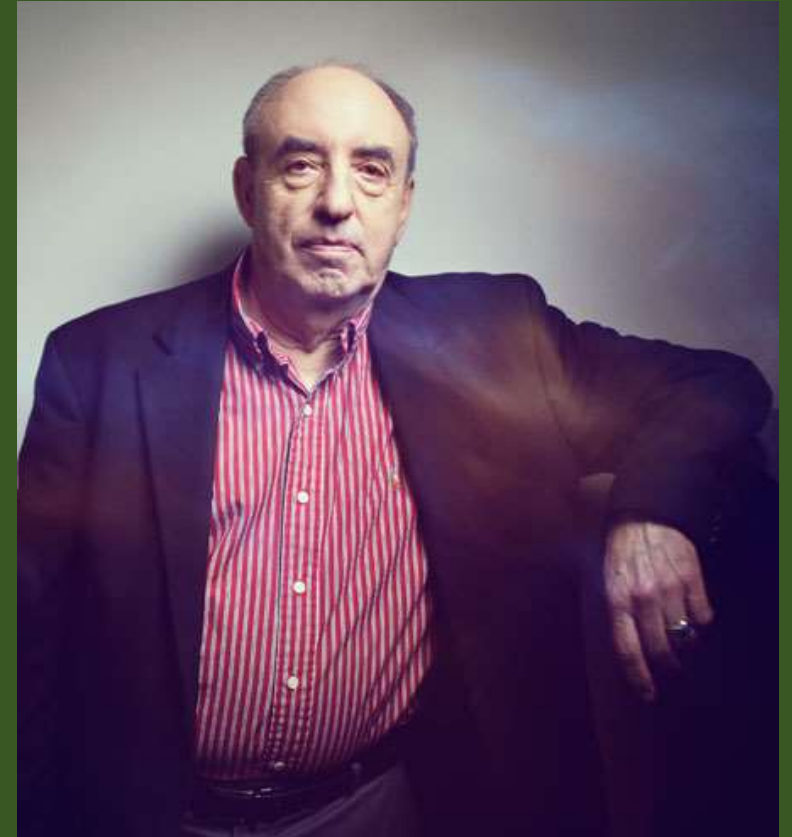
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Causality Loops

Daryl Bem of Cornell published rigorous evidence that retro-causality exists, where future events loop back in time to co-create past events.



- Information
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Causality Loops

Obviously, the past co-creates the future.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Causality Loops

Obviously, the past co-creates the future.

But what happens when the future also co-creates the past?



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Causality Loops

Obviously, the past co-creates the future.

But what happens when the future also co-creates the past?

An evolving feedback loop results.



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Causality Loops

Like the feedback between two mirrors.



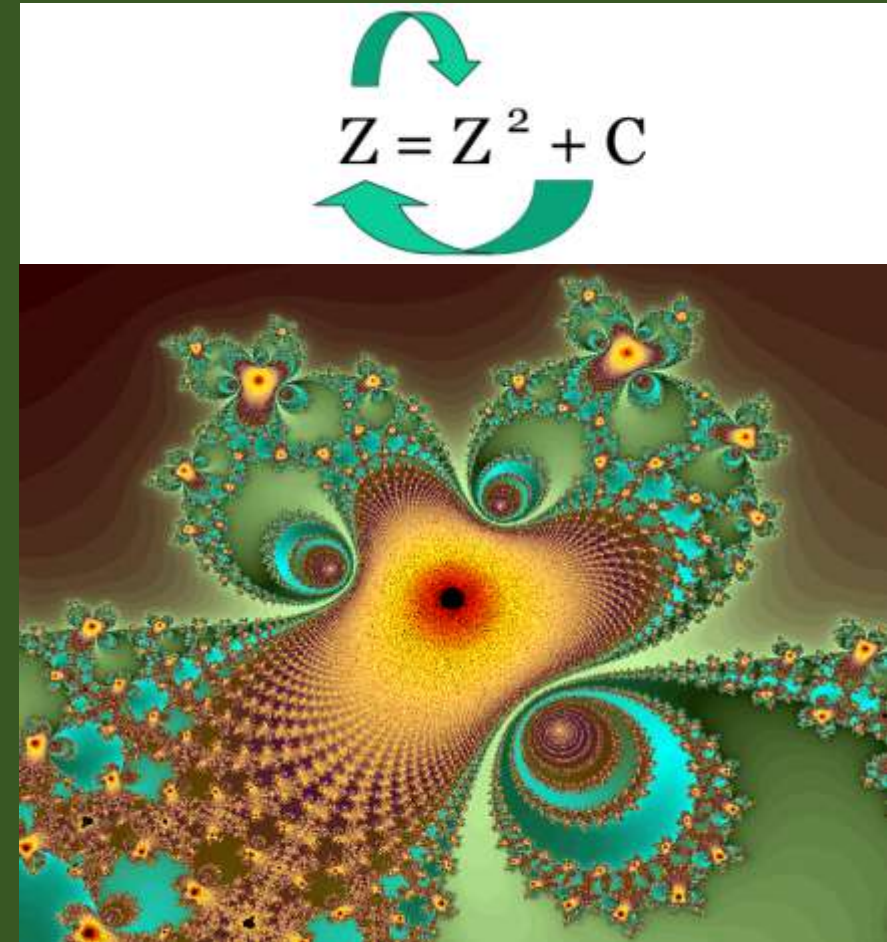
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Causality Loops

Or the mathematical feedback loop called a fractal.



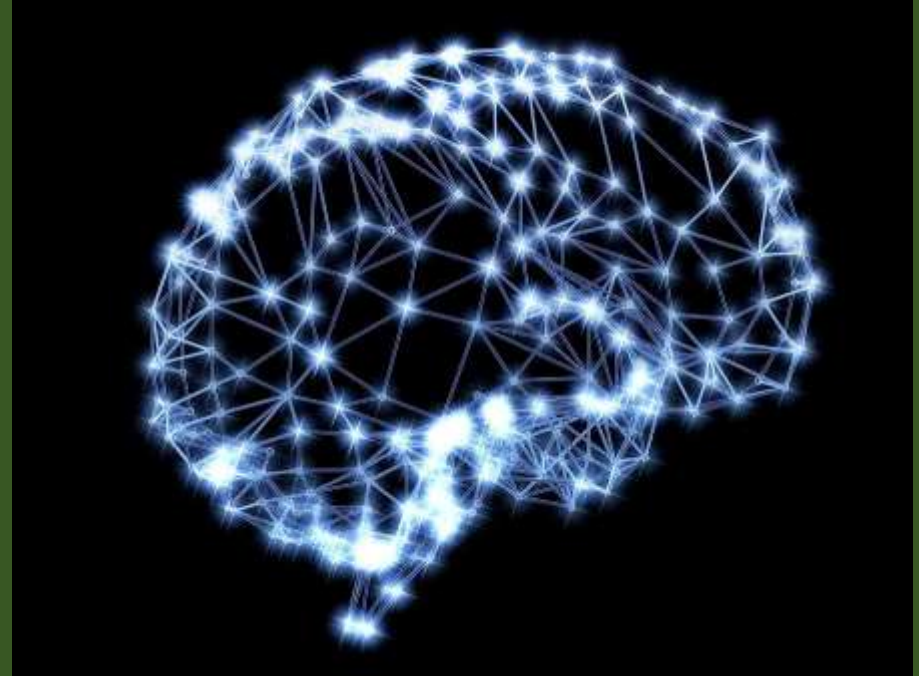
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Causality Loops

If every moment is co-creating every other moment both forward and backward in time...



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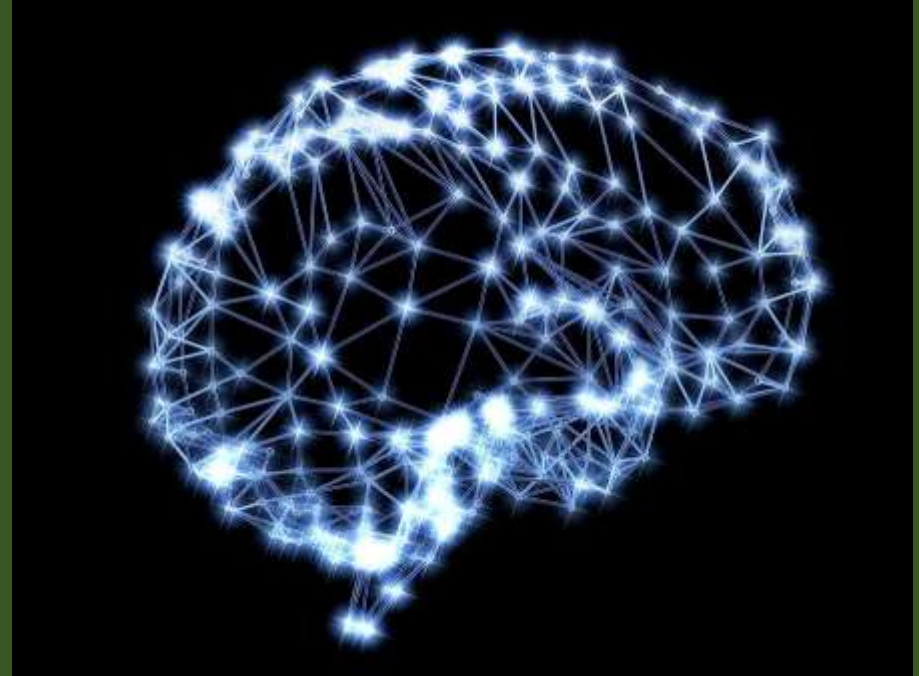


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Causality Loops

If every moment is co-creating every other moment both forward and backward in time...

...reality is technically a neural network of information spanning space and time.



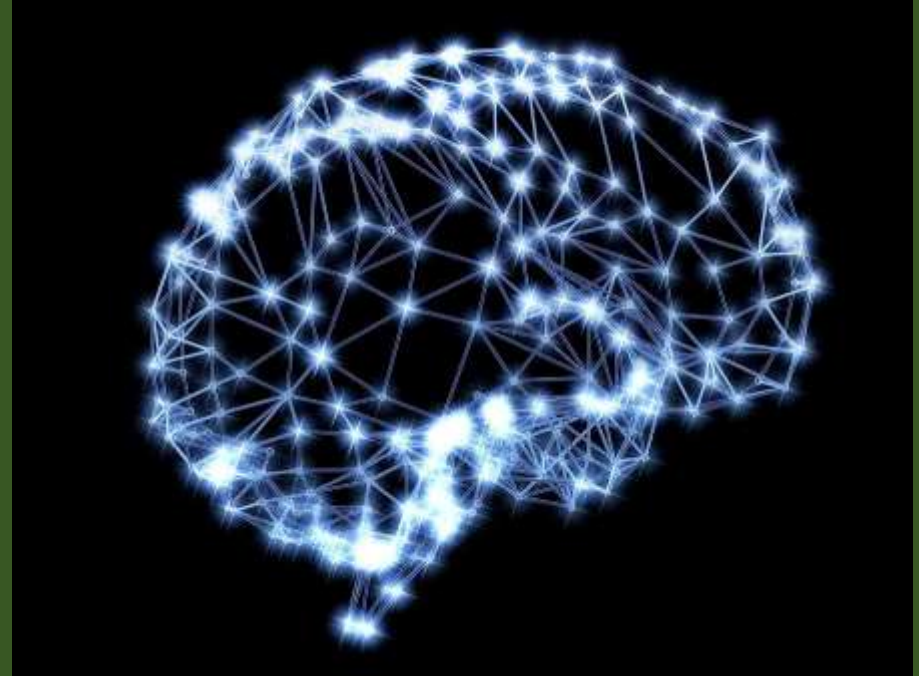
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Causality Loops

This type of network would possess a strange quality...



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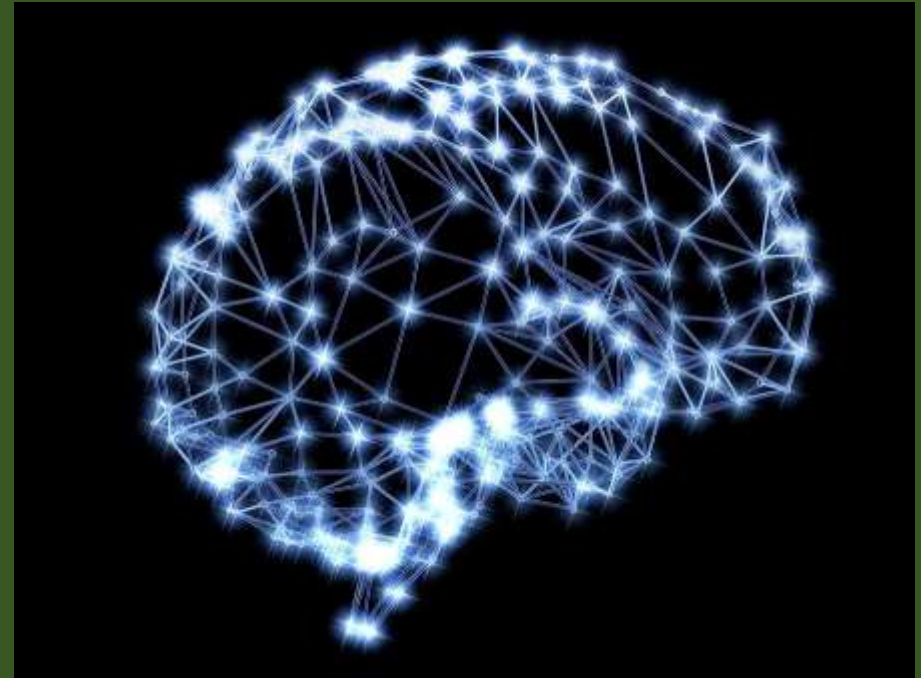


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Causality Loops

This type of network would possess a strange quality...

...it would be self-actualized – its own creator.



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Nature's Clue 3: Non-determinism



Non-determinism

Prior to the 1920s it was popular to believe in the clock-work universe idea of reality being a deterministic program playing itself out.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Non-determinism

Prior to the 1920s it was popular to believe in the clock-work universe idea of reality being a deterministic program playing itself out.

In that view, this fish didn't choose to jump. It was just following a deterministic algorithm.



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Non-determinism

The famous double-slit experiment ruled out determinism, ushering in the new paradigm of quantum indeterminism.



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Non-determinism

But even without the double slit experiment, the existence of freewill rules out the clock-work universe theory.

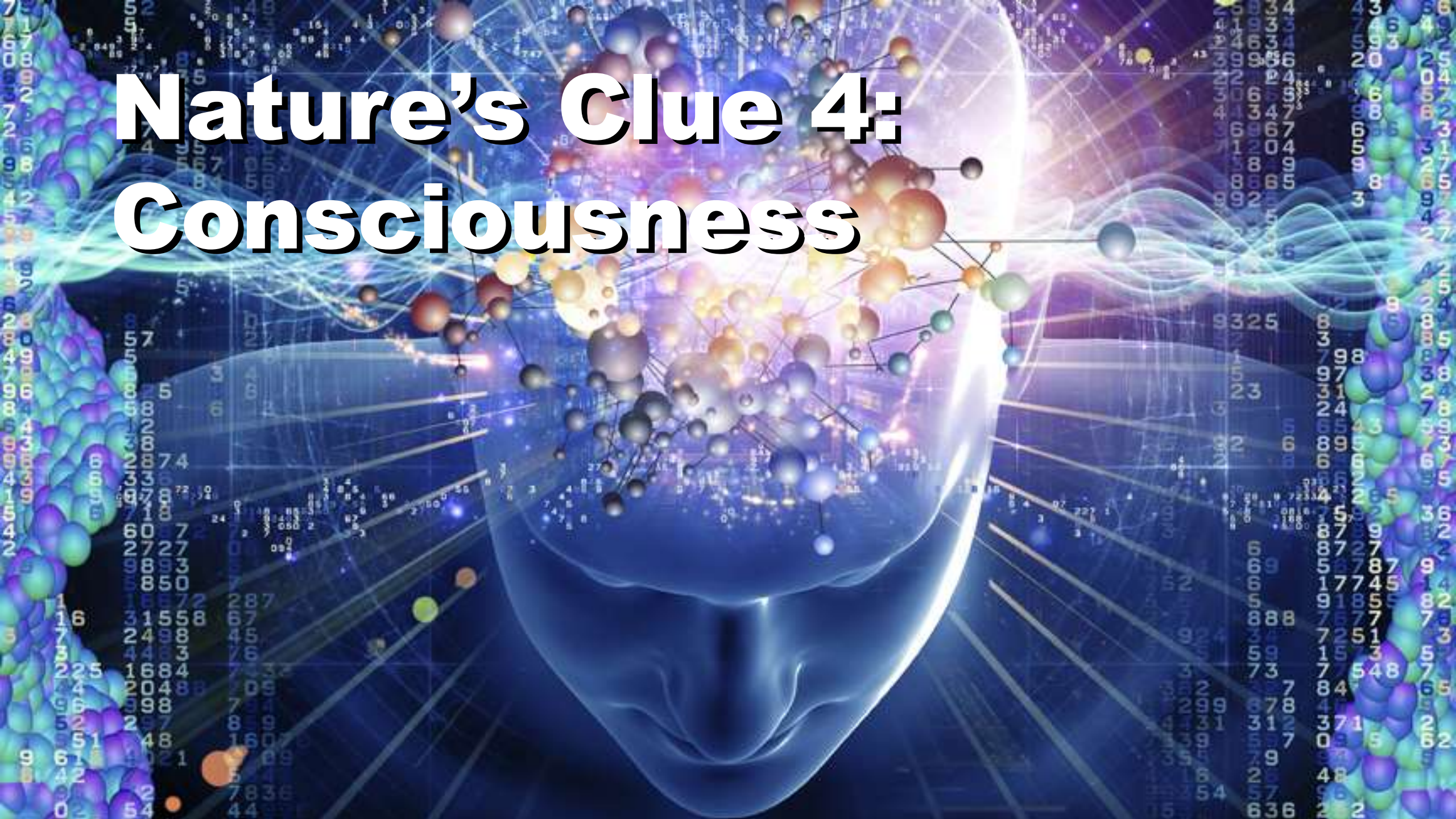


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Nature's Clue 4: Consciousness



Consciousness

John Wheeler, who coined the term *black hole*, said reality is made of information created by observation – by consciousness.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Consciousness

It certainly exists in the universe -
at least in us.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Consciousness

It certainly exists in the universe -
at least in us.

And relates deeply to quantum
mechanics in ways not yet fully
understood.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Consciousness

The definition of *information* involves the perception of *meaning*, and meaning is a subjective, freewill choice – an act of consciousness.



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Consciousness

So when one realizes that energy is pure information, it becomes clear that reality itself deeply ties into consciousness in some way...



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Consciousness

So when one realizes that energy is pure information, it becomes clear that reality itself deeply ties into consciousness in some way...

...as though the fundamental stuff of reality is somehow consciousness.



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Consciousness

Did consciousness and information emerge in a causality feedback loop?



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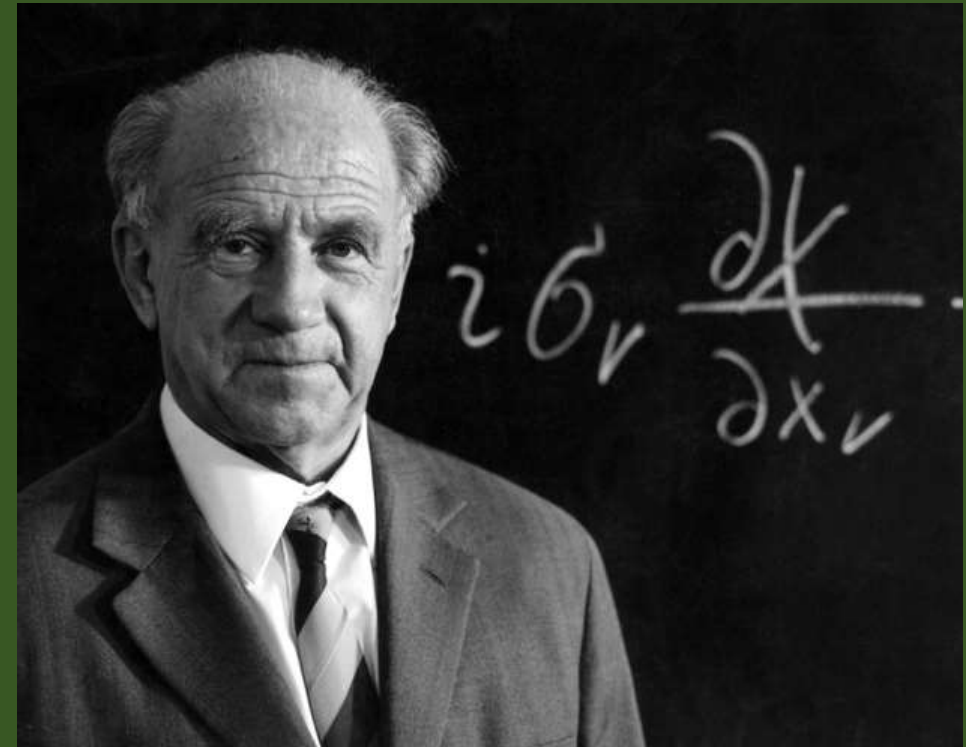
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Nature's Clue 5: Pixelation



Pixelation

Werner Heisenberg deduced space and time are pixelated into indivisible Planck units, like a mosaic.



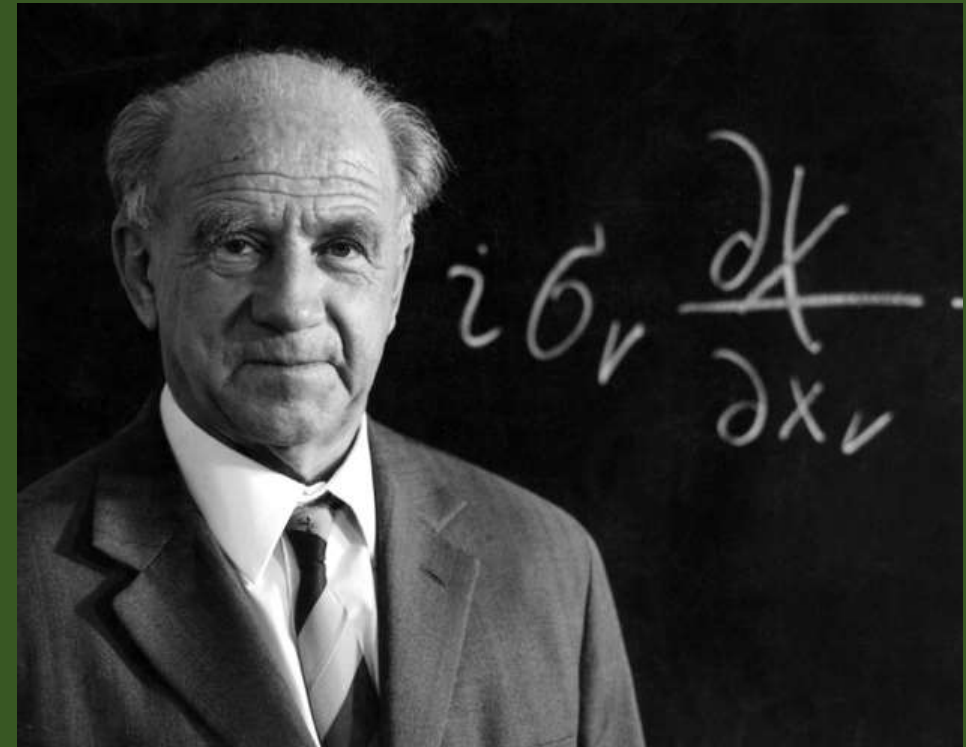
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Pixelation

The mathematics indicated this ...



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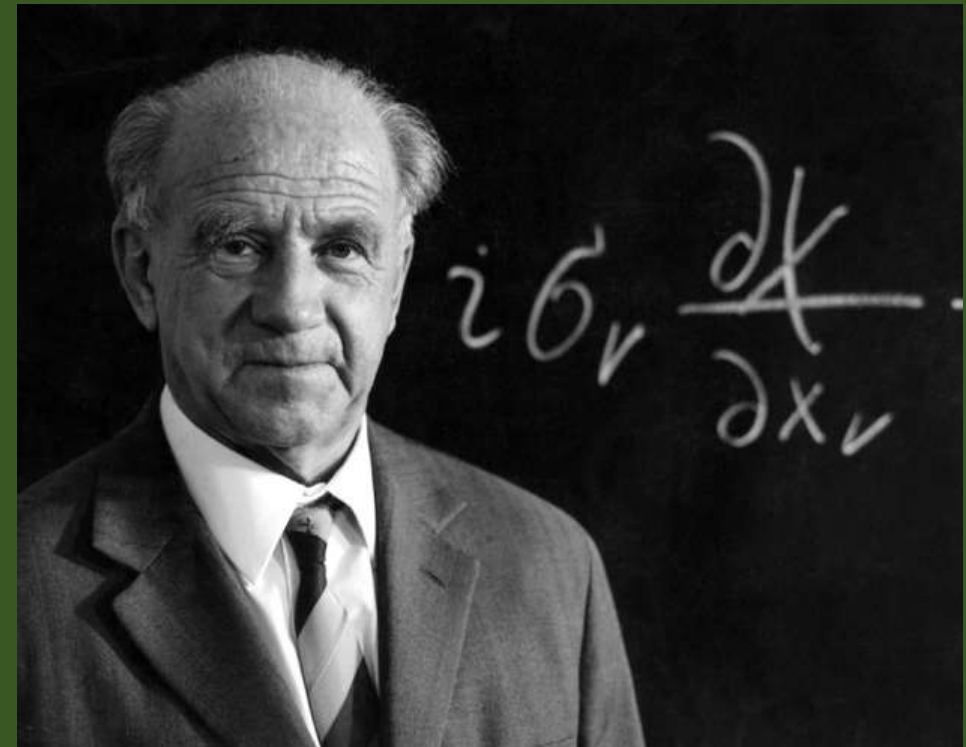


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Pixelation

The mathematics indicated this ...

...and there was no solid experimental evidence for smooth space or time.



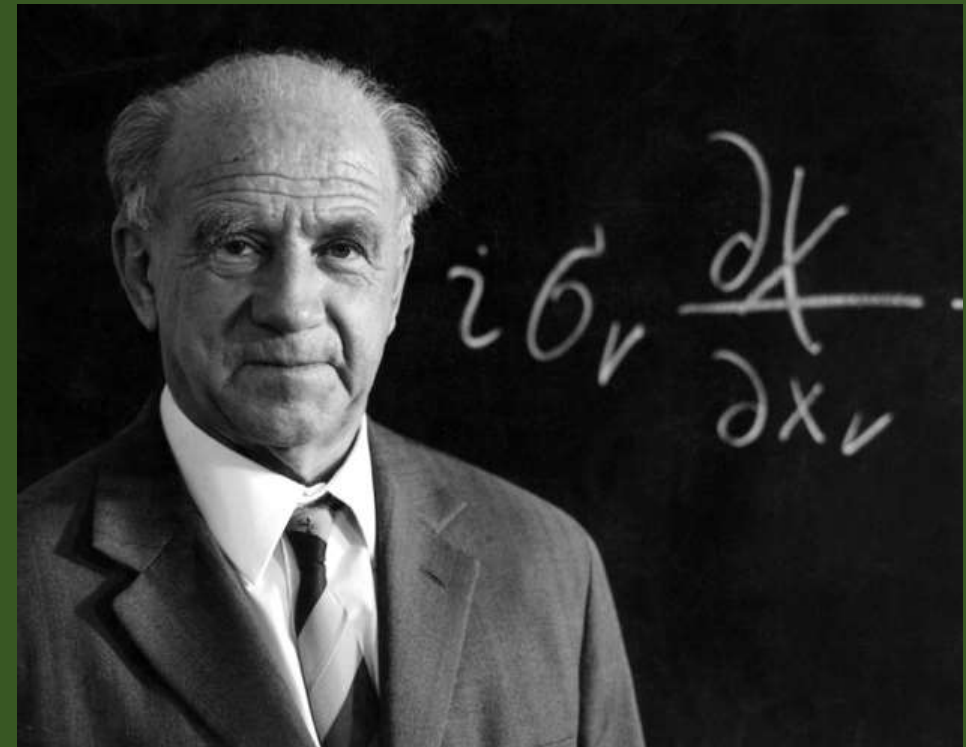
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Pixelation

However, this new idea was too radical for most scientists of the day except for Niels Bohr, who agreed with Heisenberg.



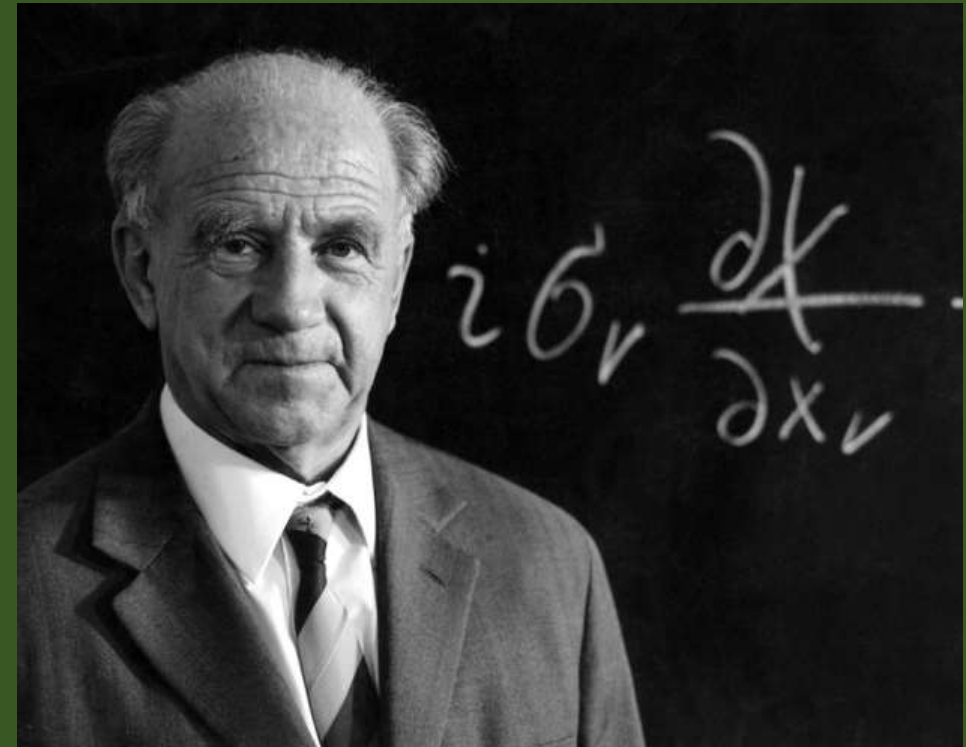
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Pixelation

Today, most scientists agree that a length can be no shorter than the Planck length – which suggest reality is pixelated.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Pixelation

What type of binary geometric code would describe a pixelated mosaic-like reality?



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Nature's Clue 6: E8 Crystal



E8 Crystal

The largest and most expensive object humans have ever built is the Large Hadron Collider in Geneva, Switzerland.



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E8 Crystal

What is it?



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E8 Crystal

What is it?

A microscope.



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E8 Crystal

What is it?

A microscope.

It peers down into the subatomic realm by colliding particles together and giving us data on how they break apart.



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E8 Crystal

So what have we learned from 80 years of smashing particles together?



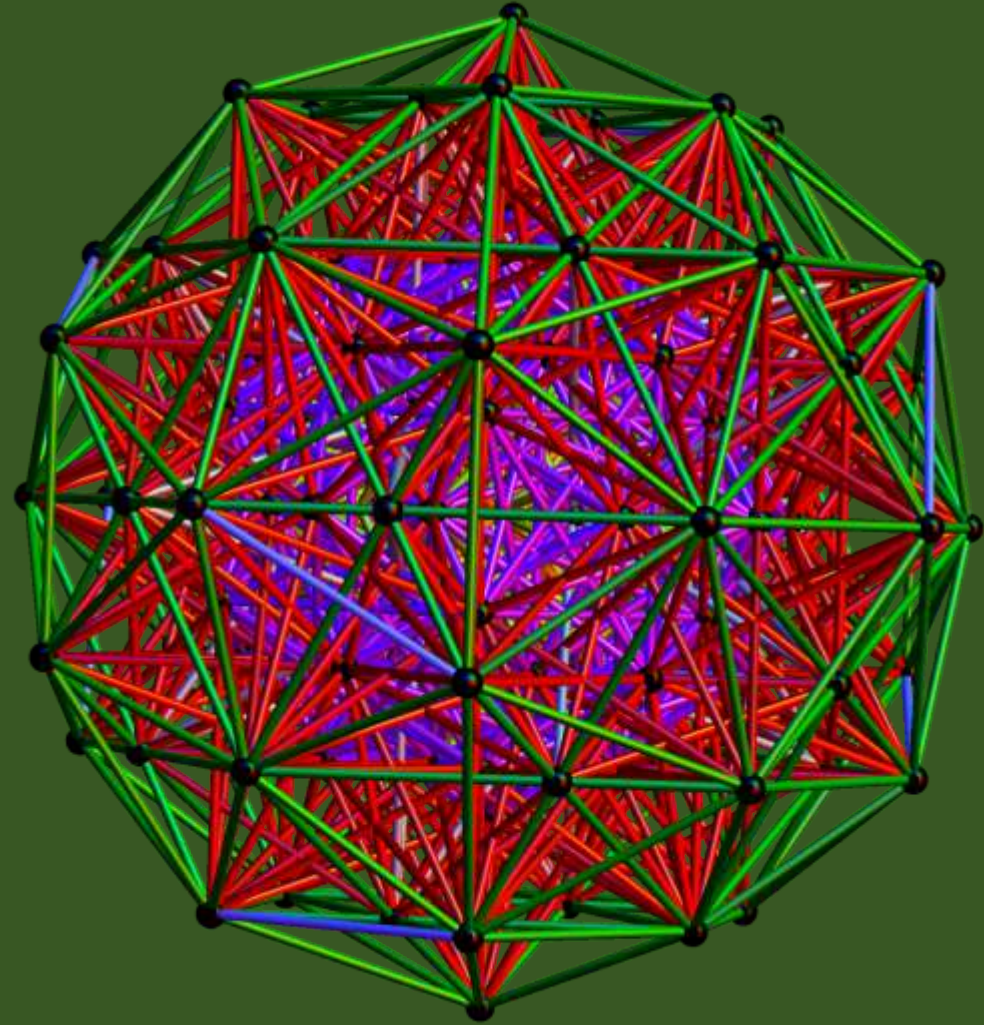
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E8 Crystal

We learned that all fundamental particles and forces, including gravity, convert into one another according to the geometry of a shape related to an 8-dimensional Platonic solid.



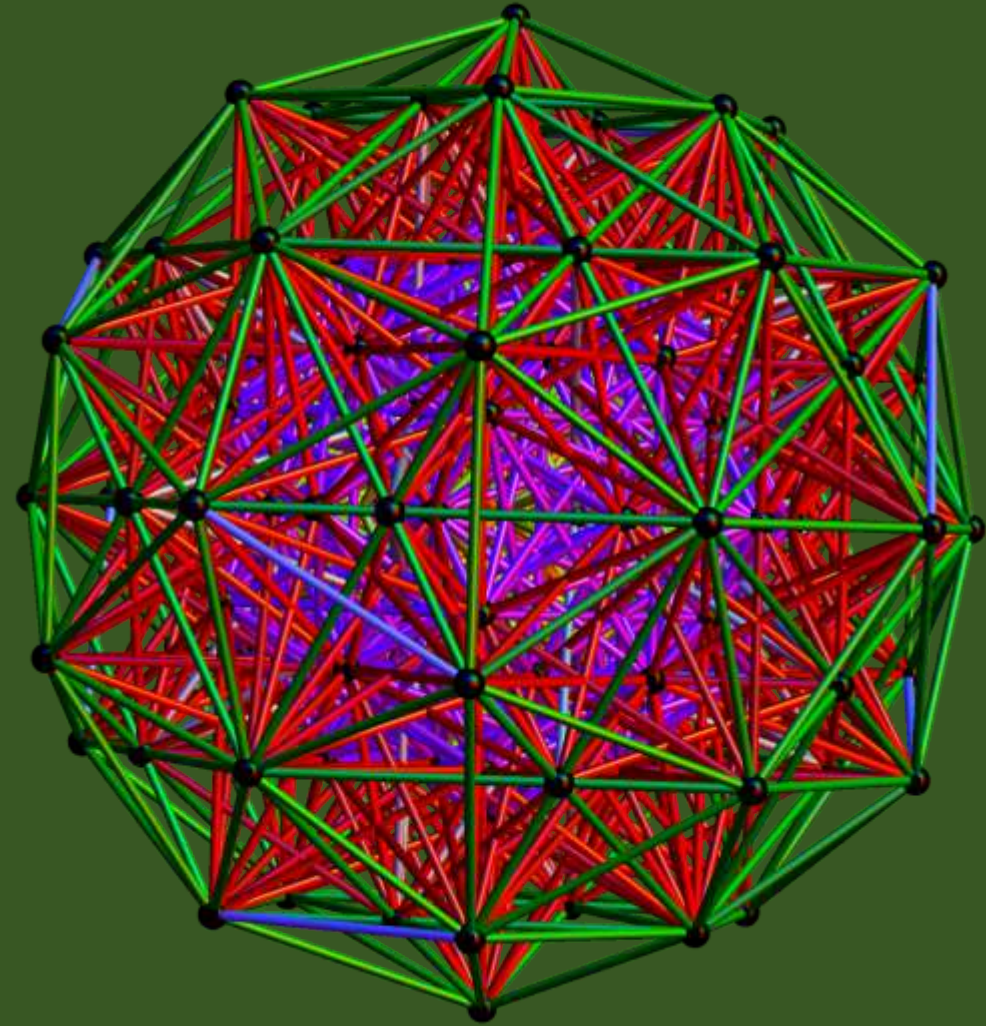
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E8 Crystal

It forms a crystal structure in eight dimensions called the E8 lattice.



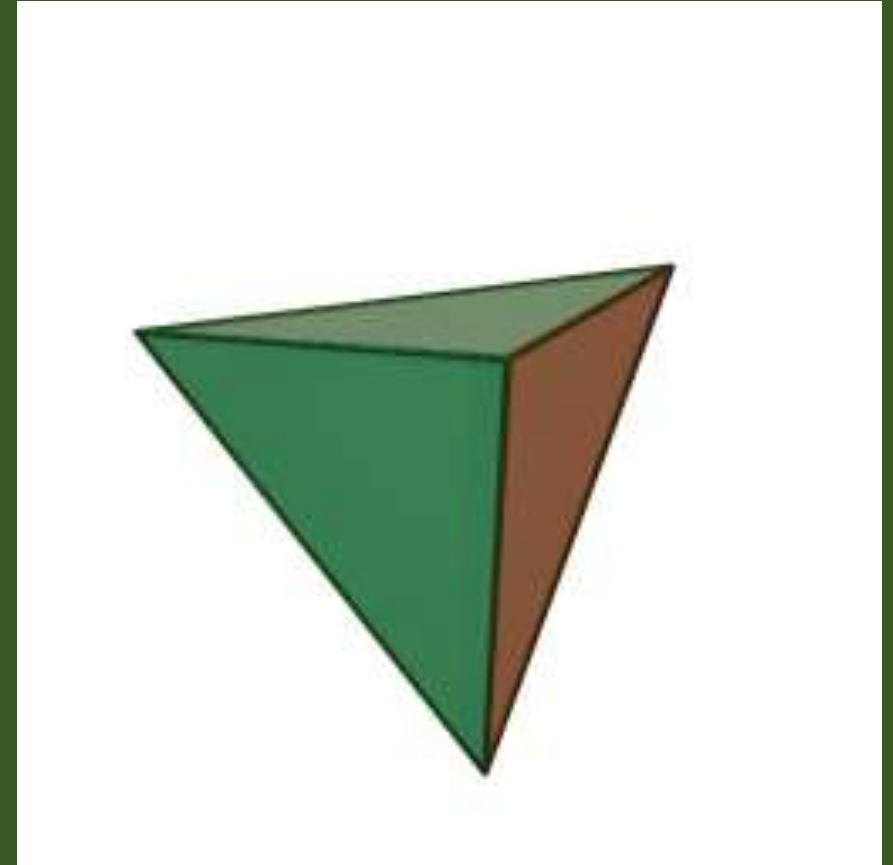
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E8 Crystal

It can be built entirely from regular tetrahedra...



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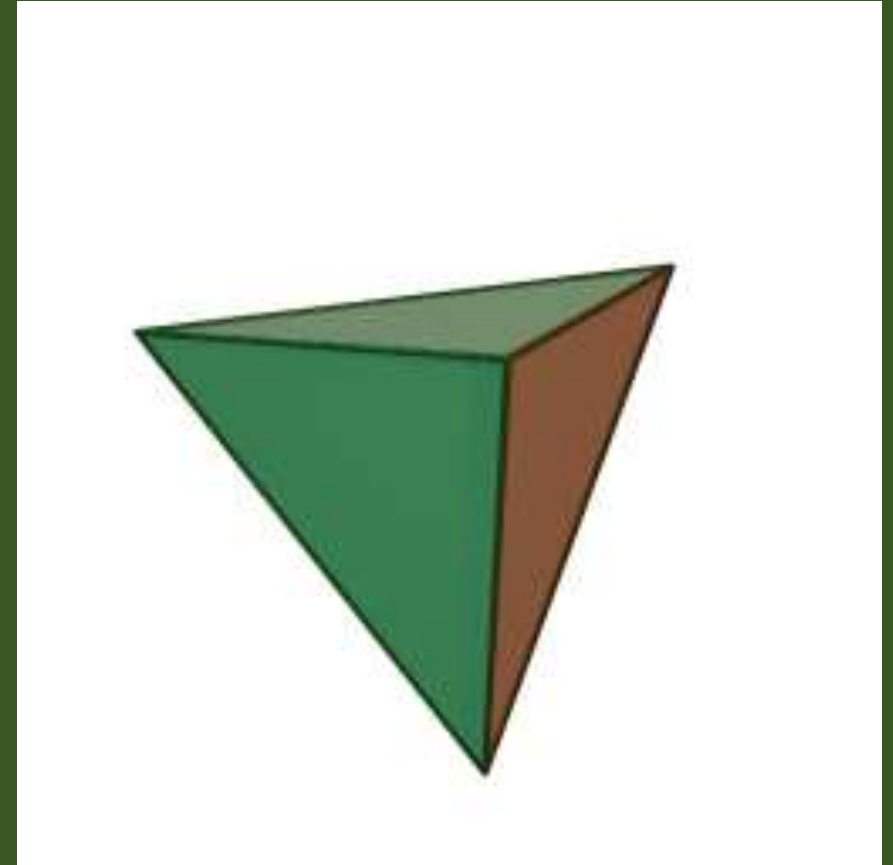


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E8 Crystal

It can be built entirely from regular tetrahedra...

...rotated from one another into higher dimensions by a golden ratio based angle.



- Information
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- Non-determinism
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- E8 Crystal
- Golden Ratio



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Nature's Clue 7: Golden Ratio



Golden Ratio

The golden ratio may be the fundamental constant of nature.

Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Golden Ratio

Along with its rational form, called the Fibonacci sequence, it is ubiquitous in the universe, from quantum to celestial scales.

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Golden Ratio

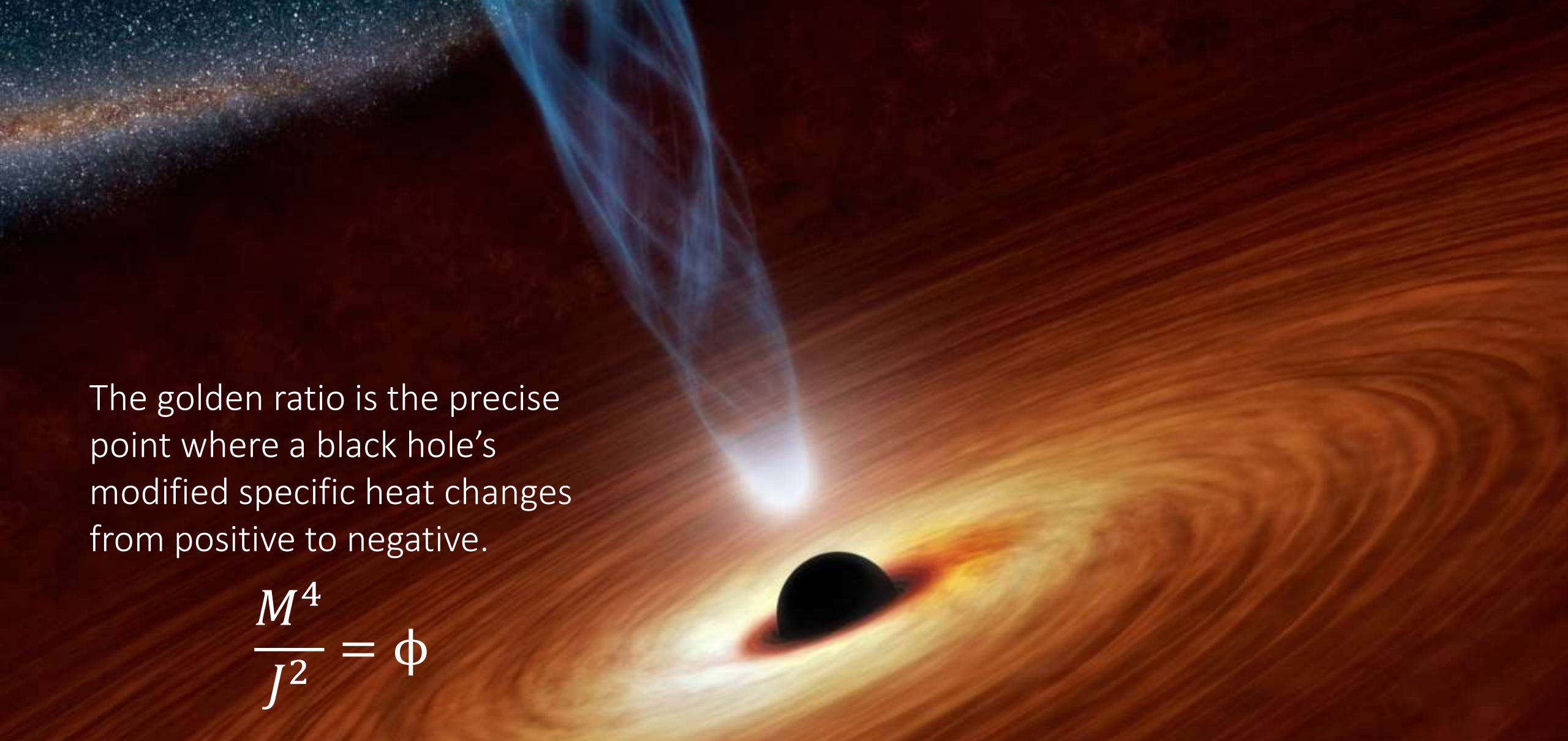
Along with its rational form, called the Fibonacci sequence, it is ubiquitous in the universe, from quantum to celestial scales.

Let's explore a few examples that are just the tip of the iceberg, starting with black holes.

Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



QUANTUM
GRAVITY RESEARCH

A black hole is depicted with a glowing accretion disk and a blue jet of light. The background shows a galaxy and a dark sky.

The golden ratio is the precise point where a black hole's modified specific heat changes from positive to negative.

$$\frac{M^4}{J^2} = \phi$$



QUANTUM
GRAVITY RESEARCH

And it is part of the equation for the lower bound on black hole entropy.

$$e^{\frac{8\pi S l_p^2}{kA}} \geq \phi$$

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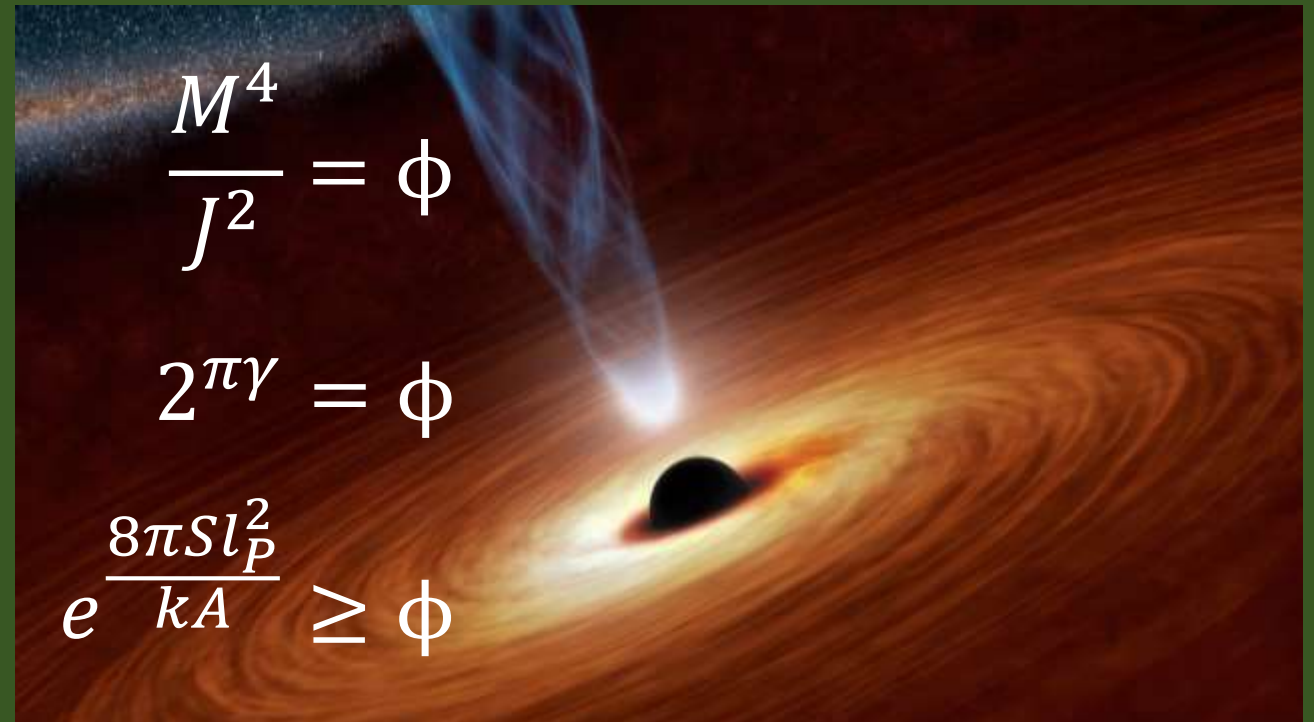
The golden ratio even relates the loop quantum gravity parameter to black hole entropy.

$$2^{\pi\gamma} = \phi$$



Golden Ratio

Why does this support the claim that it is the fundamental constant of nature?



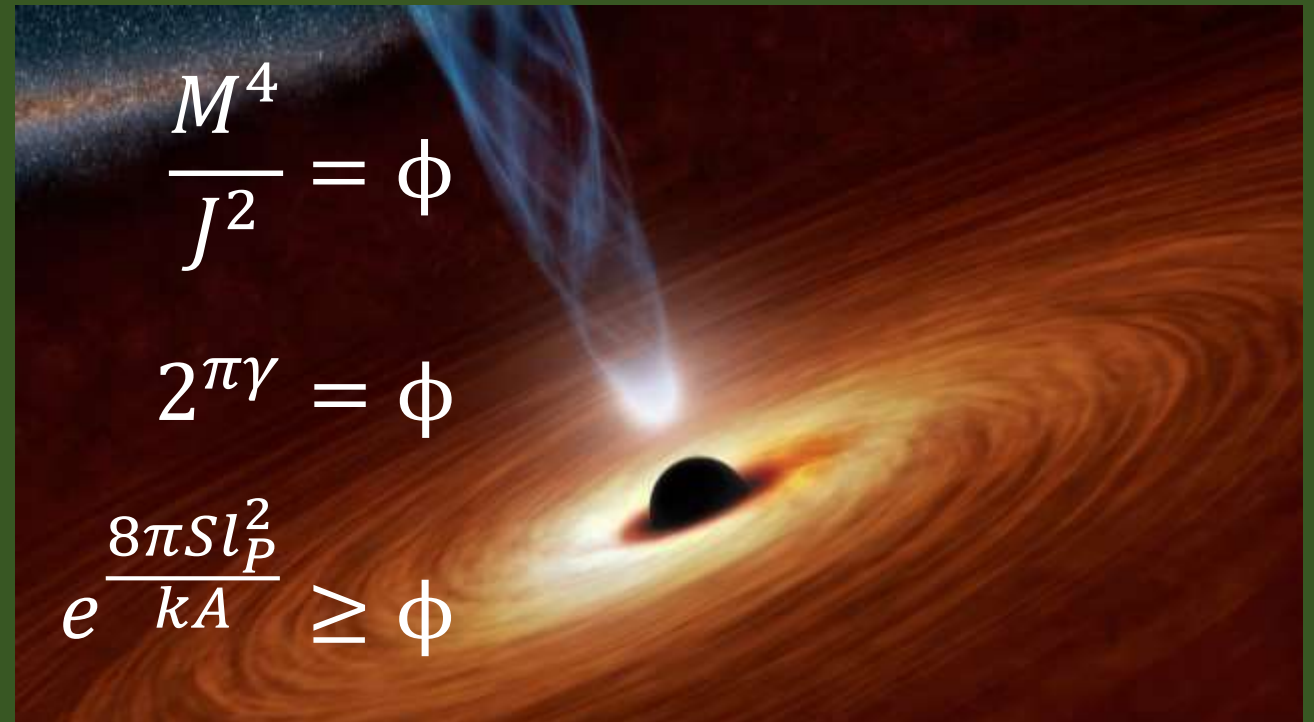
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Golden Ratio

Because a theory of everything must unite general relativity (the theory of space and time) with quantum mechanics.



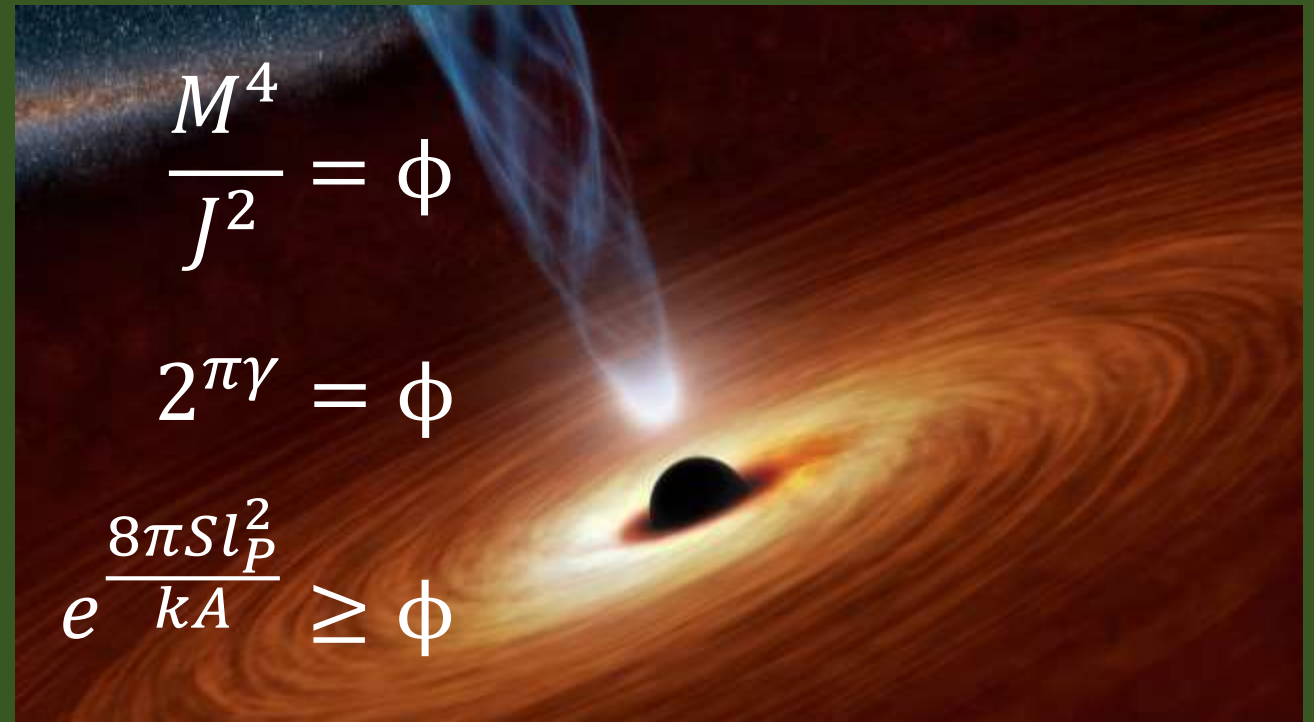
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Golden Ratio

And a black hole is where these two theories converge.



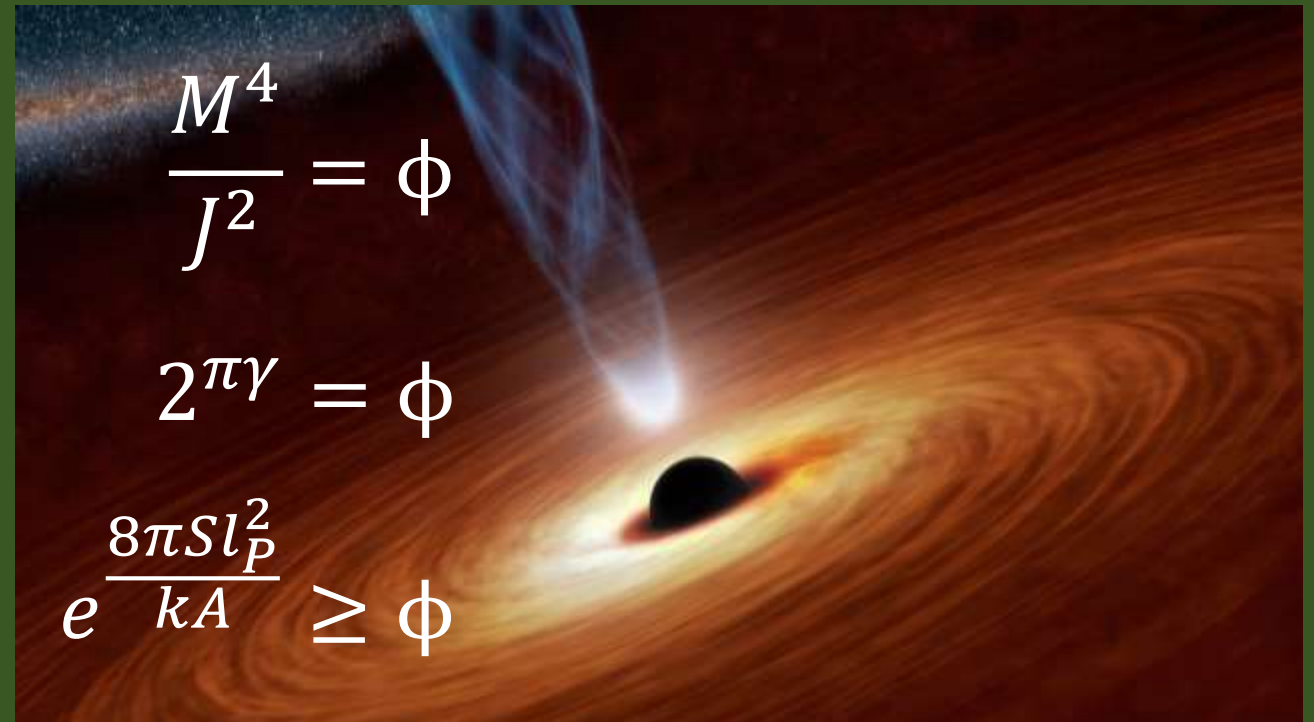
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Golden Ratio

In the case of general relativity, black holes are the maximum possible density of mass/energy.



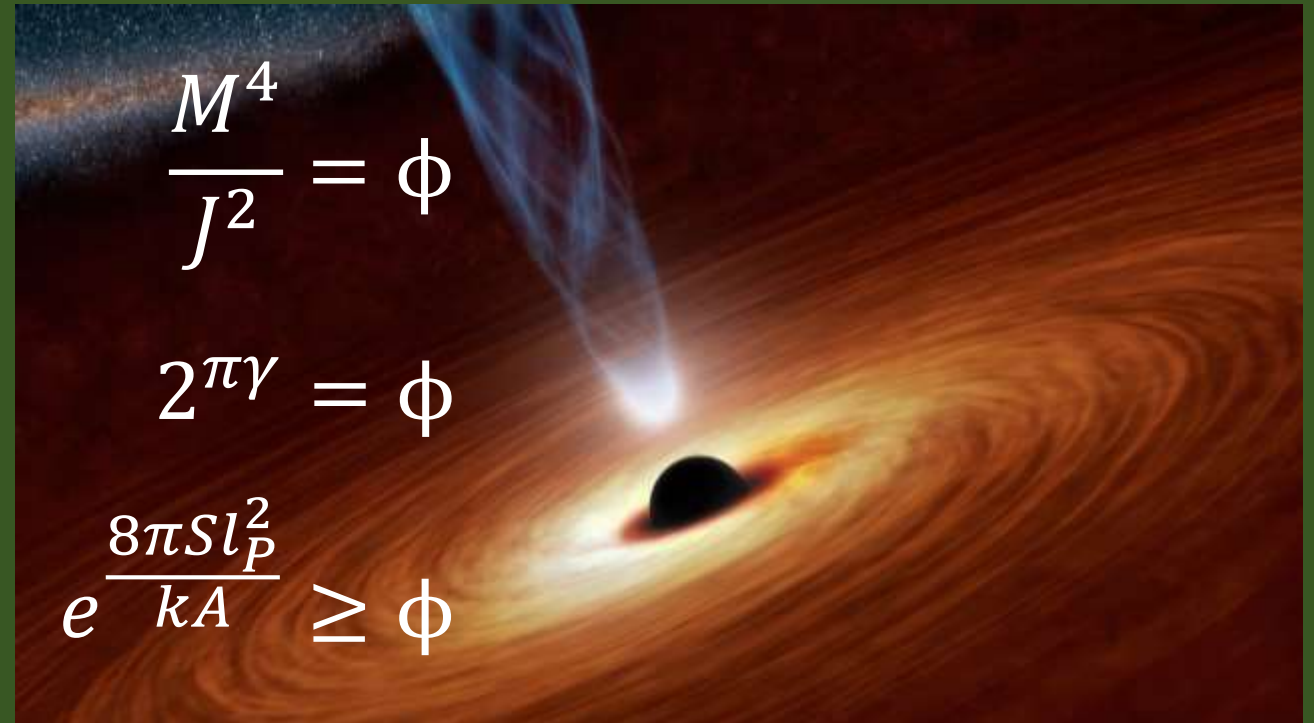
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Golden Ratio

And it's where we learn something important.



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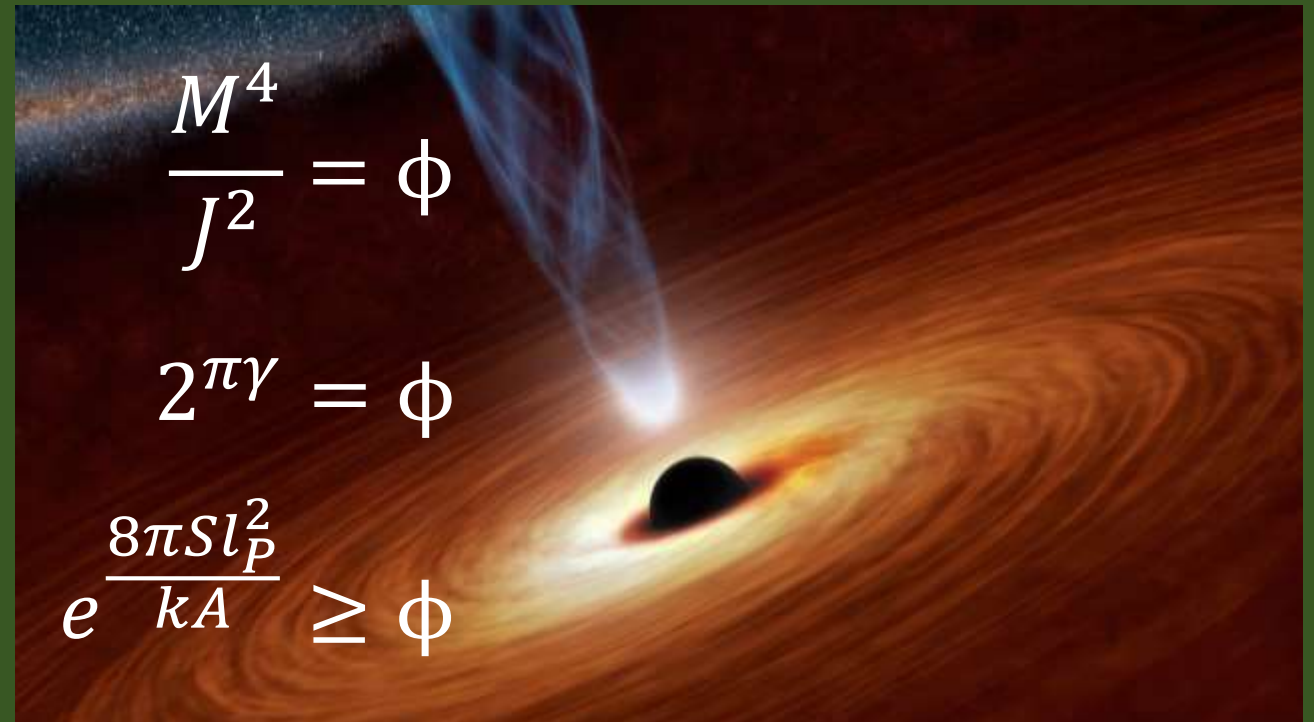


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Golden Ratio

And it's where we learn something important.

Reality appears to be made of binary information.



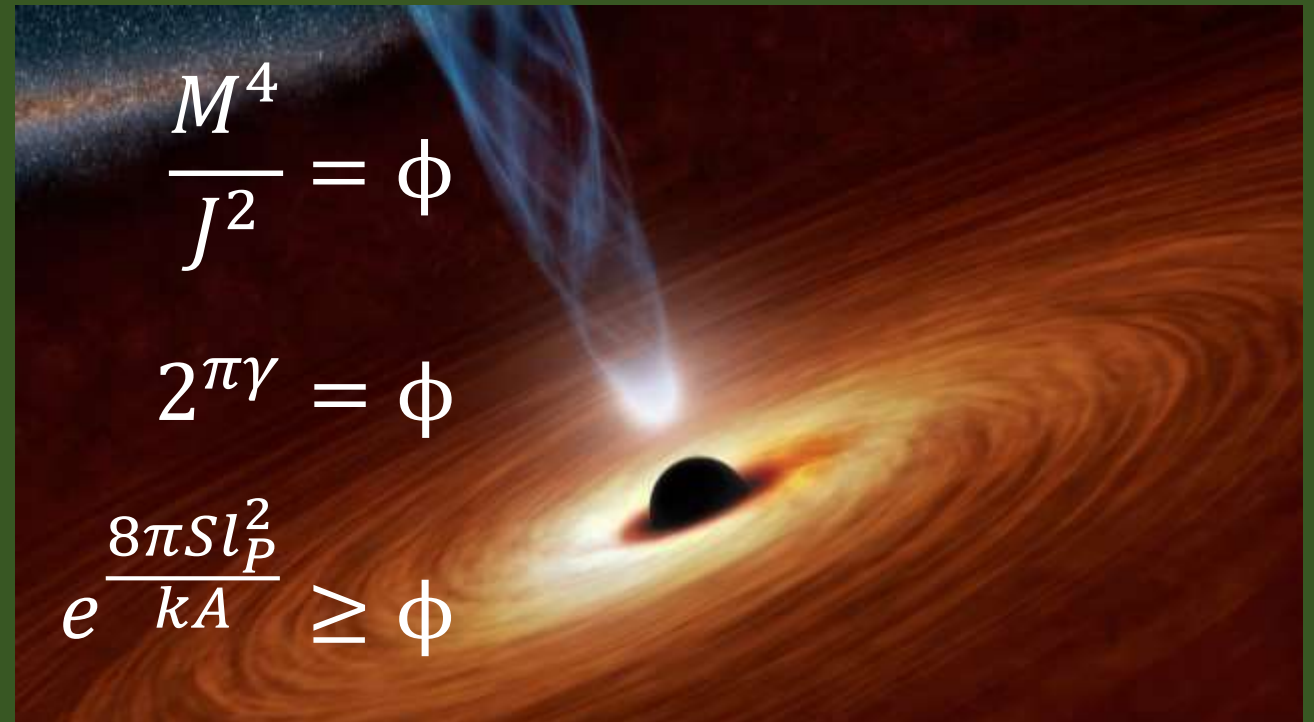
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Golden Ratio

The idea is known as the *holographic principle*...



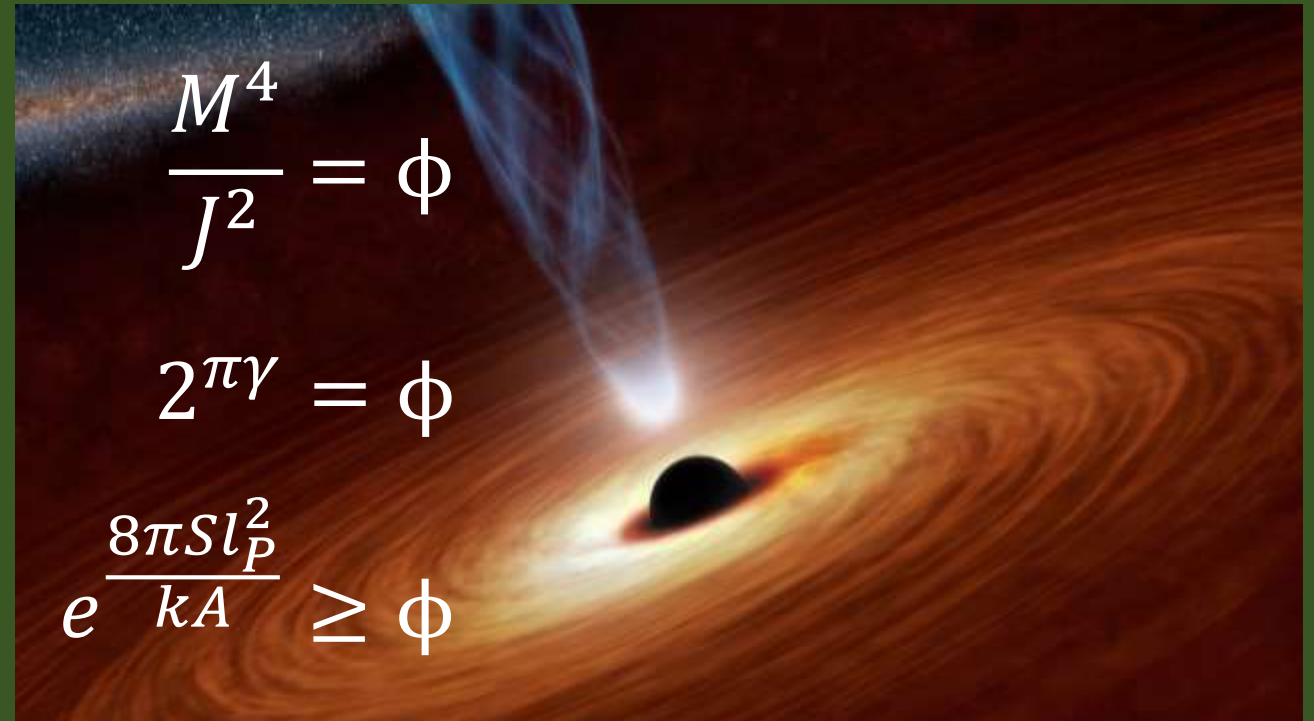
- Information
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Golden Ratio

The idea is known as the *holographic principle*...

...and it comes from a mathematical proof called the *Maldacena conjecture*.



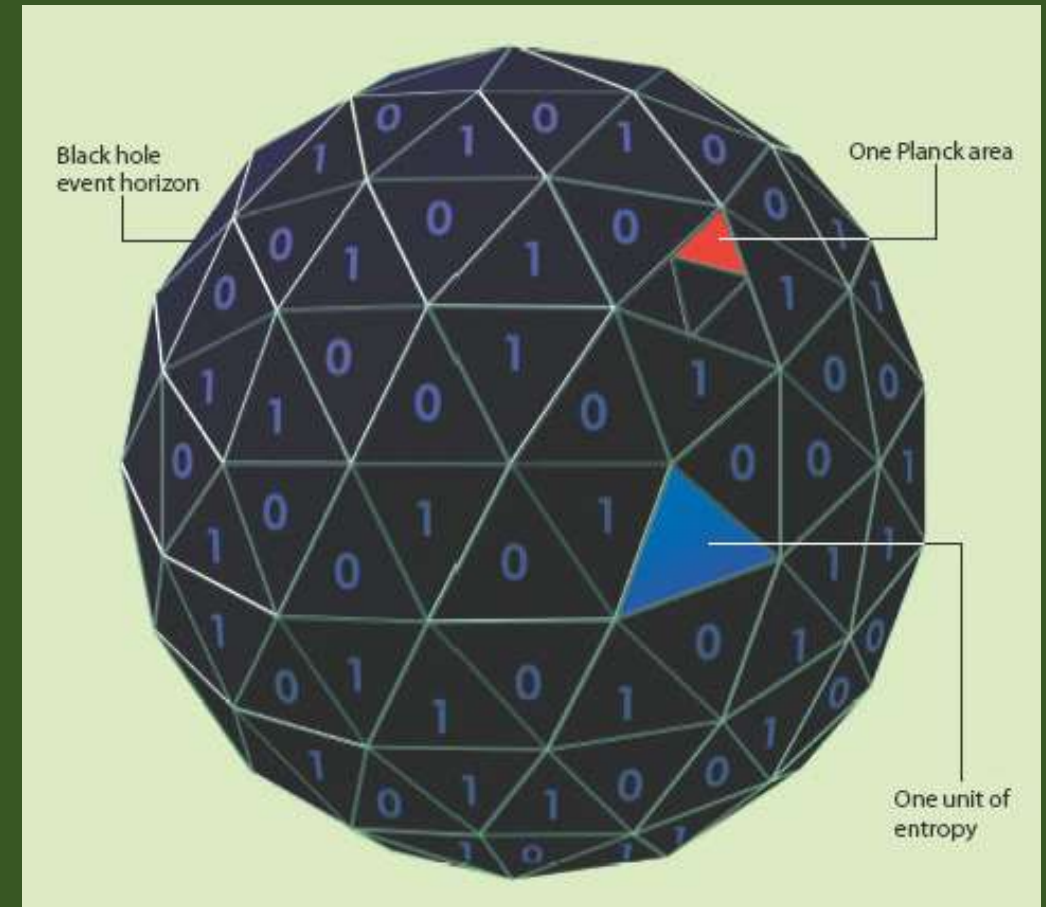
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Golden Ratio

It states that the total amount of binary information from all the mass and energy pulled into a black hole is proportional to its surface area...



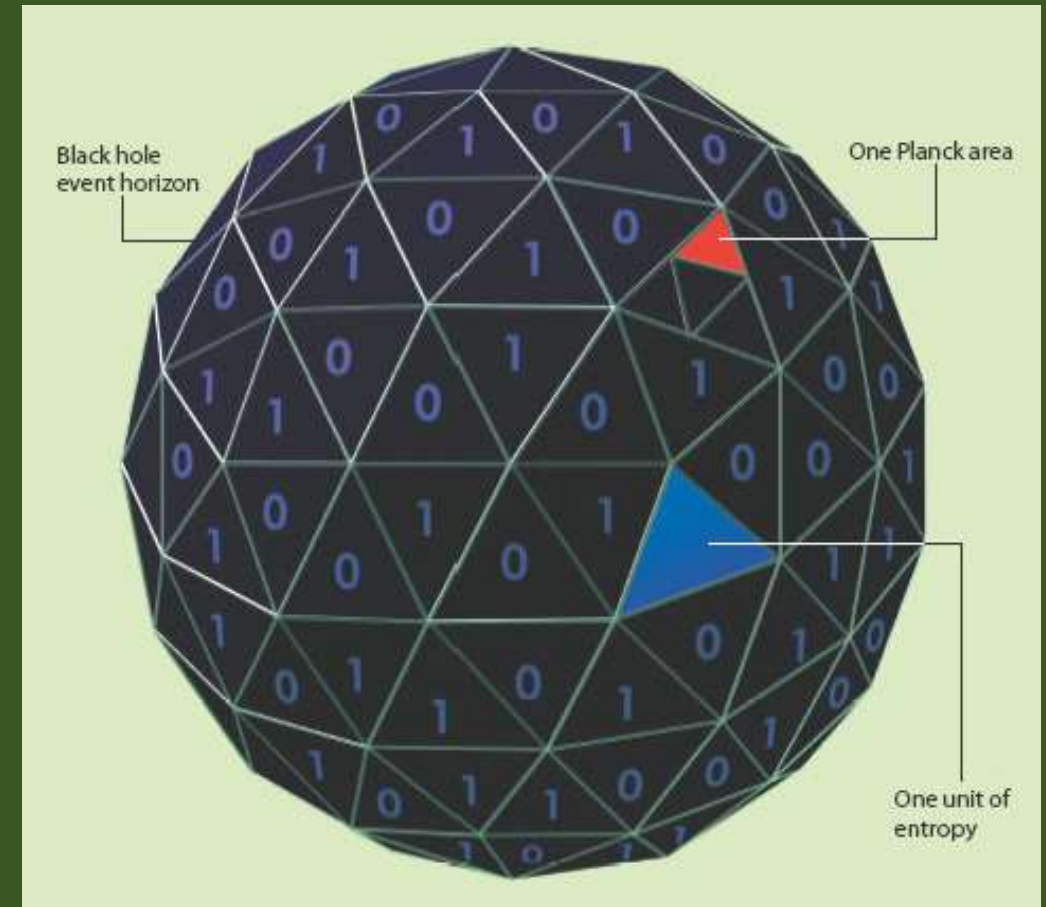
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QUANTUM
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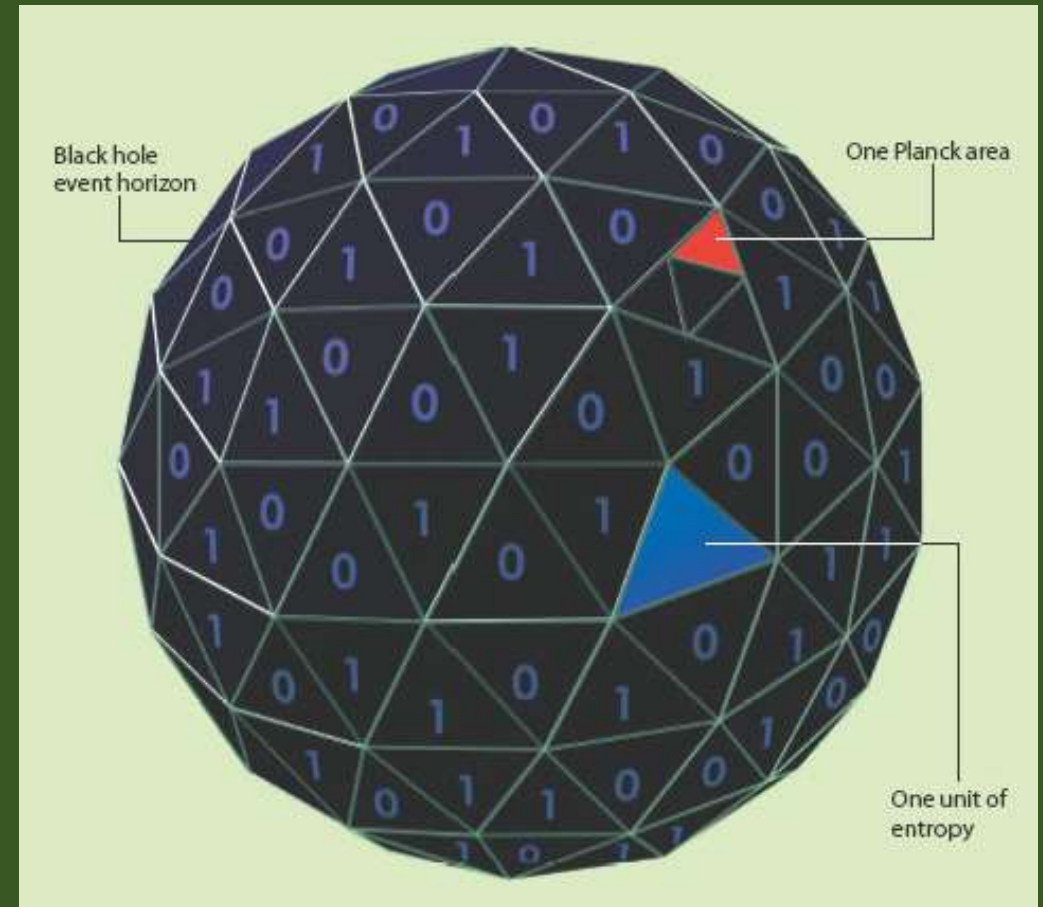


QUANTUM
GRAVITY RESEARCH

Golden Ratio

It states that the total amount of binary information from all the mass and energy pulled into a black hole is proportional to its surface area...

...where every four Planck areas of its surface encode the state of a fundamental particle that fell into it.



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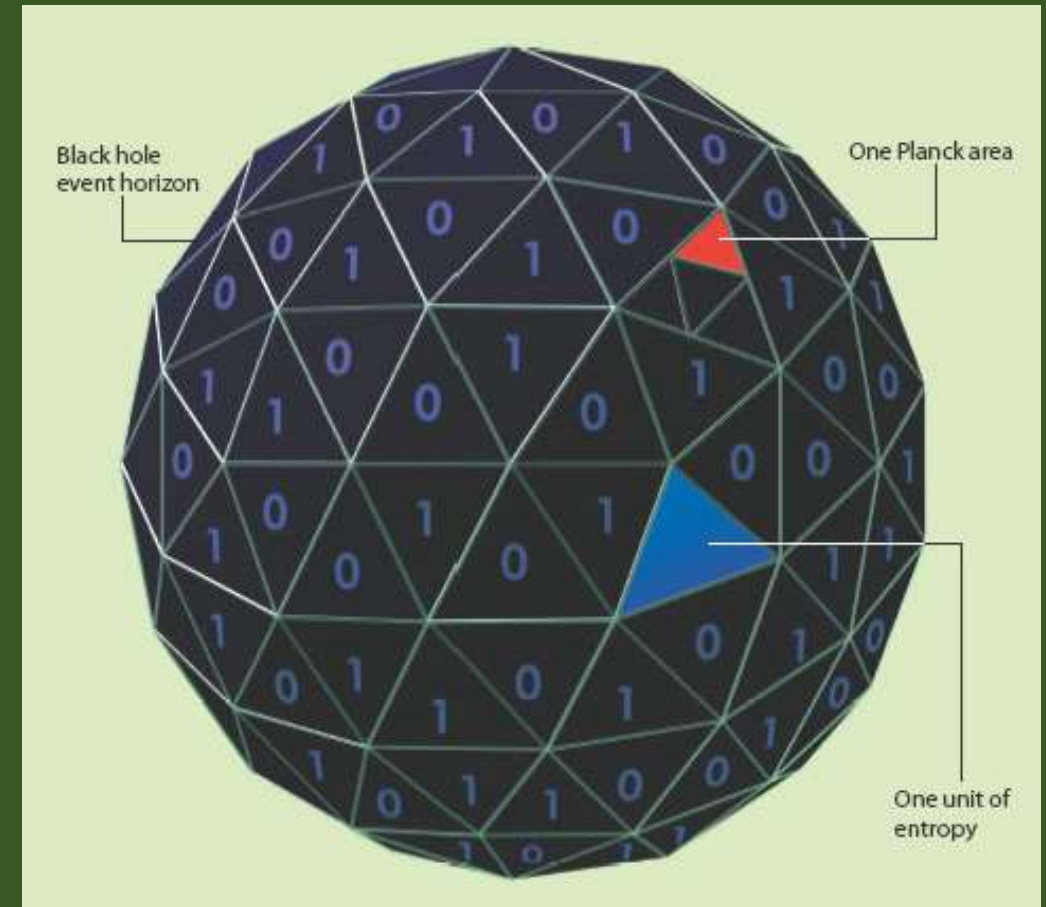


QUANTUM
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Golden Ratio

This is interesting because the 4-term 2x2 binary matrix is the most fundamental of all matrices.

$$\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$$



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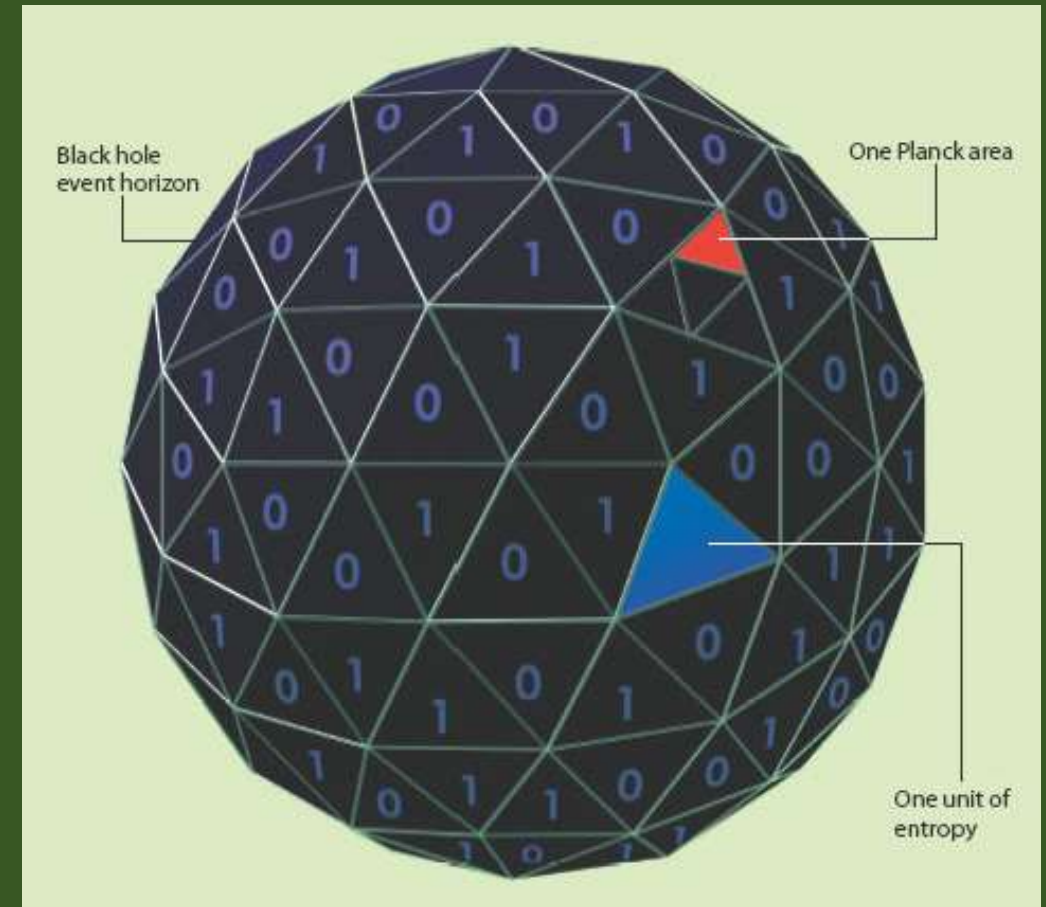


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Golden Ratio

14 of its 16 possible eigenvalues are trivial as 0, 1 or 2.

$$\begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$$



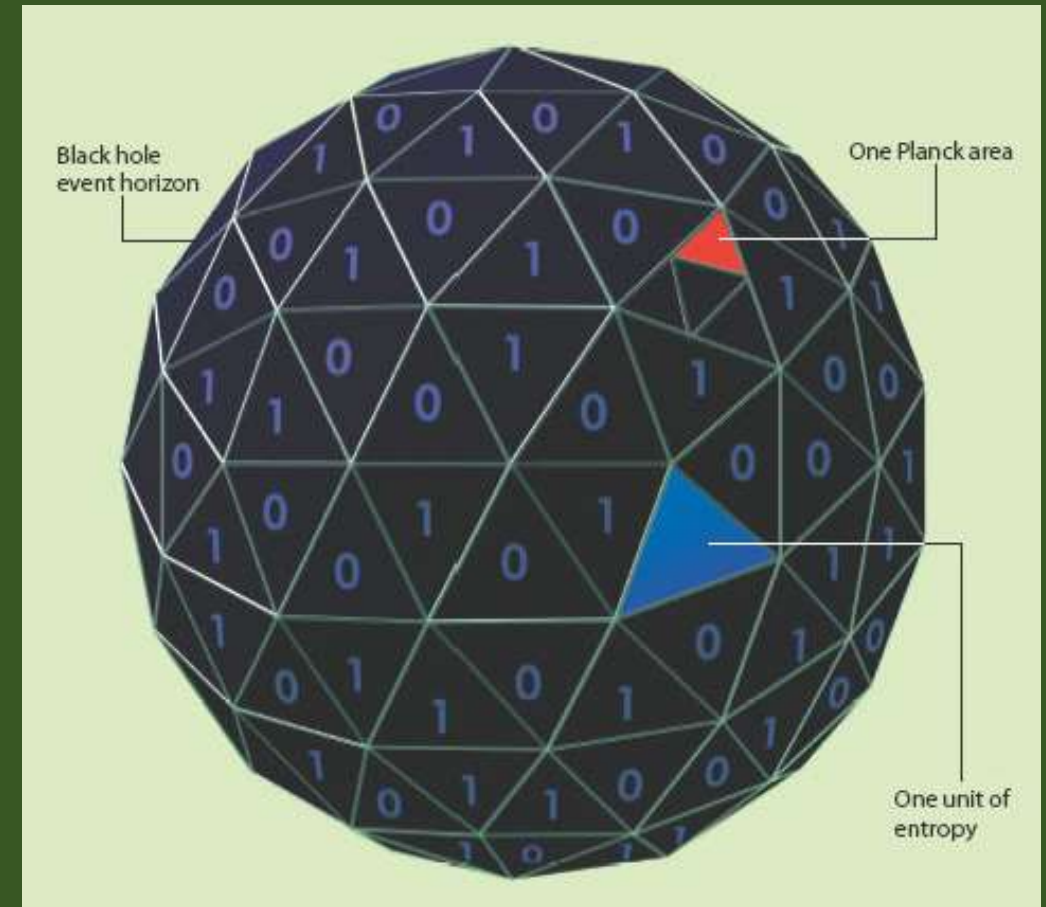
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Golden Ratio

The non-trivial values are the golden ratio.



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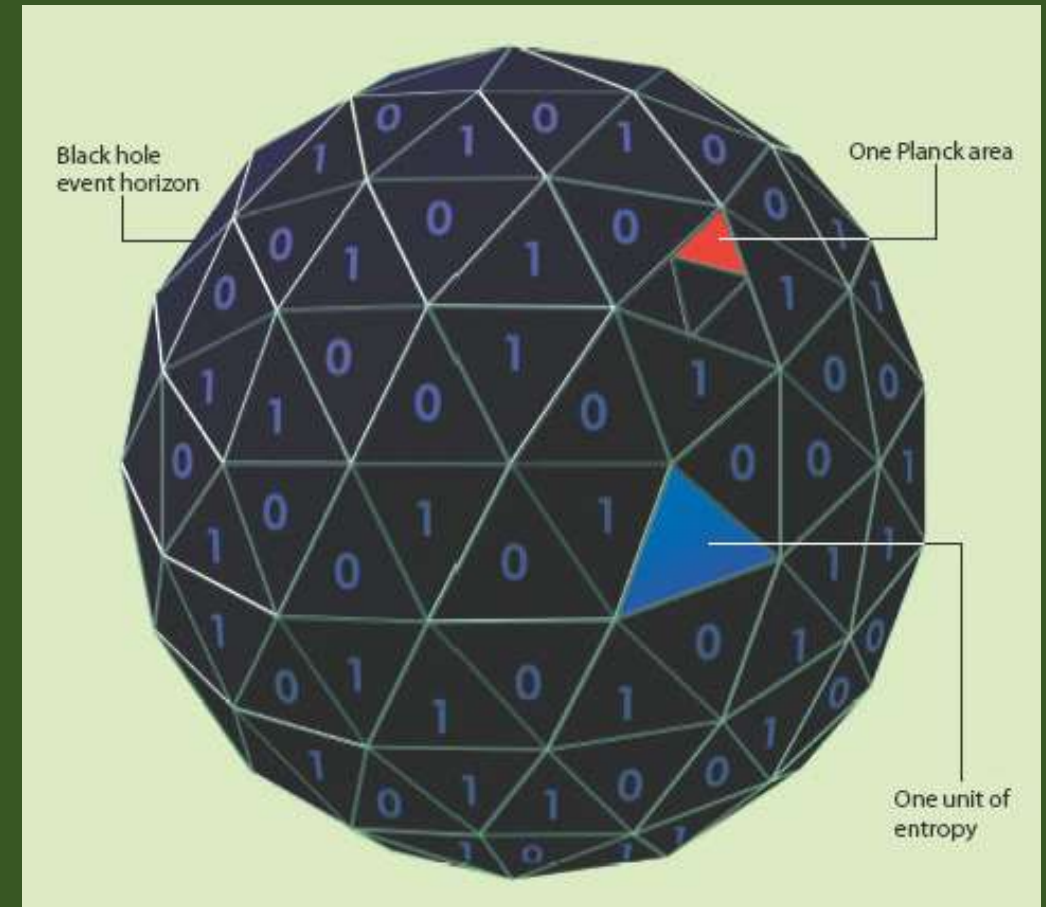


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GRAVITY RESEARCH

Golden Ratio

The non-trivial values are the golden ratio.

$$\phi \text{ and } \frac{1}{\phi}$$



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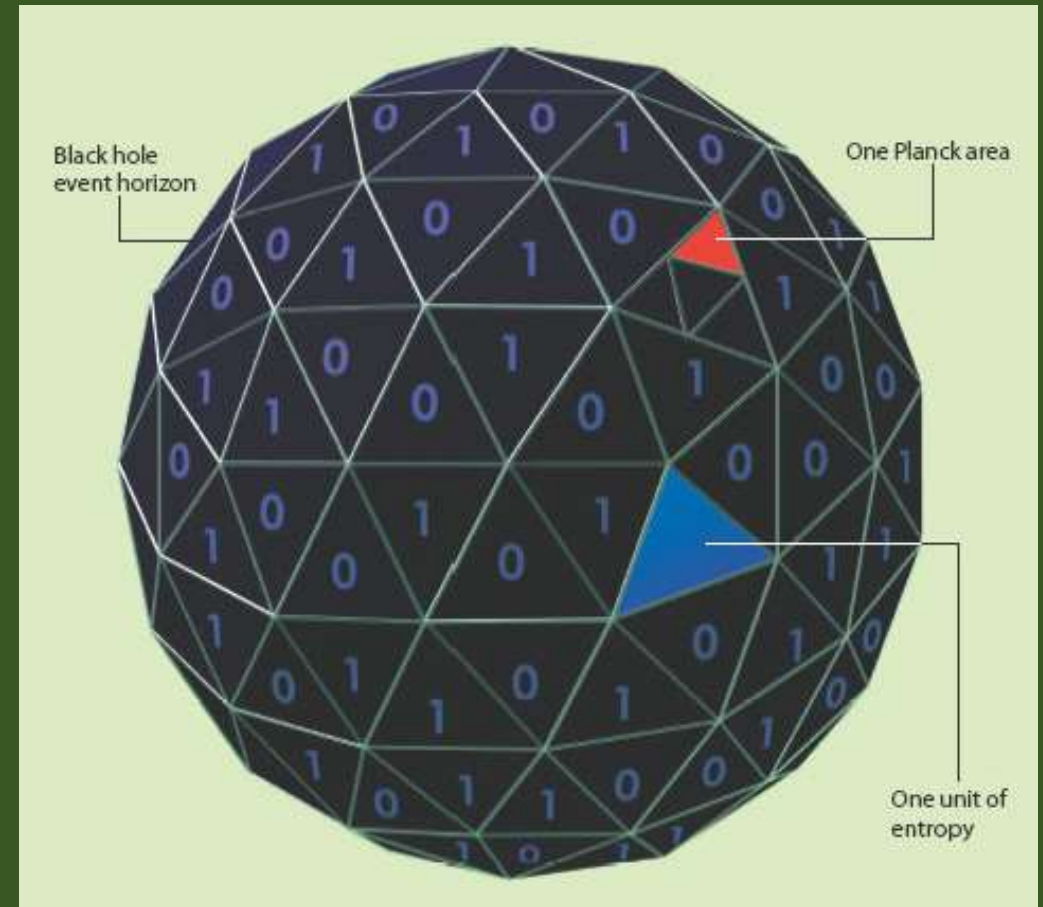


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Golden Ratio

In fact, the most probable non-trivial values for any sized random binary matrix are golden ratio based.

$$\phi \text{ and } \frac{1}{\phi}$$



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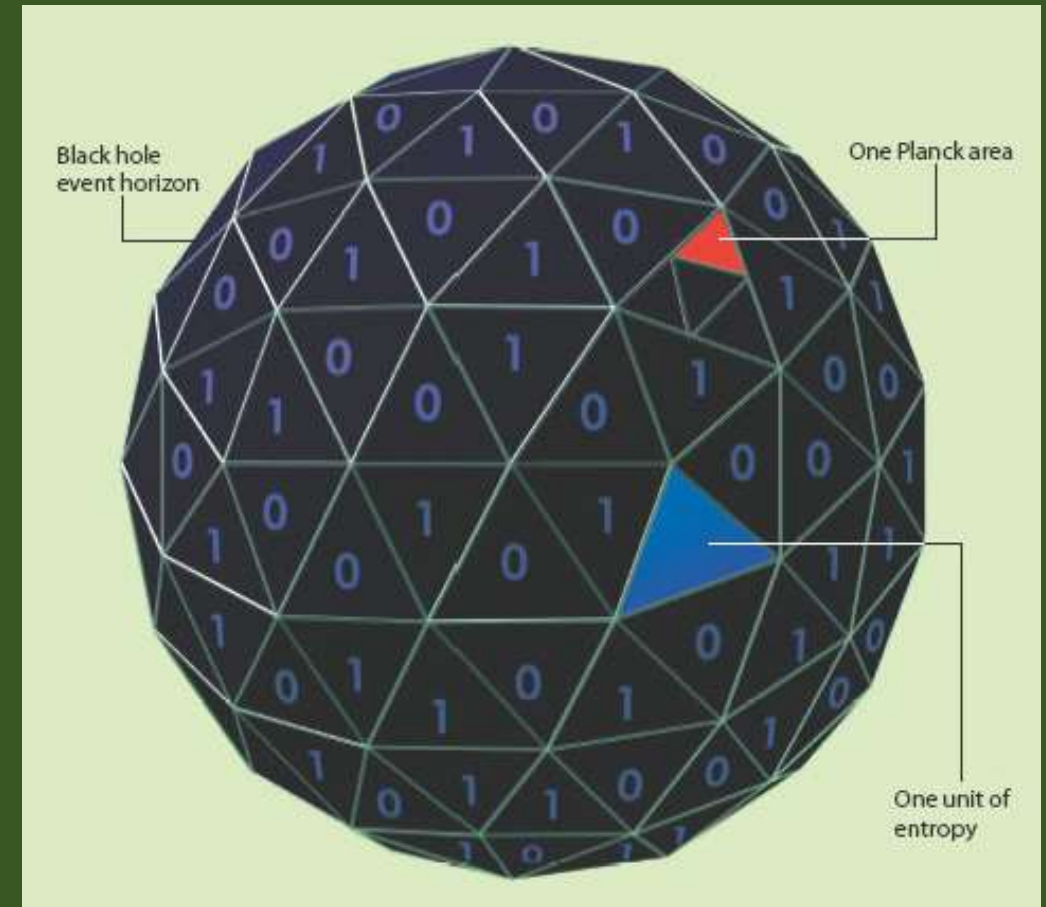


QUANTUM
GRAVITY RESEARCH

Golden Ratio

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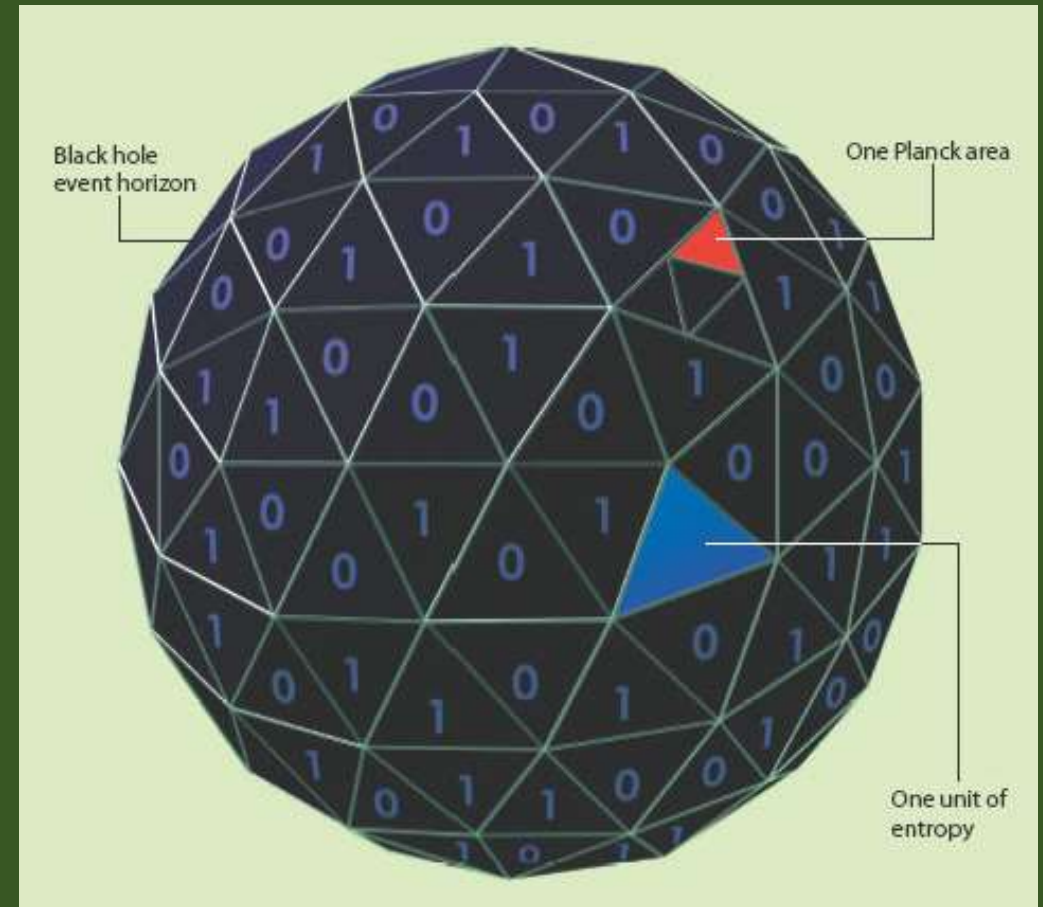


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GRAVITY RESEARCH

Golden Ratio

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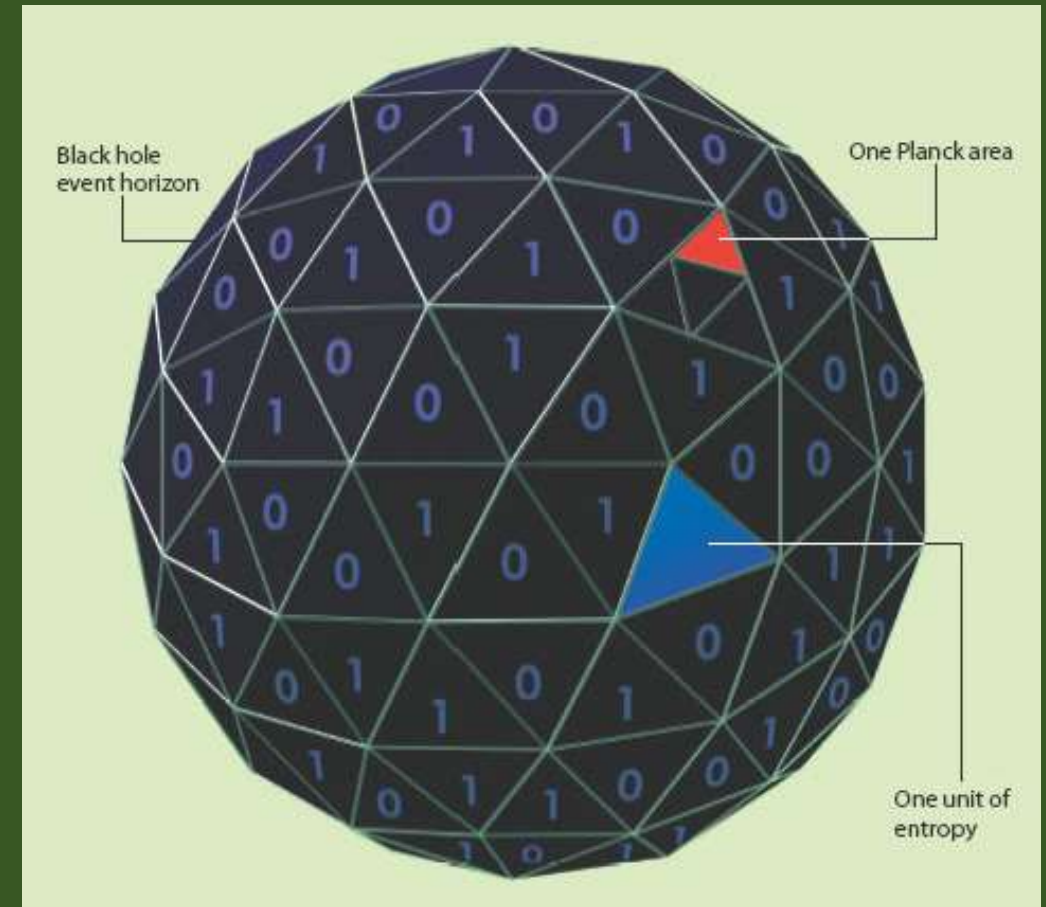
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QUANTUM
GRAVITY RESEARCH

Golden Ratio

Both black holes and quantum mechanics deeply relate to the golden ratio, binary information and the number 4...



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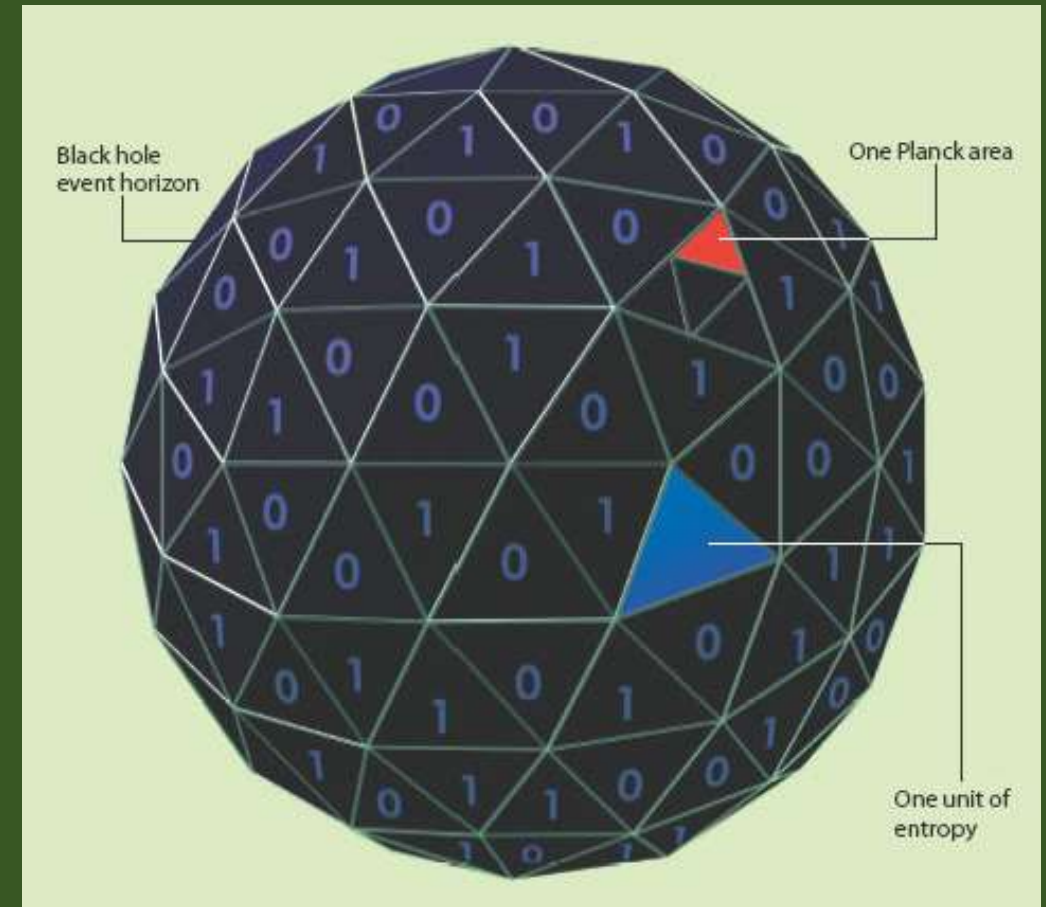


QUANTUM
GRAVITY RESEARCH

Golden Ratio

Both black holes and quantum mechanics deeply relate to the golden ratio, binary information and the number 4...

...the number of vertices of a tetrahedron.



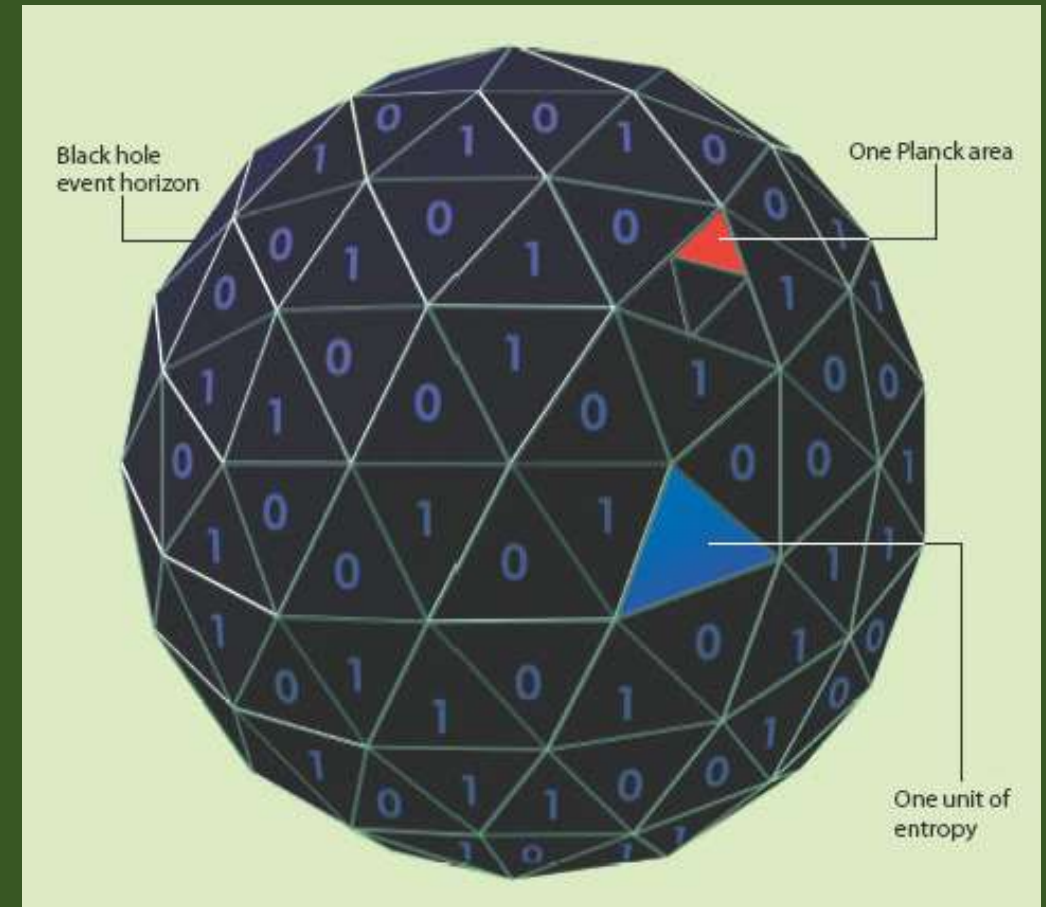
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Golden Ratio

Perhaps it's a clue about the missing quantum gravity theory of everything.



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Golden Ratio

75% of the universe is made of hydrogen.



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QUANTUM
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Golden Ratio

75% of the universe is made of hydrogen.

And the basis of all atomic theory can be derived from its values.



- Information
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Golden Ratio

Based on work done by C. H. Suresh and N. Koga in 2001, Raji Heyrovska showed the atomic radius of Hydrogen in methane to be the Bohr radius over the golden ratio.

$$r_H = \frac{a_0}{\phi}$$



- Information
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Golden Ratio

In 1993, Lucien Hardy, of the Perimeter Institute for Theoretical Physics, discovered that the probability of entanglement for two particles projected in tandem is:

$$\phi^{-5}$$



- Information
- Causality Loops
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Golden Ratio

The results were experimentally confirmed three times in peer reviewed papers during the period 1993 to 2009.

$$\phi^{-5}$$



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Golden Ratio

In 2010, a multinational team of scientists found an E8 based golden ratio signature in solid state matter.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Golden Ratio

Cobalt niobate was put into a quantum-critical state and tuned to an optimal level by adjusting the magnetic fields around it.



- Information
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QUANTUM
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Golden Ratio

Cobalt niobate was put into a quantum-critical state and tuned to an optimal level by adjusting the magnetic fields around it.

The researchers used the analogy of tuning a guitar string.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Golden Ratio

They found the perfect tuning when the resonance to pitch is in a golden ratio based value specifically related to the geometry of E8.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



QUANTUM
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Golden Ratio

They found the perfect tuning when the resonance to pitch is in a golden ratio based value specifically related to the geometry of E8.

The authors speculated that the result is evidence in support of an E8 based theory of everything.



Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Golden Ratio

Our group is publishing a new paper – a meta study of golden ratio based astrophysical data.



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Key to the Puzzle



Key to the Puzzle

Nature has given us 7 clues about a theory of everything. So what is the key to this puzzle?



- Information
- Causality Loops
- Non-determinism
- Consciousness
- Pixelation
- E8 Crystal
- Golden Ratio



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Key to the Puzzle

Our research program is focused on projecting the E8 crystal to 3D and 4D, which creates a golden ratio based binary code of pixelated space and causality loops requiring emergent consciousness.



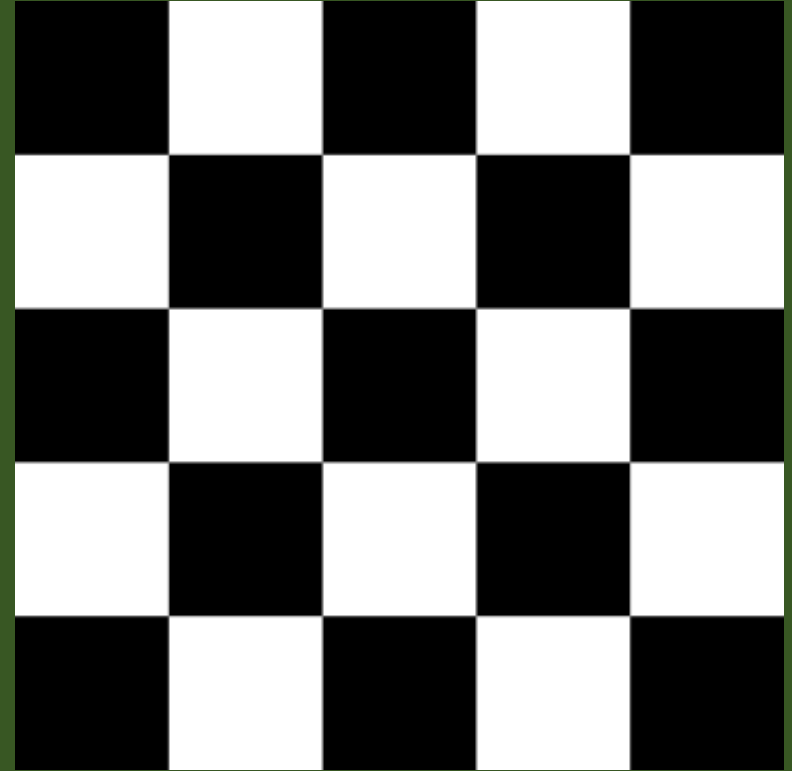
Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Key to the Puzzle

When you think of a crystal, such as a checkerboard, you can imagine its fundamental cell, the square.



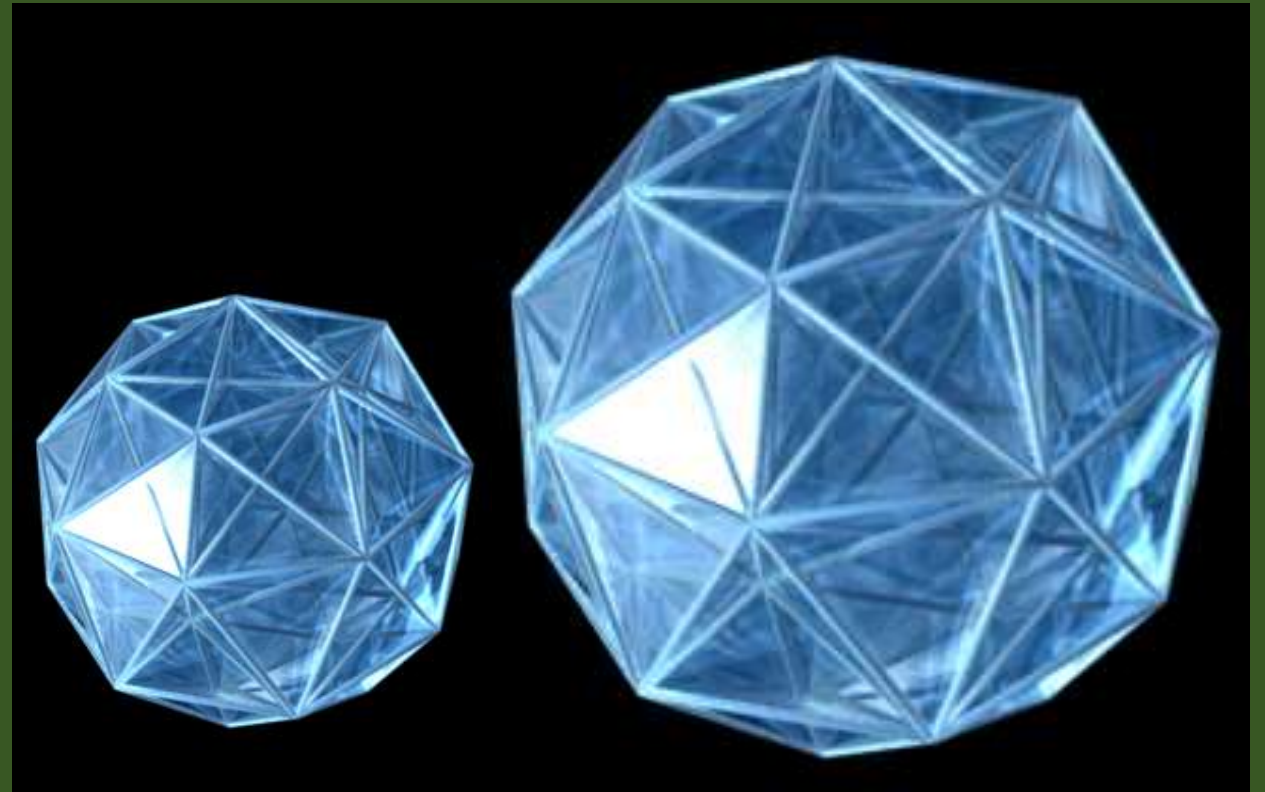
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Key to the Puzzle

So to understand the E8 crystal,
you can understand its
fundamental 8D shapes.



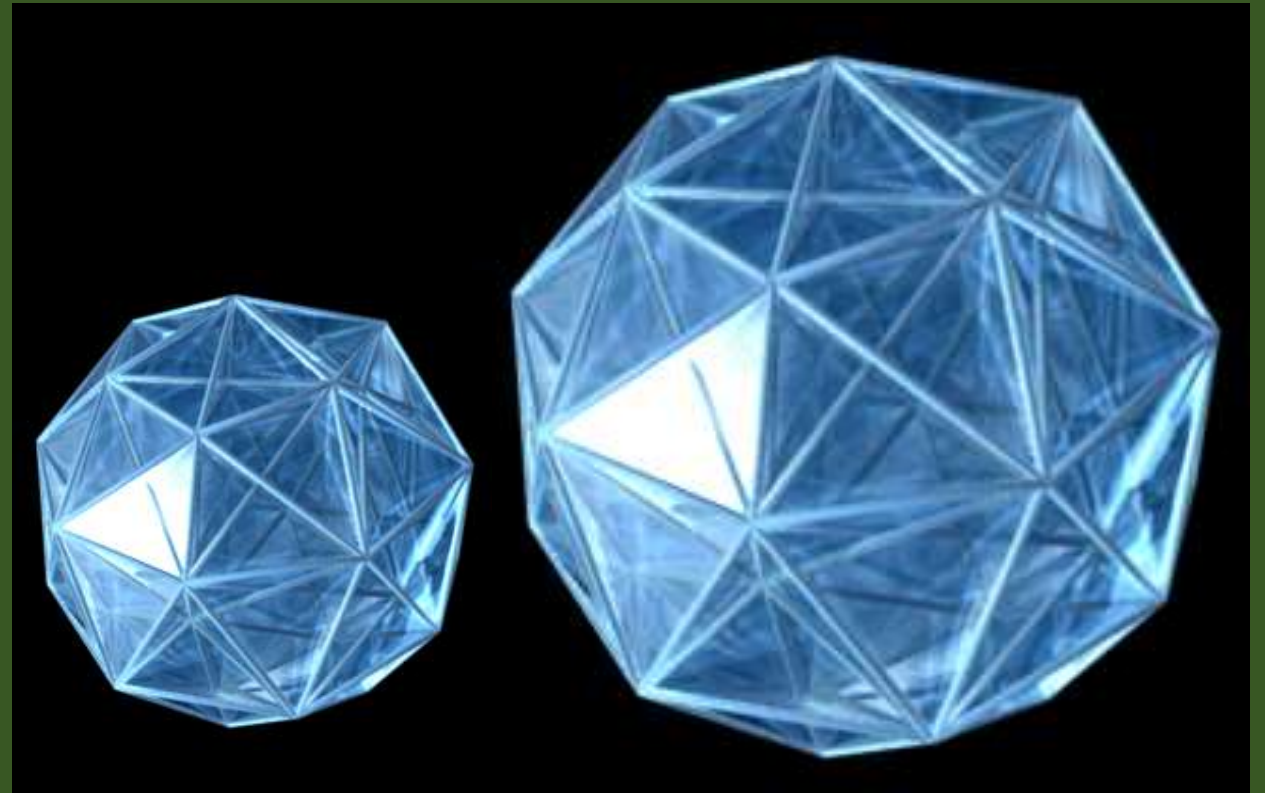
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Key to the Puzzle

The cell shape of E8 that best represents it is the Gosset polytope with 240 vertices.



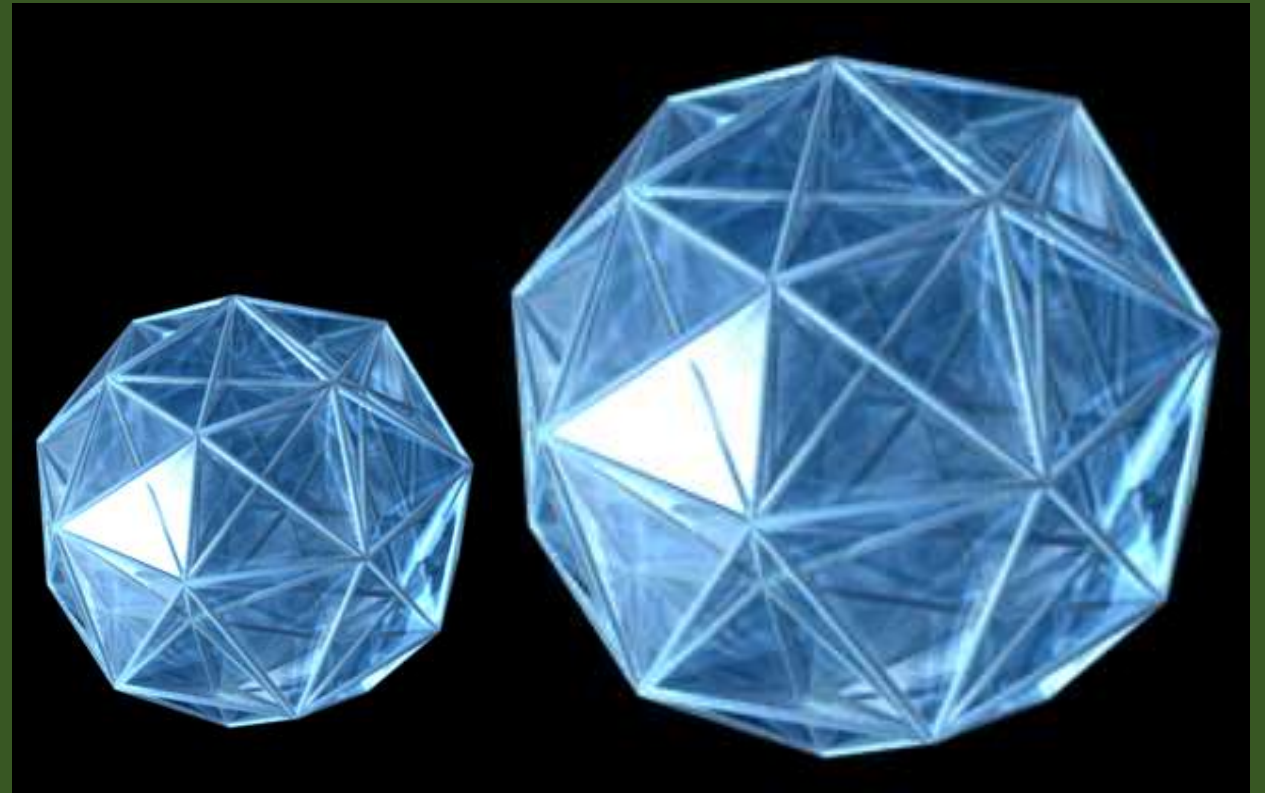
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Key to the Puzzle

When we project this to 4D, it becomes two identical shapes of different sizes like these here.



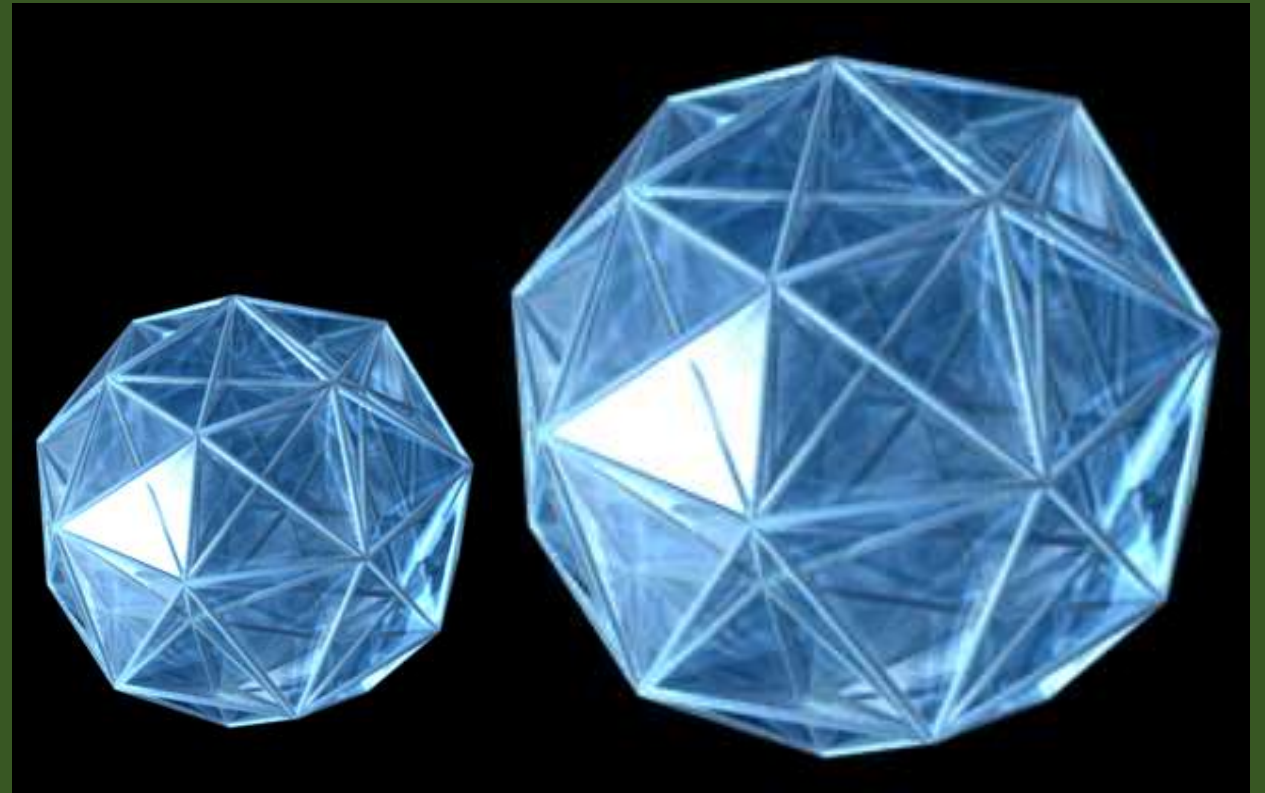
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Key to the Puzzle

The ratio of their sizes is:



- Information
- Causality Loops
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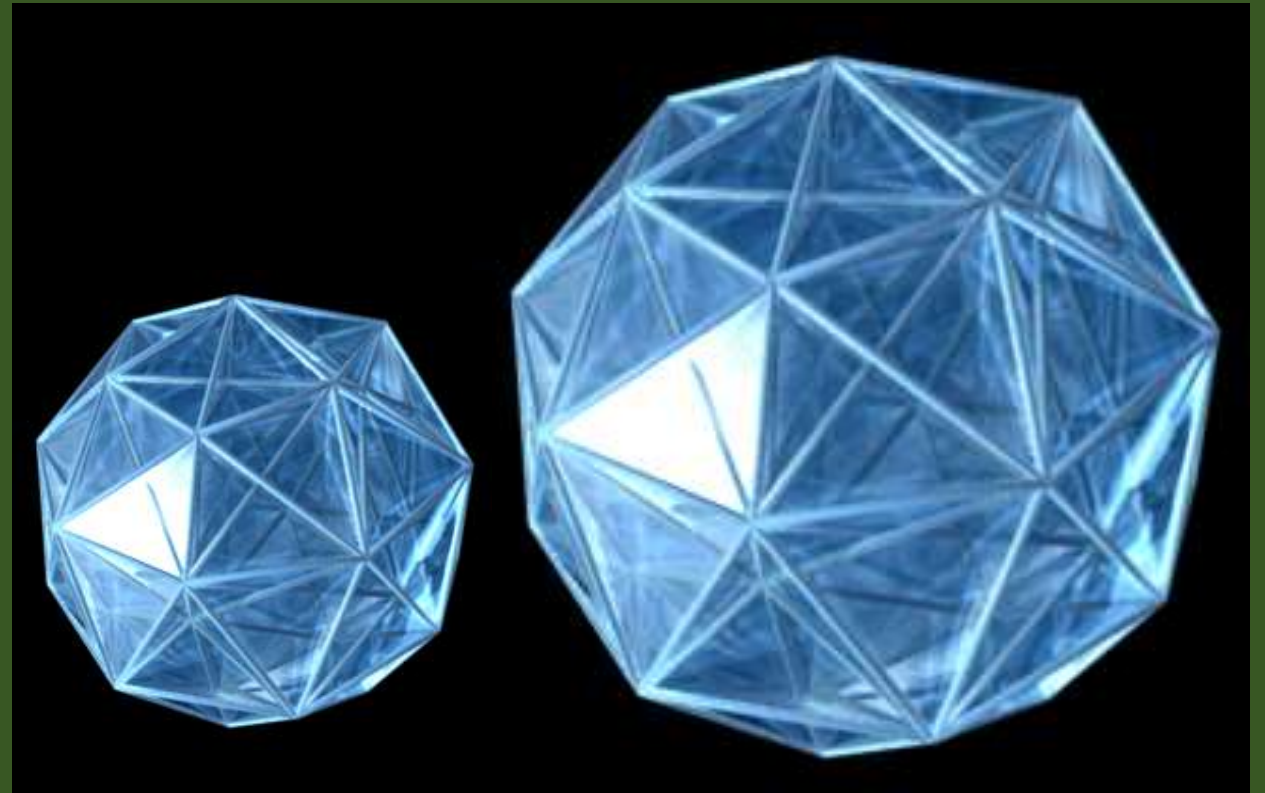


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Key to the Puzzle

The ratio of their sizes is:

ϕ



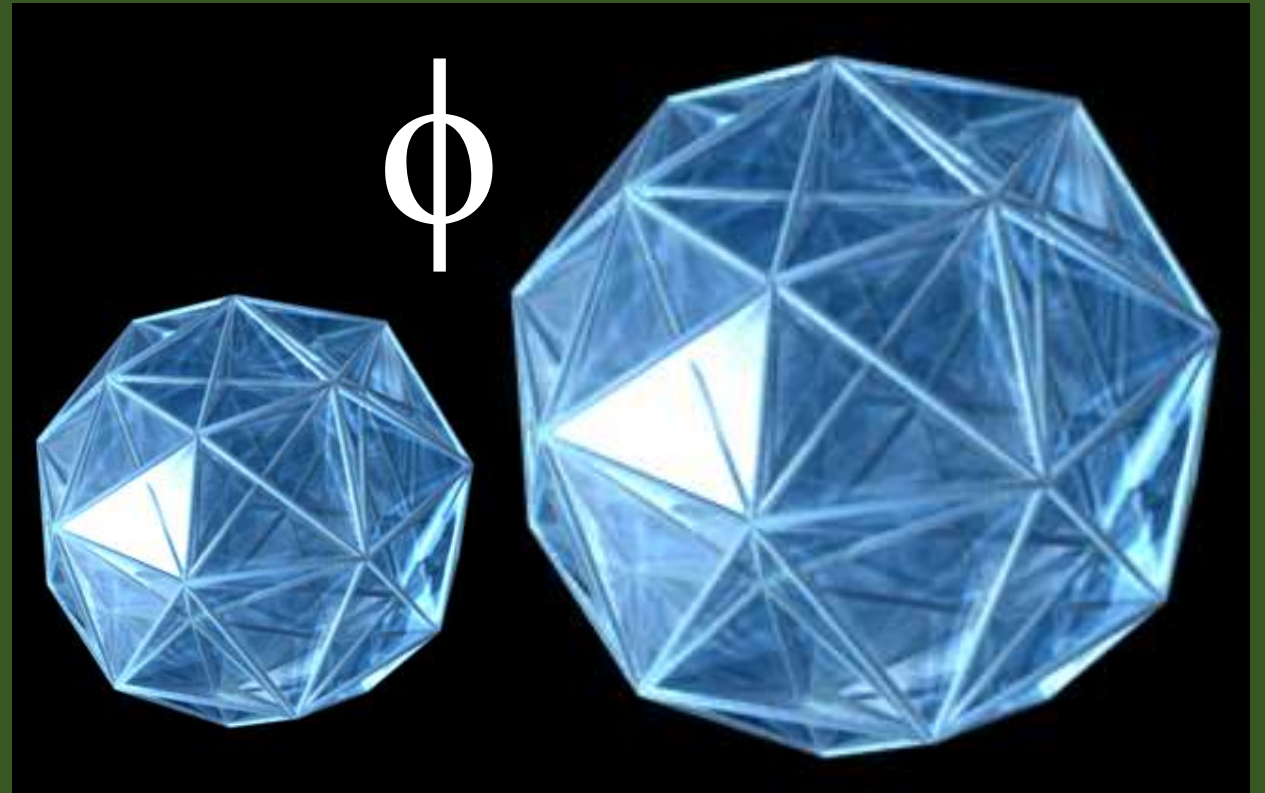
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Key to the Puzzle

They are called 4D icosahedra or 600-cells.



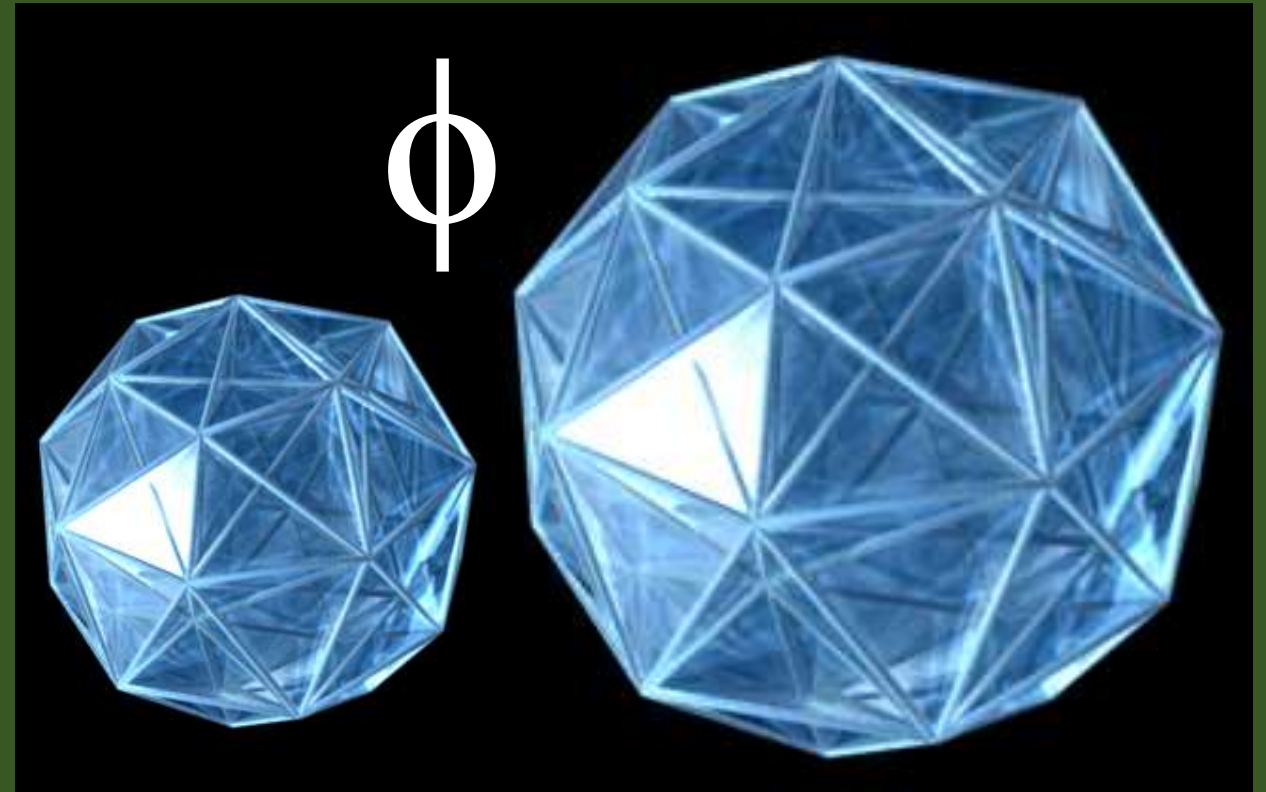
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Key to the Puzzle

And each is made of 600 regular 3D tetrahedra rotated from one another by a golden ratio based angle.



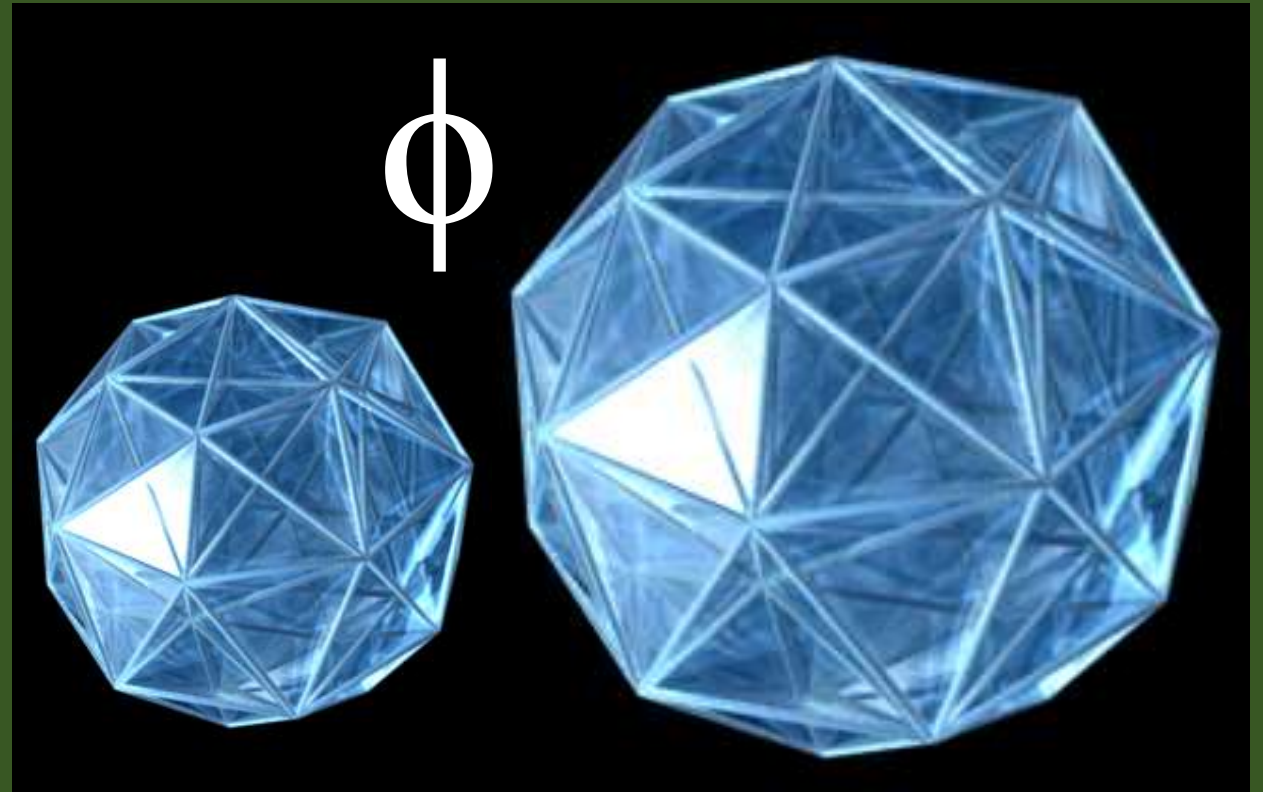
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QUANTUM
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Key to the Puzzle

The 600-cells intersect in seven golden ratio based ways and kiss in one particular way to form a 4D aperiodic mosaic tiling called a *quasicrystal*.



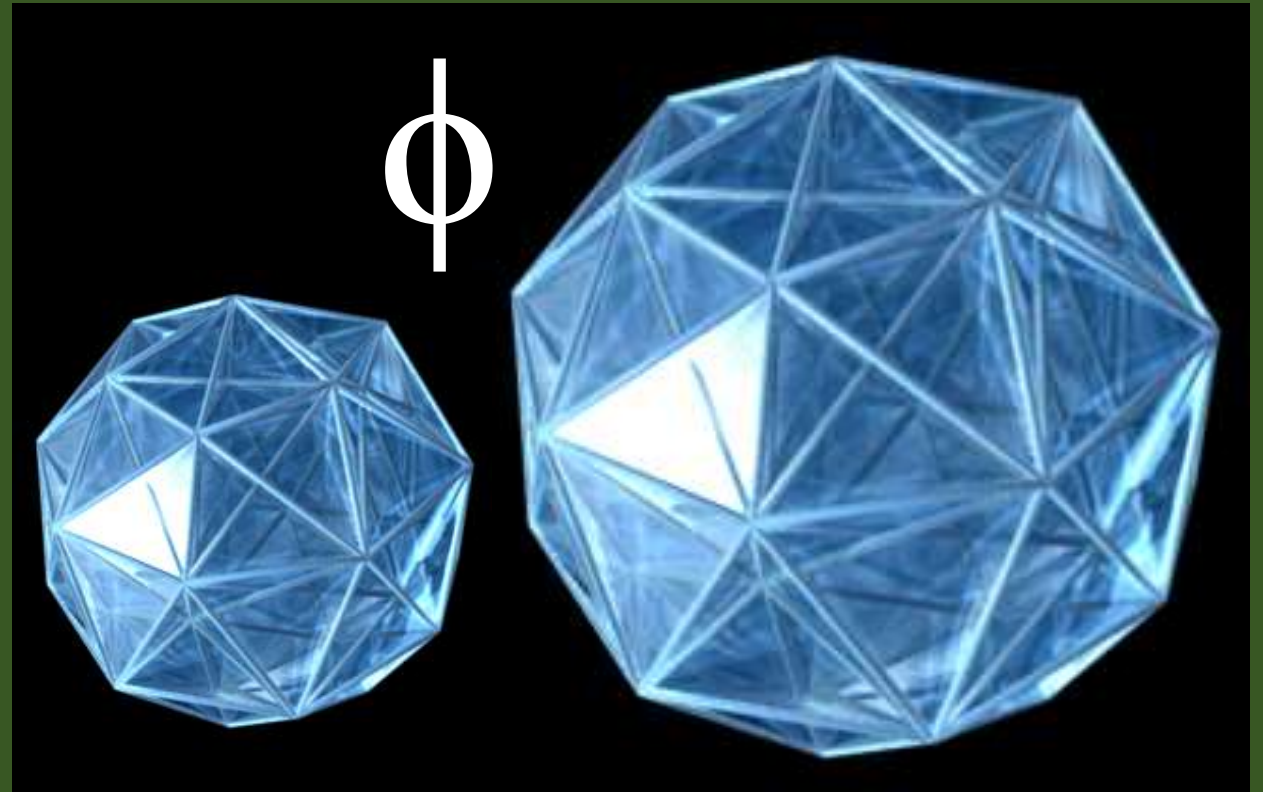
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Key to the Puzzle

A quasicrystal is a code or language.



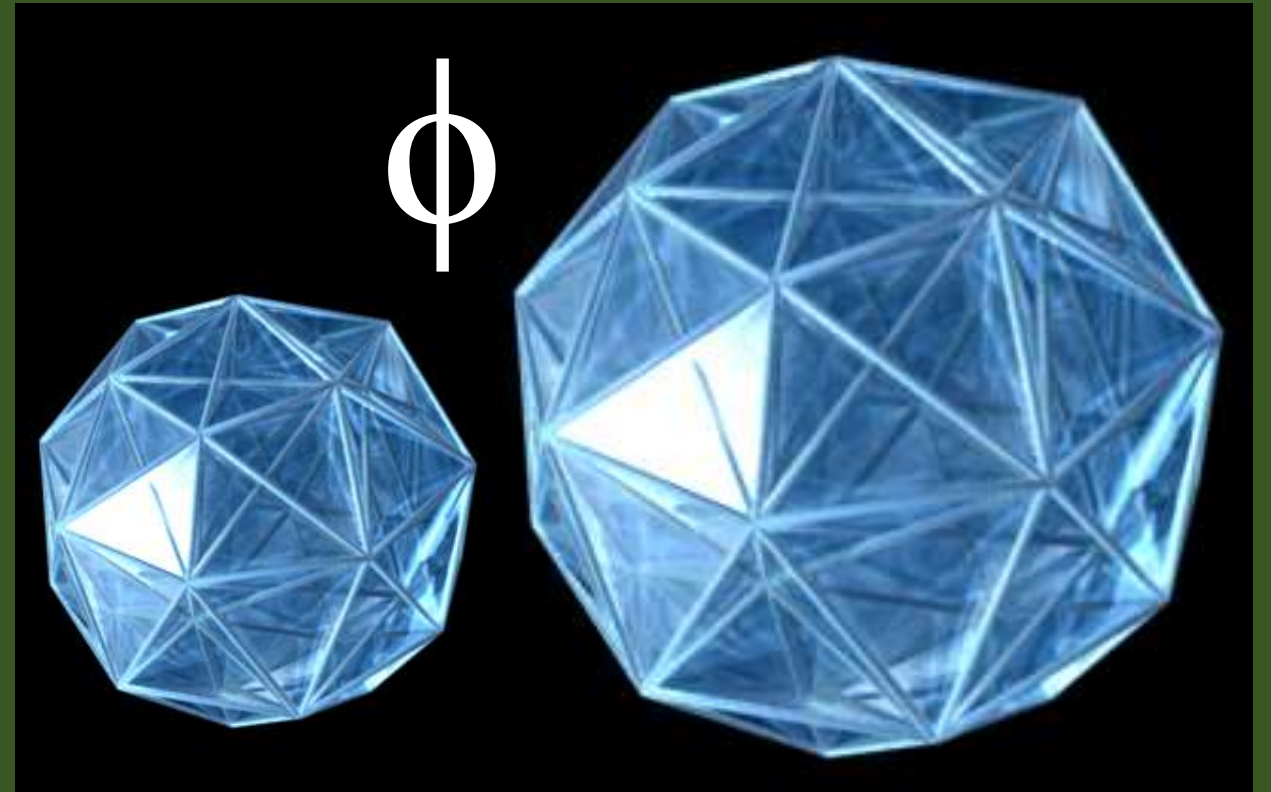
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Key to the Puzzle

This is because the ways you can arrange the building block geometric symbols or shapes are governed by rules (like a language).



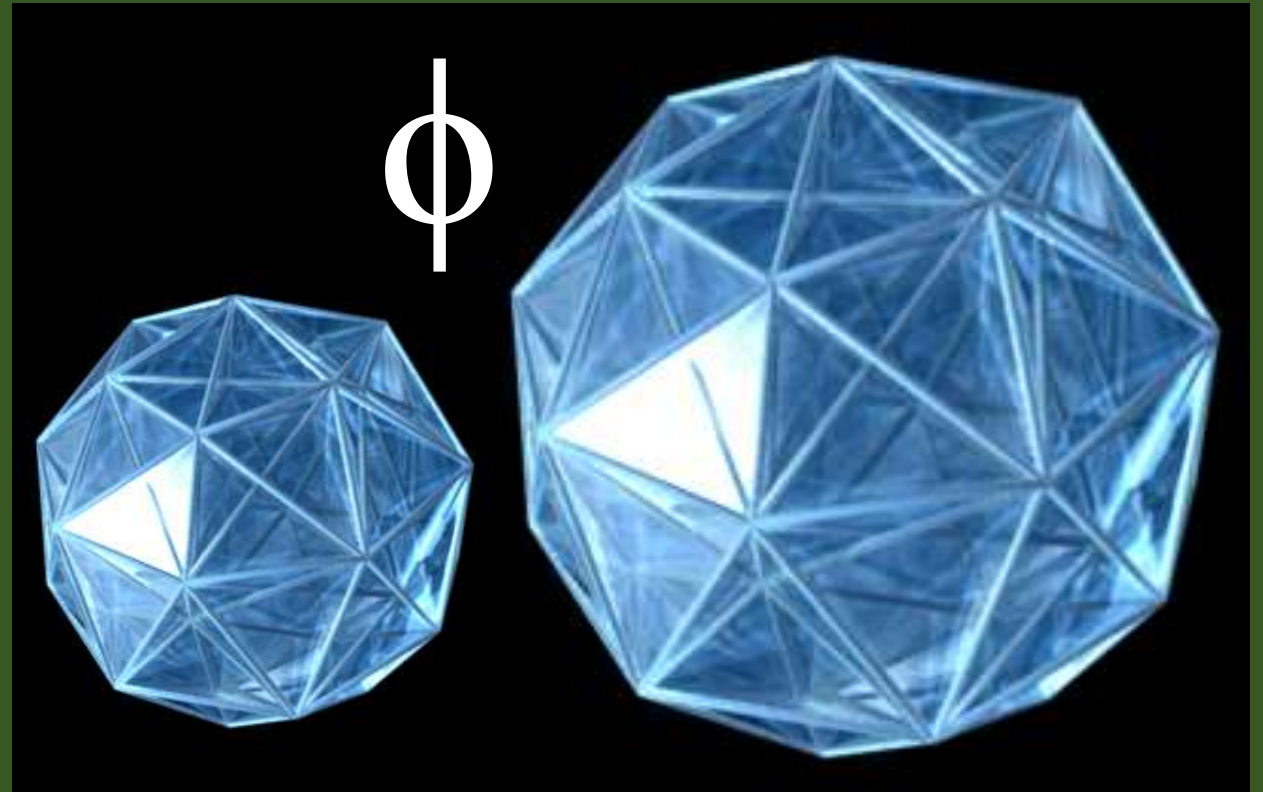
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Key to the Puzzle

But within the rules, you must make choices that are not forced by those rules.



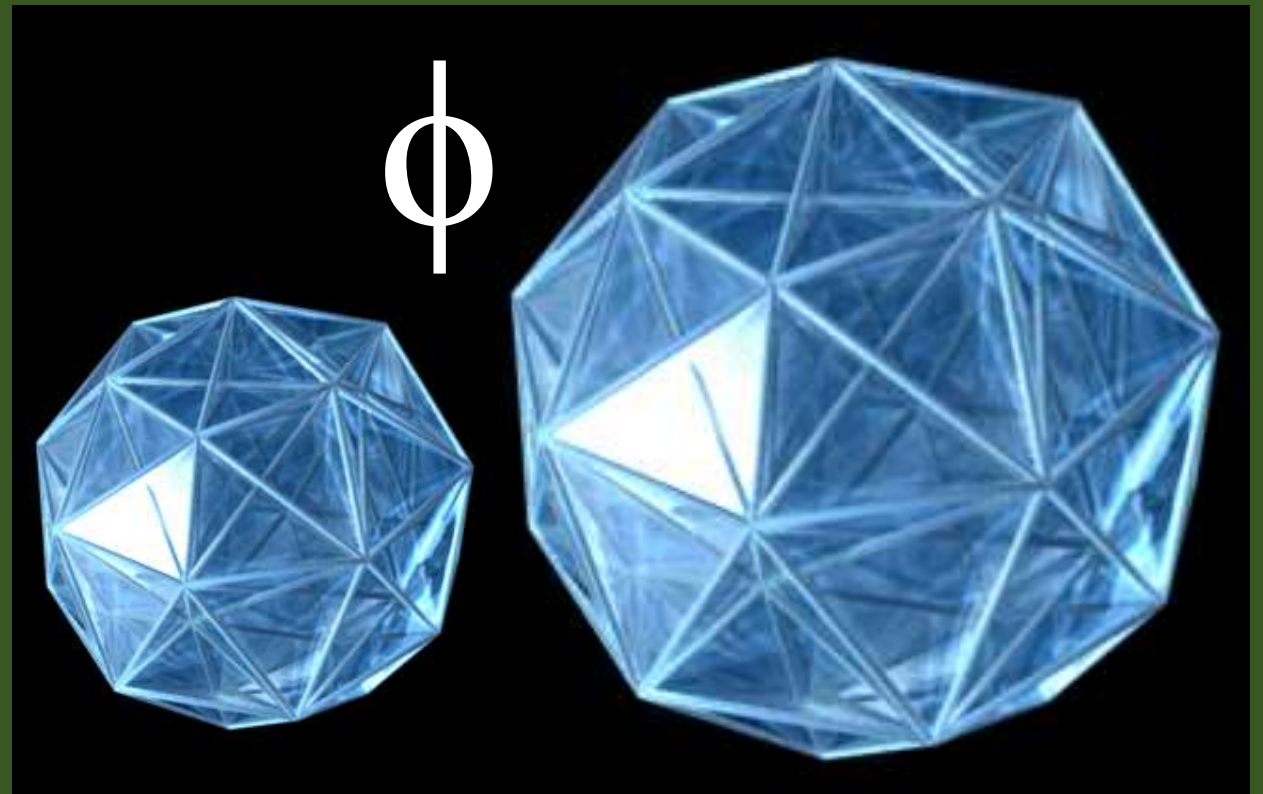
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QUANTUM
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Key to the Puzzle

So because it is not a deterministic or forced set of building instructions, there is freedom to create many patterns while still obeying the rules of the code.



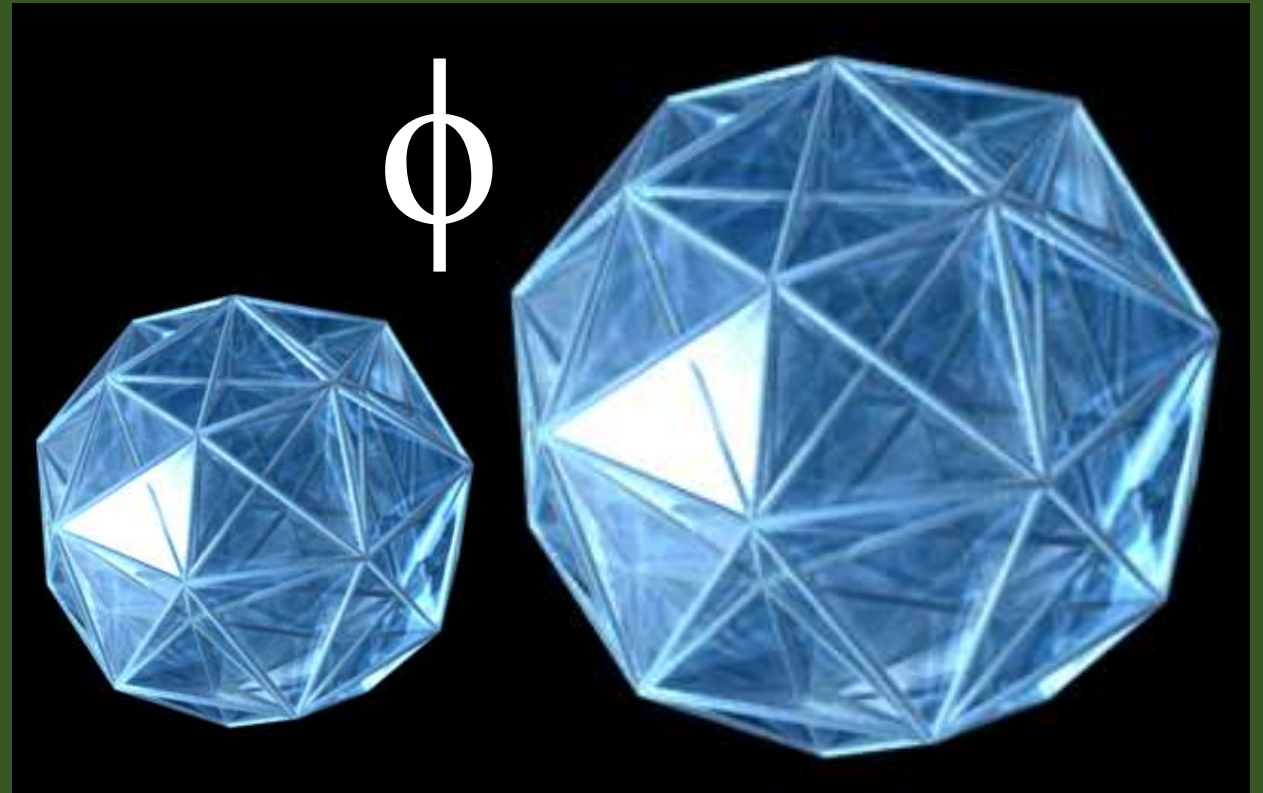
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QUANTUM
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Key to the Puzzle

It is a language in every sense of the word...



- Information
- Causality Loops
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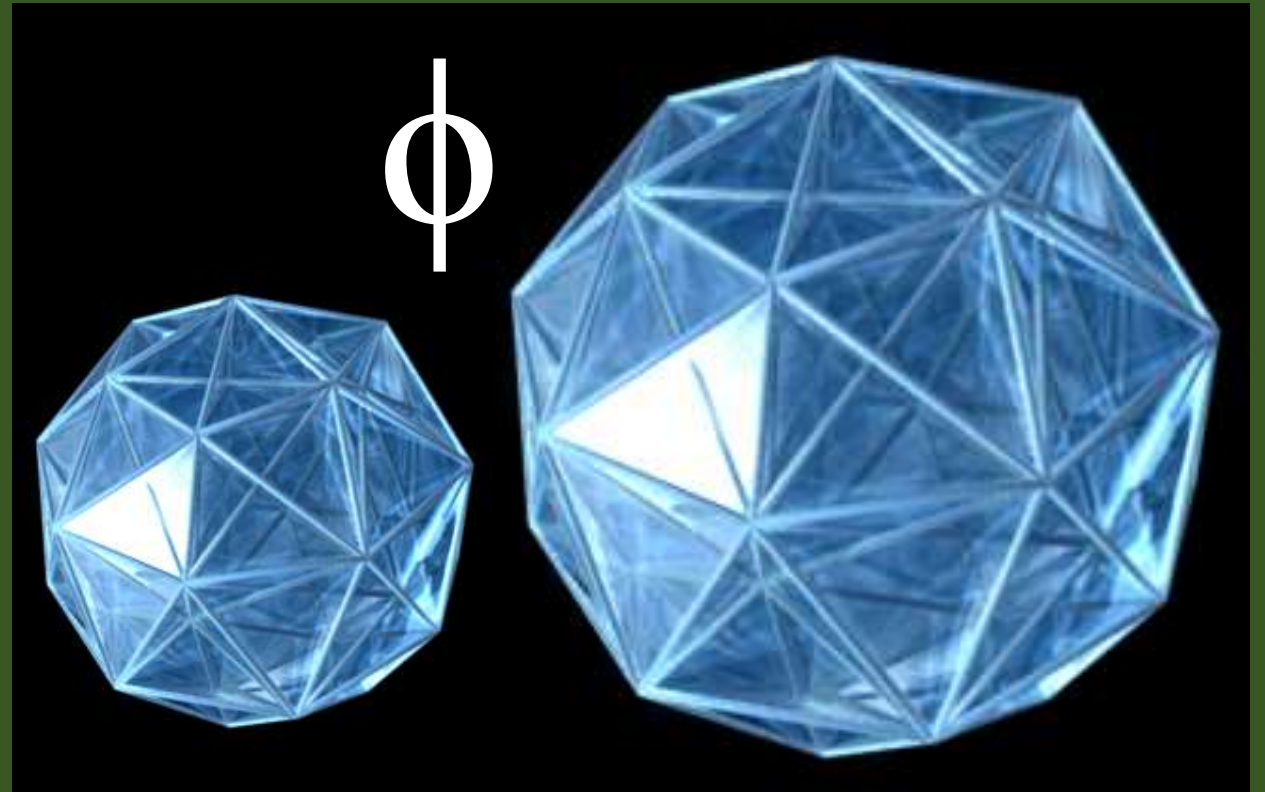


QUANTUM
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Key to the Puzzle

It is a language in every sense of the word...

...specifically it is a language of waves or vibrations.



- Information
- Causality Loops
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- Pixelation
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QUANTUM
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Key to the Puzzle

The 4D quasicrystal is represented in 3D with regular tetrahedra related by golden ratio based rotations and looks like this.



- Information
- Causality Loops
- Non-determinism
- Consciousness
- Pixelation
- E8 Crystal
- Golden Ratio



QUANTUM
GRAVITY RESEARCH

Key to the Puzzle

The language is binary, where tetrahedra form an invisible *possibility space* and are chosen to be “on” or “off” in each frame, according to the language rules.



- Information
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Key to the Puzzle

Over many frozen quasicrystal frames, dynamic wave and particle-like patterns emerge...



- Information
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QUANTUM
GRAVITY RESEARCH

Key to the Puzzle

Over many frozen quasicrystal frames, dynamic wave and particle-like patterns emerge...

...that look a little like this.



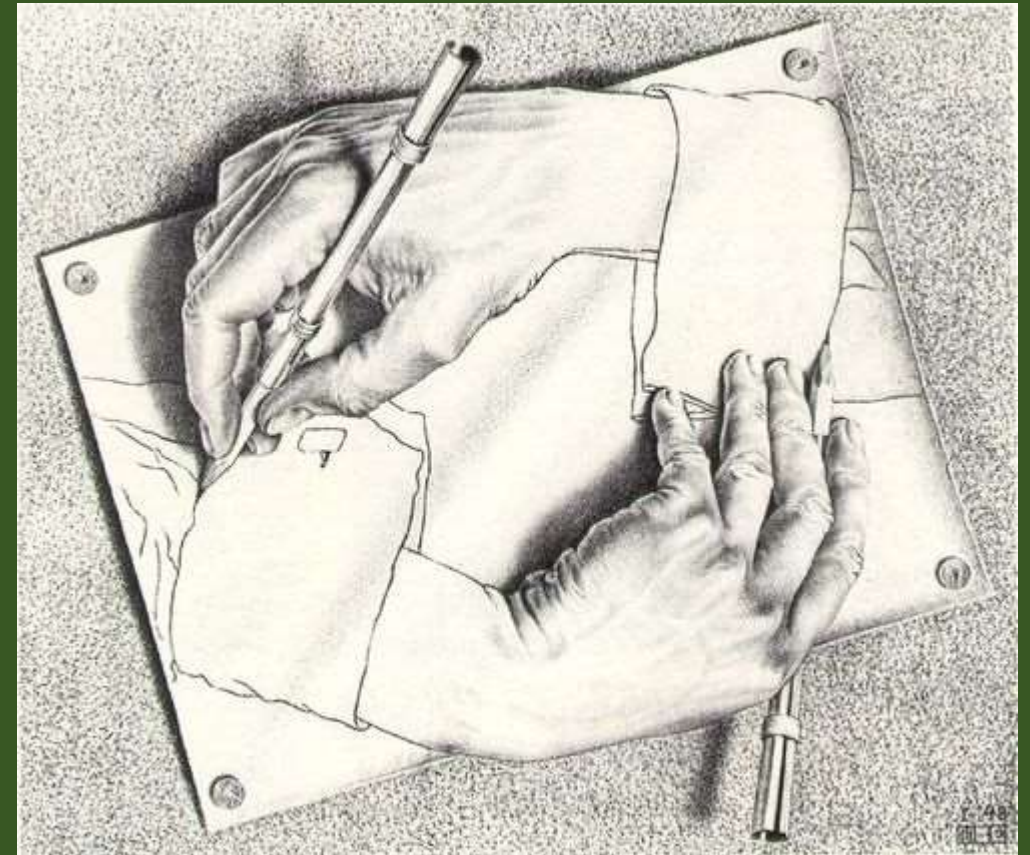
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Key to the Puzzle

Remember, evidence prevents us from believing in the deterministic Newtonian clock-work universe.



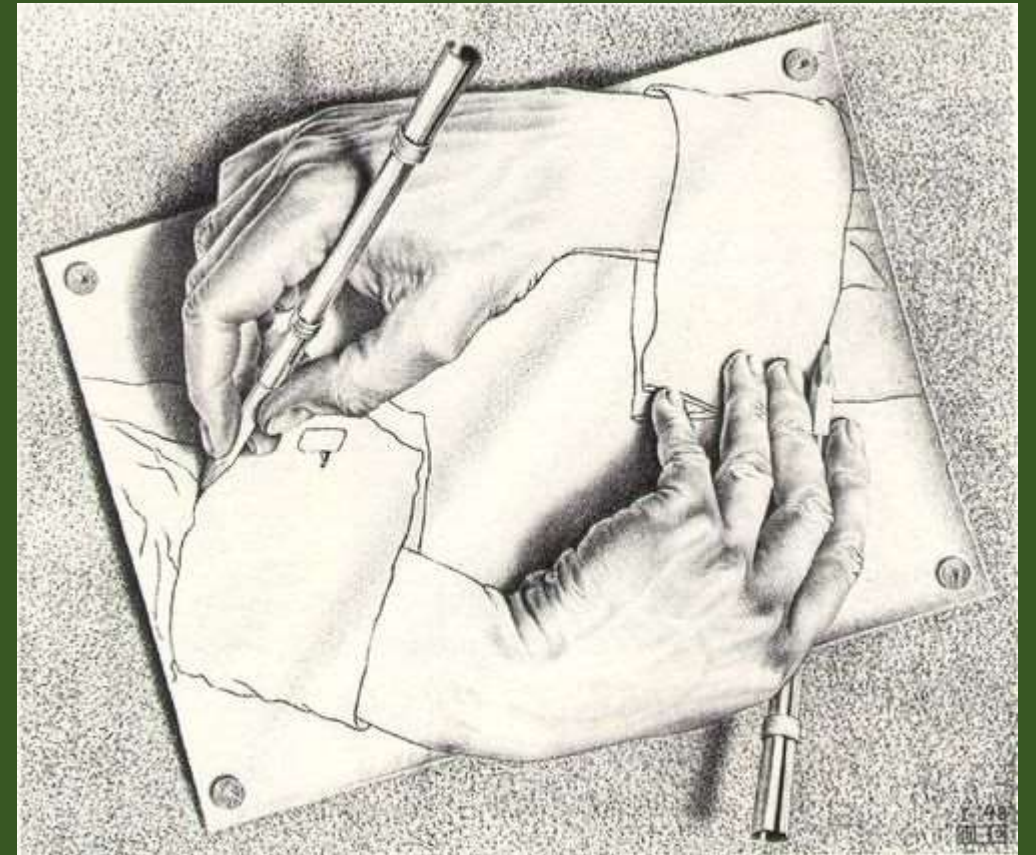
Information Causality Loops Non-determinism Consciousness Pixelation E8 Crystal Golden Ratio



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Key to the Puzzle

And codes cannot be operated by randomness or they breakdown and cease to generate meaning.



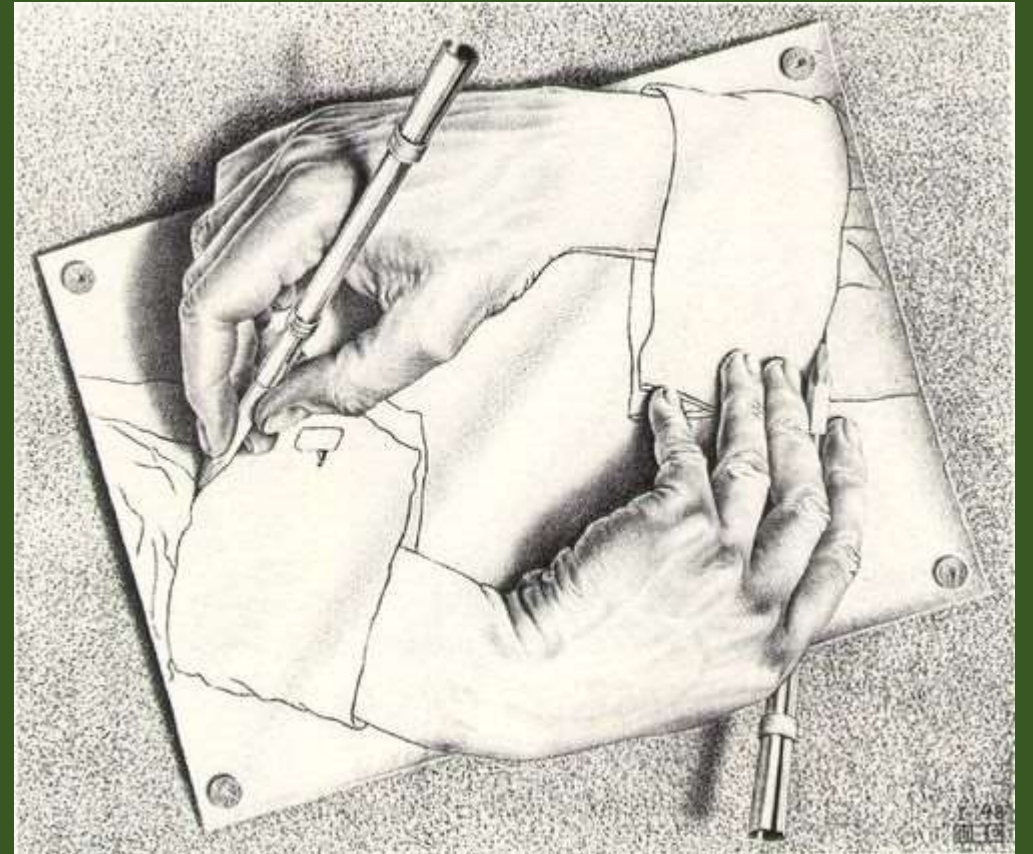
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Key to the Puzzle

So if reality is based on something like our E8 physics, WHO or WHAT is choosing the steps in the code that require freewill?



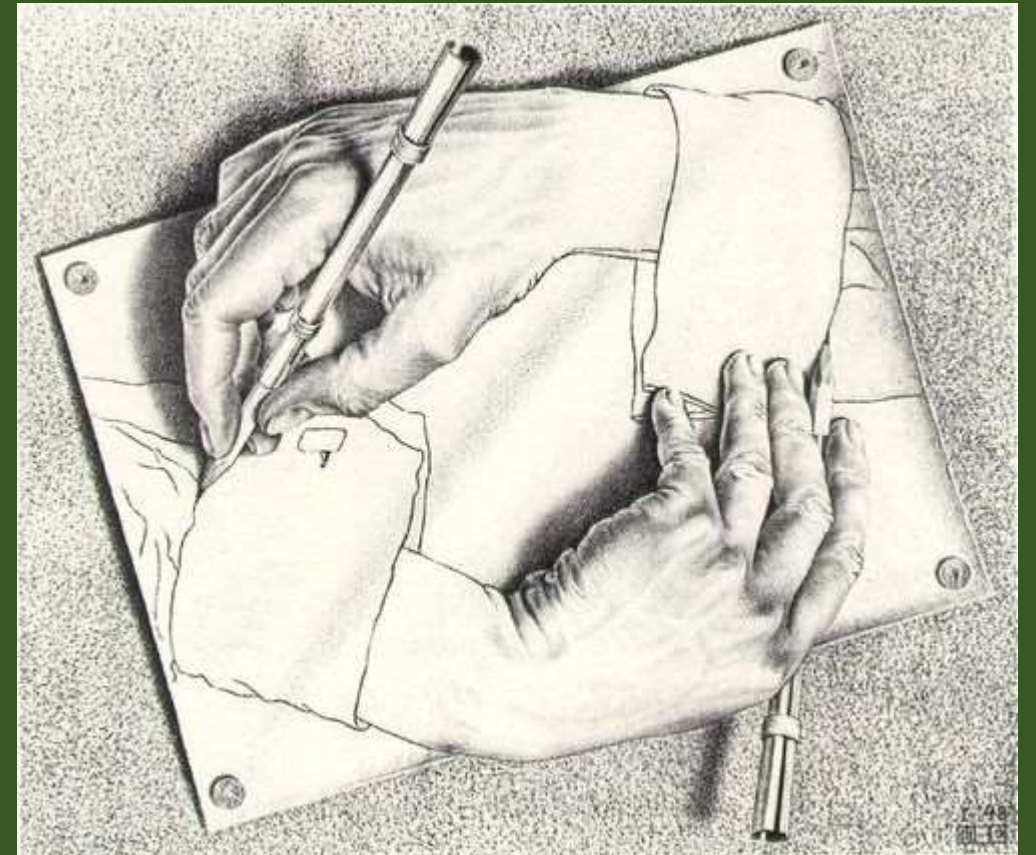
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Key to the Puzzle

It is certainly not us because this is a code that operates down at the Planck scale.



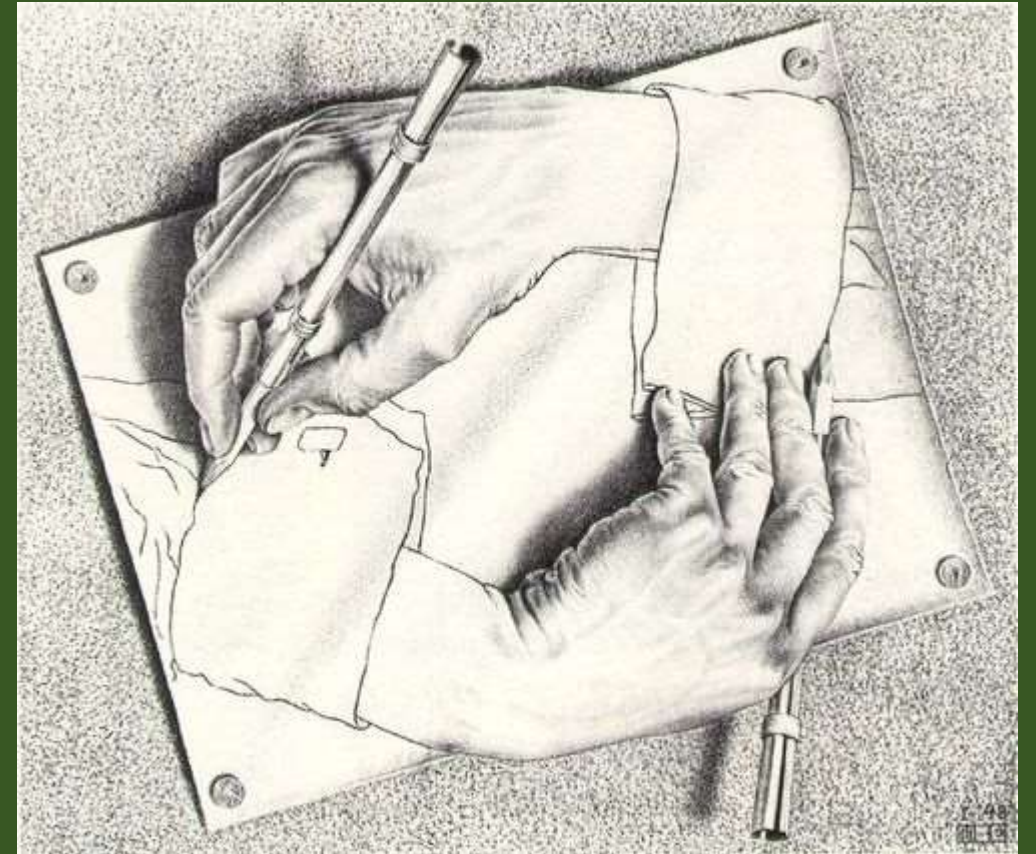
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Key to the Puzzle

And again, randomness does not generate meaning in languages



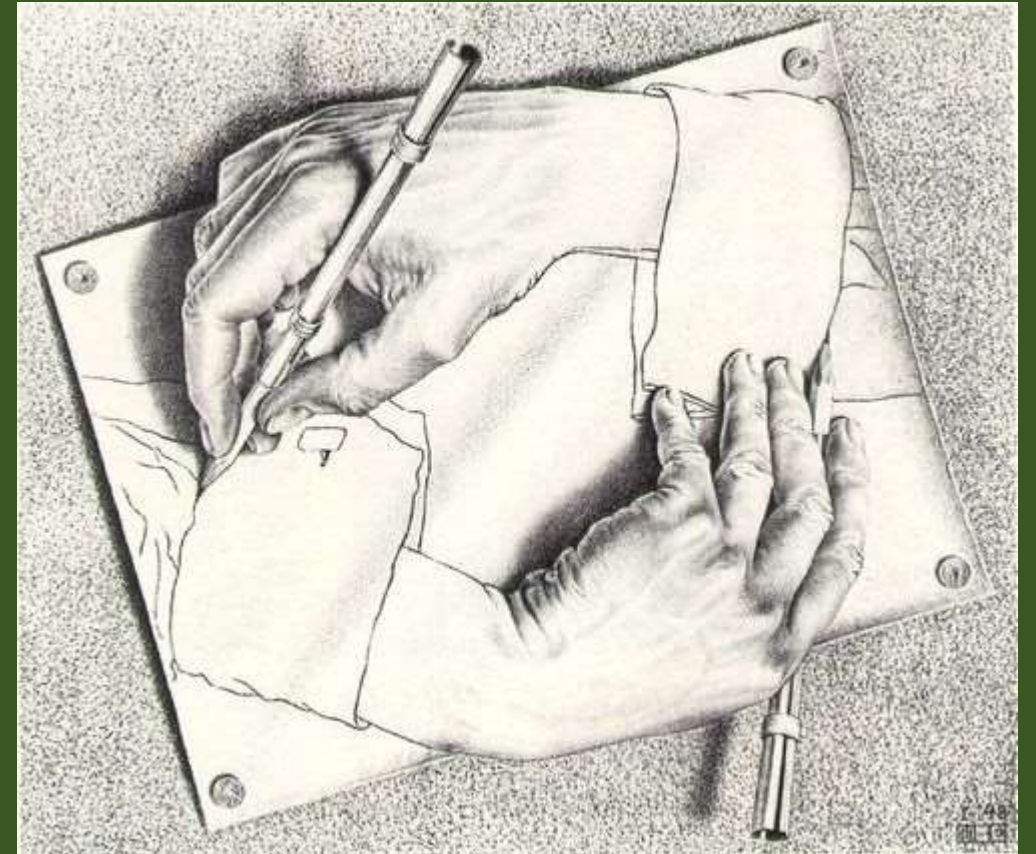
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Key to the Puzzle

Plus, there is no first principles explanation for randomness or even experimental evidence for it.



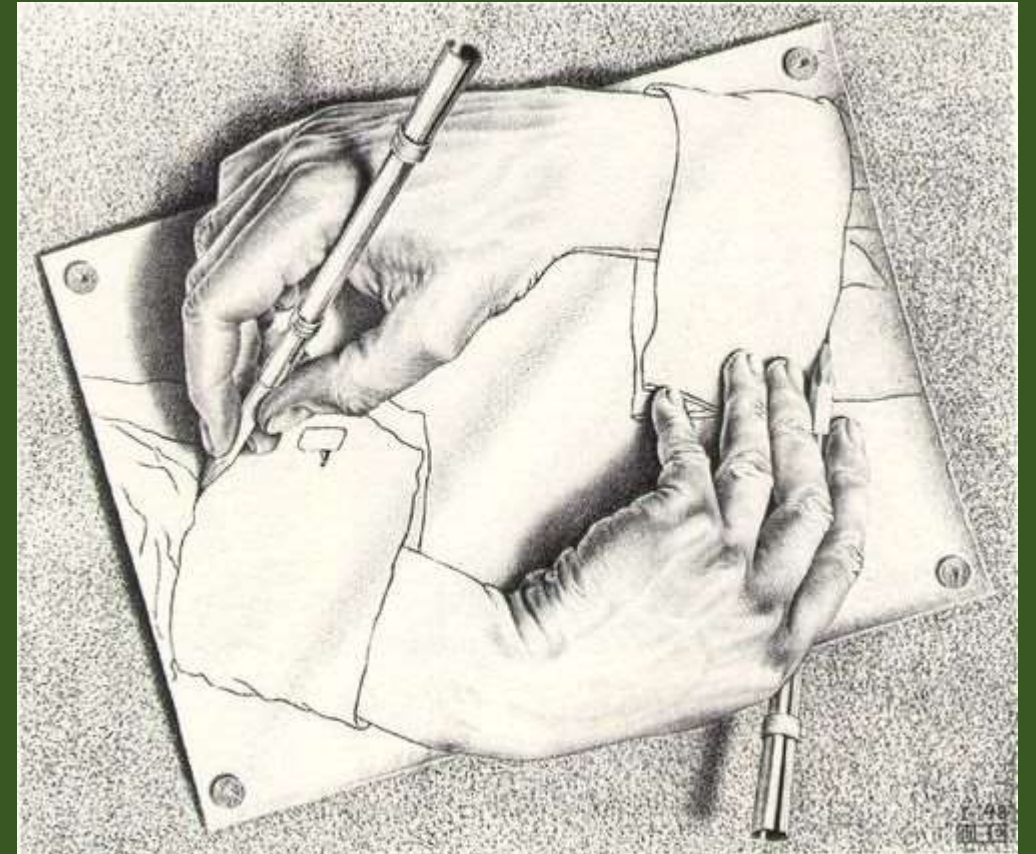
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Key to the Puzzle

Can a consciousness that emerges from the code be the origin of the code in the first place – making it a logically consistent causality loop?



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Key to the Puzzle

A universal collective consciousness could be the answer.



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Key to the Puzzle

But how could such a thing emerge from a universe made of information?



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Key to the Puzzle

And where would the information have emerged from in the first place?



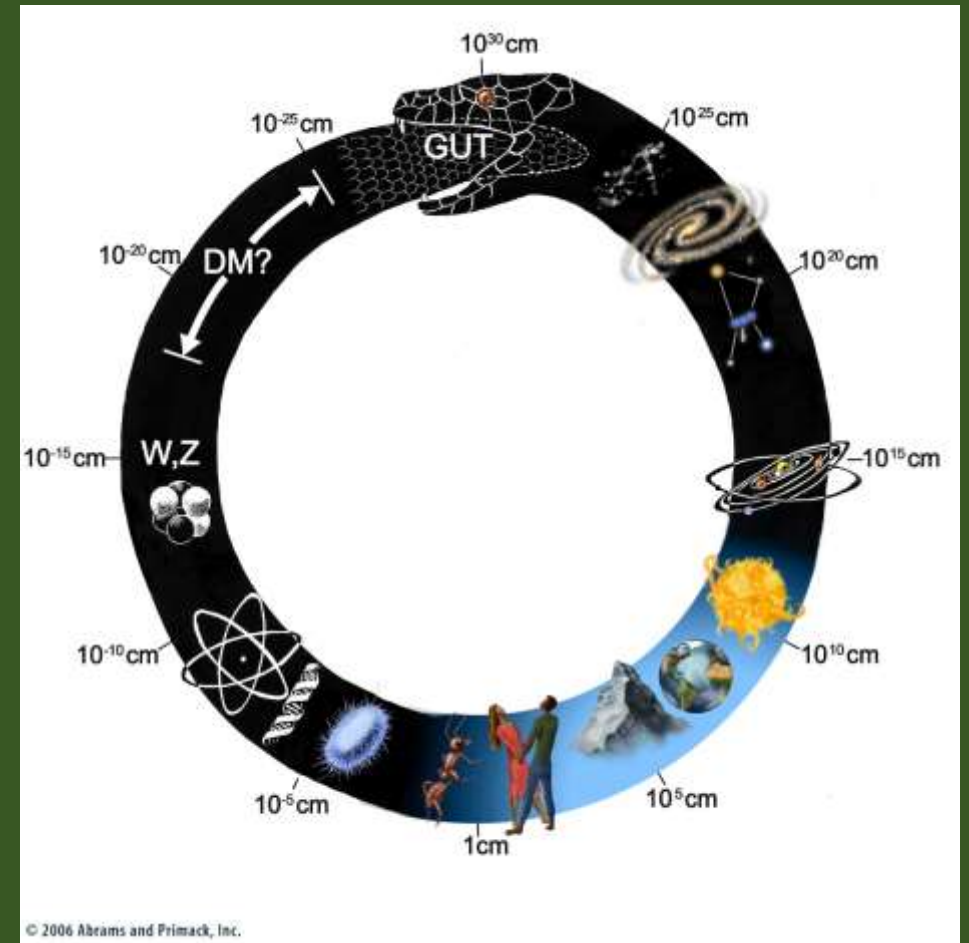
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Key to the Puzzle

Clearly, evolutionary emergence by self-organization is how the universe works...



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Key to the Puzzle

Clearly, evolutionary emergence by self-organization is how the universe works...

...where small and simple things self-organize into larger emergent things.



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Key to the Puzzle

Our minds are examples of this.



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Key to the Puzzle

The power of the neural-network like universe is in its massive connectivity – both forward and backward in time.



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Key to the Puzzle

Networks harness the mathematical power of exponential connectivity and growth.



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Key to the Puzzle

As an example, let's fold this piece of paper four times.



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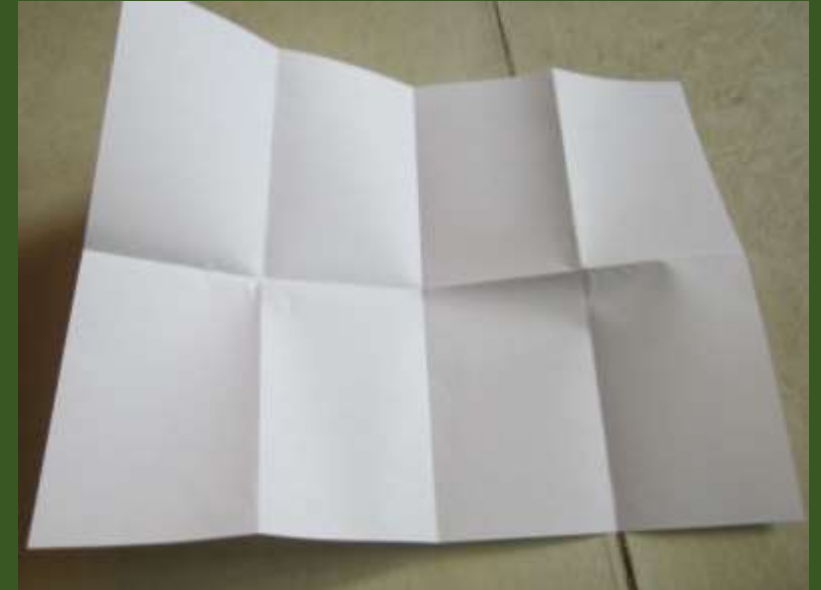


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Key to the Puzzle

As an example, let's fold this piece of paper four times.

It's still just a few millimeters thick.



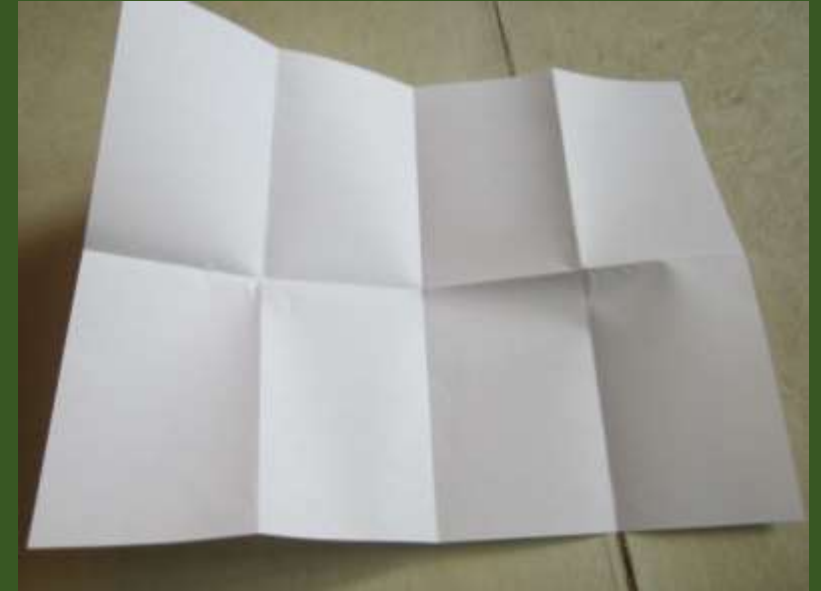
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Key to the Puzzle

How thick will it be if I folded it another 99 times for a total of 103 folds?



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Key to the Puzzle

How thick will it be if I folded it another 99 times for a total of 103 folds?

It would be twice as big as...



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The Universe



Key to the Puzzle

There are no laws in physics that place an upper limit on what percentage of the universe can exponentially self-organize into freewill systems like us humans.



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Key to the Puzzle

All the energy of the universe can be converted into a single conscious system that is itself a network of conscious systems.



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Key to the Puzzle

Given enough time, what can happen will eventually happen.



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Key to the Puzzle

Given enough time, what can happen will eventually happen.

By this axiom, universal emergent consciousness has happened somewhere ahead of us in space-time.



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Key to the Puzzle

Given enough time, what can happen will eventually happen.

By this axiom, universal emergent consciousness has happened somewhere ahead of us in space-time.

Because it is possible, it is inevitable.



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Key to the Puzzle

In fact, according to the evidence of retro-causality time loops, that inevitable future is co-creating us right now just as we are co-creating it.



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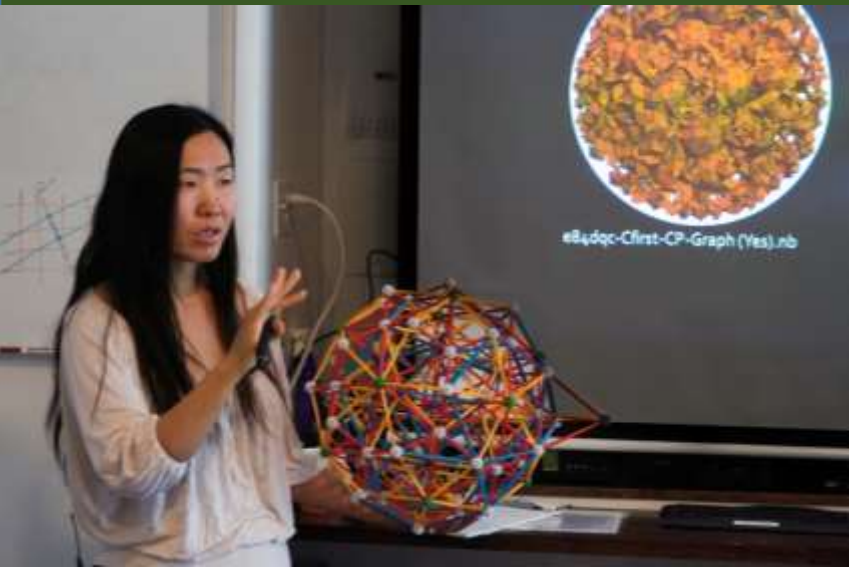


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Our quasicrystal unification physics program is called *emergence theory*. Our plan is to evolve these ideas from interesting conjectures into mathematically rigorous open-source science.



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Raymond@QuantumGravityResearch.org

www.QuantumGravityResearch.org