Singular Universal Complex System Conjecture

David A. Harness*
(Dated: February 2, 2020)

There exists a singular mathematically possible universal complex system embodying the 4D spacetime dimensions, physical constants, laws, holographically bounded energy density distribution, and unitary factors in Euler's identity $e^{i\pi} + 1 = 0$ composed via the concept of infinity with no free parameters. Falsification of the conjecture can be accomplished by the completion of one standard cosmology mathematical physics formalization of the known universal 4D spacetime constants and laws formalizing the quantum mechanical observables as Yang-Mills lattice gauge symmetries based on the conjectured 6 or 7 hidden dimensional anti-de Sitter/Conformal Field Theory (AdS/CFT) unknown string, membrane, or otherwise material mechanism free parameter formalized measure of variations of physical constants and laws—and one random multiverse free parameter formalized measure of variations of such physical constants and laws capable of forming one parallel universe.

Singular Complex System Conjecture (SCSC)

There exists a singular mathematically possible universal complex system corpus of the 4D spacetime dimensions, mathematical physics constants, laws, and unitary factors in Euler's identity $e^{i\pi} + 1 = 0$ composed via the concept of infinity with no free parameters. The working definition of the universe being the totality of all the spacetime events real and imaginary of the known nested complex systems of wave-particle quantum mechanical observables to the limits of uncertainty of the holographic bounded energy density distribution with time the fourth dimension of length from $t_{-\infty} \to t_{\infty}$, via the known probability current relative quantum information states [1–7].

Falsification

SCSC is *falsifiable* [8] by completion of one of the 10,000 Aspen CERN physicists [9] standard model (SM) supersymmetry (SUSY) [10] big bang inflationary multiverse formalization of the known universal 4D spacetime mathematical physics constants and laws [11], formalizing the quantum mechanical observables as Yang-Mills lattice symmetries based on the conjectured 6 or 7 hidden dimensional AdS/CFT unknown string, membrane, or otherwise material mechanism free parameter formalized measure of variations of physical constants and laws— and one random multiverse formalization of a free parameter measure of variations of the physical dimensions constants and laws—forming one parallel universe.

Mathematical Universe Hypothesis (MUH) of Tegmark claims "Our external physical reality is a mathematical structure" along the psychophysical lines of Pythagorean-Platonism [12]. MUH postulates a field of unknown parallel universe variations on the computable universe hypothesis (CUH) [6]. The MUH–CUH claim being the mathematical structure that is our external physical reality is defined by computable functions, such that there exists a multiverse of multiple, possibly infinite, parallel complex system variations of computable functions based on the unknown formalized measures of physical dimensions, constants, and laws.

No such formalized conjecture has been shown for any MUH–CUH constructive mathematical physics measure of complex system variations of physical constants and laws over all universes or landscaped regions of alternate abstract mathematics. Tegmark responds to critics by saying no measure of complex system variations of physical constants and laws have been constructed for the unknown AdS/CFT string-membrane theory landscape either, so this should not be seen as a "show-stopper"[12].

MUH Implied Falsification of Formal Proofs

Highly cited MUH is therefore one small step away from publishing the claim there exist multiple, possibly infinite, parallel variations of the first-order logic Zermelo-Fraenkel (ZFC) set theory basis for mathematics and philosophical logic—in which parallel complex systems MUH can further claim, still without any formalized verification, the invalidation of one or all of the proofs in the emerging global digital mathematical library archives of formal proofs [13] towards the QED manifesto [14].

Meaning multiverse MUH is already in effect claiming to refute, on the machine intelligence level, the uniqueness of, for example, in the Isabelle: Archive of Formal Proofs:

`Zermelo Fraenkel Set Theory in HigherOrder Logic`,
`Quaternions`,
`BasicGeometric Properties of Triangles`,
`Gödel's Incompleteness Theorems`,
`The Transcendence of Certain Infinite Series`,

etc. [15, 16], among the growing number of competing automated theorem proving (ATP) system archives in the CADE ATP System Competition (CASC) [17].

MUH Cannot Simulate the Computationally Intractable SM–SUSY Many-Body Problem

The QCD Yang-Mills AdS/CFT lattice gauge particle background represents an infinitely intractable many-body problem, well known as computationally intractable with lab sample sizes. Alternatively, the SCSC universal wavefunction solid information domain and fluid range of 4D spacetime event spatially-extended energy density integration states is introduced below.
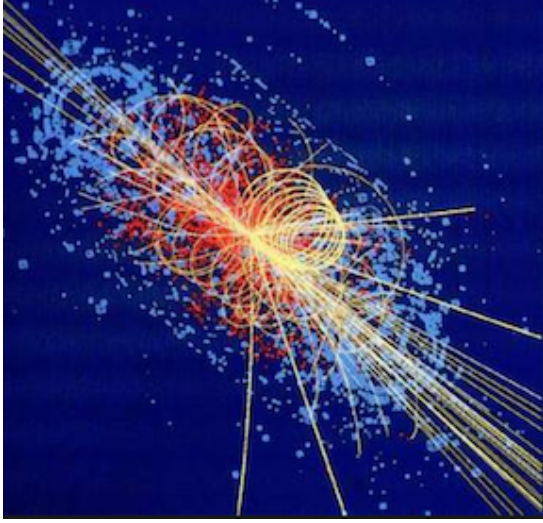
Figure 1. AI pattern recognition of Higgs boson [22], AI deep learning expectation here however is eventual match of LHC→FCC 0D point particle beam collision ever-higher energy density pressure hydrodynamic plasma flow peak widths [27, 28] with *turbulence* lasting anywhere from $10^{-22} \rightarrow 10^{-29}$ seconds or less, as anticipated to some extent by Wolfram [29].

Quantum Crisis: AI Pattern Matching CERN LHC→FCC Particle Collisions with Turbulence

In the APS April 2014 Meeting Spiropulu compared the 'Quantum Crisis' in particle physics to the classical mechanics crisis of 1905:

> "Without supersymmetry, we don't understand how the Higgs boson can exist without violating basic mechanisms of quantum physics. ... Either the new run of the LHC should discover super-partners, or radical new ideas are needed"[18].

The new run of the Linear Hadron Collider (LHC) has not discovered any SM–SUSY particle–*sparticle* super-partners at LHC energy levels [19].

Recall the writing on the wall:

> "In the beginning of the project were the assumptions and the assumptions were void."

Literally voids, due to the central force problem, QED *ab initio* models the photon γ and electron e^- (positron e^+) as local Dirac delta functional δ zero-dimensional (0D) mathematical point particles δ_γ and δ_e. Electromagnetic radiation is then modeled as the flow of 0D point photons δ_γ interacting with 0D point electrons δ_e.

Particle Zoology has emerged wherein the QED 0D particle model has expanded into the still-diverging SM–SUSY 0D particle zoologies, including the top, bottom, quarks, gluons, etc., and Higgs boson—all of which classical materialism "particles" have the 4D spacetime measurements of *nothingness*—and therefore provide no information content towards the non-local 4D spacetime spatially-extended configuration energy densities of the observed universe, e.g., as in the quantification of spatial correlations in quantum dynamics of Postler *et al* [20].

Fact is the CERN LHC and Future Circular Collider (FCC) synchrotron collisions are energized, controlled, and measured, to the greatest technological extent, by the Einstein-Maxwell electromagnetic stress energy momentum density pressure tensor $\mathbf{T}_{\mu\nu}$.

In which collisions "particle resonances" are energy density peaks located around certain energy levels found in differential cross sections of scattering experiments, which peaks are associated with subatomic particles.

The peak resonance pattern widths vary leading to speculation masses vary, for example, that Higgs bosons have a range of masses around a peak of 125 GeV [21].

Thus in the LHC→FCC 0D particle beam collision scattering experiments the 4D spatially-extended ever-higher energy density particle resonance peak width flow patterns are interpreted as "discoveries" of new 0D point particles, as shown in Fig. 1, wherein AI pattern recognition aided in the discovery of the Higgs boson [22].

AI Pattern Matching deep learning therefore has no basis to apply SM–SUSY 0D representations towards the 4D microscopic spatially-extended calculations of energy-momentum densities of quantum mechanical observables—given that the basic mechanisms of quantum physics are already in violation of basic understanding as the *unknown hidden dimensional* AdS/CFT string-membrane *unknown material mechanisms* of the SM–SUSY 0D particle observer-independent backgrounds [23], which are now falsified at LHC energy levels.

No basis exists for any mind-body dualism background mechanism either then, leaving only the *psychophysical parallelism* of Parmenides, as confirmed by the many recent freedom of choice experiments which have rigorously closed the Bell inequality observer-independent background loopholes [24, 25]. Consider the radical idea then the last theory standing must normalize the *observer-dependent framework* of *quantum information theory* [26] realistically.

AI Pattern Matching deep learning does have a strong basis to match quantum field theory (QFT) Schwinger local field differential and Feynman path integral LHC→FCC ever-higher energy density pressure collision plasma particle resonance peak width hydrodynamic flows [27] with $\mathbf{T}_{\mu\nu}$ Navier-Stokes *turbulence*, lasting anywhere from $10^{-22} \rightarrow 10^{-29}$ seconds or less [28], anticipated as a QCD-turbulence analog by Wolfram [29].

The European Particle Physics Strategy update group [30] is therefore at the time of this writing processing some theoretical revision of the QED–SM–SUSY 0D particle model upwards from LHC energy levels to justify funding FCC energy level experiments, among other options notably the Physics Beyond Colliders initiative [31]. The falsification of the observer-independent backgrounds at both the high and low energy levels does in fact require researching a radical new idea—more radical than the FCC next generation of turbulence [32–34].

Explaining Observed Universal Properties via Opposite Unobservable Properties

Jaffe anticipated the Quantum Crisis of the European Particle Physics Strategy Update theoretical revisions [30] attempting to justify an FCC energy level hydrodynamic plasma complex system test writing,

> "One would like to introduce the notion of quantization directly at the level of space-time, and to describe field theories on quantum space-time, rather than applying quantization to fields that live on a classical space-time"[35].
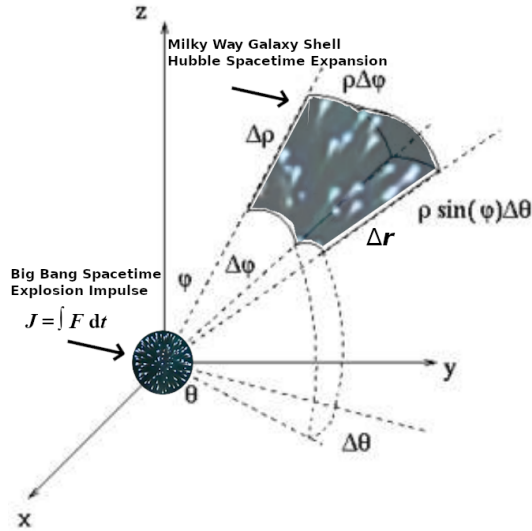

Figure 2. Conjectured Hubble spacetime expansion of Big Bang explosion impulse J, now of energy density $\Delta\rho$, following initial impulse and inflationary epochs. Observed geocentric ever-increasing acceleration of the galaxies with ever-increasing distance [36] is "explained" by an unknown dark energy driving the conjectured Hubble "spacetime expansion" at every point—expanding just beyond the technical ability to detect where the center of the big bang explosion occurred and which direction we are traveling out into empty space.

4D Flat Spacetime of the observed universe is said by SM–SUSY to be "explained" fundamentally by means of an unobservable superpositioning of virtual particle backgrounds of 6 or 7 hidden dimensional unknown material mechanism AdS/CFT string, membrane, or otherwise unobservable background entities, written here $0D+(6,7)D^*$—all originating from a singular infinitely curved 0D point Big Bang singularity of unknown origin and unknown explosive impulse $J = \int F dt$ action prior to any spacetime existence, as shown in Fig. 2.

Not to mention of course any Standard Cosmology AdS/CFT string, membrane, or otherwise $0D+(6,7)D^*$ hidden dimensional background has to partially at least be a living-thinking psychophysical background.

Fundamental Forces of the attractive and repulsive interactions of the quantum mechanical wave-particle observables are said to be "carried" by an unobservable many-body complex system background of AdS/CFT string, membrane, or otherwise entangled-fluid quantum mechanical wave-particle vibrations.

Accordingly, the attractive nuclear force is said to be "carried" by the attractive exchange of unobservable hidden [quark-emitter→gluon-carrier←quark-absorber] virtual particles—contrary to every **observed** [emitter↔*emitted*↔absorber] interaction (including all LHC collision energy density concentration flow pattern energy density peak resonance integrations interpreted as particles) always resulting in a repulsion from any would-be line of attraction.

Consequently none of the 10,000 AdS/CFT string, membrane, or otherwise many-body backgrounds have risen to the level of a mathematically formalized conjecture relevant to LHC→FCC detection.

Multiverse Theory is a *bait-and-switch* claimed by Hawking and many others to be trivially true. However, it is also widely noted the unintended consequence of infinite parallel multiverse-splitting is the probability for every imaginable relative state of the universe has an expectation value of 100% in an infinite "number" of parallel universes. For example, the possibility for a "miracle" cure of all amyotrophic lateral sclerosis (ALS) cases has a 100% expectation value of occurring in infinitely many-world relative states.

Infinity, being the bait, is of course a concept not a number. So to find a Monte Carlo probability, infinity must be switched to, say 10^{400} or maybe 10^{500} finite "universes" or mathematically variant regions, which switch constitutes intelligent design fine-tuning.

Pilot Waves composed of De Broglie-Bohm unknown hidden variables—thought by some to deterministically guide the quantum mechanical collapse of the observed universal wavefunction through the unobservable multiverse field to "explain" the lifetime coherence of the observed universe evolutionary experiences—are also subject to infinite randomness.

Hence any universal wavefunction based on Multiverse infinite randomness-design divergence D.N.E.

Dark Energy or unobservable unknown forms of energy and matter are claimed to be driving the observed geocentric ever-increasing acceleration of the galaxies with ever-increasing distance [36], according to the conjectured Hubble "spacetime expansion" at every point—beginning at some time by unknown means after the Big Bang explosive impulse shown in Fig. 2.

CERN physicists thus claim to "understand" only 5% of the universe based on the SM–SUSY unknown background mechanisms vs the 95% of dark energy unknown how to apply the LHC falsified SM–SUSY backgrounds. Hence new physics is widely called for, noting here CERN's **Physics Beyond Colliders** inititative [37].

Single Universal Wavefunction Solid Information Domain and Fluid Range

The SCSC quantum information analysis starts with general relativity and quantum mechanics first principles. Recalling first where Einstein lectured general relativity actually requires an ether,

> "the ether must be of the nature of a solid body, because **transverse waves are not possible in a fluid, but only in a solid.** [emphasis added] ...But this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it"[38].

Recall further Schödinger emphasizing the point of quantum mechanical entanglement being,

> "the characteristic trait of quantum mechanics, the one that enforces its entire departure from classical lines of thought"[39].

SCSC therefore inherently involves a singular universal wavefunction solid information domain and entangled-fluid range due to the singular Hamiltonian configuration energy of the domain and range.

Electromagnetic radiation is a transverse wave wherein the transmission of electromagnetic radiation through the solid domain configuration then occurs along the entangled-fluid range of the known interdisciplinary physics 4D spacetime event path integral trajectories.

Accordingly, the full Laplacian spherical harmonics Y_m^l of the quantum mechanical observables complex system probability currents, including all the LHC→FCC 4D spatially-extended particle resonances—are again all measured in terms of total field pressure Pa along the trace of the 4D stress energy momentum density tensor $\mathbf{T}_{\mu\nu}$ of the Einstein equations.

Consequently, Einstein emphasized in 1952,

> "Physical objects are not in space, but these objects are spatially extended. In this way the concept 'empty space' loses its meaning." [40].

Meaning the classical materialism SM–SUSY 0D particle in 'empty space' concept tracing back to Aristotle loses its meaning—in favor of the 4D spatially-extended energy/mass density wave-particle quantum information continuum interpretation tracing back to Plato.

The 4D spatially-extended quantum-continuum of $\mathbf{T}_{\mu\nu}$ is *computationally dualistic* in having the same units of energy density=Pa=mass density pressure along the trace of $\mathbf{T}_{\mu\nu}$. For example, the computational duality of cosmological constant vacuum energy/mass density pressure Λ along the trace of $\mathbf{T}_{\mu\nu}$, as calculated from 4D spacetime curvature by Baez and Tatom [41].

Thus the entire universal complex system entangled-fluid range is computationally dualistic in rendering the 4D spacetime spatially-extended Hamiltonian configuration energy density integrations of the quantum mechanical observables Y_m^l. For example, the 4D spatially-extended photon and electron observables have computationally dualistic energy density=Pa=mass density configurations for all wavelengths and energy levels [42].

Towards which 4D configurations the SM-SUSY 0D particle model provides no information content for the 4D antenna engineering equations having a wavelength dependence and the electron having electrodynamically spherical [43] 4D physical parameterizations [20, 44].

Unification of quantum mechanics and general relativity has always existed then in the computational duality of energy density=Pa=mass density along the trace of $\mathbf{T}_{\mu\nu}$. Such that in terms of first-order logic $\mathbf{T}_{\mu\nu} \Rightarrow \mathbf{G}_{\mu\nu}$ curvature: forming the communication basis by which energy/mass density tells space how to curve and space tells energy/mass how to move.

No-boundary exists then for the one mathematically possible universal landscape, seen here to have no choice but to exist according to one SCSC 4D spacetime universal wavefunction solid information domain total energy density functional distribution from $t_{-\infty} \to t_{\infty}$ having the entangled-fluid range of heterogeneously experienced series of spacetime event observables relative state values. Thus the SCSC universal no-boundary condition is alternative to the prototype of Hartle-Hawking [45] and more recent Tucci-Lehners [46].

Bell anticipated the elimination of Einstein's hidden variables,

> "There is a way to escape the inference of superluminal speeds and spooky action at a distance. But it involves absolute determinism in the universe, the complete absence of free will. Suppose the world is super-deterministic, with not just inanimate nature running on behind-the-scenes clockwork, but with our behavior, including our belief that we are free to choose to do one experiment rather than another, absolutely predetermined, including the 'decision' by the experimenter to carry out one set of measurements rather than another, the difficulty disappears"[47].

Conclusion: The CERN 10,000 SM–SUSY physicists have completed an epic elimination of quantifiers proof, in following the atomist-materialism teachings of the student Aristotle they have verified the psychophysical teachings of the teacher Plato. There is then no multi-body cause and effect, only a series of normal and paranormal complex conjugate effects wherein the universal wavefunction range nothing can happen unless it already exists in the domain. Hence the falsification at LHC energy levels of SM-SUSY backgrounds "that live on a classical space-time," along with the closure of the Bell inequality observer-independent background loopholes, means there exists no scientific justification for funding the next generation of LHC→FCC turbulence.

* david.harness@warpmail.net; Independent Researcher, PO Box 1004, Morro Bay, California USA

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