Commentary on Sub-Quantum Physics*

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Abstract. All attempts to reconcile quantum theory with true science will be futile because the underlying assumptions and methods are different. The underlying dogma of quantum theory is its denial of causality and assertion of randomness. Those who believe truth is tested by the law of non-contradiction cannot accept the Heisenberg Uncertainty Principle or models (such as Sub-Quantum Physics) that assume the HUP.

Introduction. According to Alan McCone, Jr., the objectives of the research program he undertakes in [1] are to:

- "[E]xplain the quantum uncertainty..."
- "[E]xplain...the quantum wave function..."
- Determine a "structure at a level more fundamental than the wave function."

Previously he introduced an active aether [2]; in [1] he assumes that such an aether bombards a quantum particle and affects moving charge segments, and he develops a "position probability density function $f(x)$." He implies that in so doing he has provided a causal mechanism to "explain" that which quantum theory considers to be fundamentally non-causal.

But in developing his model, McCone uses standard terms from quantum theory (*e.g.,* "quantum uncertainty," "orbit probability," and "position probability"). In so doing, he abandons his classical approach and reverts to the very quantum theory he seeks to explain.

Galilean Electrodynamics typically requires "faultless logic, greater simplicity, and absence of experimental contradiction." [3] But McCone's approach reveals an attempt to integrate the incompatible premises of *randomness* and *causality* into one theory of physical objects.

The underlying dogma of quantum theory is its denial of causality and assertion of randomness. Explanations belong to the philosophy of rationality and the science of cause and effect. One may argue that explanations should not be offered for quantum theory, because it is fundamentally irrational (having rejected fundamental causal explanations); that quantum theory cannot be reformed (or explained), and should instead be replaced completely.

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The Quantum Uncertainty. Consider McCone's "explanation" for quantum uncertainty. He writes of a "'quantum **process**' that bombards immersed quantum particles, so as to '**cause'** the quantum particle to move from one position to another inside the envelope of the wave function." [emphasis of bold letters added]. His choice of words suggests that his approach explains and provides a *causal* basis for uncertainty.

This is not the first attempt to merge the two major schools of physics by means of a "disturbance model"; many physicists welcome such an explanation, but quantum theorists know that their theories are fundamentally based on randomness. Classical physicists consider events in inanimate objects to be the effects of preceding causes, and relate physical objects and the forces between them by force laws and processes. But quantum theorists believe that uncertainty and randomness are fundamental properties of matter. Obviously, the two views are incompatible and cannot be reconciled. The quantum theorist Nick Herbert [4] states, for example:

> "...I imagined that an atom always possessed definite values for all its attributes (just like an ordinary object) whether that atom was measured or not. However, the process of measurement disturbs the atom so profoundly that its measured attributes bear only a statistical relation to its unmeasured attributes. I felt sure that such a 'disturbance model' of measurement was capable of accounting for quantum randomness, the Heisenberg uncertainty relations, and other quantum mysteries as well. In the 'disturbance' picture, an atom's *actual* position and momentum are always definite but usually unknown; its measured position and momentum cannot be accurately predicted because the measuring device necessarily changes what it measures.
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> "My belief in this disturbance model of reality was strengthened when I read that young Werner Heisenberg once held a similar view of the quantum world. It did not occur to me to wonder why Heisenberg quickly abandoned such an obvious explanation to take up the more obscure and mystical Copenhagen interpretation, which most physicists endorse today.
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> "In brief, the Copenhagen interpretation holds that in a certain sense the unmeasured atom is not real; its attributes are created or realized in the act of measurement" [4, p. xiii].

On page 110 of [4], Herbert emphasizes that "both Heisenberg and Bohr warned against interpreting the Uncertainty Principle in terms of a measurement disturbance. Rather they claimed that this relation marked the limits beyond which classical notions concerning attributes could not be pushed."

The fundamental place held by the principle of randomness is evident from the length of time this principle has been held dear: Copley [5] tells us that Epicurus introduced it in the 3rd or 4th century BC. Lucretius (*circa* 95-55 BC) wrote:

> "Here too is a point I'm eager to have you learn.
> Though atoms fall straight downward through the void

> by their own weight, yet at uncertain times
> and at uncertain points, they swerve a bit—
> enough that one may say they changed directions.” [5, p. 34]

Copley says this principle of random events was Epicurus’ “great stroke of genius...that at times not predictable for no assignable reason, the atom must swerve.” [5, p. xii] Modern adherents base their quantum theory on the same randomness principle that Epicurus introduced.

McCone established the uncertainty principle as fundamental to his model in [2]. There he viewed the “spread” in particle positions and the conjugate “spread” in particle momenta as the response of the particle to an excitation from the medium which surrounds it. Unfortunately for the subsequent work [1], the model’s use of quantum uncertainty gives evidence against it; Wesley[6] has shown the experimental failure of the uncertainty principle:

> “The Heisenberg (1927, 1930) ‘Uncertainty Principle,’ $\Delta p \Delta q > \hbar$ for uncertainties Δp and Δq of two canonically conjugate variables p and q fails by many orders of magnitude for actual examples, where the uncertainties are known. In particular, it will be shown below that actual uncertainties can satisfy the condition $\Delta p \Delta q \ll \hbar$....” [6, p. 152].

Wesley demonstrates the empirical failure of the “Uncertainty Principle” with six examples. One of these is the same model for the hydrogen atom presented by McCone. Wesley writes:

> “It is of interest to see how exact is our knowledge of the simultaneous position and momentum of the electron in the hydrogen atom. Since it is known from much scientific evidence that the electron is bound in the hydrogen atom; the uncertainty in the position Δq of the electron must be certainly less than the size of the hydrogen atom itself, or twice the first Bohr radius; thus $\Delta q < 2a_o = 10^{-8}$ cm.
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> “The uncertainty in the momentum of the electron in the hydrogen atom may be estimated from the observed line width of light radiated by a hydrogen atom. In particular, the fractional line width is observed to be less than 10^{-6}; so from the Planck frequency condition $\Delta E/E = \Delta \nu/\nu < 10^{-6}$; If this uncertainty in the energy ΔE is associated with an uncertainty in the kinetic energy of the electron in the ground state, then $\Delta p/p = \Delta E/2E < 5 \times 10^{-7}$. Since the angular momentum $a_o p$ is quantized as $\hbar$ in the ground state, [the preceding equations] yield $\Delta p/\hbar < 10^{2}$ cm^{-1}. Combining [the proceeding equations], the uncertainties in position Δq and momentum Δp of the electron in the hydrogen atom satisfy $\Delta p \, \Delta q/\hbar < 10^{-6} << 1$. Since only one electron is involved and it must have *simultaneously* both a momentum and a position; the uncertainties in the simultaneous momentum and position of the electron in the hydrogen atom are *known* to a precision that is six

> orders of magnitude more precise than permitted by the ‘Uncertainty Principle’.... The ‘Uncertainty Principle’ fails drastically for this actual case” [6, p. 160].

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The Quantum Wave Function. Since Louis de Broglie introduced wave-particle duality of matter in 1924, few concepts have been more dearly held than the notion of *wave collapse* to account for point particles. But wave-particle duality is not simply a paradox, as often claimed; rather it is a contradiction in logic. William Lane Craig [7] has eloquently described the existence problem of the quantum wave function:

> “According to the received interpretation of quantum physics, quantum systems possess dynamic properties like position, momentum, and spin orientation only when these are measured by some classical apparatus. But any physical measuring device can itself be given a quantum physical description. Thus, the problem arises that finally nothing outside quantum physics remains to make the measurement which is a necessary condition of the reality of the relevant properties.
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> “Sometimes the measurement problem is stated in terms of the collapse of the wave function associated with a quantum system. In writing the laws of quantum mechanics, Schrödinger treated quantum entities as waves. Associated with every quantum system is a particular wave, called its wave function, symbolized by ψ. The square of ψ at any location gives the probability of the associated entity’s being located there if it were measured. Before the measurement, the entity literally has no precise position, but a range of positions, varying in probability. Once a measurement has been carried out and the entity’s position detected, however, then the probability of the entity being at that location is 1: the wave function is said to have collapsed. The measurement carried out on the quantum system brought about the collapse. This led Niels Bohr, the father of the orthodox understanding of quantum theory, to conclude that dynamic properties are not intrinsic properties of the quantum system itself, but relational properties with respect to the entire measurement situation.
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> “Since the classical measuring device is also describable by the equations of quantum mechanics, it, too, has an associated wave function. The measuring device itself, therefore, also lacks any intrinsic dynamic properties (such as precise location or velocity). But if the measuring device itself is not a classical system—if it is itself indeterminate—then it cannot collapse the wave function of the quantum system being measured. So how does the wave function collapse?
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> “Bohr never answered this problem. He took for granted the existence of the classical measuring apparatus, Bohr’s Copenhagen Interpretation of quantum physics dealt only with the interrelation between the quantum and classical realms without shedding light on either realm in itself” [7].

Nick Herbert [4] tries to answer the question “Where does the Wave Function Actually Collapse” in a chapter whose title (significantly) is “And Then A Miracle Occurs”—giving up claims that quantum theory is logical and objective science.

But in [2], McCone seemed to consider wave-particle duality as a notion to be defended. In [1], he concludes that “[t]he general mathematical identity for the method of fits for hydrogen states shows the quantum position probabilities to be represented exactly as superpositions of position probabilities of collections of segments of classical orbits.” Quantum theorists will not be satisfied with this causal explanation that real charge segments in motion constitute the quantum wave, for it destroys the existing quantum theory concept of dual essence and wave-particle duality.

Atoms, Orbits and Radiation. Nor will classical theorists be satisfied, since moving charge segments generally lead to “radiation death” according to experimentally derived laws of electricity. Like so many others, McCone follows Bohr’s folly and simply postulates that orbiting electrons don’t radiate their energy into space and don’t spiral into the nucleus. In the Conclusion of [1], he says:

> “According to the perspective of this article, quantum states are merely mystery-free aether-caused superpositions of segments of classical orbits of varying energy and direction....”

But Panofsky and Phillips [8] and Jackson [9] have demonstrated that orbiting charge segments radiate energy into space. The condition for non-radiation is a continuous distribution of charge [8, p. 390 and 9, p. 697, problems 14.12 and 14.13]. Any moving charge that produces a non-static electric field will radiate energy. The notion of accelerated charged segments in stable atoms has no correspondence to physical reality—unless, somehow, there is some means of replacing radiated energy with just the right amount and in just the right form and position.

McCone could contend *logically* that random jostles from the aether serve to replenish radiated energy losses. But more specifics are needed. Do the jostles result from contact with other particles in the aether? Or does energy transfer from electromagnetic fields that comprise the aether? Or does it just happen without explanation, without physical mechanisms, or by “spooky actions at a distance”? Good science explains *how* this might occur in terms of a self-consistent model, the fundamental laws of natural phenomena, empirical data, and causal (physical) mechanisms.

Conclusions. “Sub-Atomic Physics” may be good mathematics, but it is flawed science because its physical model leads to logical inconsistencies that violate the law of noncontradiction. Furthermore, conflicts with empirical evidence invalidate it.

Scientists should revert to the use of Mach’s Criterion: “Only those propositions should be employed in physical theory from which statements about observable phenomena can be deduced” [10].

Leading quantum theorists don't even claim that quantum theory meets Mach's Criterion; this is undoubtedly why modern science texts and dictionaries do not print it. Niels Bohr, founder of modern quantum theory, rejected Mach's Criterion and substituted a more appropriate philosophy for quantum theory: "A great truth is a truth of which the contrary is also a truth." In similar style, Bohr [11] once argued that the two statements "There is a God" and "There is no God" are equally insightful propositions.

All attempts to reconcile quantum theory with true science will be futile because the underlying assumptions and methods are different.

References.

[1] A. McCone, "Sub-Quantum Physics 1," **Galilean Electrodynamics** 8, 87-96 (1997).

[2] A. McCone, "The Aether As the Seat Of The Quantum Uncertainty: Excitation Characteristics From Oscillator Ground State," **Galilean Electrodynamics**, 7, 94-98 (1996).

[3] Editorial Policies, **Galilean Electrodynamics** (1990-1997).

[4] N. Herbert, **Quantum Reality** (Anchor Books−Doubleday, New York, London and Toronto, 1985).

[5] F. O. Copley, (translator), Lucretius: **The Nature of Things** (W. W. Norton & Co., 1977).

[6] J. P. Wesley, **Classical Quantum Theory** (Benjamin Wesley, Weiherdammstrasse 24, 78176 Blumberg, Germany, 1996).

[7] W. L. Craig, "Cosmos and Creator," **Origins and Design**, 17, 24-25 (1996).

[8] W. K. Panofsky and M. Phillips, **Classical Electricity and Magnetism**, p. 390, (Addison-Wesley, Reading MA, 1962).

[9] J. D. Jackson, **Classical Electrodynamics**, 2nd edition (John Wiley and Sons, New York, 1975).

[10] **International Dictionary of Physics & Electronics**, 2nd edition, p. 699 (Van Nostrand, New York, 1961).

[11] R. C. Sproul, **Not a Chance**, (Baker Books, Grand Rapids, MI, 1994), 10 (2003), Vol. 6, No. 3, pp. 1-8 (2003).