Is There a Simpler Perspective on Some Fundamental Laws of Physics?

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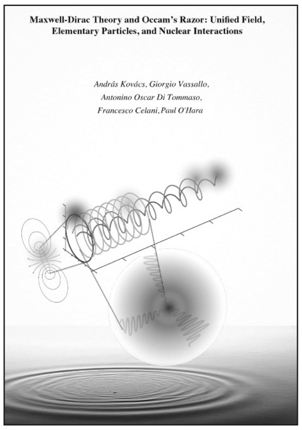


Abstract: We introduce the book *Maxwell-Dirac Theory and Occam's Razor: Unified Field, Elementary Particles and Nuclear Interactions*. We start by reviewing the historic progression from particle-oriented to wave-oriented concepts, and outline how our work fits into this evolution of scientific thought. Next, we outline how our methodology brings about a major simplification in our understanding of elementary forces and particles. Such simplification is not only a benefit in itself, but allows us to address fundamental questions, such as: what is particle mass made of or what is charge made of? Finally, we discuss some major interpretational mistakes in current physics theory, which we correct in the book. This part further demonstrates the importance of applying Occam's razor principle.

This paper is an introduction and overview of our 2019 book *Maxwell-Dirac Theory and Occam's Razor: Unified Field, Elementary Particles and Nuclear Interactions*. The book's first edition is in print and available on Amazon, and we are currently working on its second edition.

Firstly, we put our work in historical context. The history of physics may be viewed as a progression from particle-oriented to wave-oriented concepts. A thousand years ago, if one tried to talk about "fields" and "waves," the response would have been blank stares. Only the concept of matter particles existed at the time, with direct mechanical interaction among them. Waves were observed on water surfaces only, but there was no mathematics yet to describe them and they were not thought to be related to anything else. Scientists thought of light as a stream of small "light balls." In contrast, today physicists describe light as waves in the electromagnetic field. All mechanical and chemical forces are also described as being exerted by such electromagnetic waves. A hundred years ago, the notion of elementary matter particles being quantum mechanical waves started gaining acceptance. Our book fits into this historic trend, and represents a next step in the understanding of wave-oriented concepts.

It is worth recalling that such steps in the past have usually been met by strong opposition from the scientific community. We illustrate this through the brief history of light model evolution from the original "light balls" description. Around 1687, Newton and Leibnitz independently discovered differential calculus, which is needed to quantitatively describe waves. However, it took 130 more years to recognize light as a wave. In 1818, the scientific Académie of France offered a prize for a consistent understanding of light diffraction. At that time, light diffraction experiments were considered an anomaly of the prevailing "light balls" model. One of the participants, civil engineer and optometrist Augustin-Jean Fresnel, submitted a thesis in which he explained diffraction from analysis of both the Huygens-Fresnel principle and Young's double slit experiment. This irritated the academic "old guard," who were staunch believers in the particle theory of light and were skeptical of its alternative, the wave theory. Poisson, a member of the Académie, studied Fresnel's theory in detail and looked for a way to prove it wrong. Poisson thought that he had found a flaw when he demonstrated that Fresnel's theory predicts an on-axis bright spot in the shadow of a circular obstacle blocking a point source of light, where the particle-theory of light predicts complete darkness. Poisson argued this was absurd and Fresnel's model was wrong. The head of the committee, Dominique-François-Jean Arago, performed the experiment. To everyone's surprise, he observed the predicted bright spot, which vindicated the wave model. Fresnel won the competition, and the wave nature of light gained acceptance in mainstream scientific circles.

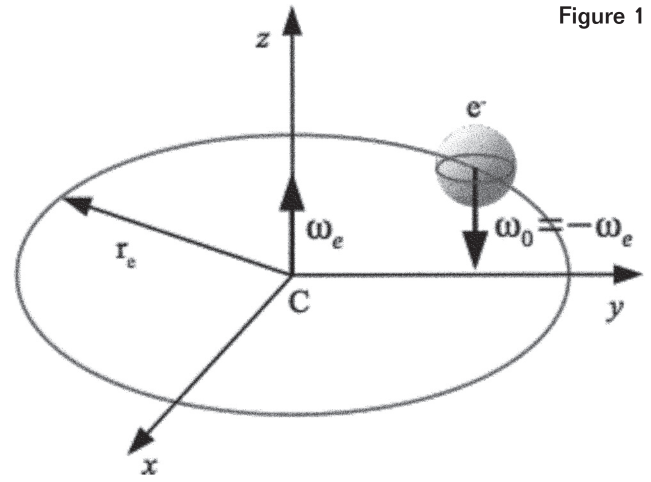
However, the "field" part was still missing, and mainstream physicists now considered light to be a wave in the physical aether, which they believed filled the vacuum. In essence, the traveling "light balls" model was replaced by a "sea of light carrying balls" model, facilitating the waves. Maxwell's discovery of electromagnetic field equations in 1862 spelled the beginning of the end for this "sea of light carrying balls" model. After the discovery of relativity in the early 20th century, Silberstein published a seminal book in 1914, *The Theory of Relativity*. In this book he quantitatively described how light is carried by a relativistic electromagnetic field. The journal *Nature* published a vitriolic review of Silberstein's work. From the perspective of the reviewer, Silberstein's main sin was to have left the aether out of the discussion: "There is scarcely a reference to the longings of the physicist for an objective aether...Many will read Dr. Silberstein's careful and detailed introduction to it, consider his illustrations, and follow his logic, and yet feel there is something lacking. The argument from need for an aether is not dealt with. The reluctance that Lorentz had to abandon the aether remains. The seeker after a deeper understanding of the physical is apt to fight shy of a principle which cannot be expressed in terms of concepts to which he can give some degree of substantiality." Eventually, the quantitative theory of electromagnetic field waves gave birth to a wide range of new radio technologies, while the mainstream theory of aether particles was of no use to radio engineers. The aether theory was then quietly abandoned by theoretical physicists. Starting from Fresnel's thesis, the whole process took over 100 years. Similarly, our approach of seeing elementary particles as electromagnetic waves might not be widely accepted initially.

The evolution of science and technology can be also seen to evolve from simpler "low hanging fruits" towards more complex and intricate concepts. However, a change of perspective comes along from time to time that allows some simplifications. The most well-known example is the pre-Newtonian Earth-centered perspective, where the motion of planets was described by epicycloid formulas. These formulas agreed with experimental data and the motion of planets was predictable. As the Sun-centered perspective became allowed, planetary motion was subsequently described by simpler elliptic formulas, which were manifestations of a universal gravitational force.

We consider our theory to be a simpler perspective on some fundamental laws of physics. A rational starting point is to look for the simplest relativistically compatible Lagrangian of a vector field. A derivation from first-principles can be found in Hobson's *General Relativity*.[1] Nevertheless, the authors harshly reject this Lagrangian because it's not "gauge invariant." But electromagnetic gauge invariance is contradictory to Maxwell's equations.[2] Therefore, we reconsider this simplest Lagrangian, and further simplify things by not imposing electromagnetic gauge invariance. We use the intuitive language of geometric algebra, namely space-time Clifford algebra. We find that this electromagnetic Lagrangian corresponds to a familiar form of Maxwell's equations: DA=G and DG=0, where A is the vector potential, D is the space-time gradient operator and G is the electromagnetic field. However, there is a big difference with respect to the usual form: G now incorporates electromagnetic fields, charges, and also currents. Is it no longer needed to insert electric charges "by hand" into Maxwell's equations? Indeed, charges and fields are now part of the same mathematical object. Our viewpoint is much simpler and more intuitive.

We then test the theory by throwing it into deep water: can it also tell us what mass is made of? This is a swimming test which no theory has passed yet, according to Feynman: "Many attempts have been made, and some of the theories were even able to arrange things so that all the electron mass was electromagnetic. But all of these theories have died." By analyzing the relationship between the Maxwell and Dirac equations, we show that the mysterious "four-component Dirac spinor field" is deeply related to electromagnetism: the spinor field's space-time gradient is the electromagnetic energy-momentum. Subsequently, we derive from the model all the essential features of the electron: its mass exactly corresponds to its electromagnetic energy; its charge surface is on a sphere at the classical electron radius and its zitterbewegung (ZBW) radius is the reduced Compton radius (in the rest frame). We derive its relativistic increase of mass, show that its charge surface retains its spherical shape under any Lorentz boost and obtain its correct magnetic moment and ZBW frequency as well. In other words, the book explains how electromagnetic fields comprise the electron mass. This resolves the mystery of what the electron mass is "made of." The obtained electron structure is illustrated in Figure 1; the sphere represents its charge surface at 2.82 fm radius and the circle represents its 386 fm ZBW radius. Neither scale value is constant however, but inversely proportional to the electron energy. In this sense one cannot use high-energy scattering to measure "how large" the electron is, because with growing kinetic energy the outcome will show ever shrinking electron size.

Figure 1



The uncovered electron geometry also suggests a fundamental geometric scaling: the ratio between its charge radius and ZBW radius is exactly the fine structure constant, α. The ratio between its ZBW radius and Bohr radius is yet again α. This brings us back to the nearly 100-year old mystery regarding the origin of α, and the importance of a true understanding of electromagnetism. We might ask if we can calculate its value from basic principles? Although we do not resolve the mystery of α in the book, we point out some geometric constraints which appear to be relevant for charge quantization. Since the elementary charge and alpha are related via the h and c constants, understanding the charge quantization process is equivalent to discovering the origin of α.

A large portion of the book investigates the broader consequences of the above results: what does this simplification imply for the range of possible electron orbits, what does it imply for nuclear forces, etc.? These calculations make strong connection with experimental data, and uncover some surprising results; for example, it predicts a new type of electron orbit which has just 0.38 pm average distance from the nucleus. Understanding the electron proves to be a stepping stone to understanding nuclear forces and nucleons; a very large set of "anomalous" or unexplained experimental data suddenly make sense. We anticipate this part to be of equal interest to theoretical and experimental physicists, and to anyone interested in understanding nuclear forces.

In the last part of this article we outline our scientific methodology. Scientists like to think of their respective field as an additive process, which advances through the accumulation of ever wiser ideas and ever more elaborate concepts. That is generally true, but one must be careful to retain checks and balances and correct mistakes that inevitably slip in.

Correcting mistakes often reveals a more fundamental perspective, whereby one realizes that separate physical laws or phenomena are one and the same thing. To give an example from a pre-Newtonian era, the celestial motion of planets was accurately and predictively described by Earth-centered epicycloid formulas. The gravitational fall of bodies was accurately and predictively described by a constant acceleration formula. These two phenomenological laws were thought to be completely unrelated, and scientists of the day had no sense of any mistaken assumption: their formulas were predictive and accurate. They were the top theoreticians of the day, drawn from the same gene pool as today's theoreticians. It is safe to assume they were just as smart as the geniuses of today. But their thinking was locked into a mistaken paradigm. Once Newton's efforts revealed what the mistaken assumptions were, the phenomena of celestial motions and falling bodies were unified, although it continued to meet opposition from some who insisted that their model of Earth-centered epicycloid motions was the correct model of reality. One must understand that phenomenological formulas may involve unrealistic models of reality, even while being experimentally correct.

Correcting mistakes is an important aspect of our methodology. We list below some major misunderstandings in interpretation which we believe to have identified and corrected. We also indicate the time period since the mistake was made in both actual years as well as resource-adjusted "19th century years," abbreviated as 19C-years.

1. *Background:* In the early 20th century, mathematicians discovered that the four Maxwell equations can be written as a single differential equation of the so-called "vector potential" field. The space-time gradient of the vector potential field yields three field types: electric, magnetic and scalar. *Mistaken assumption:* The role of the scalar field was not understood at the time, and it was assumed to be always zero. This assumption shows up in current textbooks as the "Lorenz gauge" condition, and it is now referred to as "knowledge" rather than as an assumption. There are no experimental proofs for this assumption, and it was in fact shown to lead to paradoxes.[2] *Age:* >100 years (>1000 19C-years). *What we discover upon correcting the mistake:* Electromagnetic fields and charges are not two distinct entities—they are all part of a single vector potential field. We gain a paradox-free field theory of electromagnetism, and we no longer need to ask what charges are made of.

2. *Background:* In 1927, Dirac discovered the phenomenological equation named after him, which accurately predicts the energy levels of atomic and molecular orbitals. He noted in his initial publication that this equation is a phenomenological guess and that some of its solutions appear to yield negative energy eigenvalues. *Mistaken assumption:* The negative energy eigenvalue solutions of the Dirac equation became interpreted as the physical reality of negative energy states. In the high energy limit, textbooks refer to negative energy solutions as anti-particles. But electron-positron annihilation events radiate electromagnetic energy, which would be impossible if positrons were negative energy solutions. Driven by the desire to maintain the assumption that anti-particles are negative energy solutions, some textbooks engage in wild speculation about a "Dirac-sea of electrons in the vacuum" with infinite energy density, which supposedly fills the vacuum sea with electrons. According to this hypothesis, positrons are holes in the omni-present Dirac-sea of electrons. In the low energy limit, textbooks refer to negative energy solutions as "temporary violation of energy conservation," which is supposedly allowed by the Heisenberg uncertainty, and cite quantum tunneling as an example. But the mathematics of Noether's theorem clearly states that energy conservation follows from the invariance of physical laws with respect to the flow of time. Speculation about violation of energy conservation is a radical departure from realism, as it implies that physical laws may randomly vary on microscopic time scales. Consequently, any set of quantum mechanical axioms becomes mathematically meaningless. *Age:* 90 years (900 19C-years). *What we discover upon correcting the mistake:* By studying the spatial geometry of Maxwell and Dirac equation solutions, we learn that both have harmonic and exponential type solutions. Exponential solutions of the Maxwell equation correspond to the tunneling electromagnetic field associated with reflections, *e.g.* behind a metallic surface, while exponential solutions of the Dirac equation correspond to the quantum tunneling spinor field, *e.g.* behind a potential wall. No one claims that there should be negative electromagnetic energy associated with reflections, and we prove that the correct energy density calculation indeed yields a positive value. With the help of geometric algebra we offer geometric analogies of the exponential solutions of the Maxwell and Dirac equations. Once the geometry of these solutions is understood, one realizes that claims of "negative energy spinors" originate from a mathematical misuse of the space-time metric. Happily, there is no further need for confused speculation about temporary violation of energy conservation or about an omni-present but undetectable sea of charged electrons in the vacuum. Electrons and positrons may now be described by the same quantum mechanical wavefunction: both have positive energy, and the only remaining difference between the two particle types is the sign of their electromagnetic scalar field.

3. *Background:* Experimental techniques for high-energy proton-electron scattering measurements became available in the 1960s. At that time, proton-electron scattering measurements performed at SLAC did not yet provide a conclusive answer about the number of sub-particles comprising a proton. With the development of experimental capabilities, proton-electron scattering experiments were performed over a gradually widening energy range which, in principle, gave us experimental knowledge with ever increasing accuracy of the proton's internal structure. *Mistaken assumption:* Based on theoretical reasoning, most theoretical physicists assumed by the mid-1970s that the proton comprises three sub-particles. This assumption was not quite compatible with the experimental data collected at SLAC, but theorists bridged the gap between their theory and experiment by assuming the three sub-particles are swimming in a "sea of virtual quarks" inside the proton. Such assumption might strike the reader as being particularly extraordinary, but one must remember that its proponents considered it not to be much different from the above-discussed "Dirac-sea of electrons" model, which was already in all standard textbooks. Over the ensuing decades, textbooks started to refer to all these assumptions as "knowledge" about the three sub-particle structure of the proton. Experimentally, it became possible only in the early 2000s to unambiguously count the proton's sub-particles from proton-electron scattering measurements. The corresponding experimental data was collected from the SLAC, JLAB and HERA facilities. (See Figure 2.) Unexpectedly, highly trained scientists started making elementary data processing mistakes by mixing incompatible data, and published their conclusions in high-impact journals without any peer-reviewer pointing out their basic errors. Not too surprisingly, these published reports reaffirmed the already "known" three sub-particle structure of the proton. As far as we know, the only mathematically correct analysis of these experimental data was published by William Stubbs.[3] We present his results in our book, along with an explanation of the data processing mistakes that one finds in high-impact publications. *Age:* 15 years (150 19C-years). *What we discover upon correcting the mistake:* Upon carefully combining the sub-particle momentum distribution function from multiple experiments, and refraining from making any unnecessary assumptions, its peak reveals the number of sub-particles in a proton. For X number of sub-particles, the peak distribution is at 1/X. This peak indicates that the proton is comprised of 8 to 10 sub-particles, and there is no need to hypothesize about any "sea of virtual particles." While at the current resolution of scattering data it is still uncertain whether there are 8, 9 or 10 sub-particles, it is no longer uncertain that this number is larger than 3. Investigating these protonic sub-particles opens up a new frontier of particle physics.

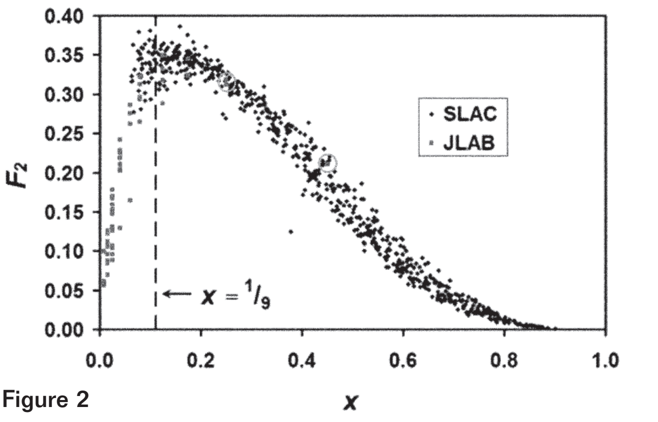


Figure 2

4. *Background:* By the 1930s, experimenters could measure the electron's magnetic moment at a rather high accuracy. These measurements revealed a slightly larger magnetic moment than what was expected from Dirac theory. *Mistaken assumption:* The first phenomenological anomalous magnetic moment formula was published by Julian Schwinger, who recognized that the anomalous part is given by the $\alpha/2\pi$ expression, where α is the fine structure constant. However, Schwinger claimed to have a theoretical calculation, not just a phenomenological formula. But Schwinger's calculation was based on a point-particle model, which assumes that the magnetic moment of Dirac theory is an inherent property of the infinitesimal point-particle. In the book we show this assumption to be incorrect, and calculate the magnetic moment as a purely electromagnetic phenomenon. Moreover, experts who claim to understand Schwinger's calculation are debating whether his calculation implies a temporary violation of momentum conservation. Most current textbooks go with the interpretation of a temporary momentum conservation violation, which according to Noether's theorem implies that physical laws randomly fluctuate at short distances. As mentioned above, any set of quantum mechanical axioms becomes mathematically meaningless after such speculations. Nevertheless, Schwinger's formula was taken to be more than phenomenological, as physicists already became comfortable with the idea of temporary energy conservation violation, due to the assumption of negative energy Dirac spinors. Soon, Feynman suggested that a more accurate result can be obtained by calculating higher order terms of α. A calculation based on Feynman's method fills 50 pages. One might wonder how it is possible to determine whether such calculation has any predictive power. One may check whether the calculation yields the correct result for various particle types. However, although the coefficients of Feynman's formula yield the correct electron magnetic moment, the formula fails badly for the proton. This was not considered to be a problem, because the proton and electron were thought to belong to unrelated particle families, and so it was assumed that there is a need to apply so-called "hadronic corrections" for the proton case. In other words, it was assumed to be impossible to have a universal anomalous magnetic moment formula for all particle types. By this point, hopefully, the reader sees how all the speculative assumptions are interrelated in a harmful way. *Age:* 70 years (700 19C-years). *What we discover upon correcting the mistake:* The solution of Maxwell's equation shows that the anomalous magnetic moments of the electron, muon, proton and neutron can all be calculated from a universal formula. We derive this simple formula from relativistic principles, which reveals that the real control parameter is not α but the charge radius and ZBW radius parameters. There is no more need to make different calculations for each particle type, no need for 50 pages of calculations and no need to debate whether physical laws randomly fluctuate at short distances. Based on this, we predicted the outcome of the so-called "proton charge radius puzzle": the correct proton charge radius is in fact given by the muonic hydrogen measurements. This prediction appears to be confirmed by a recent proton charge radius measurement,[4] which was not yet available at the time of publication. Our results uncover a universal internal geometry among particles which were previously considered to be unrelated, and demonstrate that particles are certainly not abstract points in a wavefunction.

5. *Background:* Since the early days of quantum mechanics, it

has been recognized that no more than two electrons may occupy any given atomic orbital. For covalent molecular orbitals the same pairwise occupancy was observed. This pairwise rule became known as the Pauli exclusion principle and is at the heart of understanding chemistry. Without this exclusion principle, all electrons would fall into the same ground state orbital. *Mistaken assumption:* Pauli was keen to derive the exclusion principle named after him, so that it would not be a new axiom. The derivation worked out by Pauli involved a new principle, which has become known as "micro-causality." In the words of Pauli, this principle states that "all physical quantities at finite distances exterior to the light cone…are commutable."[5] What Pauli failed to note was that this principle as formulated does not apply to entangled particle states. Entangled particles violate micro-causality by definition and for this reason, within the context of the Einstein-Podolski-Rosen (EPR) paradox, Einstein referred to spooky action at a distance. Regarding the current status of micro-causality principle, it is still debated whether micro-causality is an axiom or a consequence of relativity, and a recent systematic review of pro and con arguments suggests that micro-causality is still in axiom status.[6] *Age:* 70 years (700 19C-years). *What we discover upon correcting the mistake:* We first prove that isotropically spin correlated states can only occur in pairs. In chemistry such states are referred to as "singlet" states, and we show that singlet states are isotropically entangled particle pair states. This essentially means that indistinguishable particle pairs are either entangled as singlets or are statistically independent of each other. From this it mathematically follows that a system of n-indistinguishable particles that contains singlet states must obey Fermi-Dirac statistics, while if there are no singlet states then they will obey Bose-Einstein statistics. Boltzmann statistics follows by relaxing the indistinguishability condition.[7] In contrast to the generally assumed classification of statistics according to half-integer versus integer spin values, we find that spin value has no essential role to play. How can our theorem be experimentally distinguished from Pauli's axiom? Firstly, entangled electron states can be experimentally studied in a wide variety of physical systems, while Pauli's axiom of anti-symmetric wavefunctions is not experimentally observable, as far as we know. Secondly, when two electrons are indistinguishable in the same quantum mechanical state, a break-up of this state causes both electrons to transition pairwise out of this state. Chemists routinely observe this phenomenon for both atomic and molecular orbitals. Regarding atomic orbitals, alkali-earth metals for example are well-known to oxidize directly to +2 valence state, implying a pairwise departure of their outer electrons. Regarding molecular orbitals, the outer electrons of oxygen molecules are known to be in either triplet state (in different orbitals) or singlet state (in the same orbital). In the triplet state the electrons react individually, while in the singlet state they react pairwise. When chemists want to simultaneously bind two oxygens to another molecule, they start by inducing a singlet state of O_2 outer electrons. In contrast, there is nothing in Pauli's theory which implies that electrons in the same orbital would be pairwise transitioning. In summary, after 70 years of misunderstandings about the process behind electron statistics and chemical binding rules, we may have a chance to understand the physics of tangible matter. Our theorem is very general, and applies to all particles in isotropically entangled state, for example also to halo nuclei which break up through a pairwise emission of the two halo nucleons.

Altogether the above listed realizations provide a new perspective for the advancement of physics. Since the publication of the first edition, we have received some feedback, both encouraging and discouraging. The more one reflects on the foundations, the more one understands the obstacles that stand in the way of progress. We hope readers will appreciate our quest for truth. Correcting mistakes is by no way disrespectful of the scientists who worked on the involved problems.

Guided by the above insights, we endeavor to develop a realistic electron model. We emphasize that we seek analytic solutions of Maxwell and Dirac equations, without having to make any further assumptions or axioms about particle properties. Our book suggests that less is better and that we can have a more unified understanding of the physical world based on a few fundamental laws. As years go by, the need for a critical discussion on physicists' methods becomes ever more clear. To quote from *Lost in Math* by Hossenfelder[8]: "It is already clear that the old rules for theory development have run their course. Five hundred theories to explain a signal that wasn't and 193 models for the early universe are more than enough evidence that current quality standards are no longer useful to assess our theories." The principle of Occam's razor is as valid today as it was in his time, and applying it feels like a breath of fresh air.

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The second edition of *Maxwell-Dirac Theory and Occam's Razor: Unified Field, Elementary Particles and Nuclear Interactions* should be released by mid-2020.

ECLECTIC OBSERVER

Compiled by *IE* Staff

Hidden Energy Soon Available from *Infinite Energy*

Jeane Manning and Susan Manewich recently released the book *Hidden Energy: Tesla-Inspired Inventors and a Mindful Path to Energy Abundance*. *Infinite Energy* is publishing a few excerpts from the book, including in this issue (p. 14). In April, we will also have copies for sale. (Watch our website, as well as Issue 151 for an ad with details.) *Hidden Energy* is also available from Amazon.

Infinite Energy Technical Editor Bill Zebuhr is impressed with the book. He notes, "The book is well-conceived and well-executed and will be helpful to anyone who wants to get an overview of the new energy field." *Hidden Energy* is intelligently divided into sections that allow readers to concentrate on selected areas of interest, including: Paradigms; Hidden Energy; It's Raining Innovations; Body, Mind & Spirit; Bringing It Into Our World.

Zebuhr states, "It is not a technical book but demonstrates a good understanding of the thought processes required to invent in the field and why that is important." Chapter 5 quotes Zebuhr from an *Infinite Energy* editorial (#130): "Most evidence of the possibility of radically different and better technology is not actually hidden, but simply ignored and belittled by the mainstream." He thinks this is "a key to why the book is important and why it is successful." Zebuhr elaborates: "The evidence is not hidden but is also not able to be demonstrated to most observers. The Universe is actually far more subtle and difficult to grasp than is acknowledged by mainstream science...The authors understand the observation skills of, for example, Schauberger viewing vortices in streams and how he was able to extract so much information from his observations. The observations were enhanced by an intuitive grasp."

The authors define "hidden energy" as: a universal energy that can be tapped as a clean, abundant power source; Nature's way of quietly working with that life force; little-known technological breakthroughs that operate in harmony with Nature; the synergy of collaboration by innovators; the divine creative spark in each person.

Latest Issue of CMNS Journal Available

The *Journal of Condensed Matter Nuclear Science* (*JCMNS*), a publication of the International Society for Condensed Matter Nuclear Science (ISCMNS), has been in publication since 2007. It is an online scientific journal covering the field of cold fusion/low-energy nuclear reactions, also known as condensed matter nuclear science.

Volume 31, a collection of experimental and theoretical papers themed "Experiments and Methods in Cold Fusion," was just released in February 2020.

Links to all volumes of *JCMNS* are on the ISCMNS website at: https://iscmns.org/publications/jcmns/volumes/

2020 ExtraOrdinary Technology Conference

The TeslaTech 2020 ExtraOrdinary Technology Conference will be held from August 12-16 at the Crowne Plaza in Albuquerque, New Mexico. The conference features broad new energy topics, including: Tesla technology, magnetic motors, zero-point energy, cosmic/radiant energy, Brown's gas, magnetic healing, etc. There are typically numerous demonstrations. For more information and to register, see: http://www.teslatech.info/ttevents/prgframe.htm

Special Publications Still Available for Sale

Infinite Energy still has copies of select magazines and journals with cold fusion coverage for sale. *Current Science*, an Indian journal, published a special issue on cold fusion in February 2015 (Vol. 108, #4). It is available for U.S. customers for $6. *Popular Science* (August 1993) published an article by Jerry Bishop, "It Ain't Over Till It's Over...Cold Fusion," available for $3 U.S. *WIRED* Magazine's November 1998 issue contained Charles Platt's "Dirty Science: The Strange Rebirth of Cold Fusion"; it is available for $4.

International orders include additional postage, depending on location. International customers interested in purchasing these items can either phone *Infinite Energy* at 603-485-4700 or visit the online catalog, https://www.infinite-energy.com/store/ , and search the Miscellaneous category for these publications.