Observations of the Properties of Physical Entities

Part 1—Nature of the Physical World

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Abstract. Knowledge of nature has been acquired through common experiences and controlled laboratory experiments. When the *order* of physical encounters becomes evident, the expected outcomes of physical events and processes are formulated into general concepts, axioms, and laws of nature to provide understanding of the nature of things in the universe. Observations of the properties of physical entities divide simply into two groups: general concepts called "laws" and specific features of entities called "properties." Part 1 of this report deals with the *laws*—leaving the *properties* for a later report. In Part 1, the laws of nature are listed, referenced, and explained in relation to the Ring Model and the Standard Model of Elementary Particles.

Physical Entities. A legitimate model with scientific merit will describe the actual physical entity. The model gains credibility by predicting observations of the object with accuracy and precision. Thus, observation of an object's properties has a fundamental role in the development and validation of models.

Data. "The Committee on Data for Science and Technology (CODATA) was established in 1969"... "to provide the scientific and technological communities with a self-consistent set of internationally recommended values of the basic constants and conversion factors of physics and chemistry. Under the auspices of [the Task Group on Fundamental Constants], we completed a new least-squares adjustment of the values of the constants—termed the 1998 adjustment—that took into account all relevant data available through 31 December 1998"[1]. The values of important physical constants recommended by CODATA are reprinted in Table 2 (to be published later).

Laws of Nature. In addition to the values recommended by CODATA, scientific observations of common experiences and laboratory experiments have established a wealth of knowledge on the nature and operations of the physical world. Credible theories and models of science must fully incorporate ***all*** of these *laws of nature*. The impact of the underlying laws and axioms of Table 1 on the Ring Model and the Standard Model will be explained for all seven principles of Table 1.

Explanations for Table 1. Observations on the Nature of the Physical World.

Concept #1–Existence of Small Objects. The *unit conception of matter* is traced to Leucippus and Democritus "who believed that everything in the universe was composed

of atoms" [Mason, *p.* 32]. About 50 BC Lucretius explained that "physical things are partly atoms and partly atoms joined in combinations" [2, *p.* 12]. Bernard Pullman documents the fact that this concept has persisted to the present time:

> One century after Democritus, the atomic theory had acquired the refinements of a more elaborate articulation and polished logical structure, which was to remain practically unchanged for the next two thousand years [3, *p.* 17].

Most modern physicists and Common Sense Scientists agree on the *unit conception of matter*. This concept is incorporated into the Ring Model and the Standard Model of Elementary Particles.

Concept #2–Durability of Atoms. The concept that atoms are *indivisible and indestructible* has held up well from ancient to modern times, even with the discovery that certain elements are radioactive and spontaneously "split" into lighter elements. Moreover, particle "colliders" cause the destruction of electrons and protons when the velocity of collision is sufficiently great. These findings reveal that the single-unit structure of some atoms, say uranium, is actually rearranged rather than destroyed. Ultimately, the term "elementary particle" was defined in order to identify the components of all atoms, *i.e.* electrons and protons. Experiments show that these particles always have one unit of electrical charge but never have a fractional or multiple charge. Today it is agreed that these *elementary particles* are generally indivisible and indestructible—provided that a collision between two elementary particles is not exceedingly violent. Steven Benka is explicit:

> Fissioning electrons? No physics experiment has ever suggested that the electron is anything but an indivisible particle [4].

Today, an important challenge for physicists is to accurately predict the "nuclear half-lives" of the radioactive elements. Both Common Sense Science and Quantum Theory make predictions of "nuclear half-lives." Common Sense Science researcher Edward Boudreaux has shown that predictions made by the Ring Model of the Atom are more accurate than the predictions of Quantum Theory [5].

Concept #3–Existence of Fundamental Entities. There is strong disagreement on the identification of *fundamental physical entities*. In Common Sense Science, the fundamental entities are ***electrical charge*** and ***electromagnetic fields***—an identification that reflects an informed assumption (axiom) that the universe is fundamentally electrical-in-character. In Common Sense Science, for example, inertial mass is a secondary property derived from the fundamental entities which are *electrical charge* and *energy fields* [6]. But in Newtonian Mechanics and Quantum Mechanics, inertial mass is an inherent (fundamental) property of particles. By applying the *laws of electrodynamics*, Common Sense Science successfully explains and predicts the properties of particles, atoms and molecules with the existence of only electrical charge and fields. The Common Sense Science theory is built upon the existence of positive and negative charge plus electric and magnetic fields.

The modern establishment's physical theory is built primarily upon Quantum Theory and Relativity Theory (with many models and sub-theories such as the Standard Model of Elementary Particles). The fundamental physical entities of Quantum Theory are a plethora of ***particles*** with assumed and diverse characteristics. The fundamental entity of Relativity Theory is ***space***, which provides the basis for modern cosmology. The modern concept of space is *an entity with properties that rules the universe*, a concept that started more modestly with Einstein's conclusions about a space-time continuum:

> The principle of inertia, in particular, seems to compel us to ascribe physically objective properties to the space-time continuum [7, *p.* 55].
>
> ...the properties of the space-time continuum which determine inertia must be regarded as field properties of space, analogous to the electromagnetic field [7, *p.* 56].

However, the imagined properties of space are based on theory and have *not* been observed. Physicist and philosopher David Harriman says that space is "absolutely nothing":

> I want to start by stating unequivocally, there is no such thing as "space," whether viewed as the infinite void of the Greek atomists, or the receptacle of Plato, or the absolute cosmic reference plane of Newton, or the acrobatic and curving frame of Einstein, or the final frontier of James P. Kirk. *There is no such entity* [8].

When these incompatible theories (Quantum Theory and Relativity Theory) cannot explain a natural phenomenon, other theories such as Electromagnetic Theory or String Theory are invoked (without producing a self-consistent physical theory). Ultimately, the foundations of the Physics Establishment's theory are a set of complicated ***mathematical equations*** whose parameters are adjusted from time-to-time to establish agreement with the latest experimental measurements [9].

Modern Particle Theory often regards particles as *point-like* to enable the use of mathematics to describe the particle. The point-like electron of QT eliminates its spatial extent "by a process of direct omission or subtraction of unwanted terms." As stated by P.A.M. Dirac, the aim is "not so much to get a model of the electron as to get a simple scheme of equations which can be used to calculate all the results that can be obtained from experiment." *The point-model is actually a mathematical model* and is "not based on a model conforming to current physical ideas"[10].

Writing in Physics Today magazine, Paul Roman recently documented that quark particles are ***mathematical entities:***

> Murray Gell-Mann was certainly right when he insisted that his quarks are just mathematical entities [11].

By rejecting the physical models of fundamental entities discovered by the ancient atom-

ists and Classical Physics—and by substituting space, equations, and an exceedingly complex scheme of particles known as the Standard Model of Elementary Particles—the modern atomists have abandoned the Scientific Method to embrace a philosophy of nature that is "science" in name only. More evidence for this assessment is provided below as additional principles of true science are presented.

Concept #4–Physical Reality. The fundamental entities identified in the preceding section have a *real existence* without regard to the idea or observation of the entity. This is necessary because ***energy exists wherever a physical entity exists***. The presence of energy means an entity is observable and measurable, *i.e.* reality is detected when energy or force is measured. Conservation of energy (Concept #7) maintains the *order* among and *existence* of entities which cannot be created or destroyed naturally without acquiring or giving up energy.

The Ring Model closely resembles the actual physical reality of elementary particles. J. Paul Wesley writes:

> The Bergman...spinning ring model of the electron is so successful that it probably comes close to representing the actual dynamical structure of the electron [12].

But many contemporary physicists are *not* interested in truth-in-science and reduce science to *storytelling:*

> ...research into the prebiotic soup theory of the origin of life aims "to construct a coherent narrative." *The objective scientific principle of a search for the truth is replaced by the subjective aesthetic principle of a well-constructed story* [13, emphasis added].

> Likewise, scientific theories evolve according to how well they answer, at any given time in history, the immediate questions of interest to scientists. As a result, the present impressive array of theories has developed to satisfactorily answer the questions that interest us now. But that does not mean that science is goal-directed and thus progressing toward the "truth." The present theories were not predetermined to be discovered, any more than the first amphibians that crawled out of the oceans many years ago had the concept of humans encoded for future emergence. Science works—and works exceedingly well—because of its naturalistic approach, predictive nature, and methods of operation. *To be valid, science does not have to be true* [14, emphasis added.]

The neglect of truth in fundamental physics has produced a *crisis of reality*, especially noticed in the literature on "quantum entanglement" and the theory of evolutionary origin of the universe and life.

The Physics and Astronomy Establishment consider *cosmology* to be the evolutionary development of the physical universe and its fundamental entities. Matter does not affect space, but Einstein believed it should. Harriman explains:

> Einstein's space is very mutable; it has a complex structure that changes in response to the motions of material bodies. And the bodies move as they do because they follow the curvature of space.
>
> According to Einstein's theory of gravitation, the proximate cause of a body's movement is not physical at all. The body is merely responding to the structure of space. Einstein dreamed of a unified theory that would treat all forces in this way and thereby reduce physics to the geometry of space....
>
> Einstein retained the basic error of treating space as a thing, and he expanded, rather than diminished, the causal power of this non-existing thing. He claimed that massive bodies warp the space around them and other bodies follow the curvature of space [8].

Einstein's General Relativity Theory was not concerned with the relative distance between two bodies; Einstein was more interested in the *appearance* of distance than actual distance—showing little regard for reality:

> According to Einstein, there is no apparent way to find the distance between two bodies. There is only apparent distance as perceived by an observer. The distance between the same two bodies has one value for me and a different value for you if we are moving with respect to each other. The same goes for time intervals between events—this is Einstein's infamous length-contraction and time-dilation.... It was [Einstein's] view that *physics deals only with appearances rather than reality* that led to subjectivism in Einstein's view of space and time.

After Einstein, doctrinaire physicists developed Einstein's views on space into "worship of the view that empty space is the ultimate reality"!

> The dream of physicists is to explain away all existence as a statistical fluctuation of the underlying nothingness. Bruce Gregory, a prominent Harvard astrophysicist wrote "The universe is what the vacuum produces when left to itself." Now, what is this 'nothingness'? Well, according to today's physicists [space] has many workable properties:
>
> - It has the complex geometric structure described by Einstein's Theory of Gravitation.
> - It has electromagnetic fields that determine how charged particles will move through it.
> - It contains energy and can spontaneously create particles of matter.
> - At any place in empty space, physicists can list a whole array of properties that they assign to that location.
>
> But do they reach the obvious conclusion that what they call "empty space" is real physical stuff possessing reality? No!
>
> - The property of curvature is assigned to space itself.

- Fields are defined as mathematical functions that assign numbers to each point in space; they are not regarded as physical entities or properties of such entities.
- The energy of the vacuum is not energy possessed by any real physical thing. It is merely a potential that exists apart from actual physical things [8].

The attack on identity in modern physics is all encompassing. The doctrine of *power and control of space over the universe* has the basic marks of a religious cult. Harriman quotes a "priest" of this cult who explains the "worship of the Zero":

> "An action not caused by an entity would be caused by zero, which would mean a zero controlling a thing, a non-entity controlling an entity, the non-existent ruling the existent, which is the universe of our teacher's desire, the cause for their doctrines of causeless action, the ideal they strive for: The Reign of the Zero."
>
> In contemporary physics this ideal has been achieved in the form of the reign of empty space. As one commentator notes, "The concept of space has seized totalitarian power in a triumphant victory over other concepts of theoretical physics.... [8].

Concept #5–Physical Causality. Causality in the physical world means that *for every effect there is a preceding physical cause*, *e.g.* electrical forces *cause* the motion of electrical particles. This *law of cause and effect* prevents any random, chance-event from occurring and allows the prediction of motions by the use of equations-of-motion. In marked contrast, Quantum Theory is based upon *chance-events* described by non-physical "quantum particles" and stochastic variables. The guiding concept of Quantum Theory is the Heisenberg Uncertainty Principle which specifies the degree of uncertainty as the increment of energy that nature can create and absorb in an increment of time—effectively violating the *law of conservation of energy*. Frank Wilczek, a prominent Quantum Theorist, recently wrote:

> By accepting quantum uncertainty, we license, well...quantum mechanics. Specifically, in the sprit of this column, we can test the hypothesized quantum origin of primordial fluctuations by checking whether those fluctuations satisfy statistical criteria for true randomness [9].

Physical causality is a scientific ***law*** of nature. But Professor Wilczek's criteria for *quantum uncertainty* are man's choice and "true randomness"—which are not scientific criteria but instead are circular-reasoning. Professor Wilczek recognizes that fundamentally, "quantum uncertainty" is not a law of nature but a principle of choice that "we license"!

Furthermore, much experimental evidence shows the failure of the Heisenberg Uncertainty Principle by many orders of magnitude:

> The Heisenberg (1927, 1930) "uncertainty principle", $\Delta p \Delta q > \hbar$, for uncertainties Δp and Δq of two canonically conjugate variable p and q fails by many orders

of magnitude for actual examples, where the uncertainties are known [15].

Concept #6–Physical Unity. The scientific *principle of unity* declares that the entire universe operates under one set of natural laws and one set of fundamental particles. This operation maintains the existence of physical objects and their processes of interaction. A determined consistency is assured for every location in the universe without variation for the scale or time-of-occurrence regarding events and processes. By the *principle of unity*, natural laws will be the same today as they were yesterday, and the structure of matter will not be any different on earth, the moon, or a distant star. Furthermore, the natural laws will be the same inside an atom or outside an atom, *i.e.* natural laws do not change for size, scale, or domain. The scientific *principle of unity* means, first of all, ***consistency*** in the physical world.

There is a closely related aspect of the *principle of unity* attributed to William of Occam who looked for ***simplicity*** in physics. Simplicity expects and hopes for *one universal force law* that applies in all domains, over all ranges, and over all time. (The order observed in the universe would be absent if we encountered a new force law or needed a new model for every physical event and process.) Likewise, by the expectation of *simplicity*, we search for a credible theory of matter than minimizes the number of fundamental physical entities. When the accepted theory-of-matter was composed of 36 particles of ordinary matter and 24 force-carrying particles (bosons), Lederman and Teresi acknowledged:

> As a compact summary of everything we know, the Standard Model has two major defects: ...there are too many particles, too many forces [16].

The Common Sense Science Theory of Atomic and Nuclear Structure needs only electrons and protons to produce the observed phenomena listed in Table 2—satisfying the scientific *principle of unity* [17-20]; but Quantum Theory fails when tested by the *principle of unity*.

The electrical nature of the fundamental identities (Concept #3) and the laws of electromagnetics have been developed into a *universal force law* [21] by Common Sense Science (with on-going research underway to complete the derivation by including additional terms that incorporate gravitation). In contrast, the Physics Establishment currently identifies five forces: *strong, weak, electromagnetic, gravitation,* and a new force from *dark energy*.

> The universe has recently been commandeered by an invisible energy field, which is causing its expansion to accelerate outward.... The bulk [content of the universe] is a ubiquitous “dark energy” with a strange and remarkable feature: its gravity does not attract. It repels...causing the universe to accelerate to ever larger rates of expansion....
>
> Where does this energy come from? The best-known possibility is that the energy

> is inherent in the fabric of space. Even if a volume of space were utterly empty — without a bit of matter and radiation — it would still contain this energy [22].

Clearly, the Physics Establishment has *not* produced a *universal force law*. Furthermore, all efforts have failed in attempts to integrate Quantum Theory (based on the discrete nature of energy or matter) and Relativity Theory (based on the continuous nature of space and energy) [23]. Many physicists are working with multi-dimensional String Theory to resolve these issues in spite of a widespread belief that unification of QT and RT is impossible.

In Common Sense Science, the same Ring Model used for the *electron* is successful as a real physical model of the *proton* [24]. But the ***fifth model*** of the proton (described in 1999 by the Standard Model of Elementary Particles) consists of a "sea of particles" that are present in the proton by the "power of particles to create other particles" [25]. In this ***fifth model***, *complexity* prevails over the scientific principle of *simplicity*.

The *principle of unity* also favors the complete ***integration*** of matter and fields (identified by Concept #3 as fundamental identities). As described in reference [23], "the Ring Model provides the unification of matter (charge) and forces (from self-fields) by the consistent *laws of electromagnetism*." In contrast, integration of fields and material particles defined by the Standard Model is impossible under the current insistence upon point-like particles [23, see "Failure of Quantum Models" on page 3].

Concept #7–Law of Conservation of Energy. A formal statement of this law is given as Concept #7 of Table 1. The law allows the exchange of energy between objects and elementary particles, but it prevents an increase of total energy without the addition of energy from an outside source. David Bodanis describes the observations that led to formulation of this widely accepted law:

> Conservation of Mass: Although no one person can be credited with being the first to show that the conservation of mass is true, Newton had contributed the notion that the planets, moons, and sun were all part of a grand system put in place by God. It was unclear, however, that this applied to the differing materials on the earth (*e.g.* rocks, ice, water, air, *etc.*). Anotine-Laurent Lavoisier (1748-1794) was inspired by Newton's work, and building on Priestly's techniques, performed carefully controlled experiments in 1772-1775 using a sealed apparatus where he meticulously weighed all components and the air that was lost in the reaction (*e.g.* rusting of iron). He determined that matter was conserved in that although the rusted iron weighed more than the original iron, the weight came from the air that was lost in the process. Even though the Roman atomists conceived some sort of matter conservation, as did de-Morveau and Turgot before Lavoisier, this was an unexpected result in his day. Further historiographical considerations on this topic are found in Simon Schaffer "Measuring Virtue: Eudiometry, Enlightment and Pneumatic Medicine" in "The Medical Enlightenment of the Eighteenth Century" *ed*. A. Cunningham and R. K. French (Cambridge University Press, 1990), *pp.* 281-318.

> Conservation of Energy: Building on Hans Christian Oersted's discovery that a current in a wire deflected a compass needle, Michael Faraday did more to formalize the Law of the Conservation of Energy when in 1821 he demonstrated the connection between electricity and magnetism by making a small magnetic needle whirl in a circle resulting from a current in a wire. He effectively created the first electric motor in this experiment in his basement laboratory. Other researchers after Faraday bolstered this Law by showing that energy is merely converted from one form into another in various reactions and interactions. For example, in 1919, Emmy Noether gave a deeper explanation of why it [conservation of energy] was so persistently noted [26].

One implication of *conservation of energy* is the *law of cause and effect* (Concept #5). This is because a "cause" is ultimately a force on an object, and the amount of force, according to Potential Theory, is the change of energy over a unit distance. So, the exchange of energy between particles accounts for the dynamics and processes observed to occur. One particle can be a source of energy that moves a second particle closer by deformation of its size. The mechanism for the exchange of energy between particles is a force from the distributed energy fields that deforms the interacting particles. The Ring Model has energy from compressing the particle [27]. The forces between the electrons and protons in a molecule of hydrogen were calculated this way by a computer simulation of the model (of H_2) that keeps track of the electromagnetic energy of the H_2 system [28].

According to the the Standard Model, electrons are point-particles which lack a mechanism for the exchange of energy. To account for the electrical force between electrons, Quantum Theory posits that every electron releases a cloud of photons that carry a force between particles. This release of bosons (force-carrying particles) is said to occur inside atoms, molecules, and even in completely empty space where no electron is present. A similar quantum fluctuation, following an imagined *law of chance* (Heisenberg Uncertainty Principle) is supposed to have produced the Big Bang and the entire universe.

> ...a sudden "quantum fluctuation" of the vacuum of space is said to have produced all the matter and energy of the universe. [29, page 56]

According to the postulate of quantum fluctuations, a considerable amount of energy can be released by the power of "space." However, this additional energy is not allowed by the *law of conservation of energy.*

Summary Regarding the Nature of the Universe.

Most of the seven fundamental laws and axioms on the *nature of the world* have been abandoned by Establishment Physicists. Justification presented for abandoning the laws of Classical Physics (and concepts listed in Table 1) was a claim that various quantum features observed about a century ago could not be explained by the *classical electron*. Most physicists abandoned the Scientific Method along with Classical Physics when the classical model of the electron, a *charged sphere*, could not explain newly observed phenomena including blackbody radiation, emission of line spectra and the photoelectric effect.

Common Sense Science has returned to Classical Physics and the Scientific Method and has been successful by replacing the classical electron with the Ring Model. The laws and axioms of Table 1 proved adequate for development of a classical approach to physics.

It was inevitable that principles abandoned would be replaced by new principles that supported the new Quantum Theory. Very recently, Professor Wilczek identified three premises that guide the Physics Establishment:

> It is possible, I suppose, that apparent limitations will prove illusory and that, in the end, the vision of a unique, deterministic Universe fully accessible to rational analysis, championed by Baruch Spinoza and Albert Einstein, will be restored. But to me it seems wise to accept what appears to be overwhelming evidence that projection, quantum uncertainty, and chaos are inherent in the nature of things, and to build on those insights. With acceptance, new constructive principles appear, supplementing pure logical deduction from fine-grained analysis as irreducible explanations of observed phenomena.
>
> By accepting the occurrence of projection, we license anthropic explanation....
>
> By accepting quantum uncertainty, we license, well...quantum mechanics....
>
> By accepting the implications of chaos, we license evolutionary explanations....
>
> In constructing explanations based on anthropics, randomness, and dynamical evolution, we must use intermediate models incorporating many things that can't be calculated. Such necessary concessions to reality compromise the formal purity of the ideal of understanding the world by analysis and synthesis, but in compensation they allow its spirit much wider scope [9].

Conclusions. The Ring Model incorporates all seven of the laws and axioms of Table 1 on the *nature of the physical world*. The Standard Model of Elementary Particles incorporates the first and second concepts and incorporates portions of Concept #3 when no atomistic concept can be found to explain the observed phenomena. The Standard Model rejects Concepts #4 through #7 in many situations.

By scientific criteria, Common Sense Science is more valid than the various theories of the modern Physics Establishment.

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Table 1. Observations of the Nature of the Physical World
Common Experiences and Laboratory Data

Concepts, Laws and Self-Evident Axioms Underlying Physical Theory

#	*Concept, Law or Axiom*	*Term/ Symbol*	*Characteristic*	*Ref.*
1	existence of small objects	atoms ①	unit conception of real matter	a
2	durability of atoms ①②	N/A	physically indivisible and indestructible	a
3	existence of fundamental entities electrical charge electric fields magnetic fields	 *q* *E* *B*	 charge **–** substance of physical objects. electric field **–** substance that exerts pressure on charge. magnetic field – " exerts pressure on moving charge.	 b c d
4	physical reality	N/A	**reality.** Something that exists independently of ideas concerning it; something that constitutes a real or actual thing, as distinguished from something that is merely apparent. "the world is real and the human mind is capable of knowing its real nature." (In physical terms, physical reality exists where energy exists, *i.e.* reality is detected when energy or force is measured.)	e1 f
5	cause and effect, physical causality	N/A	"all observable phenomena are the effects of previous underlying measurable physical causes."	f
6	physical unity	N/A	"... nature is unified. We live in one world... What we find to be true here in this place will, under similar conditions, be true everywhere in the universe.... the whole universe operates under one set of natural laws." (Common experience also shows the natural laws do not change with time, domain, or scale varying from sub-atomic to cosmic ranges.)	f
7	law of conservation of energy	N/A	**conservation of energy,** *Physics*. the principle that in a system that does not undergo any force from outside the system, the amount of energy is constant, irrespective of its changes in form. Also called **law of conservation of energy** [1850-55].	e1 e2

Notes. ① *atoms,* used in the original sense meaning the smallest unit of matter

② since splitting of elementary atoms, terms such as *elementary particle* or *fundamental particle* are also used to indicate the smallest material objects.

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