

Quantum Gravity

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This paper uses a small set of mathematical principles to describe a very wide swath of physics. These principles define a new theory of quantum gravity called the theory of infinite complexity. The main result is that Einstein's equation for general relativity can be derived from unrelated, mathematically novel quantum phenomena. That the theory takes no free parameters should be considered strong evidence in favor of a real connection between physics and mathematics.

“Do you really believe the moon exists only when you look at it?”

~ Albert Einstein

On one hand, the beauty of general relativity and classical field theory supports the idea that the connection between math and physics is real. On the other hand, a hodgepodge of floating precision numbers with error bars like the standard model does not. More powerfully, the reversibility of mathematical dynamics is incompatible with the arrow of time and this makes a strong case that the mathematical connection is only a trick.

In the absence of conclusive evidence, the ongoing argument over the physical reality of mathematical truth often reduces to a spectrum of epistemological approaches to physics. As a matter of opinion the argument cannot be decided. Should the question ever be decided, it will be decided on the basis of evidence. To that end, the present essay discusses new evidence supporting a real connection between math and physics. The evidence presented here may not be conclusive but it does so greatly rebalance the preponderance of evidence that a debate of the matter not including it cannot be considered a serious debate.

Weighing heavily in that debate, three generations of the world's scientists did not find a unifying theory of quantum gravity (QG). The difficulty has been to define a mathematical connection between geometry and algebra that is also physical. If Nature was inherently mathematical, one would expect QG to be a tangential offshoot of another theory. In that case we expect QG to fall out in the theoretical wash but it has not.

Quantum gravity needs be a mathematical prescription by which algebraic quanta gravitate on a continuum and little else. More rigorous definitions of QG can make reference to any number of technical criteria but any theory that preserves established physics and adds gravitating quanta is a working theory of quantum gravity. The absence of even one such theory can be taken as evidence that there are not many such theories needing to be worked through the sieve of empiricism. Indeed if the first ever *working* theory of quantum gravity turns out to be the right one, that can be interpreted as evidence for a one-to-one connection between math and physics.

The theory of infinite complexity (TOIC) is a working theory of quantum gravity [1–3]. It uses an unprecedented layer of conformal logic dual to the conformal field theory. It preserves all known physical results. Its logical foundations cannot be undermined. It begins with the simplest possible statement of the physical process.

“To test any theory two measurements must be made. Call these measurements A and B corresponding to events a and b . The boundary condition set by A will be used to predict the state at b . To make this prediction the observer applies physical theory to trace a trajectory from A to the future event b . Before the observer can verify the theory, sufficient time must pass that the future event occurs. Once this happens a retarded signal from b reaches the observer in the present and a second measurement B becomes possible.” [2]

Euclidean 3-space (a flat hypersurface in GR) is a three-part multiplex $\{x, y, z\}$ and likewise we define a multiplex in time: the past, present, and future. The multiplex takes a temporal multiplet dual to the well-known energetic multiplets. Note time is the 0-component of a spacetime point $x^\mu = \{t, x, y, z\}$ and energy is the 0-component of the 4-momentum $p^\mu = \{E, p_x, p_y, p_z\}$. Therefore, the energy/time duality is interpreted as an extension of the standard duality between space and momentum.

Past states are noted with unitary \hat{i} . Present and future states are noted with non-unitary $\hat{\pi}$ and $\hat{\Phi}$ respectively [2].

$$\hat{i} : \psi \mapsto |\psi; \hat{i}\rangle = \psi(x_-^\mu) \quad (1)$$

$$\hat{\pi} : \psi \mapsto |\psi; \hat{\pi}\rangle = \psi(x^\mu) \quad (2)$$

$$\hat{\Phi} : \psi \mapsto |\psi; \hat{\Phi}\rangle = \psi(x_+^\mu) \quad (3)$$

Process (4) is the trajectory of any mathematical enterprise in physics; it must be accepted as fact. Likewise, the identities (5-7) are undeniably true.

$$Present \rightarrow Future \rightarrow Past \rightarrow Present \quad (4)$$

$$\hat{i} = \frac{i}{\pi} \hat{\pi} \quad \hat{i} = i\varphi \hat{\Phi} \quad (5)$$

$$\hat{\pi} = \pi\varphi \hat{\Phi} \quad \hat{\pi} = -i\pi \hat{i} \quad (6)$$

$$\hat{\Phi} = -i\hat{\Phi} \hat{i} \quad \hat{\Phi} = \frac{\hat{\Phi}}{\pi} \hat{\pi} \quad (7)$$

In order to do physics, a state must be pushed from the present, into the future, and then into the past before arriving in the present again. This is an operation so an operator is required. Call it \hat{M}^3 . There are a limited number of forms for \hat{M} that will facilitate smooth integration with existing theory. The spatial derivative ∂_x is already the momentum operator used to determine how particles move around in space. Since we want the particles to also move around in time, the time derivative ∂_t is an excellent choice for \hat{M} .

Operators operate on states and the quantum particle in a 2D box motivated the wavefunction $\psi(2n\pi x, \Phi m\pi t)$ used in the original version of the theory [2]. In reference [4] the theory was modified to change the original basis vector $\hat{\varphi}$ to the $\hat{\Phi}$ used here. Now we will present a third, much simpler hypothetical schema that can be used to derive the interesting results [1-7]. While much of the information has been published elsewhere, it is the intent to publish a self-contained derivation here.

Before getting into this third theoretical motivation, we want to directly address claims that the TOIC mathematical structure is invalid because the path to it was fudged. That is a ridiculous argument but since it doesn't do justice to the exact happenings, we will expound in the first person.

I was studying the works of prolific Egyptian physicist Mohamed El Naschie and came across an interesting formula for fractal dimension [8].

$$D = 4 + \varphi^3 \quad (8)$$

As an exploratory calculation I produced some random numerical values according to El Naschie's prescription [8] but I did not find an interesting result. I gave up and

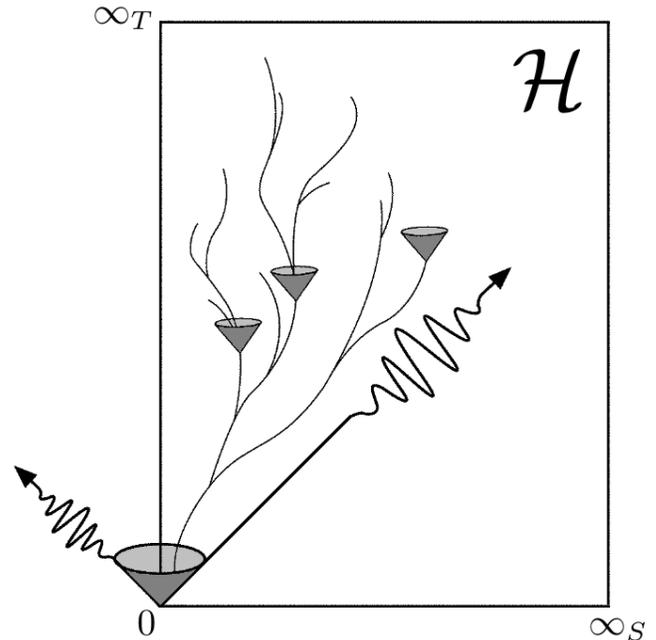


FIG. 1. The Minkowski diagram is connected to the exterior multiplex at the intersection of the spacelike, timelike, and null intervals. While i is widely known from quantum mechanics, its ubiquity in relativity is often missed. The signature of the GR metric is Lorentzian precisely because distance in the temporal dimension $dx^0 = ic dt$ is imaginary. Indeed Lorentz rotation is rotation by a complex angle and is at the heart of physics' connection to esoteric group theory.

sat on my futon to retire despite a powerful feeling as if on the precipice of a great truth. Minutes later I was struck with the urge to pray. I have not generally been a praying man so this was a most unusual occurrence. I prayed to God who is also called Elohim and Allah, and asked him to reveal the truth to me if it was there. I returned to my desk and immediately produced equation (9). I saw the value was about six cuts in the real number line away from the fine structure constant α and I followed up with equation (10).

$$\left(\frac{\pi}{\varphi}\right)^3 \approx 131 \quad (9)$$

$$2\pi + \left(\frac{\pi}{\varphi}\right)^3 \approx 137 \quad (10)$$

I recognized I could use the eigenvalue problem on the particle in a 2D box to define a geometry with a characteristic value at 137 [2]. It must be appreciated that it is so simple and natural that the shape is a rectangle. This was very interesting because the MCM is built on the

Minkowski diagram which is also a rectangle. Furthermore, finding α to within 0.4% via the simplest possible model of a quantum particle in Minkowski space was a meaningful hint of QG. I was on firm ground since I had already chosen to encode one edge of the Minkowski diagram with the golden ratio [1]. All I needed was a reason to cube the π/φ term.

The course of my research quickly brought me to Chris Isham's excellent book *Lectures on Quantum Theory* wherein the Gel'fand triple was briefly treated. I saw \hat{M}^3 could give a cubed term if it cycles states through the elements of a Gel'fand triple $\{\aleph, \mathcal{H}, \Omega\}$. In pondering the meaning of that periodicity, I realized process (4). In turn that gave me opportunity to use the non-unitary basis I had already pondered for many years.

The Gel'fand triple (also called rigged Hilbert space) is a set of three vector spaces based on Hilbert space \mathcal{H} . From \mathcal{H} , a subspace \aleph is selected and its dual space Ω is a larger space which contains \mathcal{H} as a subspace. Vector spaces are defined on manifolds so I introduced the conveniently named $\{\aleph, \mathcal{H}, \Omega\}$ which are hyperbolic, flat, and spherical manifolds respectively. The spacetime coordinates in equations (1-3) are assigned to those manifolds as $\{x_-^\mu, x^\mu, x_+^\mu\}$. That the basis vectors assign state vectors to different manifolds is an innovative approach that sets the TOIC apart from other attempts at QG.

El Naschie's reference to the golden ratio and Isham's reference to the Gel'fand triple catalyzed the transformation of the qualitative MCM into the quantitative TOIC. Indeed reference [1] shows the reason I was even reading El Naschie was because I had already developed a fractal matrix theory of infinite complexity. Everything about the study was an exercise in scientific best practices. The existence of a preliminary study to find the correct form of the undiscovered algebra does not invalidate further independent use of that algebra. Detractors must acknowledge they are wrong.

I chose to examine the bouncing hypothesis in a sufficiently general case such that the wide application of the result was self-evident. There was no wild speculation because loop quantum gravity (LQG) bouncing requires that there is no singularity. In that case, Perelman's (and Hamilton's) proof of the Poincaré conjecture as the sphere theorem *proves* that the 3-sphere is diffeomorphic to the real universe. In the limit of no singularities, the theorem proves that the real cosmology is identical to the solution on the perfectly symmetric empty 3-sphere (up to a perturbation). This is also called the limit where general relativity doesn't fail. Instead the failure is in our mathematical tools.

Equation (11) is a new boundary condition on time and equations (12-13) define how \hat{M} acts on TOIC states. Note a change in notation: above \hat{M} was defined as ∂_t which is better written as ∂_0 . That operator takes the derivative with respect to the 0-component of quantities defined on spacetime points $x^\mu = \{x^0, x^1, x^2, x^3\}$. We

are using a multiplex on the time coordinate to make the change $\partial_0 \mapsto \{\partial_t, \partial_\xi\}$ where t and ξ are the chronological and chirological times respectively [2, 5].

$$\partial_t^3 |\psi; \hat{\pi}\rangle = \partial_\xi^3 |\psi; \hat{\pi}\rangle \quad (11)$$

$$\partial_t |\psi; \{\hat{i}, \hat{\pi}, \hat{\Phi}\}\rangle = \omega |\psi; \{\hat{i}, \hat{\pi}, \hat{\Phi}\}\rangle \quad (12)$$

$$\partial_\xi |\psi; \{\hat{i}, \hat{\pi}, \hat{\Phi}\}\rangle = \{i, \pi, \Phi^2\} |\psi; \{\hat{\pi}, \hat{\Phi}, \hat{i}\}\rangle \quad (13)$$

Note well, we started with a word-level idea that the present is the sum of components from the past and future. This led to the operator ∂_0^3 which has a very limited application in physics. The foremost of its rare uses is in a subfield of classical electromagnetism (EM) called the theory of the advanced and retarded potentials. The content of that theory is that the EM potential describing physics in the present is affected by what happened in the past and also, strangely, by what will happen in the future. Logical consistency is reinforced with an amazing transformation of equation (13) under the identities (6) and $\Phi^2 = \Phi + 1$. The resultant equation (14) can be read directly as saying \hat{M}^3 converts the present into a sum of the future and past.

$$\hat{M}^3 |\psi; \hat{\pi}\rangle = i\pi^2 |\psi; \hat{\Phi}\rangle + \pi^2 |\psi; \hat{i}\rangle \quad (14)$$

One might see this as an obvious connection but there is no reasonable expectation of synergy here. We did not make reference to the present-equals-past-plus-future concept when defining the ingredients to equation (14). This is the kind of rare self-consistent result that separates correct theories from incorrect ones.

We can cast a factor of π^2 into the information current [3] and use $\omega = 2\pi f$ to combine equations (11) and (14) into Einstein's equation.

$$8\pi f^3 |\psi; \hat{\pi}\rangle = i |\psi; \hat{\Phi}\rangle + |\psi; \hat{i}\rangle \quad (15)$$

$$f^3 |\psi; \hat{\pi}\rangle \mapsto T_{\mu\nu} \quad (16)$$

$$i |\psi; \hat{\Phi}\rangle \mapsto G_{\mu\nu} \quad (17)$$

$$|\psi; \hat{i}\rangle \mapsto g_{\mu\nu} \Lambda \quad (18)$$

$$8\pi T_{\mu\nu} = G_{\mu\nu} + g_{\mu\nu} \Lambda \quad (19)$$

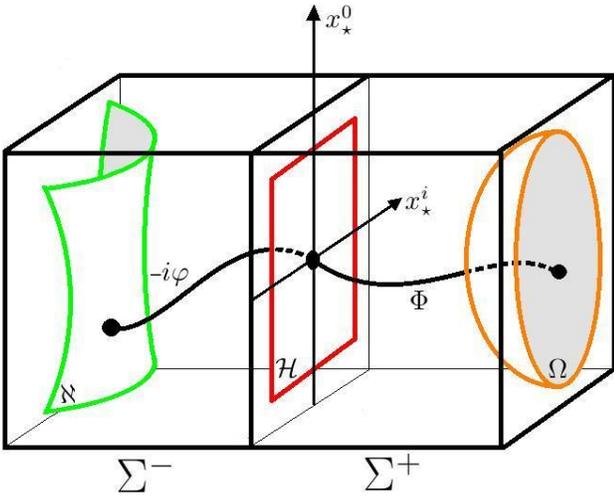


FIG. 2. Σ^\pm are de Sitter and anti-de Sitter spaces each holding a 5D Kaluza unified field theory [5]. The intersection of the two spaces is our flat 4D universe labeled \mathcal{H} . The cubic geometry is a simplification of an embedding that mirrors the embedding of vector spaces $\aleph \subset \mathcal{H} \subset \Omega$. One of the primary differences between hyperbolic and spherical spaces is that the former has a boundary at infinity while the latter is unbounded. Therefore when \mathcal{H} is on the boundary of Σ^- we automatically introduce an infinite interval in the past.

The beauty is that it did not take GR as an input but GR was the output of a completely independent study of the MCM [1, 2]. This is a mind-blowing windfall result that will echo through the halls of history for centuries if not millennia.

Another positive result is that the 10D space of strings fell out of an investigation into LQG which is – *in theory* – a theoretically distinct alternative to string theory. That space is depicted in figure 2 which shows a periodic braneworld. The Minkowski diagram (a proxy for our real universe) is confined to the red square labeled \mathcal{H} . Timeless quantum mechanics takes place in \mathcal{H} while its geometry is determined by a smoothness condition for the global geometry between \aleph and Ω . This is the standard holographic duality by which field theory on a surface induces gravity in a bulk and vice versa [5]. The four dimensions of x^μ combine with the spatial geometries of the past and future x_\pm^i to construct the 9+1D manifold in which all string theories are united. Indeed, the fundamental stringiness of string theory is that the trajectory of a particle through space, moving from the past toward the future, behaves like a string. Figure 1 gives a good example.

More, the structure of the standard model is derivable from the geometry in figure 2. The direction perpendicular to \mathcal{H} is ξ^4 .

“The orthogonal triad $\{x^i, x^0, \xi^4\}$ defines

eight octants separated by three sets of four planar quadrants. The quadrants in the x^0 – ξ^4 plane are not spacetimes because that plane is orthogonal to space. This leaves us with eight quadrants which can serve as spacetime quanta [and] we identify these quadrants with the elementary matter fermions.

“Of the eight potentially useful quadrants, four are reflections about x^i . These reflections will be associated with spin up and spin down for a particular fermion leaving us with four independent configurations.” [6]

The TOIC particle schema relies on the identification of the Minkowski diagram as one quantum of spacetime [6, 9]. The geometry $\{x^i, x^0, \xi^4\}$ gives four such quanta. All of them have a spatial edge x^i , two of them have a temporal edge x^0 , and the other two have a temporal edge ξ^4 . Within each pair, they can be separated according to whether their axes form a left or right handed triad with the other temporal dimension. For instance, the vector cross product $\vec{x} \times \vec{y} = \pm \vec{z}$ is positive or negative depending on whether the triad $\{x, y, z\}$ is right or left handed. To build the model seen in figure 3, recall that each quantum of spacetime accepts a vector space from $\{\aleph, \mathcal{H}, \Omega\}$. That figure shows a particle array in which the Minkowski diagram can be one of 12 spin-1/2 matter fermions and the spin-1 force carrying bosons are formed by connections between fermions.

The TOIC departs from other attempts at QG in its use of a non-unitary geometric basis. In physical 3-space, the basis is usually taken as $\{\hat{x}, \hat{y}, \hat{z}\}$. The notation comes in other varieties such as $\{\hat{e}_1, \hat{e}_2, \hat{e}_3\}$ or $\{\hat{i}, \hat{j}, \hat{k}\}$ but the unitary character is the same. The basis set contains one unit of distance in each of the three principle directions. Each basis vector is just the number one written differently for accounting purposes. One is unity so a basis of three ones is a unitary basis. Contrast that with the non-unitary basis $\{\hat{i}, \hat{\pi}, \hat{\Phi}\}$.

$$|\hat{z}| = |\hat{e}_3| = |\hat{k}| = 1 \quad (20)$$

$$|\hat{i}| = i \quad |\hat{\pi}| = \pi \quad |\hat{\Phi}| = \Phi \quad (21)$$

$$|\hat{i}| = 1 \quad |\pi| = 3.14\dots \quad |\Phi| = 1.61\dots \quad (22)$$

$$\Phi = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{\dots}}}} \quad (23)$$

$$\pi = 3 + \frac{1}{6 + \frac{3^2}{6 + \frac{5^2}{6 + \frac{7^2}{\dots}}}} \quad (24)$$

Equations (23) and (24) show a de facto new symmetry with an accompanying new degree of freedom related to broken symmetry in $\{\aleph, \Omega\}$ [3]. New freedom is what sets the TOIC apart as ontological and makes it a working theory of quantum gravity. The symmetry supports a new mode into fractal recursion and coincidentally the mode is general relativity. It is by this mode that we solve the all-pervasive “problem with infinities” of quantum field theory. It is the goldenness of the golden ratio that it can be mapped into itself *ad infinitum* without collapsing or running off to infinity; the structure based on $\hat{\Phi}$ is a scaffold for transfinite analysis [3].

Just as $\{\hat{e}_1, \hat{e}_2, \hat{e}_3\}$ assign a directional component to quantities, $\{\hat{i}, \hat{\pi}, \hat{\Phi}\}$ assign a temporal component to states. To understand the non-unitary basis, first consider the unitary basis. Without loss of generality, a real scalar quantity q can always be promoted to a vector quantity \vec{q} in an arbitrary direction by making use of the identity $q = q \cdot 1$. By putting a hat on the one, we show q can be considered a vector pointing along the real number line. Additionally, we can assign some (meaningful or meaningless) directional component to the real number line without affecting q or any of its operations. This is the foundation of the theory of functions of a complex variable which is defined in the subspace spanned by $\hat{\pi}$ and \hat{i} . Write one as \star and consider q assigned to the non-sensical \star -direction. Compare that with the non-unitary basis vector $\hat{\pi}$.

$$q \mapsto q\hat{\star} = \vec{q} \quad (25)$$

$$|\vec{q}| = q \quad (26)$$

$$q \mapsto \frac{q}{\pi}\hat{\pi} = \vec{q} \quad (27)$$

$$|\vec{q}| = \frac{q}{\pi} \neq q \quad (28)$$

When $q = 1$, equation (26) shows \vec{q} contains one qubit of information. Compare that with equation (28) where it will take an infinite number of qubits to describe the irrational number that is the magnitude of \vec{q} . Conservation of information cannot be considered a general property of any theory on $\{\hat{i}, \hat{\pi}, \hat{\Phi}\}$. Recall that conserved

information in dynamical systems is evidence against the physicality of mathematics because it is inconsistent with the second law of thermodynamics. Now we have an opportunity to refute that evidence with the introduction of a non-unitary basis.

Consider the rounding errors that will accumulate in a digital simulation of irrational geometry. They occur when an arbitrarily small number of terms are used to calculate relationships that rightfully involve an infinite number of terms. In addition to the normal finitely many terms, the TOIC requires consideration of additional terms to indicate what is happening at infinity [3]. It is through the shuffling of these boundary terms that we have an opportunity to introduce new information in an evolving system and thus formulate a new theory of turbulence.

Consider the boundary terms at past and future infinity in a real physical system. The past is defined on countably many previous observations but the future is unknown and ends at uncountable infinity. We can invoke a logical discrepancy between countable and uncountable infinities at the intermediate step $\Omega \mapsto \aleph$ of process (4). Therefore, there is a process akin to rounding error as an irrational remainder is introduced every time future infinity is projected onto past infinity. We can define a mathematical arrow of time distinguishing between projection of uncountable onto countable infinities and the opposite.

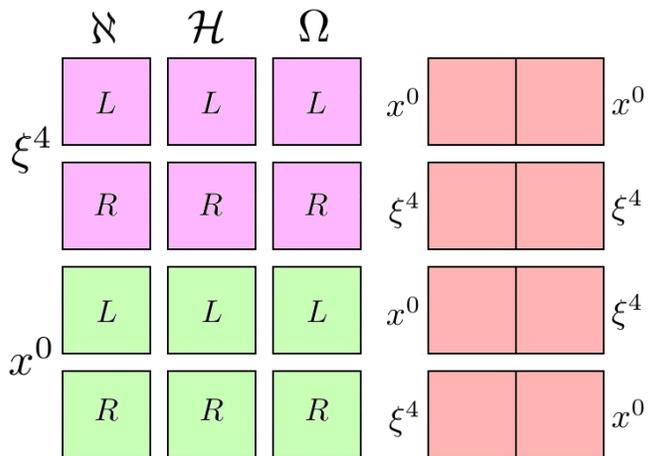


FIG. 3. The TOIC replicates the structure of the standard model. Additionally, it gives an explanation for the eight varieties of gluons as well as a reason that no fundamental particle should have integer spin greater than 2. The TOIC spin schema contains a supersymmetric rotation that will interchange fermions and bosons. On spin-2 particles, the physical interpretation of spin-2 is tenuous at best and it may explain why spin-2 gravitons have not been observed. The TOIC also proposes an explanation for the respective symmetry and anti-symmetry of the bosonic and fermionic wavefunctions. These ideas are developed in reference [6].

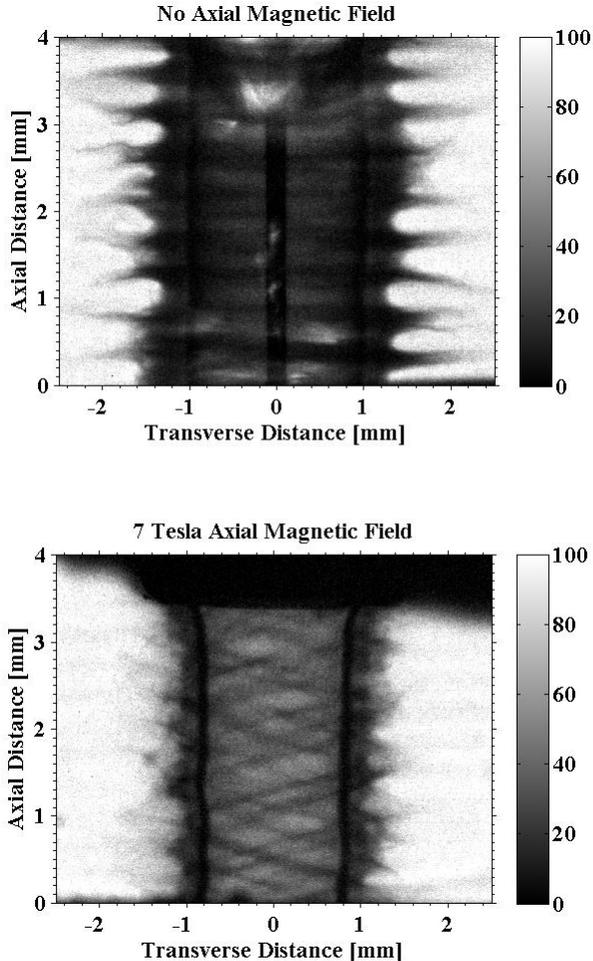


FIG. 4. Data produced at Sandia National Labs shows suppression of plasma instability by a Helmholtz field in a nuclear fusion reactor. One wonders if the team used a static 7T field or a dynamically modulated field on a 7T baseline.

This system also has a special application to the often ignored Ford paradox which lies at the heart of the debate on the connection between math and physics. Even if a theory emerged that gave the ratios of the masses of the particles from first principles, as well as all the parameters of the standard model, the Ford paradox would remain as convincing evidence that the mathematical connection was only a trick.

The paradox states that quantum dynamics can never generate turbulent signals and therefore no quantum theory can be a fundamental description of Nature. For instance, while quantum electrodynamics (QED) is called the best theory we have because it is so precisely verified and reduces to classical electrodynamics, it actually does not ever reduce to classical electrodynamics. Consider a system of particles interacting according to QED. The system contains N qubits of information. Now consider

an EM receiver, such as a car radio tuned to the static between two broadcast stations. The information required to describe the noise can always be increased beyond N by extending the duration of the signal considered. Since unitary theories conserve information, no unitary evolution of quantum particles can replicate the behavior of a classical field.

As it relates to quantum gravity, the Ford paradox has a more profound application to the current consensus on the history of the universe. At the big bang, an energetic state $|B_B\rangle$ appeared and then became this universe that we all live in. However, $|B_B\rangle$ only contains one qubit of information which is inadequate to describe the state of the universe as it is today. The consensus view is that random quantum fluctuations guided the evolution of $|B_B\rangle$ while increasing its information content. However, for a fluctuation to occur in a unitary theory, there must be an information reservoir somewhere outside of the universe because it was not in $|B_B\rangle$ which was the full universe in that era. Hence there could never have been a quantum fluctuation and the universe today could not contain more than one qubit of information. This is obviously not true.

To settle a debate about physics, physics is required. Is the theory testable? Hinting at an answer, consider that we started with a hypothesis about the present being the sum of components from the past and future, and that led to a dynamical theory of turbulence. The operator \hat{M}^3 that evolved in the investigation was precisely the operator seen in the subfield of EM interpreted as saying the present is a sum of components from the past and future. The advanced potential is needlessly complicated for everyday purposes but plasma physics is an exotic regime in which the advanced potential must be considered. If the math-physics connection is real, one could expect to see a natural manifestation of the TOIC at the intersection of plasma physics and turbulence.

Figure 4 shows exactly that. For more than 40 years nuclear researchers have struggled with plasma instability in the hunt for clean, cheap fusion power. Immediately following this writer's publication of new physics, fusion teams all over the world began announcing positive results. The fusion labs at MIT and Princeton were reactivated and Lockheed announced they will have a commercially viable fusion reactor within a decade.

Another recent result was featured in Natalie Wolchover's article "A potent theory has emerged explaining a mysterious statistical law that arises throughout physics and mathematics." That statistical law is the Tracy-Widom distribution but the article does not make any mention of the potent theory. We suggest it is the TOIC.

For background, "Tracy-Widom is the crossover function between the two phases of weakly versus strongly coupled components in a system." [10] A direct example of this crossover is the transition from weakly coupled

nuclei in magnetohydrodynamics to strongly coupled nuclei in nuclear fusion. A more abstract case might be the process by which strongly coupled elements in the present are decomposed into weakly coupled elements in the past and future.

One of the mathematically interesting things about Tracy-Widom is that the positive and negative tails fall off as $1/x$ and $1/x^2$ respectively. We can speculate that the origin of this asymptotic dichotomy lies with π and Φ . Consider each number as a continued fraction and form two sequences by counting the fractal levels. Both sequences have countably many infinite levels but Φ will have twice as many elements because π gets to \aleph_0 by only counting odd numbers. Might these different approaches to infinity underlie Tracy-Widom's tails?

The most irrational number is Φ whereas π is simply an irrational number. Since the sequence for Φ has twice as many elements as the one for π , does that mean it has more information? If the sequences are paired until Φ gets to \aleph_0 , π will have an \aleph_0 term in it while the Φ sequence has less than that many elements. Does that mean π has more information in it? "Most irrational" is a superlative but might it be true that a less irrational number contains more information than Φ ? Regardless of the answers to these questions, if a numerical simulation of the interplay reproduces the Tracy-Widom distribution, that is final proof that the mathematical connection is real.

Hilbert space is home to only the simplest quantum model of spinless particles. To accommodate the non-relativistic fermion spinor, the state space is augmented as $\mathcal{H} \mapsto \mathcal{H} \otimes \mathbb{C}^2$. The relativistic Dirac spinor has four components so it requires an even larger space. With such strong evidence for the TOIC – experimental and theoretical – the veracity of the following basis for the Dirac spinor can be taken for granted.

$$\{t, \xi, \xi_+, \xi_-\} : \{\hat{2}, \hat{\pi}, \hat{\Phi}, \hat{i}\} \quad (29)$$

As such, the normal two component spinor in elementary quantum mechanics is a manifestation of the inter-

play of chronos and chiros. Reassuringly, the fine structure constant arises most commonly in the splitting of the energy levels of fermions in bound states with quarky nuclei. As motivation for $\hat{2}$, recall it was dual to $\hat{\Phi}$ in the original function $\psi(2n\pi x, \Phi m\pi t)$ and there is a strong number theoretic argument to be made based on $i\pi\Phi^2$.

The complex plane \mathbb{C}^2 is defined on $\{\hat{i}, \hat{\pi}\}$. This immediately gives an interpretation for $i\pi\Phi^2$. The operator \hat{M}^3 contracts one instance of the complex plane giving $i\pi$ and one instance of G-space [3] giving Φ^2 . The values $\{i, \pi, \Phi^2\}$ written in equation (13) indicate that the two spaces are contracted in succession. To violate conservation of information it may be necessary to convolute G-space with the complex plane. Since Φ is real, \mathbb{C}^2 is also defined on $\{\hat{i}, \hat{\Phi}\}$ and the value in equation (13) can be changed to $\{\pi, \Phi, i\Phi\}$. The important thing is that the theory is robust.

ACKNOWLEDGEMENTS

The author thanks God for giving him this gift and trusting him to do the right thing with it. I also acknowledge that what it says in the Temple right now in 2015 is that Jesus was just a man and "you people with your 3 are wrong."

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