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The Regression of Modern Science Part 4
The Role of Mathematics

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Abstract. The reduction of the role of logic in modern science has led to the false theories of electrodynamics, gravitation, strong interaction force, weak interaction force, special and general relativity, quantum mechanics, the chemical atom, the atomic nucleus, the standard model of elementary particles, the Big Bang Theory of the origin of the universe, and the abiogenesis origin of life. This is known as the regression of modern science. The solution to the problem is to properly combine the axiomatic (logical) and empirical (experimental) scientific methods in such a manner that the full potential of logic, experiment and mathematics to discover truth is employed.[1]

History of the Role of Mathematics in Science. The development of science from ancient times was based on some intuitively obvious assumptions about the universe. These are as follows:

1. **Determinism** – There are natural causes for everything that happens in the universe.
2. **Objective Truth** – Observations of the universe can be made independent of the observer.
3. **Consistency** – The same causes produce the same effects everywhere in the universe.

These assumptions have been challenged by the theories of modern science. For instance the Copenhagen version of quantum mechanics claims that the universe is governed 100% by random statistical processes and that there is no Law of Cause and Effect thereby denying **Determinism** and **Consistency**. Also this version of quantum mechanics, according to Heisenberg, claims that reality is in the "observation process" and so is not independent of the observer and there is no **Objective Truth**.

Aristotle and other ancient Greeks developed Syllogism or the logic of inference. Syllogism is a kind of logical argument in which one proposition or conclusion is inferred from two or more other propositions known as premises. Syllogism became the core of deductive reasoning, where facts are determined by combining existing statements using logic. By contrast inductive reasoning is where the facts are determined by repeated observations.

The axiomatic method was invented by the ancient Greeks as the proper way to organize and demonstrate deductive reasoning in the pursuit of natural philosophy. The axiomatic method is a logical procedure by which an entire system of natural philosophy (e.g. a branch of science or mathematics) is generated in accordance with specified rules of logical deduction from certain basic propositions (axioms or postulates), which in turn are constructed from a few terms (charge, mass, length, etc.) taken as primitives. These terms and axioms are to be defined and constructed according to some method by which some warrant for their truth is felt to exist.

One of the oldest examples of an axiomatic system is the ancient Greek Euclidean geometry. Euclid, in the process of developing geometry, defined the axiomatic method of proofs to be used in logically establishing

(Continued on page 4)

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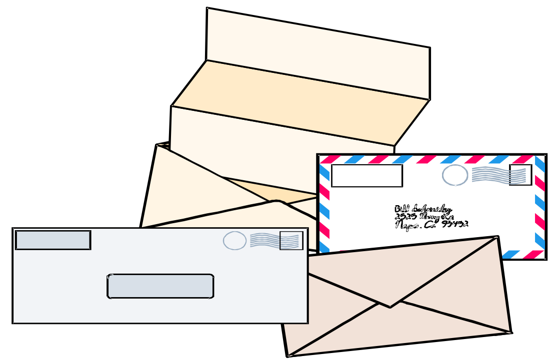

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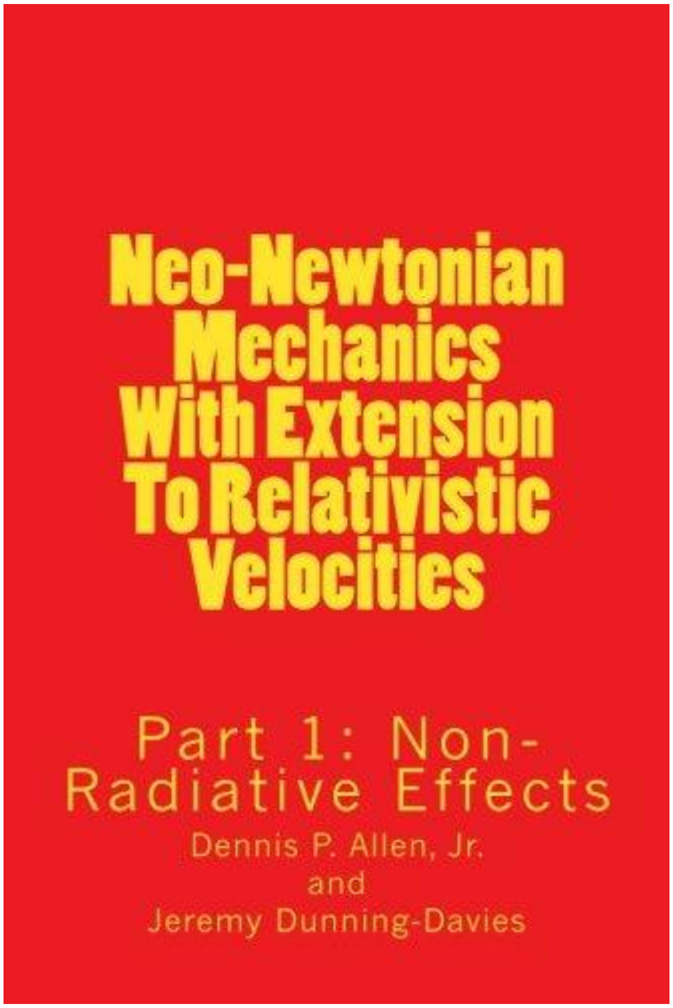
Common Sense Science lost control of the domain name www.commonsense science.org in September 2017. We managed to purchase a 10 year contract on the domain name www.commonsensescience.net. With a great deal of effort our webmaster Dr. Gerald Brown has uploaded our web application to the new address. Check it out!

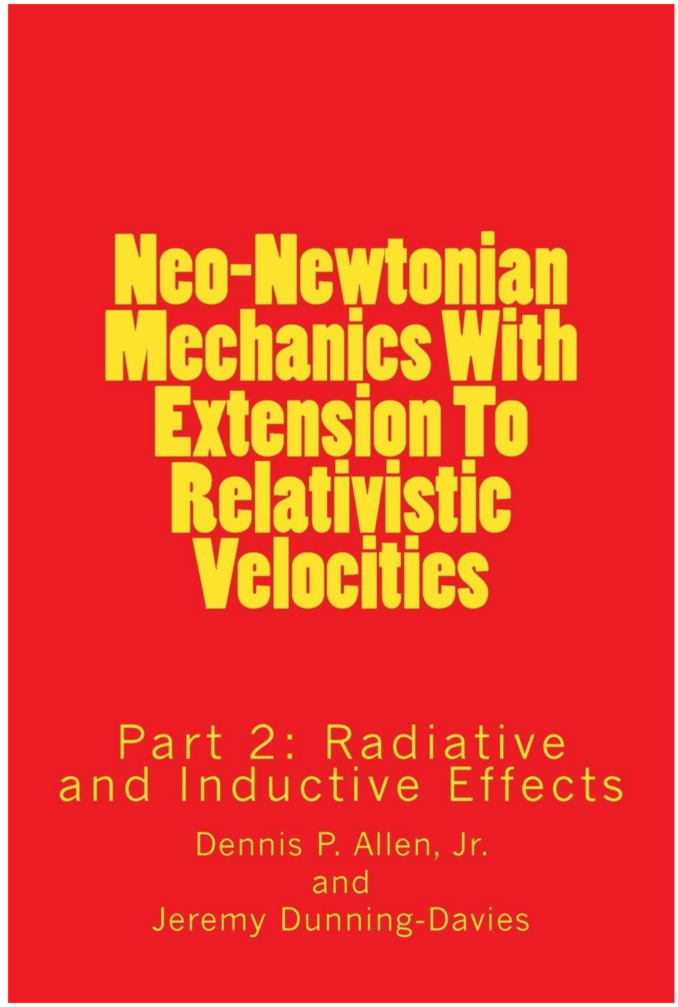
We are continuing our efforts to establish a list of leaders at each of the major scientific institutions in the United States. The list will consist of contact name, position, institution, postal address, email address and telephone number. Each leader will also be given a code to identify their interest as only science or also the Judeo-Christian religious aspects of science. We will also be creating a list of leaders with a special religious code at the Judeo-Christian seminaries, Bible colleges, and universities. Once these lists are established we will begin regular emails to them with information about the reformation in science that we are attempting to lead. All feedback from these contacts will be welcome. If you are interested in helping us to develop our contact lists or speaking engagements, please contact Bill.Lucas001@gmail.com.

One of our members Dennis P. Allen Jr. has published the seventh edition of his two books.



In his first book Dennis notes that Issac Newton considered mathematics as only a tool to help scientists achieve a more true and complete understanding of any topic in science. Dennis recognizes the dual role that mathematics plays in natural philosophy. First mathematics may be studied quite correctly and profitably as a genuine subject in its own right. Secondly mathematics may be both studied and used as the language of physics. In its second role mathematics is merely a tool and must always remain subservient to the physics it is helping to explain and to give more accurate details.

The book contains an extension of classical Newtonian mechanics to properly describe Laithwaite's gyroscope experiments and to include relativistic velocities.



This second volume is an extension of the Heaviside-Jefimenko Gravitational and cogravitational theory to take into account the experimental work of Harvey Morgan, H. W. Wallace and V. N. Samokhvalov. It also goes into some of Ernst Mach's famous speculations concerning Newtonian mechanics and especially Newton's water bucket experiment. All of this is done in light of the Neo-Newtonian mechanics treated in the first volume.

Both books are available from Amazon.com as printed paperback books. They are also available from ResearchGate.com as free ebooks on Dennis Allen's web page.

The Regression of Modern Science Part 4 The Role of Mathematics and Geometry

(Continued from page 1)

theorems in geometry. To the extent that the axioms or postulates he chose were valid, his logically developed theorems would be valid. Modern science under the Existential and Post-Modern philosophies of science has abandoned the axiomatic method, because the use of logic would falsify its theories of the atom, the nucleus, the standard model of elementary particles, quantum mechanics, and relativity theory.

In 1687 when Isaac Newton published his famous book **Mathematical Principles of Natural Philosophy**. [2, 3], he stated that he intended to illustrate a new way of doing natural philosophy that overcomes some of the limitations of the axiomatic method. This method is now called the empirical scientific method. The goal of Newton's method was to find empirically the forces of nature by induction. Thus Newton was expanding the axiomatic method to include both inductive and deductive logic. Although the axiomatic method was logically rigorous, it lacked a reliable method for discovering the axioms of science and the most appropriate terms such as charge and mass for the axioms in classical science. This could be done by performing experiments.

Newton's book is considered by many as the most important contribution to science in the history of the world, because it was the first to show how to describe the physical world in terms of the precise language and equations of mathematics which would become the laws of science. Newton's work laid the groundwork for classical mechanics, which dominated the scientific view of the physical universe for the next three centuries.

In his work Newton recognized the dual role that mathematics plays in natural philosophy. Algebra, geometry, calculus, trigonometry, etc. are valid subjects in their own right, but they may also be studied and used as a language of physics. In this second role mathematics is the tool that must always remain subservient to the science that it is attempting to explain more precisely. For instance in physics, mathematics alone can not explain what is mass or charge, etc. Mathematics must be combined with experiment and logic to do that.[1]

Using Mathematics to Formulate the Physical Theory of the Atom. In 1880 Rydberg worked on developing a mathematical formula to describe the relation between the wavelength in emission spectral lines of alkali metals. He noticed that these lines came in series and that he could simplify his calculations by using the wavenumber n (the number of waves occupying the unit length, n = 1/λ, i.e. the inverse of the wavelength) as his unit of measurement. He plotted the wavenumbers n of successive lines in each series of spectral lines. Finding that the resulting curves were similarly shaped, he sought a single mathematical function which could generate all of them, when appropriate constants were inserted.

According to Niels Bohr expressing the results in terms of wavenumbers instead of wavelengths was the key to Rydberg's discovery. The fundamental reason for this can be seen from quantum mechanics where light's wavenumber is proportional to frequency and therefore also proportional to light's quantum energy E.

$$\frac{1}{\lambda} = \frac{f}{c} = \frac{E}{hc} \quad (1)$$

Rydberg's 1888 classical mathematical expression for the formula for the spectral series was not accompanied by a physical explanation. The electron as a particle was later discovered in 1896 by the British physicist J. J. Thomson by performing experiments with cathode rays. He measured both the charge and the mass of the electron. The name electron was proposed by the Irish physicist George Johnstone Stoney.

In 1896 the French physicist Henri Becquerel discovered while studying naturally fluorescing minerals that they emitted radiation without any exposure to an external energy source. These radioactive minerals became the subject of much interest by scientists. The New Zealand physicist Ernest Rutherford discovered that these radioactive minerals emitted particles that he named alpha and beta on the basis of their ability to penetrate matter.

In 1900 Becquerel showed that beta rays emitted by radium could be deflected by an electric field, and that their mass-to-charge ratio was the same as for cathode rays. This evidence supported the view that electrons existed as components of atoms.

By 1914 experiments by physicists Ernest Rutherford, Henry Mosely, James Franck and Gustav Hertz had largely established the structure of an atom as a dense nucleus of positive charge surrounded by lower-mass electrons.

In 1913 the Danish physicist Niels Bohr postulated that electrons resided in quantized energy states with their energies determined by the angular momentum of the electron's orbit about the nucleus. The electrons could move between those states, or orbits, by the emission or absorption of photons of specific frequencies. By means of these quantized orbits, Bohr accurately explained the spectral lines of the hydrogen atom in agreement with Rydberg's mathematical formula deduced by empirically examining the experimental emission spectral lines.

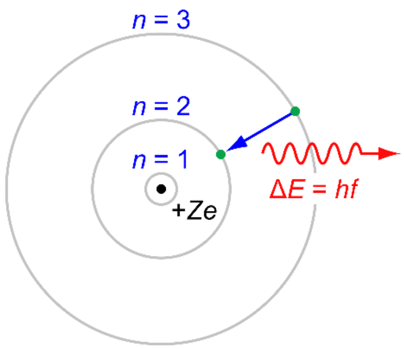


Figure 1 Bohr Model of the Hydrogen Atom

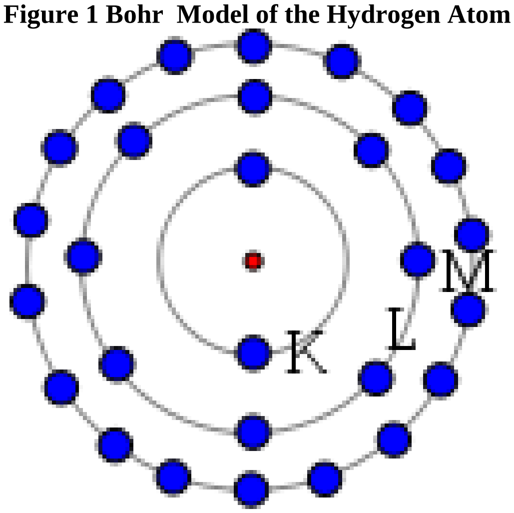


Figure 2 Bohr Model of the Atom Showing Maximum Number of Electrons Per Shell

1n 1916 chemical bonds between atoms were explained by Gilbert Newton Lewis, who proposed that a covalent bond between two atoms is maintained by a pair of electrons shared between them[4] Later in 1927 Walter Heitler and Fritz London gave a more complete explanation of the electron pair formation and chemical bonding in terms of the Copenhagen version of quantum mechanics.

The Bohr model of the atom[5] was able to predict the principal emission spectral lines of the hydrogen atom and some other atoms with one electron in the outer shell. Even though the Bohr model made some accurate predictions for hydrogen-like atoms, experiment and logic pointed out a number of failures.

1. The Bohr model of the atom gives an incorrect value for the ground state orbital angular momentum. The angular momentum in the ground state is known to be zero from experiment.
2. The Bohr model fails to predict the relative intensities of spectral lines.
3. The Bohr model fails to predict the fine structure and hyperfine structure in atomic spectral emission lines.
4. The Bohr model fails to predict changes in spectral lines due to external magnetic fields known as the Zeeman effect..
5. The Bohr model violates the uncertainty principle of quantum mechanics in that it considers electrons to have known orbits and locations.
6. The Bohr model of the atom does not accurately predict the energy levels of multi-electron atoms.
7. The Bohr model of the atom cannot explain why the classical electron orbiting the nucleus would not constantly lose energy in the form of electromagnetic radiation according to the laws of electrodynamics. Such radiation is not observed in atoms.

When mathematics is being used to formulate a theoretical model of a physical thing such as an atom, it may not describe reality completely. By performing experiments one can check the precise predictions of mathematical equations.

De Broglie's prediction of a wave nature for electrons led Erwin Schrodinger to postulate a wave equation for electrons moving under the influence of the nucleus in the atom. In 1926 this Schrodinger equation successfully described how electron waves propagated.[6] Rather than yielding a solution that determined the location of an electron over time, this wave equation could also be used to predict the probability of finding an electron near a position, especially a position near where the electron was bound in space, for which the electron wave equations did not change in time. This approach led to a second formulation of quantum mechanics. The solutions of Schrodinger's equation provided derivations of the enery states of an electron in a hydrogen atom that were equivalent to those that had been derived first by Bohr in 1913 and were known to reproduce the hydrogen spectrum.[7] Once spin and the interaction between multiple electrons were describable, quantum mechanics made it possible to predict the configuration of electrons in atoms with atomic numbers greater than hydrogen.[8]

The Sommerfeld model was fundamentally and logically inconsistent and led to many paradoxes. The magnetic quantum number measured the tilt of the orbital plane relative to the xy-plane, and it could only take a few discrete values. This contradicted the fact than an atom could be turned this way and that relative to the coordinates without restriction. The Sommerfeld quantization can be performed in different canonical coordinates and sometimes gives different answers. The incorporation of radiation corrections was difficult, because it required finding action-angle coordinates for a combined radiation/atom system, which is difficult when the radiation is allowed to escape. In the end, the Sommerfeld model was replaced by the modern relativistic quantum mechanical treatment of the hydrogen atom known as the Pauli-Dirac model.

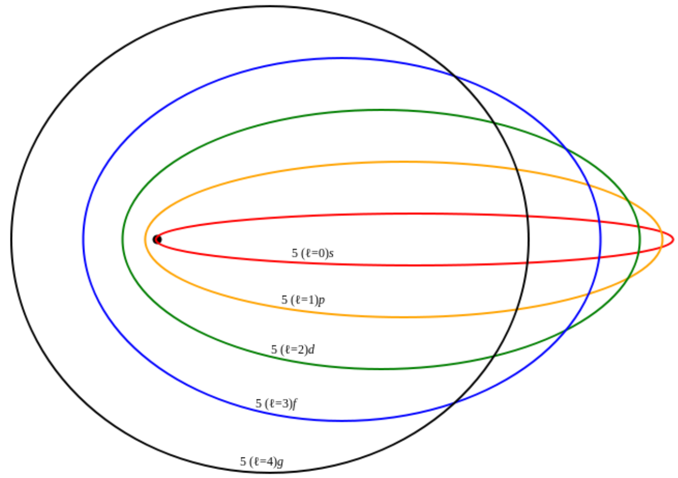


Figure 3 Sommerfeld Model of the Atom with the Same Energy and Quantized Angular Momentum

In 1924 the Austrian physicist Wolfgang Pauli observed that the shell-like structure of the atom could be better explained by a set of four parameters that defined every quantum energy state, as long as each state was occupied by no more than a single electron. This prohibition against more than one electron occupying the same quantum energy state became known as the Pauli exclusion principle. The physical mechanism to explain the fourth parameter, which had two distinct values, was provided by the Dutch physicists Samuel Goudsmit and George Uhlenbeck. In 1925 they suggested that an electron, in addition to the angular momentum of its orbit, possesses an intrinsic angular momentum and magnetic moment.[9] This is analogous to the rotation of the Earth on its axis as it orbits the Sun. The intrinsic angular momentum became known as spin. It explained the previously mysterious splitting of spectral lines observed with a high-resolution spectrograph. This phenomenon is known as fine structure splitting.[10]

The 1925 Pauli-Dirac model of the atom takes into account the spin of the electron as well as positive and negative energy electrons and antiparticles. It has been considered the best model of the atom for nearly 100 years. See Figure 4.

Experimental Confirmation of New Classical Model of the Atom. When Rydberg analyzed the hydrogen emission spectrum to obtain his empirical formula in 1890, the atomic line spectrum data was only available for the near ultraviolet, the visible and the infrared spectrum. This situation continued through the time that Bohr (1913) developed his model of the atom and Schrödinger (1925) and Dirac (1925) developed their quantum models of the atom.

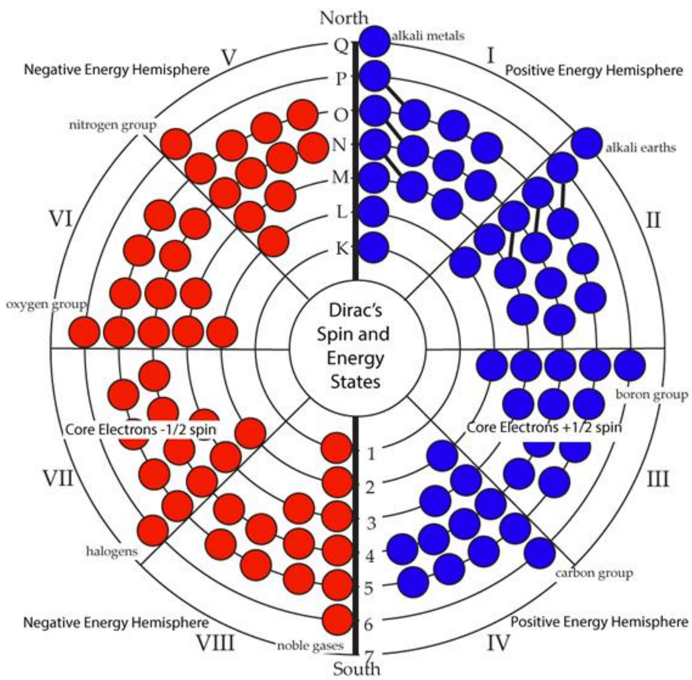


Figure 4 Dirac Circular Model of the Atom Involving Electron Spin and Positive and Negative Energy

Then in 1991 Labov and Bowyer [11] at the University of California at Berkeley devised a way to measure the extreme ultraviolet spectrum from 80-650 Angstroms (Å). They put a grazing incidence spectrometer on a sounding rocket to get above the earth's atmosphere. Flying in the shadow of the earth and pointing away from the sun toward a dark area of the universe, the spectrometer measured the spectrum from 80 to 650 Å. Presumably this part of the universe consists primarily of hydrogen and helium gas. The spectrum obtained is shown in Figure 5. There are a large number of spectral lines or peaks. The numbered peaks are for hydrogen.

Neither the classical Bohr model of the atom, nor the quantum Schrodinger model of the atom nor the relativistic quantum Dirac model of the atom were able to predict even one of the numbered spectral lines in the extreme ultraviolet for hydrogen. A new classical model of the atom incorporating a finite size electron in the shape of a continuous toroidal ring of charge predicted every one of the numbered spectral lines for hydrogen as shown in Figure 5.[12, 13, 14, 15] The same model also predicted all the spectral lines for helium in the extreme ultraviolet spectrum.

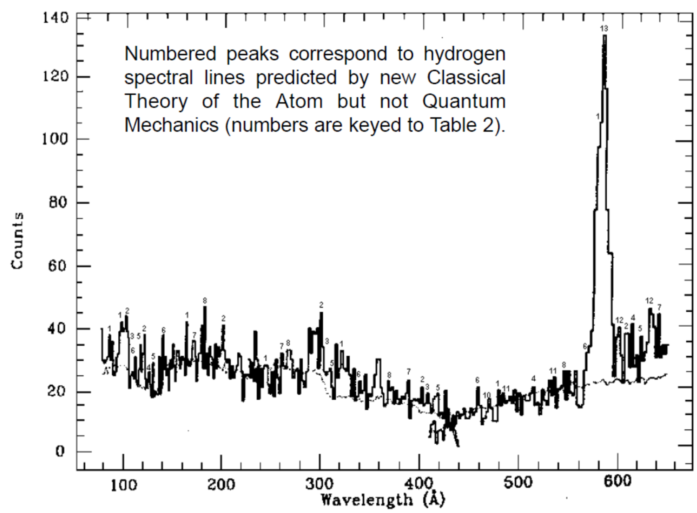


Figure 5 Extreme Ultraviolet Spectrum for Helium and Hydrogen[1]

Thus we see that the invention of the mathematical theories of quantum mechanics, relativity theory and the standard model of elementary particles to create the relativistic Dirac model of the atom eventually failed to satisfy logic and experimental data. Unfortunately after over 20 years of publications in science journals[12, 13, 14, 15] around the world showing these things, the scientific community still refuses to acknowledge its mathematical quantum models of the atom need to be replaced with a classical one with real physical electrons in the shape of a toroidal ring.

Conclusions. We have studied the role of mathematical theories in the last century in the development of the theory of the chemical atom. In the case of the classical Bohr model of the atom the physical nature of the electron was poorly understood from experiment, but the empirical Rydberg formula for the wavelength of spectral lines worked for the hydrogen atom.

In the case of the Schroginger model of the atom the introduction of the Copenhagen quantum mechanics allowed the spin and magnetic moment of the electron to be taken into account. This allowed predictions of emission spectral lines for most atoms. However there were still a large number of inconsistencies.

The Dirac model of the atom takes into account the spin of the electron as well as positive and negative energy electrons and antiparticles. This gives it more capability to describe more features of the atom surpassing all previous models.

The atomic emission spectral data for hydrogen and helium in the extreme ultraviolet is not predicted by the Bohr, Schrodinger or Dirac models of the atom. Only the experimentally based physical model of the toroidal ring electron appears to be able to predict the complete set of data to the experimental accuracy measured.

Thus the time has come to switch to the simple physical model of the electron, proton, neutron, etc. These models are more physical and simple from a mathematical perspective. It appears that the introduction of the Copenhagen mathematical version of quantum mechanics into modern science has caused a regression in modern science.

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