

johnreed take 25 – Part–2 – Modified September 30, 2008

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johnreed take 25

The Atom as a Compacted Electromagnetic Field Structure – Part 2
Modified September 30, 2008

Supporting Arguments:

In any event, we have never before entertained such notions as these, choosing instead to force our classical "object–space" view onto the universe in terms of probabilities. That is to say that although our classical "object–space" view has led us into a sea of apparently mystical probabilities, we have built a model consistent with least action principles, showing the way it could be if it was correct. And where our charged particle model runs aground we invent special particles and forces to get it to float. We just assumed that fundamental indivisible 3D spherical objects existed, that served as the efficient mathematical bricks, by which all 3D atoms were built. So we built the 3D atom from 3D charged objects in equilibrium, and 3D neutral objects to serve as a mass adjusted filler (a Kluge supported by the identification of a neutral particle found outside of, or emitted by the atom). In short we built our fundamental bricks from more fundamental charged and uncharged smaller bricks and we devised suitable forces to enable them. Planck's Constant provided us a means by which we could convert the atomic electromagnetic properties of frequency and wavelength into the classical "object–space" properties of mass, momentum, and energy. So that the atom is ultimately viewed as being composed of little indivisible balls of stuff that, indivisibility notwithstanding, exchange little balls of force. We call this construction the Standard Model. Not so much as Democritus predicted but again, like the lady who offered that "it is turtles all the way down."

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We discovered that some forms of matter that we call elements reduce to the smallest fundamental matter units we call atoms, and that each atom is unique, as each element is unique. We define elemental matter in terms of the smallest unit of elemental matter. The periodic chart of the elements describes fundamental states of matter in terms of the

properties of atoms. We have described the fundamental elements of matter in quantitative terms that we can perceive and measure, that define the properties of the smallest example of the element. This is where Democritus applied, where Democritus had no concept of an electromagnetic field.

Led by J.J. Thompson's isolation of an emitted electron and supported by the phenomenon of radioactivity, we learned that the atom was not indivisible. And because it was not indivisible we concluded that some, even more fundamental, form of matter, existed inside the atom. We defined this form of matter in terms of the atom's naturally ejected and naturally absorbed particles, and in terms of the atomic electromagnetic shards we observed after high energy experimental collisions. We subjected the atom to intense investigation and destructive scrutiny and continue this today. This, just as though we possess only the limited information available to Democritus.

We reconstructed the atom using the particles and the shards as the building blocks. We assume that the particles and shards maintain their discrete existence inside the atom. Faced with a literal zoo of electromagnetic shards we theorized the existence of an ultimate shard that all other particles and shards were built from. In the process we invented more forces to overcome and explain the flaws in our "object–space" charged particle construction. Never recognizing that the charged particle flaws required Herculean efforts to overcome, even as we were led further into conundrum. This even after we accepted the Uncertainty Principle where we admit that the internal to the atom existence of our charged "particles in equilibrium" paradigm cannot be verified, except in terms that again tell us how it could be if it did exist.

We search for the fundamental structure of atoms by destroying this structure into shards of electromagnetic rubble and then we rebuild the electromagnetic structure using fractional parts of the most prevalent recurring shards, which we statistically apply to our "charged particles in equilibrium" paradigm in terms that convert the electromagnetic field properties of the atom to the object–space properties of classical mechanics. Which "pre–existing" internal to the atom "object" we cannot locate inside the atom, outside of statistical probabilities of where it could be found if it did exist.
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We observe electromagnetic spectra data that is an electromagnetic signature for each element. To explain the hydrogen electromagnetic spectra data, Bohr introduced the idea that an atom's assumed orbiting internal accelerating charged electron could match the spectra data if the pre–existing electron orbit was described proportional to its frequency of rotation. Note how our assumption that the electron manifests inside the atom as a charged particle has us tied early on, to the whipping post. Bohr does not deal with the problem associated with our classical "object–space" view but rather describes it in a

manner that conforms to the experimental spectra data. Our "object–space" orbiting charged electron has severe problems and should be discarded but Bohr describes mathematically how it could be if it did exist. This stabilized the orbiting charged electron, by defining it in mathematical terms that agreed with the experimental electromagnetic spectra data. A defacto stabilization while carrying our conundrums forward. With a "jump" here and a "jump" there, this Bohr atom then modeled the Balmer series for the hydrogen spectra.

The Balmer series was an oversimplification as the spectra was soon to be shown to be modified by externally applied electromagnetic fields, into closely spaced doublets and triplets, etc. We had the electromagnetic spectra of the atom modified by an external to the atom electromagnetic field. Nothing surprising here provided we regard the atom as a compacted electromagnetic field structure. This is known as the Zeeman effect, and was thought to result from internal charged electron orbitals set at an angle to the external fields causing the 'energy' of the orbit to change slightly. What changes slightly are the frequency and wavelength characteristics of the atom as shown by the spectra data, our "object–space" interpretation notwithstanding. Here we further shelved the fact that an orbiting electron could not sustain itself in orbit without losing energy (not to mention just its continual attraction to the positively charged proton), while allowing the external electromagnetic field to modify that energy, rather than to modify the atom's electromagnetic frequency and wavelength properties. Where the entire atomic theoretical construct is based on discrete, but non–localizable, charged particles, in some kind of fantasy, object–space equilibrium, enabled by Planck's constant, and where the spectra data is in purely electromagnetic terms. Again, the crucial problem we must address is our assumptive a priori belief that matter is made of matter. That it is "turtles all the way down."
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The ultra violet catastrophe and blackbody radiation forced us to conclude that there are severe conditions where the atom does release excess absorbed energy in discrete quanta. We learned that the released energy is at least partially controlled by the mechanics of the atom itself. The idea that "pieces" of light at certain frequencies, carried a fixed quantity of energy took hold. We have no absolute reason to believe that these ejected and/or absorbed discrete packets of energy exist in the packet form inside the atom. If the atom can release excess absorbed energy in discrete quanta under varying and extremely adverse blackbody radiation conditions, is it not reasonable to suspect that the magnitude of the ejected excess energy occurs as a consequence of the experimentally varying built in frequency and wavelength limits attendant to the atom and to its compacted electromagnetic atomic structure. And is it not reasonable to conclude that the atom can also release "standard" packets of charged energy quanta under a less adverse and more stable condition?

No one even considered that the electron might not be a charged

particle inside the atom. No one suspected that the electron might be a "standard" packet of energy that the atom easily releases to maintain stability, at the collapse of an internal orbital wave that serves as an interface between the atom and its surround. No one thought that the electron might manifest as a charged standard packet of energy external to the atom (as well as an electromagnetic wave), that the atom readily absorbs to regenerate its collapsed energy deficient internal wave orbital. Where here the nature of the "wavicle" starts to take a rational form. This, enabling the atom to maintain stability, conduct current, and build the universe we observe under non–severely adverse, reasonably stable conditions.

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The idea that the frequency of light illuminating a metal plate is related to the electron emission that results in an electric current is called the photoelectric effect. Where Planck had attributed the blackbody energy release curve as a function of the blackbody itself, Einstein concluded that the photoelectric effect was due to a property of light. Einstein converted Planck's "pieces" of energy at certain frequencies to "photons" of light at certain frequencies. Then using energy as the means by which electrons were dislodged from the metal plate explained that only light quanta of a certain energy (frequency) could do the job. In the compacted electromagnetic atomic structure that I propose both the properties of the atom and the properties of light come into play.

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Of special significance is the fact that the fundamental elements share a common quantity of energy called the electron, that manifests as a particle (and a wave) outside the atom, enabling the atom to easily interface with its surround, maintain its core stability, conduct current in special cases, and build the universe we observe. We have no clear reason to suspect that this common packet of charged energy manifests as a charged packet of energy inside the atom. The Uncertainty Principle attests to this. Even so, our a priori idea that the electron exists as a discrete charged particle inside the atom, set our course of investigation for the entire 20th century. We had no proof for this, and no compelling reason to believe it. But believe it we did. Again, we just assumed that it was so because the isolated proton and electron exhibit a mutual attraction that we measure in terms of a standard unit we call charge. Holding the integrity of the isolated electron paramount caused us to build the atomic structure consistent with our only physical example. The planet orbits. This, even when we knew that an accelerating charged particle generates electromagnetic waves. So by our thinking, the orbiting electron if it is a charged particle inside the atom, should be losing energy and spiral into the nucleus in less than a second. Since it does not lose energy, rather since the atom retains stability (remember that we have only assumed that the electron is a charged orbiting particle inside the atom) we could easily question the existence of a "jumping",

internal to the atom, orbiting, charged electron packet. More broadly since the electron is negatively charged and the proton is positively charged when isolated, if they each retain their integrity and charge when joined inside the atom, what keeps these charged particles separated inside the atom? Here it is the classical object–space notion of the energy of motion that separates the electron from the proton. And Planck's constant is the mathematically expedient conversion factor.

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Did we question the existence of a "jumping" internal to the atom, orbiting, charged electron packet? Yes and no. Once we had a mathematical capability to convert the atomic electromagnetic properties of frequency and wavelength, to the classical "object–space" quantities of mass and angular momentum, we occupied the atom like a foreign invader, speaking the only language we knew. To match the electromagnetic spectra data the aspects of the imaginary electron orbits were restricted to specific values, where each is a multiple of Planck units. Recall that Planck's constant allows us to duplicate the atomic emitted blackbody frequency and wavelength radiation curve in terms of energy. Three quantum numbers reflected orbit size, ellipticity, and orientation, each a multiple of Planck's constant. A fourth quantum number is based on a half integer unit with respect to Planck's constant. This is the most external orbital and can be viewed in terms of an electromagnetic field structure as a less compacted wave describing a torus around the atom, where its point of anchor on its boundary, to the atom, passes into and is influenced by the atomic nucleus. This outer oscillating wave orbital is not necessarily always rigidly restricted by the mutual repulsion of an adjacent say, standing, or orbiting wave. With this approach only certain shapes and sizes and orientation of orbits were allowed, to conform to the only language we knew, measured in units as multiples of Planck's constant. It is significant that these data were interpreted and represented as though the electron maintained its discrete charged particle status inside the atom. Where the conceptual problem as I came to see it, was the difficulty in recognizing that emitted electrons are particles (and waves), while absorbed electrons are oscillating and/or standing, compacted orbital waves.

End of Part 2

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