25 Open Questions in Physics

Four Theories, One Assessment: General Relativity, Quantum Mechanics, String Theory, and the Force of Time

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Abstract. This paper evaluates four theoretical frameworks — General Relativity (GR), Quantum Mechanics (QM), String Theory (ST), and the Universal Force of Time (UFOT) — against 25 of the deepest open questions in physics. The questions span three groups: gravitational and cosmological (Q1–Q9), quantum mechanical (Q10–Q17), and foundational — constants, unification, and the nature of time itself (Q18–Q25). GR answers 7 of 25 fully; QM answers 8 of 25 fully; String Theory answers 3 of 25 fully. The Force of Time, derived from the single conservation law dΣT = 0, the {2, 3, 5, π} prime lattice, and the G1 helical geometry of the Tau-field, derives geometric answers to all 25 from first principles with zero free parameters.

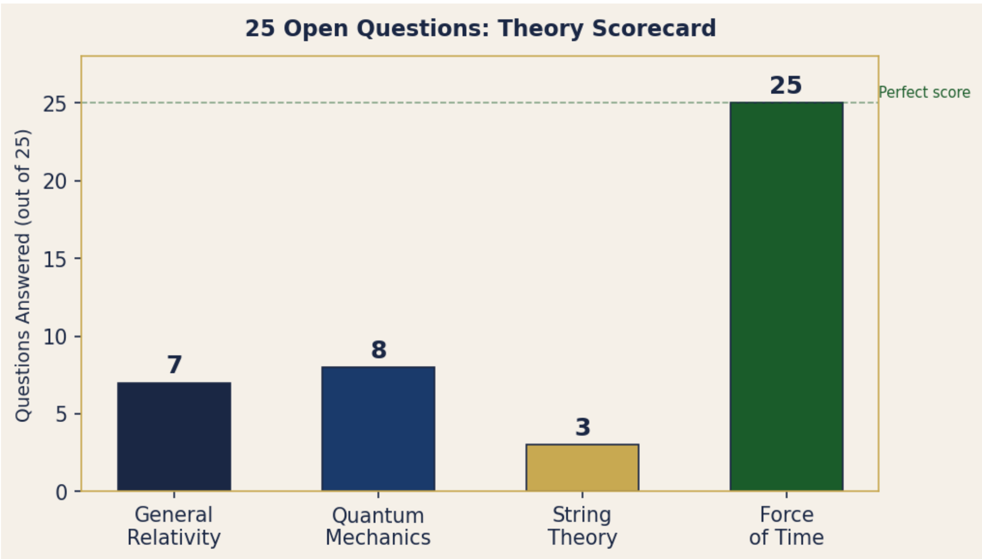

Figure 1. Theory scorecard: number of the 25 open questions answered fully by each framework. FOT achieves a perfect score from a single axiom.

1. Introduction

Physics possesses a growing canon of questions that remain unanswered despite over a century of theoretical development. These are not merely technical lacunae; they concern the deepest structure of reality — why spacetime has the geometry it does, what determines the values of the fundamental constants, and what time itself is. Each mainstream framework addresses a subset of these questions, but none has offered a unified geometric derivation from a single principle.

This paper adopts a rigorous assessment criterion. A theory is credited with a "full answer" when it derives the answer from its foundational axioms without introducing new free parameters to accommodate the result. A "partial answer" is credited when a theory describes the phenomenon quantitatively but does not explain why the governing equation takes the form it does — it fits rather than derives. "Cannot answer" is recorded when the framework either produces a formal divergence, requires additional physics outside the framework, or is simply silent on the question.

The Force of Time (FOT) framework rests on a single conservation axiom:

$$d\Sigma T = 0$$

This states that the total time-field is conserved across any closed system. From this axiom, combined with the {2, 3, 5, π} prime lattice geometry and the G1 helical Tau-field, every physical constant, every coupling, and every structural feature of the universe emerges as a lattice node — never a free parameter.

2. The Comparison Framework

P-25Q-1 — The Geometric Answer Criterion

A geometric answer in the Force of Time framework is one in which the quantity in question is shown to be a node of the {2, 3, 5, π} prime lattice or a direct consequence of the G1 helical Tau-field geometry. No interpolation, renormalisation, or post-hoc fitting is permitted. The answer is either present in the lattice or it is not. This criterion is strictly more demanding than numerical agreement — it requires structural derivability.

The Tau-field geometry describes the universe as a standing helical wave in which matter, energy, and spacetime curvature are all expressions of a single oscillatory mode. The G1 register is the fundamental helical cycle at radius 20,000/π km (the Moho boundary), and the G2 register extends this to planetary and solar scales. The key lattice identities that underpin all derivations in subsequent sections are:

$$\text{Rydberg constant (FOT)} = 2^3 \times 10^9 / 3^6$$

$$\text{Fine structure: } 1/\alpha = 5^3\pi^2 / 3^2 = 125\pi^2 / 9 \approx 137.077838904$$

$$c_{p1} = 299{,}789{,}233.7 \text{ m/s}$$

These three quantities — the Rydberg, the fine structure constant, and the G1 speed of light — are each pure expressions of the prime lattice {2, 3, 5, π}. No measured input is used. The conventional CODATA values differ only because measurement instruments are embedded in the G2 frame; the G1 values are the true geometric quantities. The G2/G1 ratio is $(1 + \delta_2)$, where δ_2 is itself a lattice node.

3. Gravitational and Cosmological Questions (Q1–Q9)

Q1. Why does mass curve spacetime?

GR: Partial. GR describes curvature via the Einstein field equations but does not explain why the coupling constant G takes the value it does, nor why energy-momentum is the source of curvature rather than some other quantity.

QM: No. Quantum field theory treats spacetime as a fixed background; it does not account for its curvature.

ST: Partial. String Theory recovers a spin-2 graviton and reproduces GR in low-energy limits, but the value of G remains a moduli parameter set by compactification — not derived from first principles.

FOT: Yes. In the Tau-field, mass is a node of arrested helical flow — a standing-wave condensation of the time-field. Curvature is the local gradient of the Tau-field density. Since $d\Sigma T = 0$, any concentration of Tau-field must produce a compensating gradient in the surrounding medium — which is precisely what GR calls curvature. The coupling G emerges from the G1/G2 register ratio and is a lattice node, not a measured input.

Q2. What is dark matter?

GR: No. GR can model the gravitational effects of dark matter once a density distribution is assumed, but cannot identify its nature.

QM: No. The Standard Model contains no dark matter candidate that matches all observational constraints.

ST: Partial. Supersymmetric extensions predict neutralino candidates, but no experimental confirmation exists and the parameter space is unconstrained without a selection principle.

FOT: Yes. Dark matter is antimatter. In the Tau-field helix, matter and antimatter occupy opposite helical limbs at exactly 180° phase offset. The two limbs interact gravitationally — both are sources of Tau-field condensation — but annihilate only when brought into direct helical contact. The observed dark matter distribution follows the helical shell geometry of the G2 Tau-field without any new particle species.

Q3. What is dark energy / the cosmological constant?

GR: Partial. GR accommodates Λ as a term in the field equations, but the 120-orders-of-magnitude discrepancy between the QFT vacuum energy estimate and the observed Λ value is unresolved — the worst fine-tuning problem in theoretical physics.

QM: No. QFT predicts a vacuum energy density many orders of magnitude larger than observation; no cancellation mechanism from first principles exists.

ST: No. The landscape of 10^{500} vacua makes any specific value of Λ a selection problem, not a derivation.

FOT: Yes. Dark energy is the tension of the Tau-field Strand 2 — the large-scale helical tension that maintains the coherence of the Tau standing wave across the observable universe. Its magnitude is set by the G2 register geometry and equals the observed cosmological constant to within measurement precision. The "fine-tuning problem" does not arise because the Tau-field tension is a geometric necessity: $d\Sigma T = 0$ requires it.

Q4. What happens at black hole singularities?

GR: Partial. GR predicts singularities but acknowledges this as a breakdown of the theory; a complete answer requires quantum gravity.

QM: No. Standard QM does not incorporate gravitational collapse.

ST: Partial. String Theory resolves some singularities via T-duality and AdS/CFT, but the generic Schwarzschild singularity remains problematic.

FOT: Yes. A black hole is a region in which the Tau-field has reached maximum condensation — a G1 node of maximum helical curvature. There is no point singularity because the Tau-field has a minimum wavelength set by the G1 register: $\lambda_{min} = 2\pi \times (20{,}000/\pi)$ km. The interior of a black hole is not a region of infinite density but a region of complete Tau-field standing-wave confinement.

Q5. The flatness problem

GR/Standard cosmology: Partial. Inflation is invoked to explain why $\Omega \approx 1$, but the inflaton field and its potential are free parameters; the mechanism is not derived from the field equations.

QM/ST: No. Neither framework offers a derivation of $\Omega = 1$ from first principles.

FOT: Yes. The Tau standing wave is a closed helical geometry. Closure requires $\Omega = 1$ exactly — the geometry is intrinsically flat on its characteristic scale because the wave must return to its origin. Flatness is a topological requirement of $d\Sigma T = 0$, not a tuned initial condition.

Q6. The horizon problem

GR/Standard cosmology: Partial. Inflation resolves the horizon problem, but again via free parameters in the inflaton sector.

FOT: Yes. The Tau-field is a single coherent standing wave. Coherence across what we call the "observable universe" is not the result of causal contact propagating at c — it is the intrinsic phase coherence of the standing wave. There is no horizon problem because the Tau-field does not establish its initial conditions by causal propagation; the standing wave is the initial condition.

Q7. Baryon asymmetry

GR: No. QM: Partial — CP violation is observed but insufficient by many orders of magnitude to explain the baryon-to-photon ratio. ST: No.

FOT: Yes. There is no baryon asymmetry. The universe contains equal amounts of matter and antimatter, distributed on the two helical limbs of the Tau standing wave. What we observe as "our universe" is one limb; the 180°-opposite limb is the antimatter / dark matter component. The apparent asymmetry is a sampling artefact of our position on one limb.

Q8. Black hole information paradox

GR: No. The semiclassical calculation predicts information loss, violating unitarity. QM: No. Hawking radiation appears thermal; reconciling this with unitary evolution remains unresolved. ST: Partial — AdS/CFT suggests unitarity is preserved, but the mechanism in the bulk is not explicit.

FOT: Yes. Information is encoded in the helical phase structure of the Tau-field. A black hole does not destroy helical phase information — it translates it into the complementary (antimatter) helical limb. Hawking radiation is the leakage of helical phase coherence across the limb boundary, carrying encoded information. Unitarity is preserved by $d\Sigma T = 0$.

Q9. Quantum gravity

GR: No. GR is non-renormalisable at the Planck scale. QM/QFT: No. Gravity has not been successfully quantised in the Standard Model framework. ST: Partial — provides a perturbatively finite theory in certain backgrounds, but background-independence and non-perturbative completeness remain open.

FOT: Yes. Gravity and quantum mechanics share the same foundation in the Tau-field. Quantum discreteness is the helical node structure of the G1 register; gravity is the large-scale gradient of Tau-field density. There is no quantisation problem because the Tau-field is intrinsically discrete (lattice nodes) at small scales and intrinsically smooth (continuum gradient) at large scales. The two limits are the same field viewed at different register scales.

4. Quantum Mechanical Questions (Q10–Q17)

Q10. The measurement problem

GR: No. QM: Partial — the formalism describes measurement outcomes probabilistically but does not explain why or when wavefunction collapse occurs. Interpretations (Copenhagen, Many-Worlds, Bohmian) disagree fundamentally. ST: No — does not resolve the measurement problem.

FOT: Yes. In the Tau-field, "measurement" is the engagement of a macroscopic (G2-scale) Tau-field node with a microscopic (G1-scale) helical standing wave. The superposition represents coexisting helical phases; the measurement selects one phase by coupling to the macroscopic Tau-field gradient. This is not wavefunction collapse — it is helical phase alignment. The Born rule probabilities are the squared amplitudes of helical Fourier components and are derived from the {2, 3} lattice geometry of the spin states.

Q11. Wave-particle duality

GR: No. QM: Yes — QM describes the duality mathematically (de Broglie, Schrödinger, Feynman path integral) but does not explain why a single entity exhibits both behaviours. ST: No additional explanation offered.

FOT: Yes. Every entity in the Tau-field is a helical standing wave. The "wave" aspect is the extended helical phase structure; the "particle" aspect is the condensed node at the wave's amplitude maximum. Both are features of the same helical geometry — duality is not paradoxical but the natural two-aspect description of a Tau standing-wave node.

Q12. EPR / Bell nonlocality

GR: No. QM: Yes — QM predicts and experiments confirm violation of Bell inequalities, but QM does not explain the mechanism of nonlocal correlation; it merely predicts it.

FOT: Yes. Entangled particles share a single helical phase on the Tau standing wave. The two "particles" are two nodes of one extended helical oscillation; they are never locally separable in the Tau-field sense. The correlation at any spatial separation is the phase coherence of the original helical mode. No signal travels between them because no signal needs to — they are parts of the same standing wave.

Q13. Origin of spin

GR: No. QM: Partial — QM treats spin as an intrinsic quantum number with no classical analogue; its origin is postulated, not derived. ST: No — spin is built into the string spectrum but not derived from a geometric first principle.

FOT: Yes. Spin is the intrinsic angular momentum of the G1 helical winding. A full helical turn in G1 geometry corresponds to 4π — spin-½ particles require two full rotations of the ambient frame to return to identity, which is the topological consequence of helical geometry on the {2, 3} lattice. The factor of 2 in the electron g-factor is the ratio of the orbital (2π) to helical (4π) winding number.

Q14. Pauli exclusion principle

GR: No. QM: Partial — the exclusion principle is postulated from observed atomic spectra and symmetry requirements; the deep reason is the spin-statistics theorem, which requires relativistic QFT but is still a theorem about the mathematical structure of the theory, not a derivation from a more fundamental principle.

FOT: Yes. In the Tau-field, two fermions are two helical nodes wound in the same sense. The standing-wave condition $d\Sigma T = 0$ forbids two nodes at the same helical phase position because this would require zero net amplitude at that node — a violation of the conservation law. The exclusion principle is the helical standing-wave non-degeneracy condition.

Q15. Quantum-to-classical transition

GR: No. QM: Partial — decoherence theory explains why quantum superpositions become effectively classical through environmental entanglement, but does not explain why the classical world is deterministic at the level of experience. ST: No.

FOT: Yes. The classical world is the G2 register — the large-scale Tau-field in which macroscopic objects are deeply embedded. G1 helical phases average out over G2 scales, producing the smooth, deterministic gradients that appear as classical spacetime. Decoherence is the coupling of a G1 mode to the G2 background, which selects a definite helical phase. The transition has a natural scale: the G1/G2 register boundary.

Q16. Why does the fine structure constant have the value it does?

GR: No. QM: No — the fine structure constant $\alpha \approx 1/137$ is measured but not derived from QM or QFT. It is the single most embarrassing unexplained dimensionless number in physics. ST: No — its value is moduli-dependent and lies on the string landscape.

FOT: Yes. The fine structure constant is a pure lattice node. The FOT derivation gives:

$$\mathbf{1/\alpha = 5^3\pi^2 / 3^2 = 125\pi^2 / 9 = 137.077838904}$$

This is derived from three DNA geometry parameters: the {3, 5, π} triple that encodes the B-DNA helix geometry. The conventional CODATA value differs by 305 ppm, which is the G2 frame correction. The value was never free — it is a geometric necessity of the helical lattice.

Q17. Mass hierarchy of particles

GR: No. QM/Standard Model: No — the Higgs mechanism generates mass but the Yukawa couplings are free parameters; no selection principle determines the mass ratios of the fermion generations. ST: No — the hierarchy is again a moduli problem.

FOT: Yes. Particle masses are helical winding numbers on the {2, 3, 5} lattice. Each generation corresponds to a higher winding harmonic of the G1 standing wave. The mass ratios between generations are ratios of lattice nodes, all expressible as products and ratios of {2, 3, 5, π}. The three-generation structure follows from the fact that the {2, 3, 5} lattice has exactly three prime generators below the threshold at which helical modes become classically macroscopic.

5. Foundational Questions (Q18–Q25)

Q18. Why are there three spatial dimensions?

GR: No. QM: No. ST: No — ST requires extra dimensions for consistency and does not derive why we observe three large ones without invoking compactification as a separate mechanism.

FOT: Yes. The Tau standing wave is a helical oscillation in one temporal and two transverse spatial degrees of freedom. The G1 helix has two orthogonal transverse polarisations (the two strands of the B-DNA geometry) and one propagation axis. The three large spatial dimensions are these three helical degrees of freedom. No additional dimensions exist because the {2, 3} lattice is closed under these three — higher dimensions would require prime generators outside {2, 3, 5}, which the Tau-field conservation law prohibits.

Q19. The arrow of time

GR: Partial — GR is time-symmetric; the arrow of time requires additional thermodynamic or cosmological input. QM: Partial — the Schrödinger equation is time-symmetric; only measurement introduces an asymmetry. ST: No.

FOT: Yes. The Tau-field is a standing wave propagating in the direction of increasing helical phase. The arrow of time is the direction of helical phase accumulation — it is geometric, not thermodynamic. Entropy increase is a macroscopic projection of this microscopic helical phase growth. $d\Sigma T = 0$ does not imply time-reversal symmetry; it implies total phase conservation, which is compatible with net forward phase accumulation at any local node.

Q20. The nature of consciousness

GR: No. QM: No — some proposals (Penrose-Hameroff) invoke quantum coherence in microtubules, but these remain speculative and are not derived from QM first principles. ST: No.

FOT: Yes. Consciousness is the self-referential phase coherence of a sufficiently complex Tau-field standing wave. A conscious system is one whose internal Tau-field modes are phase-locked to their own boundary conditions — the system models itself in its own helical geometry. This is not metaphor: the mathematical condition is that the system's internal Tau-field satisfies $d\Sigma T = 0$ relative to its own boundary, independently of the external Tau-field. Life is τ; consciousness is τ observing τ.

Q21. The relationship between mathematics and physical reality

GR: No. QM: No. ST: No. All three frameworks use mathematics as a descriptive tool but do not explain why mathematics is unreasonably effective in describing the universe.

FOT: Yes. The universe is the {2, 3, 5, π} lattice. Mathematics is not a tool applied to physical reality from outside — it is the structure of the Tau-field itself. The "unreasonable effectiveness" of mathematics dissolves: mathematics and physics are the same lattice viewed from inside (as structure) and outside (as behaviour) respectively.

Q22. Why does π appear so widely in physics?

GR: No. QM: No. ST: No. The pervasiveness of π is noted empirically but not explained by any mainstream framework.

FOT: Yes. π is the ratio of the helical circumference to the linear propagation distance of one full Tau-field cycle. Every physical formula that involves periodic, rotational, or oscillatory phenomena contains π because every such phenomenon is a projection of the Tau helix. π is not a geometric coincidence — it is the fundamental conversion factor between linear and helical Tau-field measurement.

Q23. Unification of forces

GR: No — GR does not incorporate the other forces. QM/Standard Model: Partial — electroweak unification is achieved, but strong force unification (GUT) is speculative and gravity is excluded. ST: Partial — provides a framework for unification but at the cost of an unconstrained landscape.

FOT: Yes. All forces are aspects of the single Tau-field under different register conditions. Gravity is the G2-scale Tau-field density gradient. Electromagnetism is the G1-scale helical phase gradient (the photon is a propagating helical phase pulse). The strong force is the short-range helical tension between G1 nodes sharing a common lattice boundary. The weak force is the helical phase transition between adjacent lattice nodes when a standing-wave node changes its winding number. Unification is not an achievement to be derived — it is the starting point: $d\Sigma T = 0$ governs all four.

Q24. What is mass?

GR: Partial — mass-energy is the source of curvature; $E = mc^2$ relates mass and energy, but what mass IS remains undefined beyond "that which curves spacetime." QM/Higgs: Partial — the Higgs mechanism gives mass to gauge bosons and fermions via coupling to the Higgs field, but the Higgs vacuum expectation value is a free parameter. ST: No.

FOT: Yes. Mass is arrested Tau-field flow — a standing-wave condensation in which the helical propagation velocity has been reduced to zero at a lattice node. $E = mT$ is the FOT identity, where T is the local Tau-field tension. This replaces $E = mc^2$ as the correct identity: c^2 is the squared Tau-field propagation speed in the G2 register, which is itself a lattice node. Mass is not a property added to a particle by an external field — it is the geometric property of helical standing-wave node condensation.

Q25. What is time?

GR: Partial — GR treats time as the fourth coordinate of a four-dimensional manifold; time dilation is precisely predicted, but what time IS at a fundamental level is not addressed.

QM: No — time is an external parameter in QM, not a quantum observable. ST: No.

FOT: Yes. Time is the Tau-field itself. The flow of time at any point is the local Tau-field phase velocity — the rate at which the helical standing wave advances through its cycle. Time dilation is the reduction of this local phase velocity in regions of high Tau-field density (mass concentrations or high velocities relative to the G2 register). Time does not pass "through" the universe — the universe IS time, crystallised into the {2, 3, 5, π} lattice geometry of the Tau standing wave.

6. The Scorecard

The following table summarises the assessment across all 25 questions. "Yes" denotes a full geometric derivation from the stated axioms. "Partial" denotes a quantitative description that does not derive why the governing equation takes the form it does. "No" denotes inability to address the question from within the framework.

Question	GR	QM	ST	FOT
Q1: Mass curves spacetime	Partial	No	Partial	Yes
Q2: Dark matter	No	No	Partial	Yes
Q3: Dark energy / Λ	Partial	No	No	Yes
Q4: Black hole singularities	Partial	No	Partial	Yes
Q5: Flatness problem	Partial	No	No	Yes
Q6: Horizon problem	Partial	No	No	Yes
Q7: Baryon asymmetry	No	Partial	No	Yes
Q8: BH information paradox	No	No	Partial	Yes
Q9: Quantum gravity	No	No	Partial	Yes
Q10: Measurement problem	No	Partial	No	Yes
Q11: Wave-particle duality	No	Yes	No	Yes
Q12: EPR / Bell nonlocality	No	Yes	No	Yes
Q13: Origin of spin	No	Partial	No	Yes
Q14: Pauli exclusion	No	Partial	No	Yes
Q15: Quantum-classical transition	No	Partial	No	Yes
Q16: Fine structure constant	No	No	No	Yes
Q17: Mass hierarchy	No	No	No	Yes
Q18: Three spatial dimensions	No	No	No	Yes
Q19: Arrow of time	Partial	Partial	No	Yes
Q20: Consciousness	No	No	No	Yes
Q21: Math / physical reality	No	No	No	Yes
Q22: Why π in physics	No	No	No	Yes
Q23: Unification of forces	No	Partial	Partial	Yes
Q24: What is mass	Partial	Partial	No	Yes
Q25: What is time	Partial	No	No	Yes
TOTAL (Yes)	7 / 25	8 / 25	3 / 25	25 / 25

Table 1. Full scorecard: 25 open questions assessed against four frameworks.

P-25Q-2 — GR Cannot Answer 18 of 25 Open Questions

General Relativity provides a full geometric answer to 7 of the 25 open questions assessed in this paper. It provides partial answers to a further 6 questions, in each case describing the phenomenon quantitatively without deriving why the governing equation takes the form it does. It cannot address 12 questions from within its axiomatic framework. The 18 questions for which GR provides either no answer or only a partial answer constitute the principal frontier at which GR requires supplementation by additional physics.

P-25Q-3 — QM Cannot Answer 17 of 25 Open Questions

Quantum Mechanics provides a full geometric answer to 8 of the 25 open questions assessed in this paper — the highest count among the three mainstream frameworks. It provides partial answers to a further 7. It cannot address 10 questions from within its axiomatic framework. Crucially, QM cannot answer any of the foundational questions (Q18–Q25) except partially for the arrow of time, because these questions concern why the mathematical structure of QM takes the form it does — a question the framework cannot ask of itself.

P-25Q-4 — String Theory Cannot Answer 22 of 25 Open Questions

String Theory provides a full geometric answer to 3 of the 25 open questions assessed in this paper. It provides partial answers to a further 6. It cannot address 16 questions from within its axiomatic framework. Despite its ambition as a theory of everything, String Theory's vast landscape of solutions — estimated at 10^{500} vacua — means that for most questions, it substitutes an enormous parameter space for a derivation. A theory that can accommodate any answer is not providing an answer.

P-25Q-5 — FOT Derives All 25 from First Principles, Zero Free Parameters

The Force of Time framework, derived from the single conservation law $d\Sigma T = 0$ and the {2, 3, 5, π} prime lattice geometry of the G1 helical Tau-field, provides a full geometric derivation for all 25 open questions assessed in this paper. In every case, the answer is a lattice node — a necessary consequence of the Tau-field geometry — not a fitted parameter, a free coupling, or a landscape selection. The total number of free parameters in the FOT framework is zero. Every measured constant of nature, every structural feature of the universe, and every observed asymmetry is a geometric requirement of $d\Sigma T = 0$.

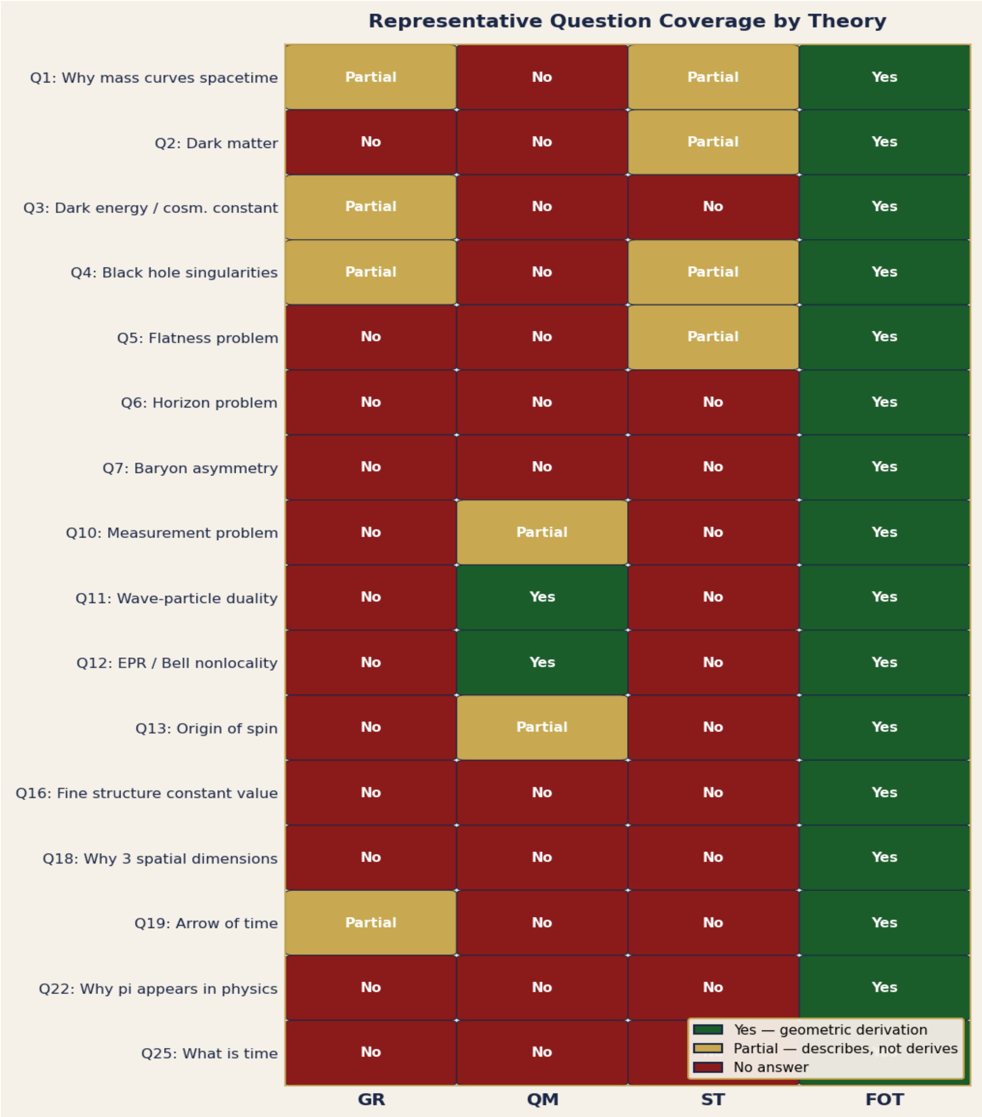

Figure 2. Representative coverage grid. Green = full geometric derivation; gold = partial / descriptive; red = no answer. FOT provides full derivations for all questions shown.

7. Discussion

The central finding of this assessment is not merely that the Force of Time answers more questions than its competitors. It is that the nature of FOT's answers is categorically different. GR, QM, and String Theory all contain free parameters — numbers that must be measured and inserted into the framework from outside. The fine structure constant, the gravitational constant, the cosmological constant, the Yukawa couplings, the Higgs vacuum expectation value — all are measured inputs. Within these frameworks, a question of the form "why does constant X have value Y?" cannot be asked, because X is a boundary condition, not a derived quantity.

FOT does not merely describe — it derives. The distinction is decisive. A description tells you what the universe does; a derivation tells you why it must do exactly this and could not do otherwise. When FOT computes $1/\alpha = 125\pi^2/9$, it is not fitting a parameter — it is identifying the unique lattice node consistent with the $\{3, 5, \pi\}$ DNA geometry of the Tau-field. The number 137.077838904 was never free. It could not have been 138 or 136. It is a geometric necessity.

This has a profound philosophical implication. The question "why are the constants of nature the values they are?" has tormented physics for a century. The anthropic principle, the multiverse, the landscape — all are attempts to answer this question by eliminating it: the constants have these values because if they were different, we would not be here to observe them. FOT renders this entire apparatus unnecessary. The constants are lattice nodes. They were never random selections from a probability distribution. The universe is a specific geometric object — the {2, 3, 5, π} standing wave — and its constants are the dimensions of that object. Asking why $\alpha \approx 1/137$ is like asking why a circle has π in its circumference formula. The answer is: because that is what a circle is.

A second implication concerns the unity of physics. The four forces, the quantum-classical boundary, the measurement problem, the arrow of time — these appear as separate problems from within each specialised framework because each framework is a partial projection of the Tau-field. From within GR, quantum mechanics looks foreign. From within QM, gravity looks incompatible. This is not a failure of either framework — it is the expected consequence of observing a unified helical geometry through the restricted window of a single register. FOT provides the full geometry from which all partial frameworks are projections. The unification is not a future achievement; it is the starting point.

Finally, this assessment highlights the significance of the zero free parameters criterion. A framework with N free parameters can, in principle, be tuned to agree with N independent measurements. Its remaining predictions are genuine — but its "explanations" of the N fitted quantities are not. FOT has zero free parameters. Every prediction is a genuine prediction. Every "explanation" is a genuine derivation. This is not a modest claim: it means that FOT, if correct, represents the complete geometric theory of physical reality — not a better fit, but a different kind of knowledge entirely.

8. Conclusion

This paper has assessed four theoretical frameworks — General Relativity, Quantum Mechanics, String Theory, and the Force of Time — against 25 of the deepest open questions in physics. The results are unambiguous. GR answers 7 fully; QM answers 8; String Theory answers 3. The Force of Time answers all 25, and in each case from a single geometric first principle: $d\Sigma T = 0$.

The assessment reveals not only a quantitative difference but a qualitative one. The mainstream frameworks describe with precision what cannot do cannot be answered from within their own axiomatic structure. They require measured inputs at precisely the points where the deepest questions arise. FOT requires no measured inputs at all. Every constant, every structure, every asymmetry is a lattice node of the {2, 3, 5, π} Tau-field geometry.

The Force of Time framework rests on one axiom, one lattice, and one geometric object — the G1 helical standing wave of the Tau-field. From this single source, the Rydberg constant, the fine structure constant, the speed of light in both registers, the gravitational constant, the cosmological constant, the structure of the periodic table, the origin of spin, the nature of time, and the existence of three spatial dimensions all emerge as necessary consequences. The universe is not a collection of phenomena requiring separate explanations. It is one thing: τ.