

ON THE UNIVERSAL CONSTANTS AND A
UNIVERSAL PRINCIPLE:
FURTHER THOUGHTS TOWARDS A UNIFIED
VIEW OF REALITY

Michael M. Lieber

“Man's capabilities are infinite, human creative potential is infinite, because in a real way we contain infinity within us.”-----Eric J. Lerner, *scientist*

“That science could penetrate into it [the world] at all is due to the fact that its tool, mathematics, is valid for all dimensions.”-----Albert Szent-Gyorgyi

ABSTRACT: The issue of forces, the dimensional universal constants, their dimensionless components, marked by the constant ratio of spiral generation, Φ , the golden ratio (1.618), and the feasible existence of a universal principle, are again addressed. As described in earlier articles, Φ is a dimensionless component or feature of most, if not all, of the respective physical, dimensional universal constants. In this rendition, the subject is further elucidated, focusing on various physical theories and their suggested unity through Φ . In this context, the subject is further developed from various perspectives, including epistemological, which serves to bring about more, perhaps deeper insights on the situation. As pointed out, with the exception of the Special Theory of Relativity, and the early stages of quantum mechanics during the early 20th century, modern physical theories have not focused explicitly on any of the dimensional universal constants as center pieces of their theories. With regard to those universal constants, focusing on their dimensionless components, further clarification is intended and illustrated in this article, such as pertaining to wave mechanics and string theory, and their relation to the universal constants. In doing so, one discusses basic questions. Could such universal constants have been proposed or predicted in a physical theory before they were discovered through experiment? Also, can experiments be devised that indicate the feasible existence of a universal principle of completion connected to or executed through the universal constants, that is, through their dimensionless or trans-dimensional features? Can such a principle involve or implicate a deeper

ultra-reality of universals? Does such a principle indicate an unfolding of reality, a developmental process, a temporal directionality? In this article, the relevancy of such universal constants, their dimensionless features, marked by Φ , to programmed computer simulations are also shown. These are tangible, visible figures on a computer screen that involve vortical, fractal features, which are connected to Φ and to other dimensionless constants. These are creations due to the human mind's involvement with the mathematical design of computer processes that represent reality. These computer generated figures of developing vortical features, displayed on a computer screen, may be mirrored in a vortical, developing reality of matter-energy and in the higher-ordered morphologies of organisms. In this connection, based on research, the function of the human brain, and by extension, the mind, appears to be dependent on the anatomical presence of the dimensionless biological constant Φ , the golden ratio. What becomes clear throughout this article, while repeatedly addressing Φ and other dimensionless constants, and referring to various, possibly united, scientific approaches via Φ , is the subtle indication of a universal causation throughout various, natural phenomena on all scales. Such phenomena and their causation, it is feasibly theorized, would be generated, supported, and guided vortically, completely, stably and developmentally by means of the universal constants through their dimensionless features or components, such as Φ and its powers. The various or specific phenomena, or the theories pertaining to such, are thus unified in this manner via Φ . This process of vortical regeneration involving completing forces would occur along with the support of other dimensionless constants such as π and the exponential constant, e . A non-relative, temporal directionality, a guided unfolding, via a guided completion through the universal constants, would be manifest via such a regeneration of completion. In that context, randomness becomes a limiting case, and perhaps, has been, at best, a constructive illusion in the history of science.

KEYWORDS: Algebra; Brain; Causation; Completion; Computer; Constants; Dimensionless; Forces; Fractal, geometry; Golden ratio; Guiding; Morphology; Potential; Prediction; Principle; Reality; Scale; Simulation; Stability; Template; Testability; Unfolding; Unified; Universal; Vortica

1. INTRODUCTION: CONSTANTS OF THE UNIVERSE

In earlier articles (M. Lieber, 1998, 2015, 2021), the author addressed the issue of forces, the dimensional universal constants, their dimensionless features, and a universal principle of completion that such constants appear to manifest, support and execute by means of such completing forces. A vortical, hydrodynamical reality of mass-energy, supported or enabled by the universal constants through their dimensionless features, was illustrated by the author. This was based on the theoretical, though feasible, position that most, if not all, of the physical, dimensional universal constants have collectively dimensionless features or components represented by Φ , the constant ratio of spiral or vortical generation,

the golden ratio, having the value 1.618. And that these universal constants through Φ give, by means of completing forces, stable and design support to physical phenomena or various aspects of physicality. The dimensionless components of the dimensional universal constants enable the operation and guidance of the those constants. In so doing, the dimensionless or trans-dimensional constant, Φ , will be repeatedly illustrated and focused upon throughout this article. (Being also a trans-dimensional constant, it will also be referred to as a dimensionless, trans-dimensional constant.) Other trans-dimensional constants will also be addressed in their supporting role. Φ is seen as a dimensionless biological constant, because it manifests or represents biological features, such as regeneration, which would involve dynamic completion. The golden ratio or Φ also represents or guides, which observations suggest, a constant parameter of spiral or vortical, self-similar regeneration via completing forces through all physical scales, a developmental or unfolding process. This would involve or enable an increasing stabilization within an unfolding physicality through various scales of 4-dimensional space-time.

Via the guiding, universal constants and primarily through Φ , this self-similar vortical, completing regeneration, modifying space-time, would underlay, manifest and project stably, as a vortical design. This would occur through all features of unfolding physicality or physical phenomena, such as waves, mass-energy particles, atoms, and their behavior. Thereby, sub-atomic particles and atoms would become vortical in their configurations. And such vortices would thus be in or would manifest in a fluid-like medium. A few physicists proposed such a hydrodynamical view of physical reality, and in fact, proposed such vortices at the quantum level (Lerner, 1992.). Also, within the higher morphologies of various plants and animals, such vortical or spiral morphologies also become manifest, as various observations show (Cook, 1914, 1979). And many of these are guided by or manifest the Φ parameter.

Through the pioneering research by Paul Lieber (1968, 1969a), the significance of the dimensional universal constants in physics was first addressed. In this article, as an extension of the author's 2021 article, one goes into this subject more deeply, or perhaps more subtly, and expresses such somewhat differently from various perspectives. This is done in order to bring out various meanings that may not have been clear previously, such as those pertaining to wave-mechanics and string theory. In doing so, one asks whether such

dimensional universal constants could have been proposed or predicted *a priori* in a physical theory, before investigating the actual physical phenomena, where they were first detected? And whether experiments could be devised to test whether such a universal principle exists, which implicates the dimensional universal constants through their dimensionless, trans-dimensional features or components? Furthermore, one points out that computer simulations on a computer screen, based on mathematical iterations, can demonstrate in a tangible and artistic manner the generation of life forms patterned on the golden ratio, that is Φ , the biological constant.

Moreover, as research shows, the human brain, which created the computer, is likely itself formed at the cellular level through the involvement of the dimensionless biological constant, the golden ratio (Penrose, 1994). What becomes apparent in all of this is the manifestation of a universal causation dependent on completing forces, the dimensional universal constants and their dimensionless, trans-dimensional features, and a universal principle of dynamic completion throughout physicality in its various forms and scales. With the exception of the Special Theory of Relativity, which focuses on the speed of light constant, and the earlier and middle stages of quantum mechanics, which respectively focus explicitly and implicitly on the constant quantum of action, other, relatively recent physical theories, such as string theory, have not addressed the universal constants as the center piece to their theories, nor their implications for a more complete view of reality. Regarding Φ , various physical theories and approaches are discussed and their likely unity through Φ . Other dimensionless, trans-dimensional constants are shown to be also involved in a supporting role. The following sections will address these subjects.

2. COMPUTERS, FRACTALS, AND THE GOLDEN RATIO, Φ . A MODEL OF REALITY

Quantum phenomena and a guiding mathematics, such as guiding algorithms, are necessary for computer functions. Many computer simulations of various fractal morphologies, visible on screens, which could represent space-time, have been generated using a basic iterative or feed-back loop algorithm (with exponents) involving the complex number plane, the Argand plane, based on the imaginary number, i , the square root of -1 , which is a constant parameter in these

generations. The exponential constant e (2.718) was also involved in the structuring of those fractal generations within the simulations. A fractal is a structure or phenomenon that has self-similar patterns or morphologies through its different scales or levels of organization. Through the simulations, many of these fractals take on the intricate and complex shapes of various integrated spirals or vortices on the computer screen. Others closely resemble complex, branching aquatic plants and small, aquatic invertebrate animals. (See Pickover, 1990.) This iteration, through i and e , is involved in the generation of the self-similarity on various scales of these vortical and biomorphic fractals on the computer screen. This would appear to be a transcalar, completion process. Implicitly, Φ would also be involved in such a simulation of reality.

Such iteration or looping or twisting, producing, engaging and connecting various scales, would be a necessary, significant feature of regeneration, especially of biological regeneration, which is transcalar. As pointed out earlier by this author (Lieber, 1998a, 2021), the dimensionless biological constant, Φ , the golden ratio, or powers thereof, defines, reflects, and guides a self-similar process or design of vortical or spiral regeneration through completing forces on various scales. This would occur by means of a repeated generation of uniformity within non-uniformity of dynamic structures and phenomena, via the completing forces, throughout the space-time geometry of physical and biological reality. This geometry would have fluid-like features. (And this geometry could be studied through the mathematics of complex numbers, as shall be discussed in this article.) The non-uniformity would have ultimately originated in an underlying plenum. And such non-uniformity, projected into space-time from the plenum, would also be the source of the completing forces.

The very computer generation of the various fractal, vortical morphologies use and depend on electric and magnetic forces and the electromagnetic energy of light for the display to be visible on a computer screen. Though computer programs enable the generation of the fractals, such programs must be designed via algorithms in such a way whereby the dynamic process of regenerative-iteration through different scales, via those forces and energies, has to take place. In effect, this duplicates or represents pictorially on a much smaller scale what is occurring actually and developmentally in nature in a causal manner. Such is in the vortical morphologies occurring within the morphologies of various plants and animals, where Φ becomes manifest. More generally, in the natural world,

the regeneration of vortical, self-similarity through iteration, a completing process, is defined or enabled by Φ . This could perhaps be best represented, in a more refined and sophisticated manner, using a complex number system based on i in a geometry of three or more dimensions, as opposed to two dimensions. Such fractal, hierarchical vorticity, whose generation or design would be guided by Φ , and would involve i in support, may represent or replicate the actual inner, stabilizing structure of matter in the natural or physical world, whose hierarchy has otherwise been revealed to us in terms of mass-energy particles, nuclei, atoms, and molecules.

This hierarchical regeneration, it is proposed, would be spirally/vortically manifested, defined and guided by Φ as a template connected to or composing a projected template (or connected templates) present within a deeper realm or plenum. This guided regeneration would also be the manifestation or projection via Φ of the inner-template, a type of symmetrical “imperfection” or form or a network of universals within an underlining plenum, into space-time. These universals could be seen as promoting deep symmetrical non-uniformity within the plenum, via imprinting, to be eventually resolved in space-time, through the universals themselves, into an increasing uniformity within non-uniform physicality in 4-dimensional space-time. This resolution would be by means of a regenerative, completing projection involving completing forces. Thereby, this deeper or inner template would be projected, as a dynamic resolver through forces, into 4-dimensional space-time by means of the templates of the dimensionless, trans-dimensional components of the universal constants. They would be the enabling, guiding structures of the projection. Such guided regeneration, by means of Φ through a projected template, would create, vortically, completion, thereby uniformity within non-uniformity through space-time. Through such generative, projected vortical completion in non-uniformity, Φ as a projected, guiding template would also manifest the deeper template in space-time. And such projected, vortical completion in non-uniformity would thereby extend into space-time via vortically completing forces, a completing generation. Such dynamical extension would be as complexes of intersecting vortices of matter-energy, which would be resolving developmentally and completingly towards a more uniform, symmetrical, and stable vortical system of physicality in space-time.

The intersections would represent or define the quantization of reality and of matter-energy through intersecting continuities of vortical matter. In so operating, this inherent form, an ultra-reality of universals within a plenum, would projectively and self-similarly modify and define a space-time-field geometry, via the guidance of the universal constants, where it would manifest itself transcenderly. This would occur after its imprinting throughout the underlining plenum, which would also be an ultra-reality. That is, from and through this plenum, the ultra-reality of the universals would manifest further into a fluid-like space-time, overlying the plenum, as vortical matter-energy. And, in so doing, to restate differently, such would create and projectively evolve, via the guidance of the universal constants, their dimensionless features, stabilizing and completing forces on all space-time scales. These would be guided completing forces originating in the plenum's induced non-uniformity. This would occur within and enable various, developing physical phenomena of intersecting vortices in a fluid-like medium. And thereby, it would bring stability and completion to mass-energy and morphogenic states, hence enabling such.

This could be a template or ultra-reality that might be considered as an inherent, universal program or a guiding principle to increasingly negate the non-uniformity it induced in the plenum-field, and which has been projected therefrom into space-time. This negation via the template would occur by means of its global guidance and dynamic enabler of completion throughout physicality in space-time, whereby increasing uniformity within non-uniformity of dynamic structure is generated via completing forces. Such a global guidance by means of the dimensionless, trans-dimensional features of the universal constants, involved in an ultra-reality or ultra-template projection, would also be a source of or shape a geometry involving or based on complex numbers.

This would be especially a force-involved geometry. Specifically, this geometry (or complex geometry) would also be dynamically patterned and mediated by and through the dimensionless constants, such as Φ , and i , the imaginary constant unit of complex numbers and complex geometry. Along with the dimensionless constants i and e , which would also be trans-dimensional, the dimensionless, trans-dimensional constant, within and supporting the dimensional universal constants, Φ or any of its power forms, such as Φ^{-1} and Φ^2 , would be the primary guiding avenue or template for vortical physicality into

our reality. That is, this guiding avenue would be enabled through completing forces also projected from the non-uniformity of the plenum. And thereby, this force-based guidance would enable the universals of the inherent template or form to extend or project into our existence as a vortical, completing physicality, whose underlying features would be a geometry involving complex numbers. These trans-dimensional constants, i and e , themselves would also be the guiding, projected templates for such an extension or projection from the ultra-realm, as noted. And in so doing, they would guide, as deeply connected, composing templates, the dynamic structures and forms issuing from this deeper template reality into space-time. Any of these projected structures would eventually be as relatively stable states of completing, vortical matter through all scales in space-time.

In effect, through the various dimensionless, trans-dimensional constants, especially through Φ and its forms, vortical physicality in space-time becomes increasingly and relatively stabilized (or progressively less destabilized) via an unfolding involving projections from a deeper reality enabling completion. Vortical physicality would evolve, or complete, further, into higher orders or morphologies, also by means of such constants. Though externally, such physicality in some cases would not appear to have an inner vortical dynamic. One such higher ordered morphology would be human beings and their minds. With the evolution of these higher-ordered realities would our theoretical views of reality also change or evolve as the minds accommodate and integrate with their evolving reality, and thereby, come to reflect such in a evolutionary manner. However, the various constant parameters would continue to manifest in various ways, especially through this evolving act of epistemology.

Relevantly, the physicist, David Bohm, spoke of a theoretical implicate order, which is multidimensional, that underlies and enfolds our reality. According to Bohm, this implicate order unfolds its potential, the unfolding, via a holomovement, defined or modified by various conditions, creating and shaping our reality, which he referred to as the explicate order. In many ways, this explicate order has appeared to us, due to our limited experimental and conceptual approaches, as a disconnected reality of separated, random phenomena (See Bohm, 1980; Peat, 1996). An unfolding, implicate order, according to Bohm, would explain the apparent, disconnected realm portrayed

by quantum mechanics. According to Bohm, one must develop more complete views of reality in order to increasingly understand its totality. One could also conjecture, had it occurred to Bohm, that this unfolding would have been described as being guided by the dimensional universal constants, making continuity more apparent.

3. DOES A UNIVERSAL PRINCIPLE EXIST?

One may ask whether such a proposed, template-related principle exists. Is this a valid scientific hypothesis that can be tested? So far, the information presented in previous articles (Lieber, 1998, 2021), and on the author's website (2015), suggests this existence. More specifically, such information, based on experimentation and mathematical applications involving geometry, which would include computer simulations, may suggest the feasibility of a template (or connected templates) with geometrical, associated dynamical properties being present. These templates, as universals seated within a plenum, which could be considered as a type of ultra-matter, would effect a universal, guiding principle of completion via forces arising through a non-uniform plenum. And this would be a non-uniformity due to (or through) the presence of the universals.

From our limited perspective, these connected templates may be in an ultra-realm or in a connection of ultra-realms that could be described as “imaginary” from our limited perspective. Though, nevertheless, such could be approached best, and somewhat illustrated, as a type of experiment, through a mathematics of complex numbers based on the imaginary, constant unit, i . This mathematics of a complex geometry would be an extension, through projection, from an “imaginary” or ultra-realm. As such, it would have possible, “imaginary” geometrical features that may be attributed to the extensions of the reality of this deeper realm. into that geometry. This being the situation may further indicate, in this type of investigation or approach, the existence of mathematical or geometrical realities merged with the deeper or ultra-reality of the universals. The universals would implicate an inherent, designing, template-based mathematics involving Φ within the universe. And this template-based mathematics would also contribute indirectly to our reality, that is, to physical phenomena, also through projection. These mathematical templates might be considered as subtle restatements of the Platonic forms or as extensions of the

regenerative universals in ultra-matter, the plenum-field. The universals were originally described as being conducted throughout an impenetrable manifold or plenum by means of regeneration (Paul Lieber, 1961).

The physicist and mathematician, Roger Penrose (1994), does argue for independent, eternal mathematical expressions and rules as inherent realities within the universe to which our minds have direct access, many of these having been used in physics. Our minds being a part of the universe, and freely seeking and engaging external mathematical expressions within reality, would be in itself a type of experiment or scientific test. Moreover, newly discovered mathematical or algebraic expressions, especially with new types of constants, could suggest the existence of new types of phenomena or new relationships within known phenomena, as has been the case in the history of science. For the future, predicted, new physical phenomena may make evident new, dimensional universal constants dependent on Φ or its various forms, which as noted could be various powers of Φ , such as Φ^{-1} and Φ^2 .

Mathematical rules that govern the formation of algebraic equations might be an example of such an inherent reality of mathematics or templates in the universe, which brings an eventual awareness of new physical phenomena. For example, these rules govern the formation of algebraic equations via the manipulation of the relationship of the physically, meaningful components or symbols making up those equations. Such rule-guided manipulation leads to the formation of views of newly predicted physical phenomena. This occurs through those relationships within the final concluding algebraic equation, giving or revealing form or design to such phenomena, or enabling how such phenomena become revealed to us. This final, derived algebraic equation, which followed from a series of connected equations, was one that enabled or guided a particular scientist's view as to the relation between matter and waves. This would be a prime example how a series of algebraic equations, guided by rules, led to the tangible view that mass has wave features.

It is as if the final forming, derived equation, though seemingly abstract, nevertheless, draws one to the predicted, tangible phenomenon. It is as if it, drawing on intangibility, controls one's reaching the predicted tangible phenomena, or the way one does so. Through such a forming and designing equation, which follows a rule-governed sequence of equations, the guidance of

an important physical, dimensional universal constant also became revealed. Such a forming equation has brought to our awareness the necessary operation of a universal constant in that situation. It has enabled our awareness of it, its necessity. This whole mathematical process involving algebra, possibly drawn or projected from a deeper ultra-realm, would be a type of experimentation. Via this type of experimentation, the algebra and its rules, its reality, possibly and intangibly connected to a projection emanating from a deeper, template-based reality, can reveal, and has revealed, new, predicted, tangible realities in our space-time. And such could lead to the traditional scientific method, as it has done by arriving at the predicted and observed relation between mass, waves, and Planck's constant via algebraic steps. (The algebraic steps in this case are described by Semat, 1965.)

Yet, what about this traditionally empirical or scientific method of testability that has been so successful or effective? At this stage of scientific development, the existence of such connected templates and a related guiding principle of completion may not be directly testable or accessible to testing due to the current limitations of our scientific apparatus or technology. However, with the development of new scientific technologies and approaches via the application by the evolving mind, the hypothesis could very well become testable in a growing manner, and such testability would become revealing in a growing and developing manner, as well. The very testability towards a less incomplete view could be guided by Φ .

In fact, there may be an unusual approach to such an experimental test through the known organization of the micro-tubules composing the neurons of the human brain. The organization of the protein components of the micro-tubules, which make up the functioning cytoskeleton of those cells, is based on numbers having the golden ratio with respect to one another. (See Penrose, 1994.) As Professor Penrose points out, various scientists argue that this particular organization, which is based on the golden ratio, enables the micro-tubules to function more efficiently through changes in their conformations mediated by electrical forces, behaving as information processors. As Penrose further shows, these micro-tubules are very likely required for higher consciousness, which he says could manifest itself as a quantum coherence on the macro-scale. This coherence would be throughout all the interconnected micro-tubules of all the

neurons of the brain.

The golden ratio Φ , the dimensionless biological constant and an apparent template in this situation, appears essential for the organization within the micro-tubules. This being the situation, is it not possible that the template of the golden ratio can imprint itself ---via the dynamics shaped by this organization---on this coherence, our minds? And that this imprinting, possibly involving vortical forces, could be demonstrated? And through this imprinting, could we not have grasped its deeper significance and universality? Specifically, could not such a universality also suggest a completing imprinting of a deeper template represented and guided by Φ onto our consciousness, our minds? Perhaps, through a further investigation of such micro-tubules, and their enabling of consciousness, could such an imprinting-template be accessed or demonstrated, perhaps holographically projected through and outside our minds.

In view of this, such testability could become very feasible at some time. At present, this may seem to be a difficult if not a nearly impossible task. Yet, the history of science demonstrates how the development of new concepts, technologies and approaches enabled the testing of important theories, which before seemed impossible to test. Thus, it should remain for the future to ascertain completely whether or not such connected, universal templates exist. And whether or not such templates envelope a universal principle. However, it will be a determination that ultimately depends on mind creatively connecting to and using a deeper, infinite reality or existence. Perhaps, this deeper ultra-existence of templates would be reflected through a multidimensional geometry based on and allowed through the eternal, trans-dimensional, universal constant Φ and its forms.

Other constants would, as noted, also play a role. These would be the exponential constant, e , involved in the generation of the logarithmic spiral, which manifests the golden ratio in nature, the imaginary unit, i , the constant basis of an imaginary, complex geometry, and the constant π , which has been used in physics. And in the form of π^2 , π is also a trans-dimensional constant or parameter within the dimensional universal constants (Lieber, 2021). Perhaps, one could freely, eventually, and progressively access this deeper, infinite reality and its principle by means of experiments involving and guided by the universal constants via their dimensionless features. From the point of view of such

experiments, one could also ask: Could not Φ be primarily involved in shaping or contributing to reality, and in so doing, could not Φ primarily shape our access to such reality? That is, could not Φ progressively shape, in an primary manner, along with various algebras and classical experimentation what is progressively and evolutionarily revealed on all levels of organization? In the very context of an apparently evolutionary universe, this would be quite feasible. Yet, these are also epistemological issues that can be investigated in the context of a developmental view.

4. PREDICTIONS REGARDING THE UNIVERSAL CONSTANTS

From the standpoint of classical experimentation, *does* physical theory in fact predict the existence of the very dimensional universal constants of nature? According to Paul Lieber (1968), the very generation of stability and constancy within nature through forces would indicate the necessary existence of the dimensional universal constants in physical phenomena and their representation in a mathematical description of such phenomena. As he argues, the Special Theory of Relativity demands that the speed of light be a constant. In fact, the accommodation to that constant is the center piece of the Special Theory. The deeper implication of this is that the Special Theory of Relativity would have predicted the constancy of the speed of light, even if such constancy had not been demonstrated before.

In the same article, Paul Lieber points out that a quantum constant of energy, such as the Planck's constant, had to be involved in the maintenance of the stable states of matter. He also notes that such a quantum constant would necessarily have been predicted for a critical feature of quantum theory. He also suggests that such a constant has been the focus or basis of quantum theory. Quantum mechanics has done so explicitly for its early stages and implicitly during its subsequent, middle stages. For example, the conjectured stability, a type of constancy, of the energy states of electrons within the atom, first proposed by the physicist, Neils Bohr, demands or predicts the existence of a constant of stability, such as the quantum of action, Planck's constant. In effect, Bohr would have had to propose such a constant, even had it not been detected earlier. Again, this implicitly predicts the necessary existence of such a constant in order to enable a theory, even had Planck's constant not been demonstrated before the theory. In

general, Bohr's original theory of discontinuous, stable electron energy states in the atom, described and established in quantum mechanics, predicted and focused on the necessary presence or involvement of a quantum constant of energy in the maintenance of such stability within any atom of matter. Explicitly, quantum mechanics, at least in its earlier stages, has been constrained to develop around such a constant of stability.

The electron-wave theory proposed by de Broglie, an early 20th century physicist, which was arrived at through a sequence of connected, algebraic equations, as noted, and later confirmed by experiment, makes this especially clear. The quantum constant of energy defines the parameters of the generation of electron waves. This becomes evident through de Broglie's equation: $\lambda = h/mv$, algebraically arrived at, where h is the quantum energy constant, v is velocity, m is mass, and λ denotes wave length. This equation famously links the Special Theory of Relativity, through $\text{energy} = mc^2$, with the propagation of energy quanta, whose representation is $\mathcal{E} = hf$, f denoting the frequency of propagation of radiation and \mathcal{E} , the energy of any propagating quantum, where the magnitude of the energy quantum is proportional to its frequency of propagation. This would also indicate that the quantum of energy (or mass-energy) has circumscribed wave features involving the constant energy quantum. "This means that the quantum [of energy] of given magnitude manifests itself in a periodic process of definite *frequency* which is directly proportional to the quantum... which rather suggests itself that a wave process of frequency mc^2/h might be associated with a particle mass m , which according to Einstein has the energy mc^2 " (Schrodinger, 1956). He further states that such a wave process associated with mass was experimentally demonstrated.

In this situation, might not the quantum energy constant fuse the macro-level physicality addressed by the Special Theory of Relativity with quantum phenomena, and in so doing, play a critical or central role in joining or fusing two pictures of or approaches to reality? Might it have been a predicted constant of unification between two realms of reality, especially through its trans-dimensional, component, Φ .

In the subsequent stages of quantum mechanics, indeterminacy explanations or approaches were developed pertaining to detecting simultaneously an electron's position and momentum as it moves around the nucleus of an atom.

These approaches were developed by physicists Werner Heisenberg and Max Born, though the dimensional universal constants were not the explicit focal point of those approaches or views. Nevertheless, the critical role of Planck's constant in defining, determining and stabilizing those approaches becomes evident, especially in the author's revision of Born's fundamental equation.¹ The revised equation shows explicitly that non-commutation and indeterminacy become involved in unsuccessful attempts to measure simultaneously an electron's momentum and position during experiments: $\Delta p \Delta q - \Delta q \Delta p = h/2\pi i$, where Δp refers to an increased change or uncertainty in momentum of an electron when trying to precisely measure its position q , and Δq refers to an increased change in its position q when trying to precisely measure its momentum. And h is Planck's constant, which appears to enable or stabilize this situation. If one first measures p in a concise manner, q is affected or greatly changed. If q is first measured in concise manner, p is affected or greatly changed. This is where the non-commutation and indeterminacy are manifested. These changes marked by Δ also mean that the reciprocally induced uncertainties or changes also preclude the simultaneous, accurate measurement of both the momentum of an electron and its position. This is due to an electron's wave properties and Planck's constant. The wave properties of an electron determine its uncertainty as a defined integrity. Ironically, it appears that wave determinacy or stability, based on h , underlies or brings forth uncertainty, when applied to electron integrity.

The uncertainties pertaining to the particle translate into the propagating structures of various wave amplitudes, when the particle becomes structured and propagated as a wave-complex. A particular concentration of the highest wave-amplitudes or wave group would represent most of a more complex electron within a particular region and having most of its mass-energy within that region in space-time. Lower wave amplitudes of the electron would correspond to the electron-wave complex having less mass-energy within an adjacent, continuous region of space time. The wave complex of various amplitudes would represent

¹ Born's equation is $pq - qp = h/2\pi i$, and it implicitly indicates the uncertainty principle. Heisenberg based his explicit uncertainty principle on it. The Heisenberg principle is $\Delta p \Delta q \geq h/2\pi$, as described in various physics books. See *The End of the Certain World. The Life and Science of Max Born*, by Nancy Greenspan. Also, see *Quantum* by Manjit Kumar.

an electron in a continuum, hence its location and energy would be undefined, yet determined through wave generation.

In this situation, the electron is no longer a particle, or perhaps no longer an electron. This makes the issue of indeterminacy not applicable in this situation. The non-commutation comes into play or relevant, as to what is first revealed or accessed, when choosing what to measure or determine first, momentum or position that pertain to the electron particle but not to the electron waves, whose propagation and configuration is a determined feature, according to the physicist Erwin Schrodinger. In effect, uncertainties pertaining to the definition of some structures, particles, translate or transform into structures that are certain and determined, the latter being waves. (The sub-structure of the wave-amplitudes could be that of a helix.) It would appear that uncertainty and certainty are reflections of, or are contingent on, generative structures in the process of completion. Among its various attributes, Planck's constant could also define a constant energy parameter of such a completing translation. In fact, Planck's constant was noted as being a parameter of a translation between particles and their becoming waves or manifesting as waves (Lande, 1951).

When not considering a particle's wave features, but rather as a highly compressed, completed structure in space-time with rather clear boundaries, does uncertainty still apply? In addressing this question, one begins by noting the presence of the two dimensionless constants and the presence of an imaginary circumference, $2\pi i$, within the complex energy constant, $h/2\pi i$. This might even suggest some type of circular (or even helical thru time) completing dynamic, underlying the regeneration of stability pertaining to waves and particles. This would be the completing regeneration involved in or supporting wave propagation and particle definition. $2\pi i$ may reflect a structuring, curving geometry of regeneration connected via curled dimensions to an ultra-realm and involving the energy constant.

- Born's equation is $p\Delta q - q\Delta p = h/2\pi i$, and it implicitly indicates the uncertainty principle. Heisenberg based his explicit uncertainty principle on it. The Heisenberg principle is $\Delta p\Delta q \geq h/2\pi$, as described in various physics books. See *The End of the Certain World. The Life and Science of Max Born*, by Nancy Greenspan. Also, see *Quantum* by Manjit Kumar.

And $h/2\pi i$ may reflect a constant generation of quanta of energy through

vortical intersections. Such a quantum of generated energy, represented by $h/2\pi i$ and its trans-dimensional features, would, it is proposed, constantly envelop, completely, via $2\pi i$, any particle in given situations. And through such enveloping of a particle, such as an electron, through this quantum of energy, the enveloping energy would enable and describe the extent of any particle's stability, and the extent of its definition or boundaries, its stable completion as a particle at the micro-level in connection to other particles, whose generation is also based on vortical intersections (Lieber, 1998). And those particles would concurrently and respectively be enveloped by the quantum of energy, $h/2\pi i$.

This complex, enveloping quantum of energy would stabilize the particle, the boundaries of its existence, and in doing so, might even determine the existence of a particle as a highly compressed vortex with a pronounced, stable boundary. Yet, this generative, enveloping, and completing determination of a particle, its boundaries, would not be completely accessible or detected, leading to the misapprehension of the concept of indeterminacy as applied to particles. Though, the enveloping, determining, generative agency of any particle, $h/2\pi i$, would, be so detected or defined through the aforementioned equation, which was arrived at, nevertheless, through an incomplete view of certainty and the negation of such incompleteness.

This enveloping quantum of energy, which would be vortical, could also lead to the generation of wave features, when and if the experimental situation becomes altered. This experimental inaccessibility of this stabilizing, enveloping quantum, and yet its theoretical detection, represented algebraically, would be, perhaps, the deepest and most accurate meaning of an apparent indeterminacy of stable boundaries. This implies a generative determinacy of stable completion through particles and waves, but a determinacy not presently accessible experimentally. As described, Planck's constant has a generative component, namely Φ (Lieber, 1998, 2021). It is such that enables stability and definition of various physical configurations through the intersectional generation of stable completion, of which, $h/2\pi i$ would define. This view might be a major step towards an experimental demonstration.

Relevantly, if it were not for Planck's constant, the constant quantum of stabilizing energy, there would not have been quantum mechanics (Paul Lieber, 1968), its stabilization. Could that mean that a universal constant determines, through its trans-dimensional features, quantum mechanics, including that which

only has the appearance of an uncertainty situation? Might this even suggest a constant determination of a state of certainty that is accessed incompletely as uncertainty? Might this certainty be reflected through the determining, complex and enveloping constant $h/2\pi i$? Might $h/2\pi i$, connected to and manifesting a deeper ultra-reality, through its trans-dimensional features, reflect a generative, projecting, intersectional and enveloping process through Φ , conventionally viewed as quantization? And could not that generative, completing process enable the act of free will through the mind as a creative process?

These aforementioned approaches, along with de Broglie's experimentally confirmed theory pertaining to matter-waves, led to wave mechanics developed by Erwin Schrodinger. This approach regards moving electrons not within atoms as superimposed waves. And within an atom, electron movement around an atom's nucleus manifests as superimposed, standing waves. Schrodinger regarded the waves as real and determined, not as waves of probability, as did Born. These situations are described through Schrodinger's equation. As will be seen shortly, such an approach or model could implicitly involve or predict Φ as having a critical role in the hydrodynamical stabilization and re-stabilization of such superimposition and standing waves, and perhaps of the model itself. This would be especially the case in that Schrodinger's equation has a hydrodynamic interpretation. This is so as the continuity equation of hydrodynamics can be derived through a series of steps from the the Schrodinger equation (Lande, 1951).

In view of the critical role of the quantum energy constant just described, it is likely in general that various dimensional universal constants, such as the charge constant of the electron and proton could also have been predicted. It could have even been concluded that the charge constant is involved in determining those very electric charges in a hydrodynamical context or situation. The dimensional universal constants represent or define the deep connection between constancy or stability in nature in all of its variations. And those constants also guide the forces that execute such stability via a completion dynamic within and throughout nature's variations. Moreover, the execution of such stability would be guided by those constants through their dimensionless features in eventuating a universal principle. Constancy and stabilization depend on those very forces or energies and their guided, stabilizing patterns via a universal principle of completion, which subsumes the vortically guiding, defining constants.

Implicitly, the dimensionless biological constant or its forms, such as Φ^{-1} , should also be predicted if those compose the physical, dimensional universal constants. As it appears feasible that this dimensionless biological constant defines or represents a vortical regeneration that gives an enhanced, inner stability, and thereby constancy, to various physical and biological processes or phenomena at various levels of organizations, then this dimensionless constant Φ could also be predicted as being demonstrated through such phenomena, especially processes having a vortically structural dynamic.

The very universal constant electrical charge of an electron (and implicitly of a proton and positron) demands the predicted occurrence of Φ as a necessary structural representation or definition of this charge. Specifically, Φ could represent the negative charge of the electron, while Φ^{-1} could represent the positive charge of the proton and positron. Why would this be the case? In answering, we note the direct evidence of Φ in this universal charge constant. As pointed out (Lerner, 1992; Lieber, 1998), there is evidence that “particles” such as electrons and protons have an asymmetrical, vortical structure within a fluid-like medium, where one charge, say negative, occurs when the vortex is asymmetrically left-handed and the opposite charge occurs if the asymmetrical vortex is right-handed, or vice versa.

In other words, the negative and positive charges, denoted by the charge constant, are dependent on complementary, asymmetrical configurations, that is, mirror images of the respective vortices. Negative and positive electrical charges could respectively be represented by Φ and Φ^{-1} . As pointed out in these articles, such vortices suggest an inherent hydrodynamic nature of reality on all scales, including the quantum mechanical. Based on the vortical morphology of matter on the quantum level, one can predict that a constant of matter, the electric charge, on that level would be directly represented by Φ or Φ^{-1} . In fact, this is relevant to a critical interpretation in the physics of the 1920s and 1930s, which becomes a historical issue in science. (See Lieber, 2022.) Φ or Φ^{-1} would also define the vortex of a logarithmic spiral, involving the constant e . Φ and e , as trans-dimensional constants, would represent and operate the vortex's increasing generation of stability, enabling unity, from the quantum level to cosmological level. These illustrations of the role of the dimensional universal constants

through their dimensionless features might even connote that the existence of such constants, as guiding effectors, becomes self-evident. The role of such dimensionless features in this becomes paramount, which includes the operational and supporting role of e .

Relevant to such dimensionless features, an algebraic equation based on Euler's mathematics shows that Φ , e , π , i and 1 (implicitly present as unity) are connected (Lieber, 1998). One will recall that π^2 is also a dimensionless component of the dimensional universal constants. In exercising a single algebraic rule or step, this equation was obtained, through which, new operational relationships involving Φ became evident or formed so as to become evident in our reality. The equation was conjectured as reflecting a deeper, "imaginary" or unifying ultra-reality, a plenum or ultra-matter with universals, as the unifying seat of vortical regeneration. "This [equation] would again indicate in another way that inherent in ultra-matter is the capacity to spirally generate forces, and, through such generation, matter (and biological organization) could spirally develop from ultra-matter."

Through vortical action, or rotation via the spiral, regeneration occurs, which eventually becomes evident through the many unfolding features of our reality. And such regeneration creates constancy through change by means of the completing forces, and thereby stability throughout our reality. In unpublished notes, dated May 3, 1978, Paul Lieber points out that rotation through a helix is regeneration, which resolves constancy with change in various phenomena, such as fluids in motion. And such helical rotation is enabled and supported through impenetrability, and as proposed, ultimately through an underlying plenum, whose non-uniformity becomes manifested as forces in 4-dimensional space-time. And these very forces become the means to create, vortically, dynamical uniformity within the non-uniformity of physicality. As the author has illustrated in different ways, it is the completing, stabilizing patterns these forces manifest and evolve that is contingent on, and expressive of, the role of the dimensionless, trans-dimensional constants. And it is through this dynamic involving these constants that the universal principle of completion operates. Most relevantly, Φ is a parameter of the double DNA helix (Lieber, 2021). This helix is itself a template. Thereby, Φ , as an innerly connected template, would enable the stabilization of DNA as a template of inheritance. And thus, it would play a

significant role in the stabilization of biological inheritance and in an ensuing biological development. Most relevantly, the pattern of regeneration of the universals through the plenum-field is a helix (Paul Lieber, 1961). This pattern could be connected to the projections into our reality.

In this regard, it would seem that Φ and its forms, as well as other supporting, trans-dimensional constants such as e (the logarithmic and exponential constant involved in spiral generation), π , and i (the constant, imaginary unit underlying complex geometry), represent, manifest and extend, as templates themselves, to a deeper template-realm of universals, which would appear imaginary from our limited perspective. This template-realm or ultra-realm of the regenerative universals, it is proposed again as emphasis, would be present within or connected dynamically to the plenum. And this ultra-template-realm would effect a completing principle through Φ and the supporting trans-dimensional constants. And in so doing, this ultra-realm would projectively guide and enable through such constants, and via a completion by completing forces, the vortical, self-similar generation of those force patterns into our reality and into others. Such generation would allow for an increasing, developing uniformity of force within non-uniform force magnitudes throughout all physical scales, situations and morphologies.

In other words, this increasing dynamical uniformity in non-uniformity would be a major feature of a growing dynamic completion within physicality, and in such increasing completion, an increasing stabilization (within an unstable situation) would evolve. This would occur through the template-like projections from the regenerative universals, embedded in an underlying plenum, into a fluid-like space-time. And these projections would occur by means of the universal constants through their dimensionless features. And the dimensionless constants i and e would also be involved in such projections. This would enable, through, or along with, those guiding, template-based constants, a vortical, hydrodynamic drive or conserving regeneration. Such a drive or regeneration would be towards a maximum stability and dynamic completion on all physical-temporal scales. This would manifest as the vortical generation of relatively, stable states of vortical matter on all scales. Such would be the core and enabler of all of matter's morphogenesis, as well as the evolution of that morphogenesis. Could such an evolution be an unfolding, via the universal constants and their

trans-dimensional, template features into our realm of an infinite, template-based potential underlying space-time and involving an ultra-matter with universals?

Through such a transformation process, a conservation of physical integrity or physical system, and connected physical laws, would be achieved or enabled continually, and hence what physicists refer to as physical symmetry. This would be through all scales of reality by means of vortical regeneration involving guided, completing forces via the universal constants. Specifically, this symmetry as a continuity of system integrity, or its dynamic maintenance, would reflect a constancy, a stability, through all spatial-temporal scales via vortically completing regeneration enabled by Φ , and the other template-based constants connected to the universal template of the universals. In effect, this would be constancy through change or generation, which would be guided by the universal constants. Might those enabling constants in effect be extensions of such a universal template, by virtue of which, those enabling constants such as Φ being templates themselves? This could very well be the situation, as noted. (See Figure 3 in the Spiral article present in www.michaellieber.com. The image in Figure 3 represents a vortically-structured reality emerging biologically or morphologically into space-time from an underlying plenum-field through a template projection manifested by Φ 's guidance.)

This and other articles have argued, as noted, for the existence of an enabling, underlying and implicit dimensionless, trans-dimensional biological constant, which manifests within all the physical, dimensional universal constants. And thereby, this provides feasibility for its existence, hence feasibly linking or fusing the physical constants. In doing so, these articles have not only predicted the existence of such a biological constant and its forms, they have shown their existence is very likely, if not self-evident, especially their role in achieving maximum stability, and hence maximum accommodation throughout reality. Also, had this dimensionless, trans-dimensional biological constant been demonstrated in physical phenomena before the discovery of the physical, dimensional universal constants, the latter might very well have been predicted because of the former. In biological phenomena, Φ has in fact been detected in morphogenesis without any reference to the physical, dimensional universal constants. However, the inverse of a dimensionless universal constant, the fine structure constant pertaining to finely discontinuous light patterns emitted by

atoms, has been shown to be connected through Φ to the morphogenic process of phyllotaxis in plants. This is a growth pattern that enables leaves to be exposed to a maximum amount of light energy (Lieber, 1998). In view of this, could not the other physical universal constants have been predicted as operating in the biological situation through Φ ? As the physical, dimensional universal constants would also be operating in the biological realm, this would likely have occurred.

Other enabling, biological constants analogous to Φ might also be found in nature. These would also be respective growth constants per 90 degree turns of respective logarithmic spirals other than the golden spiral. These biological, growth constants, analogous to Φ , and their defining logarithmic spirals, would geometrically represent and pattern, completing, further vortical, generative features of projecting realities on all levels, some yet to be discovered. And thereby, such generative features could manifest or determine new physical, universal constants yet to be elucidated. These would be realities or systems, guided by constants, vortically developing towards a maximum dynamic uniformity or completion in non-uniformity. And thereby, such would be increasing, developmentally, stability, integrity and connected adaptivity of those systems of vortical matter and their higher, morphological orders. This would pertain even to structures on the smallest of scales.

5. THE PLANCK LENGTH AND THE QUANTUM ENERGY CONSTANT, WAVE MECHANICS, THE SCHRÖDINGER EQUATION, AND RELATED PHYSICAL THEORIES. THE ROLE OF Φ AND OTHER DIMENSIONLESS CONSTANTS.

In this regard, the Planck length is relevant. The Planck length or scale, which is $\Phi \times (\pi^2)^{-35}$ meters, and which is derived from three universal constants, would appear to show that Φ operates or enables a patterned dynamics at one of the smallest estimated lengths or dimensions. That is, this operation and reflection of Φ would be at an extremely small micro-scale of reality. This would be a scale where micro-gravity forces merge or integrate, as waves or force-configurations, with superimposed quantum phenomena (or states) arising as, possibly vortical, superimposed waves of many moving electrons. The mass-energy of the superimposed electron waves would generate the forces of micro-gravity due to such mass-energy inducing micro-space-time curvatures (This would be an

example of General Relativity operating at the micro- or quantum level.) And, in so doing, as Penrose (1994, 2004) argues, the different micro-gravity-force-fields emanating from evolved, superimposed electron-wave phenomena would become integrated or superimposed, as waves or configurations of force, in turn with those electron waves. This ensuing, inclusive, complex superimposition would be a quantum situation or state of many potential alternatives or realities involving electric and gravitational forces. These potential realities would be represented and defined by an algebra and geometry based on the imaginary number i . As Penrose further indicates, these realities could also configure or resolve with one another in a stable manner. This resolution would ensue in one, reduced, non-superimposed (or less superimposed), localized, dynamically stable, quantum-electric-gravity system or reality from many possible ones, in which electron particles and their waves become manifest, stabilized, and detected in, and connected to, a gravity milieu.

According to Penrose, there would be an incompatibility of these different micro-gravity-fields, their geometries, generated by the non-uniform distribution of masses of electron waves, with one another and with the electron waves. This would have created an unstable, complex, which would be a unstable superimposition of waves or configurations of micro-gravitational forces with electron waves. Consequently, a dynamically driven accommodation to such an instability of a complex configuration would ensue, and such an accommodation would determine the resolution towards the stable, reduced quantum state of a stable, wave-force configuration. That is, this would be the collapse, independent of an observer, as Penrose maintains, of the unstable, superimposed, non-local, systems or states into a reduced, local, dynamically more stable system of integrated micro-gravitational-electron forces or waves and electron particles. Might this stability be based on a uniformity and fusion of forces defined by a geometry structurally defined by Φ , and whose stabilization through Φ might eventually be made evident through experiment?

In this regard, as the author proposes, the subsequently, newly superimposed quantum state of electron waves integrated stably with waves or forces of micro-gravity could evolve and persist generatively via Φ . Φ would be seen as being involved in the generative maintenance of the configuration's integrity via completing forces until destabilization occurs again through a future fusion with additional, non-uniform microgravity. Thus, this maintenance of integrity or

stability could involve a spiral or vortical regeneration via completing forces throughout space-time. This would be a completing regeneration also defined by the imaginary constant i and Φ within an algebra of complex numbers.

As Penrose (1994) points out, such an evolution of superimposed waves, that is, electron waves accommodated to, or integrated with, waves or configurations of micro-gravity-forces, represents a determinism at the quantum or micro-level of existence, Might this determinism be based on a vortical, constant, guided regeneration of superimposition, by means of dynamic completion, through space-time? And that this evolution of superimposition can only be described and illustrated through the algebra and geometry of complex numbers. In fact, the evolution of a simple superimposition of a few quantum states can be represented as helical momentum waves of an electron in a geometry of complex numbers (Penrose, 2004). As the current author conjectures, these helically-structured momentum waves could, in this situation, be of variable amplitudes in space-time.

This can be a simple geometrical representation of the Schrodinger wave equation, whose components have been denoted by Ψ . This equation can also represent a propagating potential of many, superimposed, alternative quantum states or situations involving many superimposed electron waves of various amplitudes. Such a complex configuration may not necessarily be helical due to the role of micro-gravity forces or waves within the superimposition making up the complex. These non-uniform gravitational forces within the complex configuration would enable or cause the configuration to become unstable from a stable state. Because this superimposition or configuration is a potential, it has been in turn defined or represented in terms of of a complex or imaginary number system or algebra, which has been the practice in quantum mechanics. However, this does not mean that such a potential is any less real. It means that such a potential is a subtle or implicit reality, which is best defined or represented by an imaginary, complex geometry based on complex numbers. Such a potential could be an extension of a deeper implicate order of infinite potential, as described by David Bohm, as noted before. (Again, see Peat, 1996.) This implicate order of infinite potential could very well involve the templates of the universals within an infinite plenum. When such a possibly extended potential, as represented by the Schrodinger equation, collapses or is reduced to a more

stable (or less unstable) state (perhaps guided vortically by Φ), actuality, or another version of reality, becomes stably existent or manifest as the explicate order, and it is best defined by the real number system.

Vorticity, via a projective unfolding, may indeed become involved in this process of stabilization of the multi-state potential involving waves or configurations of micro-gravity forces integrated non-uniformly with electron waves. This would be the ceasing of an unstable superimposition, via dynamic completion, of what has become a complex of integrated waves or configurations of electron-gravitational forces at the micro-level. This could occur in a self-similar and completing manner through and by means of an increasing, unfolding, vortical fractal, whose geometry is based on Φ and the imaginary number or constant, i . Perhaps, such stability of states, via completion, could also occur concurrently, not only at an extremely small scale connected to (or opening to) a proposed, six, hidden micro-curved dimensions of ten-dimensional reality, but could also occur throughout even smaller scales within fractals of vortical matter, whose very unfolding, completing generation could predictably also be defined or guided by Φ , π , i and e .

Within the extremely intense gravitational reality of black holes, the intense fusion between superimposed quantum states of electrons as waves and non-uniform micro-gravity, or waves of such, could lead to the generation of quantum-gravity, according to Penrose's speculations (2004). Such a possibly entangled, vortically reticulated, quantum gravity could be, as fractals, the occurrence of stability, via completion, within the reality of the black hole, as the current author also conjectures. Perhaps, such entangled, reticulated quantum gravity-fields, as fractals, may extend vortically from an underlying plenum-field of multidimensional potential. Such extension or projection could be guided through the trans-dimensional constants and be represented, and perhaps shaped, through a geometry of complex numbers. Such projection, through an unfolding, involving or from an "imaginary" realm of a deep, multidimensional potential, in which the universals reside and define through an infinite plenum, would be a deep feature and extension of a fractal, vortically stratified reality from a deeper, inherent ultra-reality.

Regarding multidimensionality, reality, as some physicists have argued, is composed of ten dimensions, six of which are curled in micro-scales, leaving our

four-dimensional reality accessible at the macro-level. One can speculate that this is also the situation in black holes. Pi squared (π^2) within the universal constants could represent those ten dimensions within any situation. Such a reality in a black hole would also appear to be a complex fractal composed of adjacent fractals within fractals, These would be fractals of vortical, hydrodynamic matter in configuration through self-similar, intersecting, thereby quantizing, logarithmic golden spirals, themselves reflecting or defined by Φ . In other words, this would be an ensuing complex, vortical fractal, defining mass-energy in an apparently discontinuous or quantized manner based on continuous intersections and fractals.

This complex fractal would envelope quantum gravity. And whose underlining, enabling constant parameter would also have to be Φ or its reciprocal Φ^{-1} . (See Figure 1 and Figure 2 in the spiral article present in the author's website.) Perhaps, this fractal, vortical reality of matter and integrated quantum gravity, whose generation and design is dependent on the universal constants, could also be further described and illustrated. This would enable our complete and detailed account of such through a type of experimentation defined by an analytical geometry of complex numbers, as well as by π and e , the logarithmic constant, which approximately equals $\Phi + 1$.

Away from the intense gravitation of a black hole, the collapse or reduction of such possibly, vortically or helically superimposed, complex states or systems, involving superimposed waves, or integrated force configurations, *could also occur* through an unstable, force-based interaction or intervention or access by an experimenter. Consequently, from the author's perspective, one stable, vortical state would become established via completion and maintained, also as an objective, adaptive situation until a future destabilization and reduction occurs, either independently of an observer or by experimental intervention. The latter view would be the conventional interpretation in quantum mechanics pertaining to the detection of an electron or electrons, or any sub-atomic particle. Even in view of such an interpretation, one could also conjecture that such a stable, highly compressed, highly completed vortical state, as a detected electron or electrons, is arrived at through the guidance of the various constants, dimensional, and ultimately trans-dimensional. Yet, in some manner, it is proposed, such guidance can also be activated through human, experimental

intervention or access, via classical forces, to bring about objectivity via completion, the stable state, a stable, explicate view or version of reality. In this case, this would be seen as the stable detection of stable, completed electron particles as highly compressed vortices, with distinct boundaries, in a fluid-like, space-time field.

In other words, the experimental conditions of the intervention, which would necessarily involve destabilizing, non-uniform forces, would further shape what becomes newly objective or evident through completion. Without referring to destabilizing forces, this would be the conventional picture in quantum mechanics. A further elaboration and illustration of the objective and stable phenomena, obtained through a completion dynamic, leading to further predictions and interventions, might also be through the application of designing algebras and geometries. As we have seen, the application of complex geometries and algebras have been involved in the illustration and shaping of new theories of reality's behavior and design. Such geometries and algebras have enabled us, also in a completing manner, to see shape or form in the natural realm in their application and rules. And through such, they have enabled, completingly, what has become evident to us, as manifested from a deeper ultra-realm. The operation of the completion dynamic thus becomes also evident in physicality and in the act of epistemology.

6. MULTIPLE DIMENSIONS, STRING THEORY AND THE QUANTUM HALL EFFECT, UNITED THROUGH Φ .

In modern physics, various theories have been presented that attempt a complete illustration of physical reality, and perhaps to grasp a deeper realm. Those theories have proposed multiple dimensions as a means of unification of various particles and forces into inclusive realms. One of these is string theory. In this theory, very narrow tube-like strings or filaments form loops at the Planck length-scale. And these string-loops or loops of filament, present at this extreme micro-realm, vibrate through 10 dimensions and 26 dimensions. Vibrations that are clockwise within the filament-loop occur in 10 dimensions, whereas vibrations in the counter clockwise direction occur only in 26 dimensions. According to the theory, these vibrate at various frequencies, and generate different particles of mass at the respective frequencies, as well as quanta of gravity at a given

frequency (Kaku, 1992). In the later situation, it is proposed that the fusion of loops of vibrating strings or filaments generates quantum gravity. The fusions represent gravity, according to the theory. One's understanding is that the fusions vibrate at a particular frequency, which manifests as gravity and quantum gravity. String vibration is energy and energy is mass. And such mass (or micro-mass) produces gravitational force, as described in the General Theory of Relativity (Greene, 1999). Thereby, according to Greene, vibrating strings at the micro-level can be the source of gravity, as quantum gravity, at the micro-scale.

Respective complexes of such vibrations or resonances would be what physicality has manifested respectively as forces, sub-atomic particles, atoms and molecules. One could speculate that the ratios of such respective frequencies of vibrations, creating waves, perhaps vortical, are at multiple integers of the golden ratio. In this regard, and from this theoretical point of view, the ratio of the number of compact vibrations per second that would be seen as making up a proton, with respect to the number of compact vibrations per second that would be seen as making up an electron, could be seen as being in some integer multiple of the golden ratio or its forms, such as Φ^{-1} . In this context, the proton/electron mass ratio being $3\Phi^{-1} \times (\pi^2)^3$ is especially significant as a dimensionless constant that could apply in this situation. In fact, such constants do apply in string behavior: In terms of the 10 and 26 dimensions that enable the strings' generation of the forces and sub-atomic particles, the constants π^2 (10) and $\Phi^2 \times 10$ (26) or $\Phi^2 \times \pi^2$ (26) are clearly evident, and thus, it can be concluded that these dimensionless, trans-dimensional constants must play a critically important role in enabling string behavior or at least in enabling the theory. Π^2 (10) is another dimensionless component of the dimensional universal constants, as noted.

Though the strings are seen as the fabric of space-time (Greene, 1999), string theory does not make clear as to what is the physical nature of these strings or agencies that vibrate, nor of what is the "stuff" that embeds such vibration. Kaku points out that the string loops, or narrow tube loops, vibrate in a 26 dimensional space-time. And that these vibrating strings curve the space-time, as the theory indicates (Penrose, 2004). Such curving, through the mass-energy of the vibrating strings, would create the gravity-fields, as would also happen at the macro-level through mass-energy inducing space-time curvature, according to the General Theory of Relativity. At the micro-level, this would appear to be through space-time's 26 dimensions. Perhaps, such waves generated by the vibrating loops

become first superimposed in a stable manner in that space-time. And then such superimpositions are guidingly and completingly transmitted, via the universal constants, their trans-dimensional features, and the other dimensionless constants such as i , as helical or vortical structures, into our 4-dimensional, physical reality. And thereby, such structures would contribute to such a reality. Though, they would be viewed, incompletely, due to current experimental and conceptual conditions, as various sub-particles, atoms and molecules of matter.

What determines the vibrations of the string loops in the first place? And why are there loops? Could the loops be types of extremely contracted or constricted vortices that change in magnitude and shape through the vibrations? Could vibrations of the looped-strings have their source in some deeper reality of a dynamic plenum of infinite potential, in which universals or forms are seated as a universal, complex template; and, which imprint dynamically, vortically and guidingly through the plenum into 4-dimensional space-time? Could this guidance occur through the template-based, trans-dimensional constants composing the dimensional universal constants? The trans-dimensional constants would be guiding the forces of a completing imprinting, ensuing in the generation of vortical matter at all scales, as noted. At present, there is no empirical evidence for string theory, though, the space-time structure described by the General Theory of Relativity has been derived from such. “When the constraints that the string places on space-time [possibly through Φ] were first calculated, physicists were shocked to find Einstein's [General Relativity] equations emerging from the string” (Kaku, 1994). As noted, Φ is implicit in those Relativity equations (Lieber, 2021). Does Φ join string theory to the General Theory of Relativity, and to an encompassing theory involving vortices?

Though, an altered approach, which would address and focus on the guiding universal constants, their trans-dimensional features, could lead to or bring about such evidence of integration. The exposure of evidence of the dimensionless, trans-dimensional constants π and Φ being within, and necessary to, string theory makes this feasible. Though, the physicists involved in developing string theory have never focused on the involvement of Φ and π , especially their significance for their type of physics. However, implicitly and unknowingly, they are nevertheless utilizing these very constants in developing string theory. If physicists knowingly focused on those constants, could string theory be effectively

developed, leading to experimental tests of it? In view of this, some evidence for string theory, or some version of it incorporating vortical mass-structures on different scales, could likely be arrived out if physicists consider the unification and application of the universal constants through their dimensionless, trans-dimensional features. Nevertheless, string theory would not be the complete or the best picture of reality due to theoretical issues, as Penrose states (2004). From the author's perspective, it would have to be subsumed by a more encompassing approach, where Φ is the focal piece.

As noted, Φ could bring unity to the universal constants, such as Planck's constant and the constant ratio of the proton's mass to the electron's mass. Relevantly, in experiments and calculations, the velocity of ions composing filaments of a plasma vortex is identical to the velocity of electrons being pushed by (and perpendicularly to) crossed electric and magnetic fields (Lerner, 1992). As one understands this from other sources, the effect of this latter situation is that the electrons can only exist in sharply defined levels of energy. (This latter phenomenon is known as the Quantum Hall Effect.) In the former situation, the velocity (of the vortex) depends on the constant proton to electron mass ratio, whereas in the the latter situation, the electron velocity, within the Quantum Hall Effect, depends on Planck's constant (Lerner, 1992).

According to Lerner, this suggests that vortices are operating on the quantum scale, and have their operative connection to those present on the macro-scale. In the author's view, this suggests a situation even more important. It shows that these two universal constants are connected in their guidance or design of matter's vorticity independent of scale. And Φ uniting those constants, enables those constants to be involved in designing a vortical or spiral generation of matter-energy through various scales in space-time from the plenum. This phenomena of identical velocities independent of scale would not have been predicted by string theory. However, such phenomena could have been predicted by considering the unification of the universal constants, and how this unification could have been used in clarifying string theory. Namely, it could have been used, as applied to string theory, towards an understanding of phenomena from the micro-scale to the macro-scale, as well as towards an understanding of the roles of all dimensions involved. This might even include the vibrating loop strings, which could be considered as the shapes of filaments that some vortices

assume at the quantum scale, namely highly contracted vortices, whose vibrations, possibly vortical, extend into higher dimensions.

It would appear that all of the theories discussed in this article could be unified through Φ . This would be especially so as one theory has even been focused unknowingly by physicists on Φ . This might enable an eventually, complete, credible approach or perspective through shaping our evolving awareness of, or access to, various developing realities, their increasing stabilization, and their unification through Φ . This unification via Φ would enable and define a projected, vortical, intersectional dynamic, involving quantization, towards increasing completion and stability on various scales, an unfolding via projection from an ultra-reality. This could be considered as a feasible view as to what is the inner dynamic of reality. Namely, in other words, a completing dynamic that enables, through projection from a deeper realm, the morphological generation of various, unified realities as a totality of existence.

7. CONCLUDING THOUGHTS: TOWARDS A FEASIBLE, UNIVERSAL VIEW OF AN INFINITE UNFOLDING REALITY

Throughout this article, one reached towards unifying or fusing various physical theories and the phenomena addressed by those theories, and the manner in which such theories can be created. In view of what has been presented, it becomes clear that the physical, dimensional universal constants through their dimensionless, trans-dimensional features, such as Φ and its power forms, are necessary for the stabilization and unification of various physical phenomena, or at least, for the eventual unification of the physical theories addressing such. This also occurs through the support of other dimensionless constants. These are the trans-dimensional constants e , i and π , the latter of which is also a component of the dimensional universal constants. In the growing awareness of this situation, the dimensional universal constants' necessary existence becomes self-evident and true, but beyond proof in the Godel sense. By extension, this would apply to their involvement in the laws governing such phenomena through their supporting, via regenerative forces, a unified principle governing the emergence and stabilization of various phenomena, including mental. According to some physicists, the physical laws that govern the universe have enabled the universe to exist in the manner in which it has been revealed to us (Davis, 1992). If these laws did not exist, the universe as we know it would not exist. From this, one can

conclude that the physical, dimensional universal constants, through their trans-dimensional features, would have enabled those laws, stabilizing such, thereby our universe. From a related perspective, the universe is seen as being fine tuned due to the values of the physical universal constants. This would imply that such fine tuning would be based on the values of their trans-dimensional features. Such fine tuning, it has been conjectured, has enabled the initial development of life, biological evolution, human evolution, and the manifestation of mind (Laszlo, 2004). Though such views are certainly very much in accord with the themes developed in this article, this nevertheless does not mean that the many modern physical theories, such as hyperspace theory, have focused on the dimensional universal constants as the focal points in one's attempts at unification.

In an effort to unify the various fields, forces, particles of mass-energy and types of matter, theoretical physicists have proposed a hypothetical hyperspace composed of higher dimensions, which enables such unification in higher dimensions (Kaku, 1994). The role of the dimensional universal constants is not even addressed in this type of situation. However, using this perspective of hyperspace, one can conjecture that these features of physical reality can be guided into a unification at a higher level of organization through the trans-dimensional, template-based features of the dimensional universal constants. If these proposed higher dimensions are ever demonstrated experimentally, it is predicted that Φ will also become evident as a parameter. In fact, string theory, which uses higher dimensions, does indicate implicitly that Φ is a necessary parameter of the theory, as is π . Yet, as noted, such an approach using a hyperspace has not knowingly addressed the significance of the dimensional universal constants and their dimensionless features, such as Φ , in such a model or approach. This has also been the situation in related approaches.

Specifically, in the various, modern physical theories, such as string theory and super-symmetry theory, none of these approaches have focused on the dimensional universal constants as center pieces to those theories. Those theories have failed to grasp the dimensional universal constants' proposed, deep significance in stabilizing the natural world via their guiding of regeneration, their unifying role in joining various realities, and the vortical, fractal structures necessitated by such, as center pieces of those theories. Certainly, their dimensionless, trans-dimensional features were not even conceptualized in this

regard, thereby precluding steps towards a unifying view. However, if such a unifying view of their importance or significance would have been arrived at, specifically, with regard to the stabilization of reality via a guided completion dynamic, those scientists would have thereby reshaped those modern physical theories, making them far less incomplete, while enabling effective experimentation and unification through Φ .

These hierarchical, vortical fractal structures, though being features of a 4-dimensional reality via Φ , as theorized, would be revealed differently via conventional, incomplete approaches. What conventional mathematical, conceptual and experimental conditions have revealed to us, or have enabled us to view, are hierarchies of matter, rather than growing, developing complex vortices. These hierarchies of matter would be sub-particles of mass-energy, nuclei, atoms, molecules, complex molecules, such as DNA, and higher orders of matter, including the living state. In changing our mode of conceptualization, these could be viewed, completingly, rather as growing complexes of vortices within vortices or vortical fractals, whose development into space-time is guided completingly by the dimensional universal constants through their dimensionless, trans-dimensional components. This fractal nature of vortical reality, from the point of view of quantum mechanics, may be interpreted as discontinuities of matter-energy or quantization. Moreover, these generating, vortical structures, as generatively projected features of reality from and via an ultra-realm, an unfolding, would enable higher orders of morphogenesis and the evolution of such orders, increasing their stability through a completion dynamic. Such an evolution would also be guided by the template-based constants.

This view point regarding the inner, vortical, completing features of reality, which give stability to such, has been made aware to some of us, feasibly, through the universal constants, physical phenomena (Lieber, 2021), observations of living matter, geometry, computer simulation, and ultimately through mind, which connects to those constants. Experimentation of various types, designed through the mind, could further elaborate and completingly shape what is revealed of reality's patterned, evolving, and unfolding unity. Pertaining to such a revealing, as theory further indicates, such generating vortical structures would be the means to such higher ordered, unifying and completing morphologies and their evolution, indicating an unfolding, developing, and stabilizing reality. And such

a reality would be accessed progressively through developing, completing methodologies. The computer simulations described earlier clearly suggest this. This would also be a type of experimental verification due to a developing and completing methodology, a completing act within physicality.

In fact, as observed and revealed, in the higher ordered morphologies of various plants and animals, including their genetic material, vortices or spirals and helices are also manifested. In such, Φ is evident as a guiding, developmental parameter. This is especially evident in the Φ connection between the inverse of the dimensionless fine structure constant and phyllotaxis in plants. Towards a unifying and more revealing view, the dimensional universal constants through their dimensionless features, via completing forces, would be involved through all such scales and morphologies. In the author's view, one must consider the structuring, guiding and regenerative role of the universal constants through their dimensionless, trans-dimensional features. These constants would be the projected, guiding templates extended from the ultimate-template of a deeper, ultra-reality of universals. These universal constants through their trans-dimensional features would guide the vortical, regenerative and completing unfolding from the infinite realm of the universals, a realm of infinite potential. Scientists not doing so would place limitations on their theories and related methodologies as to what they could reveal about a unified, unfolding and developing reality, and the testability of such theories and methodologies. This could be rectified in future, evolving, unified theories and methodologies focusing on and through Φ .

What could be predicted if physicists and biologists seriously consider the feasible existence and enabling operation of a dimensionless biological constant such as Φ , or analogous biological constants, in their approaches? One can answer: In using Φ to guide such approaches, a truly unified, detailed, and growing view of a developing reality may eventually ensue and be experimentally accessed and enabled. Such would likely demonstrate or reveal a drive (or principle) via regenerative forces towards a maximization of stability through increasing dynamic completion on all levels, including the epistemological, and thereby, through all dimensions and morphologies of physical reality and of mind. This would be a unification through enabling and stabilizing constants, such as Φ . And this would be a feasible, unifying and completing view through which to

approach existence.

And this constant Φ , as proposed, would be projected or extended from a deeper, multidimensional, ultra-template-realm (or realms) of universals, as a primary guiding, universal, trans-dimensional constant or template for various, vortical, intersectional regenerations projected into space-time from the ultra-realm. The other trans-dimensional constants, also projected from the deeper realm and detected in a complex geometry, would also support such guidance. And these regenerations, templately-temporally guided via those constants, would enable the vortical, hydrodynamical generation of fractal matter exhibiting quantization. And through which, fractal matter, as vortical mass-energy, presenting as particles with enveloping energy quanta and waves, would the known physical, dimensional universal constants, as extensions or agents of the universals, become manifest, stabilize via forces, and endure in four-dimensional space-time as stabilizing agents of physicality. And hence these, themselves, along with their dimensionless, trans-dimensional components, would be the projected, stabilizing templates for physicality, from a deeper, multidimensional, ultra-reality of universals in a plenum, an infinite potentiality.

To clarify, these trans-dimensional components would include powers of Φ , and π . The interconnections between the trans-dimensional components of the universal physical constants and constants such e and i , which are involved in a complex geometry, could be investigated. As previously illustrated, i also represents a spatial-temporal regeneration over 90 degrees in a complex number system, and hence is closely allied to (or corresponds to) Φ in this manner (Lieber, 1998). All of this may better clarify the role of a complex geometry in defining vortical regeneration via completion. This could be done through further computer simulations, especially as earlier computer simulations involving e and i , as noted, mirrored a type of reality.

Through these completing dynamics and projections into our reality, which probably involves such a complex geometry as a vehicle, the immutable, regenerative, completing features of the universals, as marked by the universal, trans-dimensional constants, become fused effectively with the specifics of physicality, such as forces, and in so doing, stabilizing physicality in all of its variations. Universality becomes reconciled with Specificity, as Paul Lieber would have stated. In view of the previous comments, details of the

aforementioned completing dynamics and projections could thus be revealed and enabled through a complex geometry approaching the ultra-existence. Furthermore, the very human mind may function through the trans-dimensional constant Φ , which would be involved in structuring the very anatomy and physiology of the human brain. Thereby, this may very well further enable and support human access to, and thereby enable our detailed, growing, completing view of, the deeper, ultra-realms of existence. This would also be a type of experimentation.

In 1969(b), Paul Lieber was thinking along similar lines with regard to the effectiveness of the dimensional universal constants of physics in opening up new vistas, when he wrote: "These constants, I believe, are the universal constants of nature and therefore in particular of the life process [and that of the mind]. It is in these constants and in what their existence manifests that the processes which we arbitrarily ascribe to the inanimate and animate worlds merge, and where we must search for their synthesis and thus their comprehension."

And through a concurrent investigation of the universal, dimensionless, trans-dimensional biological constant, and of similar constants, such a universal comprehension could well be approached via Φ and experimentally defined, increasingly, through the evolution of mind, its infinite potential unfolding. This would be a comprehension that would likely and conceptually grasp in various ways and views, and hence enumerate in various manners, experimentally, a feasible principle, namely, the drive for dynamical completion through out the universe. Such dynamic completion, a universal drive towards completion on all scales, vortically effected and guided, and manifested as stable, interconnecting vortical matter-energy in morphogenic phenomena, would be seen as the universe's stable, morphogenic or unfolding accommodation on all scales within and to itself. It would indicate an infinite, universal capability, which would include mind's potential, a rational potential in the universe.

This would be a very feasible or credible principle of dynamic completion involving Φ , on which to base new scientific and philosophical endeavors. To restate in a different way, by means of these very endeavors involving Φ , various types of experimental, conceptual, and mathematical conditions and approaches will evolve that would enable the evolving, shaping testability of this principle, and in so doing, shaping our evolving access to this principle and connected

realities, including higher orders of such. In effect Φ , the guiding, primary shaper of reality, would also be involved in evolutionarily shaping, completing, what is revealed to us of that developing reality as it evolves various morphologies.

Some of these approaches might even involve mind or *nous* directly accessing deeper, “imaginary” ultra-realities, representing another type of experimentation. Associated with these evolving approaches and theories involving Φ would be an evolving, biological epistemology. This act of epistemology, itself based on completion, may indicate that this principle, though eventually and completely established as being existent and being true, would nevertheless not be provable. Though perhaps, some day, directly through mind's access to the deeper ultra-realms, it could become provable.

To restate, in view of the information presented in this article, one can conclude that the existence of the principle of completion is highly feasible, but various types of experimentation are needed towards the complete indication of its existence. Nevertheless, an implicit causation throughout the universe on all scales would be a manifestation of such a feasibly true, dynamic completion. By this feasible process of completion, guided, in effect, through the trans-dimensional, universal constants, such as Φ , an unfolding of an infinite potential would occur. Such unfolding would reveal an infinity in nature, an infinity which was advocated by Nicholas of Cusa centuries ago. And hence, guided by the universal constants through their trans-dimensional, template-based features, an unfolding of an infinity within ourselves, our minds, will become progressively evident and utilized. This would enable an increasingly creative, free will involving Φ .

This proposed unfolding, an evolution towards increasing morphological stabilization in space-time, via a guided, increasing dynamical uniformity in non-uniformity, a completion process, would manifest a non-relative, temporal directionality. This directionality would be in progressively manifesting such an infinity in nature at all scales. And through this directionality, stability becomes more and more manifest throughout the universe in all of its various, infinite features. Stability is constancy, and thus constancy, as an expression of the universals in space-time, through the guiding universal constants, becomes more and more established through the infinitely various features or phenomena of the universe. And through this, the universals become more and more manifested

throughout the infinite variations of physicality. These many specific, physical variations enable this growing manifestation of the universals in our space-time, their constancy, and their guided maintenance of constancy, via dynamic completion, throughout our space-time and the universe. The universals become, as it were, increasingly entangled throughout space-time, enabling, perhaps, rapid connection of influences or communication throughout various scales, especially the micro-scales.

Research and theoretical discussion by the physical chemist, Prigogine and colleagues (e.g. 1978, 1979, 1984 1988), give support to this view of temporal directionality, as well as to a view of directed symmetry in evolution. This might even imply an evolution of directed completion. From this perspective, randomness and non-directionality in nature would become a limiting case, or perhaps at best, a constructive illusion. This should be the source of our ability, motivation and courage to find new truths, which ultimately would be healing. In the conclusion to his book, Penrose states that the true road to elucidating reality has not been found, even in considering our accomplishments in the sciences (Penrose, 2004). He argues that another, new perspective would be needed, probably coming in the 21st century. Maybe, such a perspective, trans-experimental, has always been implicitly present in various ways, involving the application of Φ .

Michael M. Lieber
Genadyne Consulting
michaellieber@juno.com
1-510-526-4224

ADDENDUM

In this regard, 2470 years ago, the pre-Socratic Greek philosopher, Anaxagoras, stated that the rotary or vortical motion of an undifferentiated mass of being is the source of all of reality's features (Nahm, 1947). The efficient cause of this vortical motion is mind or *nous*, according to Anaxagoras. The few modern restatements of this view pertaining to vortices contributing to physicality, especially by some of those, including myself, first in high school, who originally

were not familiar with Anaxagoras' view, might even suggest an inherent unity or stratum of thinking, of mind, across the generations, and ultimately mind's presence, as a rationality, within and reflecting reality, thereby a vindication of Anaxagoras' philosophy. Many of the findings and theories of physics have been sophisticated re-statements or developments of those views held by a number of the early Greek philosophers. Perhaps, with this *in mind*, one can state without reservation that the regenerative universals are the seat of *nous* within the plenum, being, and all which it manifests, such as the universal and guiding trans-dimensional constants, and our stabilized, completed realities.

POSTSCRIPT AND ACKNOWLEDGMENT

In 1952, Paul Lieber met with Albert Einstein to discuss the physical, dimensional universal constants. Paul wanted to share his views on the subject with Albert Einstein and to learn Einstein's response to those views. According to my father's account, they sat together on a couch in Einstein's house during the meeting, which went very well, with much mutual enthusiasm, with my father slapping Einstein's leg through his own enthusiasm due to the discussion. Einstein's questions and comments were "very sharp," according to my father. At the conclusion of their meeting, Einstein told my father "to keep your courage." I assume this referred to overcoming any obstacles my father would experience in his further investigation of the universal constants. Unfortunately, the details of those sharp comments and their discussion in general are unknown. As far as I know, my father did not leave a written account on the specifics of their discussion, though I believe it must have had an influence on his subsequent thinking and writing. I never asked my father about those details, failing to seize the opportunity, which I have regretted. Had I done so and received the information, perhaps important, constructive perspectives could have become part of the history of science.

In memory of Professor Paul Lieber, another pioneer in science and philosophy.

BIBLIOGRAPHY

- Bohm, David. *Wholeness and the Implicate Order*. Routledge, London and New York, 1980.
- Cook, Theodore Andrea. *The Curves of Life. Being An Account of Spiral Formations and Their Application to Growth in Nature, to Science and to Art*. Dover Publications, Inc. New York, 1979 (Originally published, 1914).
- Davis, Paul. *The Mind of God. The Scientific Basis of a Rational World*. Simon and Schuster. New York, London, Sydney, 1992.
- Greene, Brian. *The Elegant Universe*. W. W. Norton & Company, New York, London, 1999.
- Greenspan, Nancy Thorndike. *The End of the Certain World. The Life and Science of Max Born*. Basic Books, New York, 2005.
- Kaku, Michio. *Hyperspace. A scientific Odyssey Through Parallel Universes, Time Warps, and The 10th Dimension*. Oxford University Press. Oxford. New York, 1994.
- Kumar, Manjit. *Quantum. Einstein, Bohr and the Great Debate About the Nature of Reality*. Icon Books Ltd., UK, 2009.
- Lande, Alfred. *Quantum Mechanics*. Pittman Publishing Corporation, 1951.
- Laszlo, Ervin. *Science and the Akashic Field. An Integrated Theory of Everything*. Inner Traditions, Rochester, Vermont, 2004.
- Lerner, Eric, J. *The Big Bang Never Happened*. Vintage Books. New York, 1992.
- Lieber, Michael. The Living Spiral. A Dimensionless Constant Gives a New Perspective to Physics. *Rivista di Biologia/Biology Forum*. no. 1, vol. 91(1998): 91-118.
- Lieber, Michael. Article: re vortices and the constants in www.michaellieber.com (2015)
- Lieber, Michael. Morphogenesis, Forces and the Universal Constants: Towards a Unifying Perspective and Principle, with Implications for Scientific Practice. *Cosmos and History: The Journal of Natural and Social Philosophy*. no. 1, vol. 18 (2021): 365-396.
- Lieber, Michael. The Unity of Phenomena on Different Scales as Exemplified by the Research of Albert Einstein and Paul Dirac: The Relevance of a New Universal Constant. *Cosmos and History: The Journal of Natural and Social Philosophy*. no. 2, vol. 18 (2022): 572-576.
- Lieber, Paul. Some Considerations Relating to Theoretical Biology. April, 1961. Published on www.michaellieber.com. Article is copyrighted.
- Lieber, Paul. Constants of Nature: Biological Theory and Natural Law. In *Towards a Theoretical Biology I*, C.H. Waddington (ed), University of Edinburgh Press, Edinburgh, 1968: 180-204.
- Lieber, Paul. Aspects of Evolution and a Principle of Maximum Uniformity In *Towards*

-
- a Theoretical Biology II*, C.H. Waddington (ed), University of Edinburgh Press, Edinburgh, 1969a: 219-316.
- Lieber, Paul. Categories of Information. In *Contributions to Mechanics*, edited by D. Abir. Pergamon Press, Oxford, 1969b: 87-106.
- Nahm, Milton, C., editor. *Selections from Early Greek Philosophy*. Third Edition. Appleton-Century-Crofts, Inc., New York, 1947.
- Peat, David, F. *Infinite Potential. The Life and times of David Bohm*. Helix Books, Addison-Wesley, Reading, Massachusetts, 1996.
- Penrose, Roger. *Shadows of the Mind. A Search for the Missing Science of Consciousness*. Oxford University Press, 1994.
- Penrose, Roger. *The Road to Reality. A Complete Guide to the Laws of the Universe*. Alfred A. Knopf, Publishers, New York, 2004.
- Pickover, Clifford. *Computers Patterns Chaos and Beauty*. St. Martin's Press, New York, 1990.
- Prigogine, Ilya. Time, Structure and Fluctuations. *Science*, vol. 201 (1978): 777-785.
- Prigogine, Ilya. et al. Stability, Fluctuations and Complexity. *Collective Phenomena*, vol. 2 (1979): 103-109
- Prigogine, Ilya and Stengers, Isabella. *Order Out of Chaos*. Bantum Books, New York, 1984.
- Prigogine, Ilya and Petrosky, Tomio Y. (1988). An Alternative to Quantum Theory. *Physica*, vol. 147A (1988): 461-486.
- Schrodinger, Erwin. *What Is Life & Other Scientific Essays*. Double Day and Company, Inc., Garden City, New York, 1956.
- Semat, Henry. *Fundamentals of Physics*. Fourth Edition. Holt, Rinehart and Winston, Inc., 1965.