Precambrian results as the "age" of the earth, and explain away any younger and older results.

Uncertainties about decay constants are *not* trivial even though the uncertainties are smaller than in previous decades. This is evident in the following statements by the uniformitarian Paul:[10]

> So how do we know that ^{238}U, for example, has a half-life of four and a half thousand million years? The answer is that we believe radioactive decay is always exponential, an assumption which has been tested repeatedly on short-lived radioisotopes, and hence all we need to know is the *rate* of decay of a known mass of ^{238}U to calculate its half-life. Even so the determination of half-lives is open to some error, and various different figures have been published for the same radioisotope. For example, two books I consulted in preparing this chapter gave the half-life of ^{87}Rb as 5.0 and 4.7×10^{10} years, respectively. The difference may not seem like much, but 0.3×10^{10} is three thousand million years which is roughly two-thirds of the age of the earth!

One can clearly see that Dalrymple's cavalier dismissal of uncertainties in decay rates would not be shared by Paul. Furthermore, the basic *assumption* of decay rates themselves is glaringly evident. From Paul's statements it is evident that uniformitarians are *assuming* that radioactive isotopes such as ^{238}U behave (and have always behaved) in the same way as radioactive isotopes whose radioactive decay can be followed empirically through several half-lives. Dalrymple's puerile quibbling with Slusher's discussion of ^{57}Fe is clearly a red herring.

In conclusion, none of Dalrymple's criticisms whitewash the pretensions of radiometric dating in any way. Radiometric dating remains a mockery of scientific experimental technique because of its selective acceptance of results: multiplied assumptions coupled with gargantuan special pleading, rationalization of discrepant results, and *ad hoc* use of data. I doubt if there is any other field of science where results could be so selectively interpreted and in such cavalier manner. The label "intellectual fraud" which Dalrymple scurrilously affixes to scientific Creationism properly and so deservedly belongs to radiometric dating! Dalrymple concludes with an emotionalistic "sad day for humanity" if Creationism triumphed over (his self-serving definition of) science. Actually, it *is* a sad day for humanity that intelligent people are taken in by the parody of experimental science that is radiometric dating.

References

1. Woodmorappe, J. 1979. Radiometric geochronology reappraised. *Creation Research Society Quarterly*, 16:102-29 147, back cover.
2. Dalrymple, G. B. 1983. Radiometric dating and the age of the earth: a reply to scientific creationism. *Proccedings: Federation of American Societies for Experimental Biology*, 42:3033-35.
3. Woodmorappe. *Op. cit.*, note reference 42, Table I, p. 104.
4. Lanphere, M. A., et al. 1964. Potassium-argon and lead-alpha ages of plutonic rocks, Bokan Mountain area, Alaska. *Science*, 145:707.
5. Woodmorappe. *Op. cit.*, Table I caption, p. 103.
6. Smith, A. G. 1983. Review of numerical dating in stratigraphy. *Geological Journal*, 18:361.
7. Woodmorappe. *Op. cit.*
8. Snelling, N. J. 1983. A basic review and some guidelines for planning new facilities. *Episodes*, 1983(1):21.
9. Woodmorappe. *Op. cit.*, pp. 121-23.
10. Paul. C. 1980. The natural history of fossils. Holmes & Meier Publishing Co., New York, p. 185.

TRANSFORMER ANALOGUE OF THE HYDROGEN ATOM

THOMAS G. BARNES*

Received 2 April 1984; Revised 6 November 1984

Abstract

A classical electromagnetic model of the hydrogen atom was introduced in the author's previous paper, ***A Unified Theory of Physics.***[1] *The model consists of a spinning spherical proton and a revolving electron ring. Spectral radiation results from resonant vibrations of the electron and proton. The model behaves like a transformer in which there is no ohmic loss. The proton spin and the electron ring rotation form the primary and secondary currents. The mutual inductance stores some of the atom's energy. One of the forces required to establish the stable state and to yield the required free-vibrational frequencies is supplied by an interaction between the primary and secondary currents. Its computation involves the gradient of the mutual inductance, the variation of mutual inductance with distance.*

Introduction

The new model of the hydrogen atom, described in reference 1, pictures the hydrogen atom as a spinning spherical proton and a revolving electron ring (Figure 1). The indentation in the electron ring is maintained by the combination of electric and magnetic forces that tend to pull the two bodies close together while still keeping the positive and negative charges separated enough so that they never touch.

The magnetic fields associated with these motions of the charges form a magnetically coupled system that is analogous to a transformer in circuit theory. The proton has a self inductance L_p; the electron ring has a self inductance L_e; and there is a mutual inductance M_{ep} between the two.

Outside the atom the proton has an intrinsic spin, but the electron has no spin when it is free and completely outside of any magnetic field. As the electron falls in toward the proton, under the influence of the electric attraction, it moves into the magnetic field of the proton. As one might expect from Faraday's induction law, an electric current is induced in the electron.

*Thomas G .Barnes, D.Sc., Professor Emeritus of Physics, University of Texas at El Paso, receives his mail at 2115 N. Kansas St., El Paso, TX 79902.

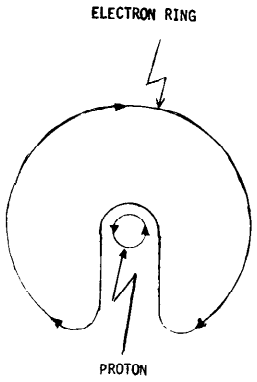

Figure 1. Model of the hydrogen atom.

It shows up as a spin of the electron's negative charge. The closer the electron gets to the proton the greater the spin until the electron opens into a revolving electric ring. This revolving ring has a magnetic field that induces additional current in the proton. That is to say, the induction from the electron's magnet generates some additional spin in the proton. This induction is similar to the induction between the currents in the primary and secondary of a transformer.

The Transformer Energy

The source of the magnetic energy added during the formation of the atom is the potential energy (P.E.) given up by the electron less the energy lost by radiation before the system settles down to its ground state. This radiated energy is precisely equal to the energy qV required to ionize the hydrogen atom. The values of charge q and ionization potential V are known to be $q = 1.602 \times 10^{-19}$ coulomb and $V = 13.599$ volts.

The equation that relates the source energy to the distribution of this generated magnetic energy is

$$\text{P.E.} - qV = L_p I^2_p/2 + M_{ep} I_p I_e + L_e I^2_e/2 \qquad (1)$$

where $L_p I^2_p/2$ is the magnetic induction energy in the self inductance of the proton, $M_{ep} I_p I_e$ is the energy in the mutual inductance, and $L_e I^2_e/2$ is the energy in the self inductance of the electron. The currents I_p and I_e are the currents induced in the proton and electron during the formation of the atom. The total current in the proton is this current I_p plus the initial current I_0 that it had due to its intrinsic spin.

It is assumed that the proton and electron in the ground state of the atom have the same values of magnetic moment as that listed in the physical tables, namely, magnetic moment of the proton $M_p = 1.41 \times 10^{-26}$ and magnetic moment of the electron $M_e = 9.28 \times 10^{-24}$. The self inductance L_p of the proton is

$$L_p = (\pi \mu r/3) \qquad (2)$$

Equation (2) can be deduced from the following equations:

$$L = \emptyset/I \qquad (3)$$

$$\emptyset = \mu M/3r \qquad (4)$$

$$M = q w r^2/3 \qquad (5)$$

$$I = q w/2\pi \qquad (6)$$

The first equation follows from the definition of self inductance. The next two were derived in the book *Physics of the Future*,[2] as equations (10-14) and (10-11). Equation (6) gives the charge flowing per second in that closed path. Using $r = r_p = 1.02 \times 10^{-18}$ meters (m) in equation (2) gives the value of the self inductance of the proton

$$L_p = 1.35 \times 10^{-24} \text{ henry.}$$

An approximate value of the self inductance of the electron ring can be computed from the equation

$$L_e = 3.32 \times 10^{-6}\, l \qquad (7)$$

where l is the length of the periphery of the ring. Assuming l is equal to the Bohr orbital length ($2\pi \times 5.3 \times 10^{-11}$ m), the self inductance of the electron ring

$$L_e = 1.11 \times 10^{-15} \text{ henry.}$$

Equation (3) is derived from the equation

$$L = 10^{-7}\, l[1 + 2 \ln(\Delta s/r)].$$

(See *Introductory Circuit Theory*, Ernst A. Guillemin, John Wiley, 1965, p. 213). The quantity $(\Delta s/r)$ was taken as the ratio of the radius of the circle of length l to the radius r of thickness of the ring. The thickness of the electron ring is obtained by assuming that the volume of the electron ring equals the volume of the classical spherical electron of radius 1.87×10^{-15} m. Dividing this volume by l yields the cross sectional area of the electron ring from which r is computed. Cross sectional ring radius $r = 5.12 \times 10^{-18}$ m.

Currents in the Transformer

The current in the electron ring is

$$I_e = 1.03 \times 10^{-3} \text{ amp.}$$

That is obtained from the knowledge that *the magnetic moment of a plane loop of current equals the current times the enclosed area.* The area is assumed to be equal to the area enclosed by the Bohr orbit, which has a radius of 5.3×10^{-11} m.

The potential energy is computed from the well-known equation

$$\text{P.E.} = 9 \times 10^9\, q^2/d \qquad (8)$$

where d is the effective distance between the electron and proton charges. This distance between the electron ring and the center of the proton can only be estimated until the precise shape and spacing of the ring is known. As an approximation we assume that $d = 4 \times 10^{-11}$ m, which is roughly three-fourths of the Bohr orbital radius. Using that value in equation (8) the potential energy given up by the electron

$$\text{P.E.} = 5.77 \times 10^{-18} \text{ joule.}$$

The mutual inductance

$$M_{ep} = k\sqrt{L_e L_p} \qquad (9)$$

where k is the coefficient of coupling. The coefficient of coupling depends on that fraction of flux that links the electron and proton. Making the assumption that $k = 0.25$ and using the known values of L_e and L_p, the value of mutual inductance in this model of the hydrogen atom is

$$M_{ep} = 9.68 \times 10^{-21} \text{ henry.}$$

All the variables in equation (1) are now known except I_p. Substituting the known values into (1) and simplifying, yields the quadratic equation

$$6.75 \times 10^{-25} I_p^2 + 9.97 \times 10^{-24} I_p - 3.59 \times 10^{-18} = 0.$$

The solution to this equation is

$$I_p = 2.31 \times 10^3 \text{ amp.}$$

This is the induced spin current generated in the proton. This induced current is over and above the intrinsic spin current I_0.

Magnetic Force

Variations in the magnetic repulsion occur *during changes in the magnetic coupling* associated with the oscillatory vibration about the equilibrium position of the electron. The repulsion force on the two coupled circuits in a transformer is

$$F = i_1 i_2 (\partial M/\partial x) \quad (10)$$

(See *Foundations of Elecricity and Magnetism.* 1977. T. G. Barnes, equation (12-60) third edition, p. 270.) This force equals the product of the primary and secondary currents times the gradient (change with separation distance) of the mutual inductance M. This equation is valid for the hydrogen atom. The hydrogen atom is a *no-loss transformer.* In its stable state the "primary" and "secondary" currents continue to flow without dissipating energy, whereas the ordinary transformer *requires alternating current* to sustain the flow of current.

As seen in equation (9) the mutual inductance may be written in terms of the coupling coefficient k. This coefficient is a function of effective separation distance x (the axial spacing distance between an idealized transformer ring and the rest of the transformer). For theoretically perfect coupling $k = 1$ at $x = 0$. The coupling drops off rapidly with x. For illustrative purposes we shall assume that the coefficient of coupling is the following exponential function of separation distance

$$k = \epsilon^{-ax} \quad (11)$$

The transformer repulsion force may then be written as

$$F = i_p i_e \sqrt{L_e L_p} (\partial \epsilon^{-ax}/\partial x) \quad (12)$$

or simply

$$F = i_p i_e \sqrt{L_e L_p}\, a\epsilon^{-ax} \quad (13)$$

To put this in the form of Hooke's law equation (13) is differentiated, yielding change in force as a function of change in distance from the equilibrium position,

$$dF = i_p i_e \sqrt{L_e L_p}\, a^2 k_0\, dx \quad (14)$$

where

$$k_0 = \epsilon^{-ad} \quad (15)$$

is the coefficient of coupling at separation $x = d$ which is the equilibrium state or ground state of the atom.

Using the previously assumed values: $k_0 = 0.25$ and $d = 4 \times 10^{-11}$ m in equation (15), the value of the constant a is found to be 3.466×10^{10}.

The Hooke's law stiffness constant in equation (14) may be written as

$$K = i_p i_e \sqrt{L_e L_p}\, a^2 k_0 \quad (16)$$

We have seen that for the ground state of the hydrogen atom:

$i_e = 1.03 \times 10^{-3}$ amp
$i_p = 2.31 \times 10^3$ amp
$L_e = 1.11 \times 10^{-15}$ henry
$L_p = 1.35 \times 10^{-24}$ henry
$k_0 = 0.25$ and
$a = 3.466 \times 10^{10}$ meter^{-1}

Using these values in equation (16) yields:

$$K = 27.7 \text{ N/m}$$

This is the magnetic stiffness for free translational oscillations of the electron about its equilibrium position in the hydrogen atom.

Radiation Frequency

The radiation frequency for this mode of vibration may be found from the well known mechanical resonant frequency equation

$$f = (1/2\pi)\sqrt{K/m} \quad (17)$$

Using $K = 27.7$ N/m and the mass of the electron $m = 9.1 \times 10^{-31}$ kg, yields the *radiation frequency* $f = 8.78 \times 10^{14}$ Hz.

In spite of the simplifying assumptions and approximations made for this spinning proton and revolving electron ring model of the hydrogen atom, the radiation frequency of this fundamental mode of oscillation lies within the Balmer series spectral range, the visible range of the hydrogen spectrum.

One of the assumptions should be pointed out. The magnetic force is not the only force, there is also the electric force acting on the electron. If one assumes that the spacial rate of change of the electric force is much smaller than the spacial rate of change of the magnetic force in the region near equilibrium, very little correction needs to be applied to the previous derivation.

In order to have a *restoring* force, which is necessary for oscillation, there must be a net force acting back toward the equilibrium position whenever the electron moves either outward or inward from the equilibrium position. The magnetic force is a repulsion force and the electric force is an attraction force. The magnetic force must dominate when the electron is below the equilibrium position. The electric force must dominate when the electron is above the equilibrium position.

The repulsion force ΔF below the equilibrium position is due to the increase in magnetic over electric force. The attraction force ΔF above the equilibrium position is due to the decrease in magnetic over electric force. In other words, the electric force is assumed to be relatively constant in that region. That is only an approximation since the electric force does vary, albeit at a smaller rate. Because of that change, perhaps the restoring force is somewhat smaller. A smaller restoring force means a smaller stiffness K.

Even though this derivation of the resonant frequency of oscillation is based on some rough approxima-

tions, it shows the reasonableness of this classical model of the hydrogen atom. Inclusion of the change in the electric attraction force in that region would have lowered the spectral frequency. Instead of the radiation frequency being $f = 8.78 \times 10^{14}$ Hz, it would have been somewhat lower. Recalling that the H_α spectral frequency $f_\alpha = 4.568 \times 10^{14}$ Hz it is reasonable to expect one of the fundamental modes of vibration to be lower than that obtained when the spacial variation in electric attraction was neglected.

This model of the hydrogen atom is a perfect radiator in the sense that it has no ohmic loss and has an extremely high Q. For an explanation of Q, see reference 1, page 61. This extreme efficiency assures sharp spectral lines and wave trains long enough to satisfy the phase coherence required in optical standing wave experiments. Much more work needs to be done before the precise configuration and force functions can be developed. It has, however, the potential for many modes of vibration within the hydrogen spectral range.

References

1. Barnes, Thomas G. 1984. A unified theory of physics, *Creation Research Society Quarterly*, 21:56-62.
2. Barnes, Thomas G. 1983. Physics of the future, Institute for Creation Research, El Cajon, CA, p. 125.

EDUCATIONAL COLUMN

TEACHING ABOUT ORIGIN QUESTIONS: ORIGIN OF THE UNIVERSE

JOHN N. MOORE*

Received 17 November 1984; Revised 23 November 1984

Abstract

In the first article in this series (CRSQ 21:115-19) the author stated a positive, scientifically objective alternative to the "conventional wisdom" of a mechanistic, materialistic origin of the universe and life on the earth, and an animalistic origin of human beings. He listed support data, and demonstrated the validity of Total Creationism and Total Evolutionism as contrasting viewpoints about origins: (1) the former a set of ideas based upon belief in Eternal, Personal Creator God Who created all things, (2) the latter a contrasting set of ideas based upon the belief that all things derived from some Eternal, Impersonal Matter-Energy condition. Further he contrasted inquiries about the **present** *involving scientific hypotheses and theories, and inquiries about the* **past** *involving unnatural singularities and speculation about what "could have been" or what "might have happened." This article contains discussion of specific examples and illustrations of the above points as applied to teaching about the origin of the universe.*

Introduction

Total Creationism *and* Total Evolutionism are viewpoints about origins that involve belief in *un*natural objects and/or events (singularities) that cannot possibly be submitted to scientific study. To protect the integrity of a pluralistic educational curriculum, both of these contrasting viewpoints about origins should be presented in the public schools to neutralize the current exclusive, monopolistic ideas of "evolutionary" origin of all things.

Of course professional scientists do not study the *super*natural or the *un*natural. Science, as a proper and orderly profession, entails specifically the direct and/or indirect, *repeatable* observation(s) of *natural* objects and/or events that occur or exist in the physical environment. Nevertheless professionally qualified scientists of the majority do present objective, scientific facts in support of Total Evolutionism; and, also, professionally qualified scientists of the minority do present objective, scientific facts in support of Total Creationism, as listed in the December 1984 article in this series.

However, Total Evolutionism, as well as Total Creationism, relate to inquiries scientists make about the *past*, *un*natural, non-repeatable aspects of life on the earth, about the solar system, and about the entire cosmos; such inquiries being quite different than inquiries scientists make about *natural* objects and/or events in the *present*. Because there is this discernable difference between inquiries *in the present*, and inquiries *about the past*, the purpose of this second part of the continuing series on "Teaching about Origin Questions" will be to show that limitations exist regarding any inquiries about the origin of the universe.

Importantly, in further introduction, is the very real problem in teaching about origin questions concerning the use of the term "hypothesis." In proper, orderly scientific work, a hypothesis must be testable, as numerous leading evolutionists have written repeatedly. Astronomers and astrophysicists quickly *claim* that they do formulate hypotheses about their natural environment.

But modern science teachers can state pointedly that no scientist has ever studied or been initially aware of any natural objects, first events, or prior conditions by which the universe supposedly came into existence. Astronomer Dr. Robert Jastrow has admitted this point

*John N. Moore, M.S., Ed.D., professor emeritus of natural science, Michigan State University, is now Director of Origins Educational Service, 1158 Marigold Ave., East Lansing, MI 48823. Dr. Moore expands his position in this article in greater detail in his book, *How To Teach Origins (Without ACLU Interference)*. 1983. Mott Media, Milford, MI 48042 ($14.95). Similar strategy on teaching about "biological evolution" is found in *The Secret of the Sixth Edition* by Randall Hedtke. 1983. Vantage Press, NY ($9.50).