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Notes on Russellian Cosmogony - Part 1: Absolute Atomic Mass

O. P. Obande (Phd)
[1,]*Department of Chemistry Ahmadu Bello University*
Zaria, Nigeria. (gababands@gmail.com)

----------Abstract----------

Absolute atomic mass was evaluated from frequency values provided long ago by Russell using Planck's and Einstein's energy equations. An empirical model successfully reproduced from absolute values relative atomic mass values that agree remarkably well with established values. Analyses of the results produced tenable evidence suggesting that reality consists of three universes orthogonally positioned relative to one another. Two of these universes are invisible and constitute the microcosm while our visible universe constitutes the macrocosm. The procedure facilitated empirical verification of Einstein's mass-energy equation the results of which provided additional evidence in support of existence of the three universe system. It was also revealed that each universe is defined by its inherent electro-magnetic radiation the transverse speed of which is identified with its unique speed of light and this determines values of atomic mass of its constituent chemical elements. Inherent e-m radiation of our visible universe and its invisible analogue were positively identified with the cosmic microwave background (CMB).

Keywords: *Russell's Cosmogony, Absolute Atomic Mass Evaluation*

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I. INTRODUCTION

Comparatively little to no interest has been shown to address cosmogony from the phenomenon of atomic mass. Since the universe consists essentially of mass and energy, factors responsible for formation of mass cannot be separable from those responsible for formation of the universe. Indeed we should expect an atomic mass cosmological model to offer some unique advantages over other models. It should, for instance, be able to provide explicit answers to questions of identity and mass of the ultimate particle and factors that govern its formation and properties. In addition it should also be able to provide a clear picture of possible relationships between the microcosmic world of the atom and the macrocosmic world of the universe both being products of the same process. Researchers however seem bent on endless refinements of the elegant cosmological models of Newton [1] and Einstein [2, 3] with hardly any inclination to chart new courses

Subsequent cosmological models are reducible to attempts to fine-tune Newton's gravitational constant, G, Einstein's cosmological constant, L, or Friedmann's curvature constant, k. This is true for the key models that drive modern cosmology, notably, DeSitter (L >0) [4]; Friedmann (k = +1; k = -1) [5,6]; Dirac (G =G(t)) [7,8]; Lemaitre, Big Bang theory (L > 0; L > |G|) [9]; Einstein & De Sitter (k = 0; L= 0) [10]; and the higher dimensional space-time models, Kaluza-Klein; Friedmann-Robertson-Walker and others [11, 12, 13,14]. Without doubt these models have been quite successful in broadening our knowledge of atomic structure however the same cannot be said of atomic mass. On the contrary, whenever theory predicts the existence of some 'fundamental particle' empiricism is sure sooner or later to come up with evidence to the effect that the particle has an internal structure [15]. There seems no limit to this cycle provided experimental set up can amass sufficient energy or incorporate requisite ingenuity. Physical cosmology seems headed for the brick wall but, is it not possible to consider alternative, perhaps complementary, models?

Lorentz is credited with first to attempt to elucidate the phenomenon of atomic mass. He is reported to have observed in 1892 that moving charge generates both electrical and magnetic fields which resist change and back-react on the electron's motion; and asked rhetorically: "Might that back-reaction account for the electron's inertia – hence mass?" The concept of 'back-reaction' seemed neglected over time however, in a 2012 birthday message to the electron Frank Wilczek [16] has this to say: "Although the Higg's particle is sometimes credited with giving matter mass, its contribution is actually quite small. Lorentz's beautiful idea, in modern form, accounts for most of it. Mass of protons, neutrons and others arise from back-reaction of gluon fields". Successful modeling of atomic mass might open new windows on the nature of such determinants as 'back-reaction', 'gluon field', or some other hidden parameters and indeed highlight possible relationships between the microcosm and the macrocosm. We present here results of an investigation of the subject.

1.1 'Russellian' atoms of the chemical elements

In 1981, Walter and Lao Russell [17, 18] published the second edition of their book: 'Atomic Suicide?' first published in 1957. In the book the authors present an elaborate description of a cosmogony which is quite persuasive if rather assertive. Russell's cosmogony begins with presentation of a comprehensive periodicity of the chemical elements consisting of 121 elements distributed in 9 periods (referred to as 'octaves') and 8 groups (also referred to as 'tonal positions' within the octaves). The node of each octave is identified with the noble gas of the period. Most importantly the authors in pp. 31 and 39 ref. [17] provide the following values of frequencies of electro-magnetic (e-m) vortices said to define the atom:

Table 1 Frequencies of e-m vortices of 'Russellian' atoms

Octave/Period	Element	Atomic e-m Freq.,ϑ_R/Hz
0	Unknown	8^0
1	Unknown	8^1
2	Unknown	8^2
3	Hydrogen	8^3
4	Helium	8^4
5	Neon	8^5
6	Argon	8^6
.		.
8	Barium	8^9
9	Radon	8^{10}

The idea of electromagnetic vortices is not entirely new to cosmology. Descartes' Cartesian Vortex Universe [19] is a static evolving steady state infinite universe in which a system of "swirling whirlpools of aethereal or fine matter produces what we call gravitational effects". Descartes' vacuum of space is not empty but filled with matter that swirled around in large and small vortices. In spite of wide separation in time by over two centuries, the similarity between Cartesian and Russellian cosmologies cannot be more remarkable. If Russell's frequencies are indeed innate properties of the atom it should be possible there from to evaluate absolute atomic mass and reproduce values of conventional relative atomic mass; a procedure is presented.

1.2 Computation of absolute (m^*_{abs}) and relative(m^*_r, m^o_r) atomic masses

Absolute and relative atomic mass values were calculated using the combined mass-energy relations of Planck and Einstein in the form:

$$m^*_{abs} = h\vartheta_R/c^2 \quad (1)$$

where m^*_{abs} = absolute atomic mass
c = velocity of light in 'vacuum'
h = Planck Constant, and
ϑ_R = e-m vortex wave freq. of the 'Russellian' atom.

By convention relative atomic mass of an element, E, is its absolute value relative to hydrogen's, i.e.

$$m^*_{r\,(E)} = m^*_{abs(E)}/m^*_{abs(H)} \quad (2)$$

Values of m^*_{abs}, m^*_r calculated with eqns. (1) and (2) and conventional relative atomic mass, m_r, are presented respectively in columns 3, 7-1 and 7-2 of the annexure. While m^*_r (also m^*_{abs}) increases exponentially from $1.0 g.u^{-1}$ for H to $3.1457 \times 10^6 g.u^{-1}$ for Am, corresponding values of m_r, vary approx. linearly from $1.0 g.u^{-1}$ to $243 g.u^{-1}$. A simple mechanical model is proposed to reproduce a linear growth rate in relative atomic mass (m^o_r) from exponential growth rate in absolute atomic mass, m^*_{abs}, and its component, m^*_r, with an increase in (Russell's) atomic number, Z_R.

II. A PHENOMENOLOGICAL (LEVER SYSTEM) COSMOLOGICAL MODEL

A lever system is proposed for creating at its midsection a linear function from exponential functions at its opposite ends. Supporting the lever at an appropriate point is the function responsible for creating exponential growth rate in absolute atomic mass (m^*_{abs}) – call it "Absolute Universe"; at one end we have the function responsible for creating relative atomic mass component of absolute mass (m^*_r); at the midsection we have the function responsible for linear growth rate of relative atomic mass (m^o_r) of chemical elements of our universe – tagged "Visible Universe"; and at the other end we have a parallel universe – an "Invisible Analogue of the Visible Universe" - whose elements' atomic mass (m'_r) values also grow exponentially with an increase

in atomic number and functions to precisely balance similar growth rate of elements of the absolute universe and maintain a linear growth rate at the midsection. With this arrangement we simply work out the arithmetic relation between the two exponential growth rates at the opposite ends of the lever to obtain the desired linear function at the midsection. To illustrate the concept, the existence of an integral three-universe system is proposed describable with the following set of assumptions:

[1] Reality comprises an integral system of three universes working together in perfect harmony to define existence, labeled "Invisible Absolute Universe", our "Visible Universe", and an "Invisible Analogue Universe" which is an analogue of the visible. These universes may be seen as Reference Frames of one common experience of existence.
[2] The universes are co-existent, interactive (freely exchange matter and energy) and mutually balanced with respect to mass and energy in a framework of a unified system of single reality.
[3] The same set of elements occurs in each universe but the specifics of each set are defined by the universe's unique mass-energy characteristics. As a result, the same laws of physics apply equally to all three; however, values of the same physical quantity vary according to the mass-energy characteristics.
[4] The absolute universe functions as fulcrum upon which the visible and invisible universes are precisely balanced. In this arrangement, our invisible analogue works in concert with the absolute to determine mass-energy specifics of our universe.

The arithmetic relationship between atomic mass values of elements of the two invisible universes at opposite ends of the lever which would give linear atomic mass growth rate for chemical elements of our visible universe reduces to the following simple rules:

[1] For the first three periods of Russell's periodicity (these are invisible octaves containing unknown elements) we equate atomic mass values of the two invisible universes , i.e. for elements Ab to He we have,

$$m^{*}_{r} = m'_{r} \quad (4)$$

[2] In view of indubitable success of conventional relative atomic mass values, for the visible octaves of known elements (Russell's periods 4 to 9, He to Am) we also equate the required ('theoretical') atomic mass (m^{o}_{r}) value with existing empirical whole number values, i.e.

$$m^{o}_{r} = m_{r} \quad (5)$$

Given the above, it turns out that in general m^{o}_{r} value is given by the expression,

$$m^{o}_{r} = m^{*}_{r} \pm m'_{r} \quad (6)$$

Within the first four periods/octaves, i.e. elements Ab, $Z_R = 1$ to Na, $Z_R = 37$, the sum applies while from the 5^{th} to the 9^{th}, i.e. elements Mg to Am the difference applies. Equation (6) is able to reproduce m^{o}_{r} values that are well in line with established empirical, m_r, values. In order to make a clear distinction between familiar terms as applicable to conventional periodicity and Russell's, the following legend to items in the Annexure are provided:

Definition of terms (see Annexure)

Z_c	=	Conventional (Conv.) atomic number, 1- 95,
Z_R	=	Russellian atomic number, 1- 121,
$m_r/g.u^{-1}$	=	Conventional Relative (Rel.) atomic mass,
ϑ_R/Hz	=	(Russellian) atomic e-m vortex freq,
$m^{*}_{abs}/g.atom^{-1}$	=	Absolute (abs.) atomic mass, Abs. Frame,
$m^{*}_{r}/g.u^{-1}$	=	Rel. At. mass, abs. Reference (Ref.) Frame,
$m^{o}_{r}/g.u^{-1}$	=	Rel. At. mass, Visible (Vis.) Ref. Frame,
$m'_{r}/g.u^{-1}$	=	Rel. At. mass, Invisible (Inv.) Ref. Frame,
ϑ^{o}_{R}, ϑ'_{R}/Hz	=	Frequency equivalence of respective masses.

Excellent agreement between calculated atomic mass (m^{o}_{r}) and empirical (m_r) values would suggest that the underlying model should be valid. In order to further test its validity we proceeded to examine mass-energy correlations within and between the hypothetical universes or reference frames.

III. RESULTS AND DISCUSSION

Consideration of the results is focused primarily on:

[1] Correlation of atomic mass values with atomic number for each universe (ref. frame) as basis for comparison of Russellian and conventional periodicity of the chemical elements.
[2] Correlation of atomic mass value with frequency of equivalent e-m vortex wave (i.e. mass-energy correlation) within each and across the three hypothetical universes in order to reveal possible inter-connectivity.
[3] Empirical verification of Einstein's mass-energy equation.

3.1 The Absolute Universe

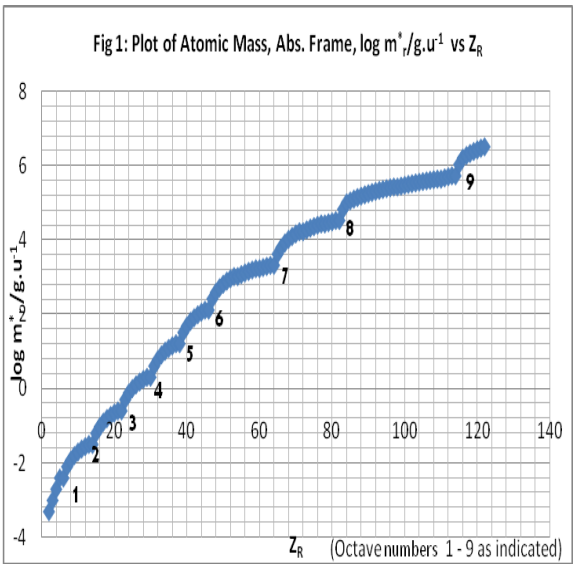
Values of m^*_r, are correlated in Fig.1 with (Russellian) atomic number, Z_R, in a log - lin plot. The graph is a non-linear continuous variation of mass with atomic number with points of discontinuity that clearly demarcate Rusell's octaves or periods, notably, it starts from the origin (0, 1). Figure 2 presents correlation of m^*_r with equivalent ϑ^*_R values in a log - log plot; expectedly, the relationship is perfectly linear in line with eqn. (1). It may be relevant to observe that Fig. 2 has a slope and an intercept, this is significant to proof of Einstein's mass-energy equation.

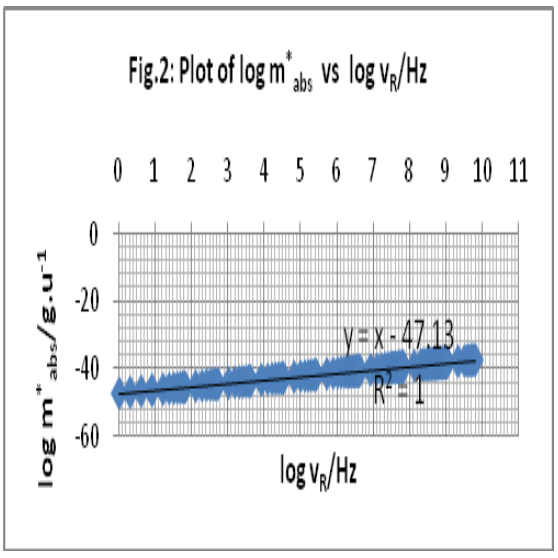
3.2 The Visible Universe

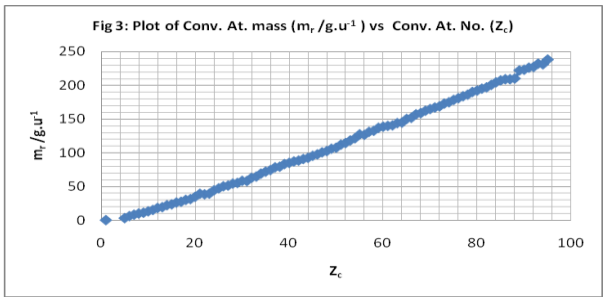
Conventional relative atomic mass, m_r, values are correlated in Fig. 3 with corresponding values of conventional atomic number, Z_c; the relevant observations are highlighted:

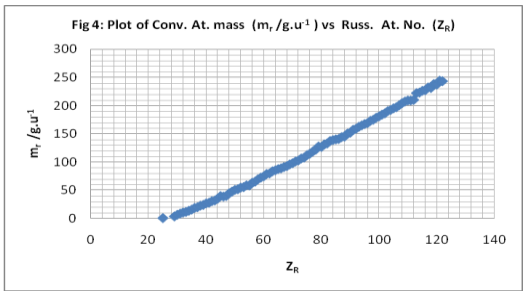
[1] Values of m_r, are not exactly linearly related to Z_c.
[2] Periods/octaves are not as clearly demarcated as observed in the Russellian model however, subtle discontinuities are discernible where octave demarcations exist in Fig. 1.
[3] Figure 3 unwittingly creates the impression of starting from the origin at the seemingly first element of conventional periodicity, H, $Z_c = 1$.
[4] A conspicuous gap is shown between H and He. To the best knowledge of the author existence of this gap, first noted by Mendeleev [20], is yet to be satisfactorily accounted for. On the other hand, the gap is taken up by three elements, L, Ha, and Ng, in the Russellian model.

The last two last points, i.e. false origin of m_r vs. Z_c correlation and the erstwhile intractable gap between H and He, in the author's view, constitute a weighty subject in the development of atomic physics. Inevitable but erroneous acceptance of hydrogen as origin of periodicity of the chemical elements due primarily to inaccessibility of the unknown elements, including strong support from the ground breaking results of Moseley's X-ray frequencies of the elements [21], seem to have decided the course which empirical and theoretical physics took right from inception to date.



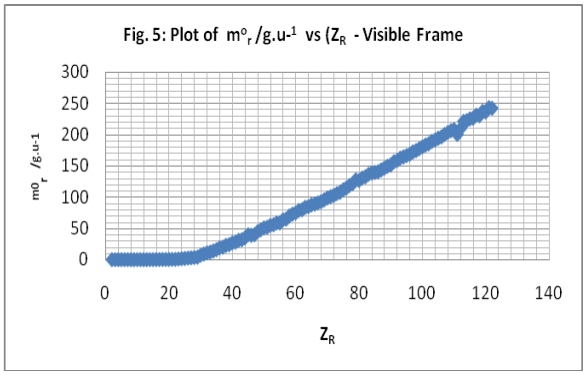


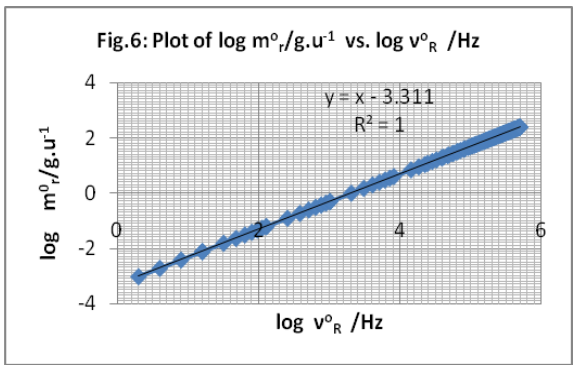




Correlation of m_r, with corresponding values of Russell's atomic number, Z_R, in Fig. 4 merely shifts the curve to the right of the abscissa in line with his atomic numbering. More importantly, the non-zero origin is made much more visible as a result of the shift. When, however, values of 'Russellian' relative atomic mass, m^o_r, are correlated with 'Russellian' atomic number, Z_R (Fig. 5), the graph starts from a well defined origin at $m^o_r = 0$ and $Z_R = 1$ and, as observed already, the gap between H and He disappears. The part of the curve from H, $Z_R = 24$, to Am, $Z_R = 121$, depicting the trend for known elements, remains essentially same as in Figs. 3 and 4.

Figure 6 is a correlation of m^o_r with ϑ^o_R values; notice that the data points are more widely spread out in periods 1 to 4 compared to the subsequent lumped points in periods 5 to 9. The effect is attributable to marked reduction in the rate of increase with Z_R of values of m^o_r and ϑ^o_R relative to corresponding values of m^*_r and ϑ^*_R or m'_r and ϑ'_R in periods (octaves) 5 to 9. The reduction becomes much clearer if values of m^o_r are correlated with corresponding values of ϑ^*_R or ϑ'_R as shown in Fig 7. We see that a perfect linear relationship is observed only from octaves 1 to 4; starting from the 5th octave values of m^o_r and ϑ^o_R (i.e. visible universe' mass-energy matrices) are drastically reduced relative to equivalent values for the invisible universes. The effect would seem to suggest existence of a major change within the 5th octave; recall that a similar change is observed also in eqn. (6).



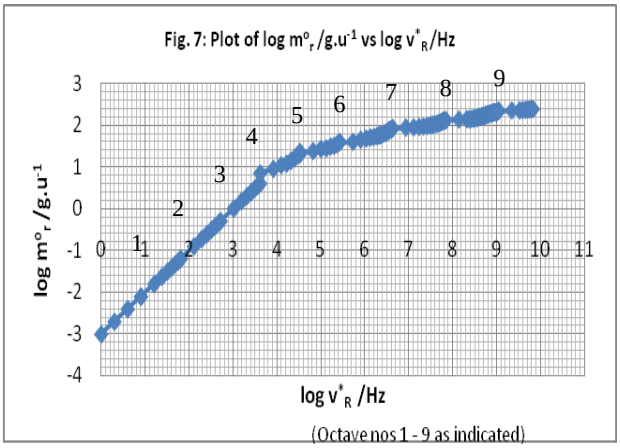


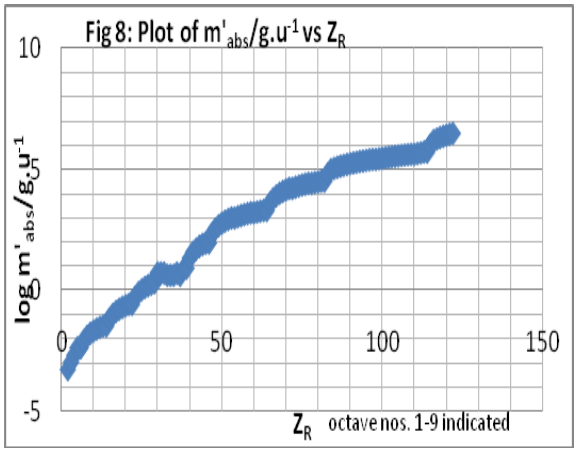
3.3 Periodic Positions and Relative Atomic Masses of Deuterium and Tritium

Deuterium, D, and tritium, T, conventional isotopes of hydrogen, H, i.e. ^{2}H and ^{3}H respectively, are presented in Russellian periodicity as proper elements in their own rights. Much more importantly, values of their relative atomic mass, m^o_r, calculated from eqn. (6) are 1.0 and 1.5 respectively while hydrogen's is 2.0g.u^{-1} (annexure, coln. 7-3). Observe that the value 2.0g.u^{-1} refers to H not H_2. From internal consistency of the above results, one is constrained to support Russell's description and periodic placement of the two elements, D and T. However, this raises valid questions regarding established perception of the subject of atomic mass and isotope.

3.4 The Invisible Analogue of our (Visible) Universe

The invisible analogue of our universe presents the most intriguing feature of all three ref. frames. The feature manifests in an attempt to correlate any two quantities in this ref. frame. A graph of m'_r vs. Z_R, is shown in Fig. 8, the graph is essentially a reproduction of Fig.1; however, there is an important difference. In the 5th period (octave), m'_r values remain fixed as Z_R increases (see details in the annex. colns.7-4 and 7-5, i.e. Li to Ne). Graph of log m'_r vs. ϑ'_R, in Fig. 9 gives the usual perfect straight line indicative of uniformity of mass-energy matrices within a reference frame (see Figs. 2 and 6). Observe that even in a linear relationship, the 5th octave still appears different, being significantly shortened compared to preceding and succeeding octaves.





Internal consistency and remarkable agreement between calculated and empirical atomic mass values strongly support validity of the underlying model. The results present Russell's periodicity as being more comprehensive than conventional periodicity of the chemical elements and show that the latter is actually a subset of Russell's. In the following section we examine correlations of atomic mass values across interfaces of the three reference frames.

3.5 Orthogonality of the three universes

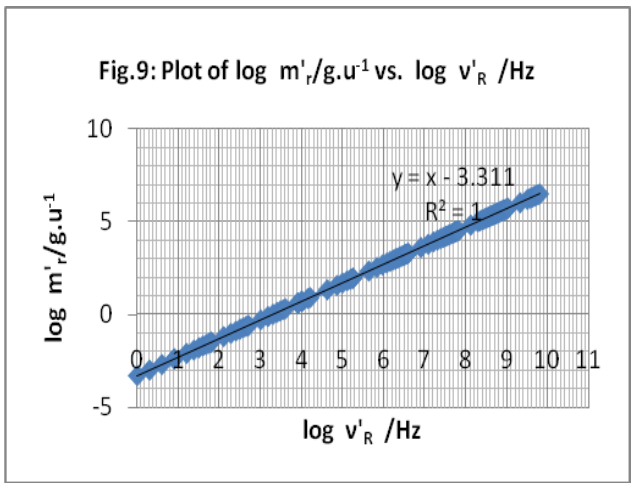
Figure 10 is a lin-log correlation of m^*_r vs. m^o_r values, the figure reveals perfect orthogonality of the interface between the two values - hence between mass-energy matrices of the (invisible) absolute universe and our visible universe. Similar correlations of m'_r vs. m^o_r and m^*_r vs. m'_r produce graphs identical to Fig. 10. The results therefore indicate that the three universes are orthogonally related to one another. The graph of m^*_r vs. m'_r (Fig. 11) is perfectly linear which, as already noted, is indicative of similarities of mass-energy matrices of the two invisible universes. It is important to note that the graph of m'_r vs. m^o_r, Fig.12, shows the characteristic inflexion point occurring at period 5 (Russell's 5th octave) seen also in Fig. 8. In view of space limitation, results of investigation of the phenomenon causing peculiarities of Russell's 5th octave seen in eqn. (6), and also in Figs. 7, 8 and 12 shall be presented in a subsequent report.

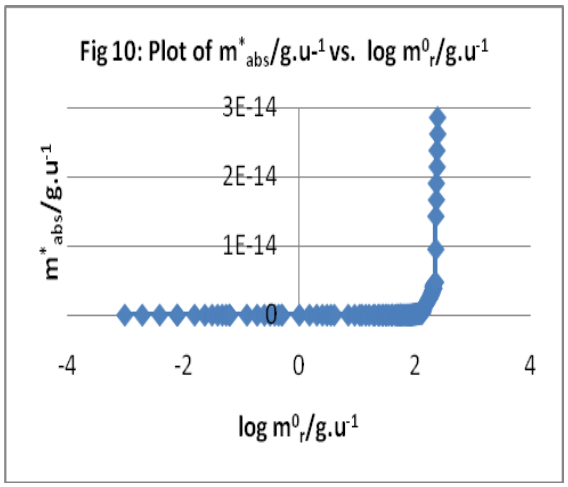
3.6 Empirical proof of Einstein's mass-energy equation

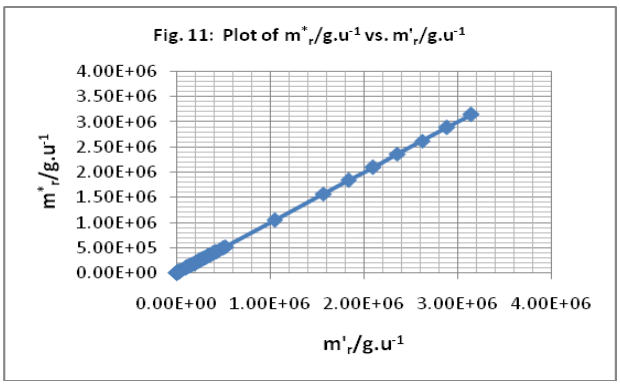
The straight line graphs, Figs. 2, 6, and 9 are all proofs of Einstein's mass-energy equation. For the purpose of evaluating relevant parameters, eqn. (1) may be re-written in its generalized form, that is,

$$E = h\vartheta_R = m^n c^2 \qquad (7)$$

where n is an exponent of mass. Correlation of log $h\vartheta_R$ vs. log m should give a straight line whose slope and intercept would yield values of n and c respectively. The correlations are presented in Figs. 13 and 14 for the absolute and visible universes respectively, the graph for invisible analogue universe is a replica of Fig. 14; a summary of the results is presented in Table 2.







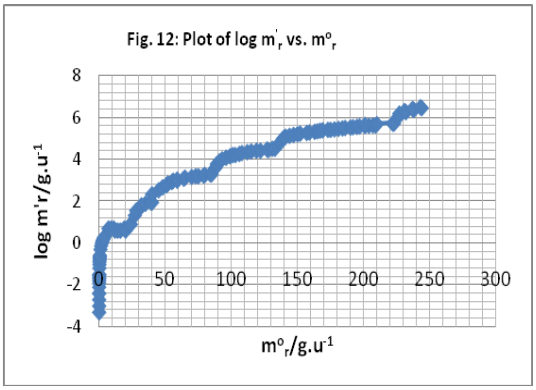


Table 2: Values of parameters (n and c) of Einstein's equation

Universe	Slope (n)	Velocity of light, c/cm.s^{-1}
Absolute	1.0	2.98753×10^{10} = c^*
Visible	1.0	3.71535×10^{-12} = c^o
Invis. Analog.	1.0	3.71535×10^{-12} = c'

The table reveals as follows:

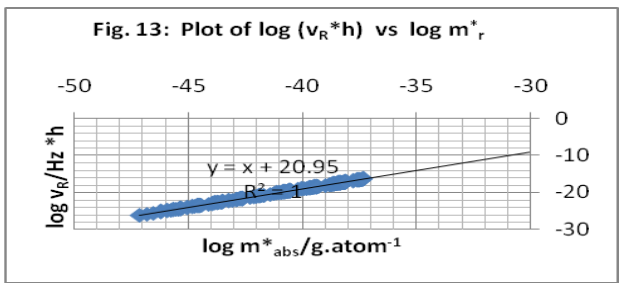
[1] Einstein's mass-energy equation can be expressed in a generalized form in which mass has an exponent; it turns out (fortunately!) that the exponent is unity in all three universes that constitute our cosmos.

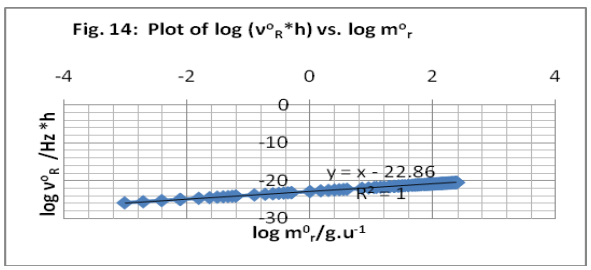
[2] Innate e-m atomic wave frequencies provided long ago by Russell [17] proved valid for successful empirical verification of Einstein's equation.

[3] The results would suggest that Russell's cosmological model is valid. We conclude therefore that the atom has no solid nucleus and Einstein's equation is statement of the fact that *matter comprises only e-m waves, i.e. energy pockets or quanta*. What appear as solid nucleus must be some sort of tightly woven e-m wave pockets.

[4] The results are also consistent with our hypothesis that reality comprises three universes working in harmony to define existence. Each of the universes has its inherent e-m radiation the transverse speed of which is equal for the visible universe and its invisible analogue, i.e. $c^o = c' = 3.71535 \times 10^{-12}$ cm.s^{-1}. Interestingly, the value of this quantity for the absolute universe is established as speed of light in vacuum (invisible ref. frame), $c^* = 2.987538 \times 10^{10}$ cm.s^{-1}. The results further suggest that the light which irradiates our visible universe originates from the (invisible) absolute universe and is *not* an inherent feature of our universe.

[5] If in the equation $c = \lambda\vartheta$ we substitute the values of $c^o = c' = 3.71535 \times 10^{-12}$ and frequencies of radiation in the microwave region, $\vartheta = 10^{12}$ to 10^{10} s^{-1}, we get $\lambda = 0.3$ to 4mm. The range falls within wavelengths in the microwave region; this clearly identifies the cosmic microwave background (CMB) of our universe and its invisible analogue with their *inherent e-m radiations*.





3.7 The Standard Gram-Mass

Data in Table 2 enables evaluation of the standard gram - mass (g-m); for the purpose eqn. (1) is re - written in the form:

$$\text{g-m} = \vartheta\text{Hz.g}^{-1} = c^2/h \qquad (8)$$

Since the value of c is specific to the universe, g-m value would vary from one universe to another and atomic mass would vary accordingly. More significantly, atomic mass value is shown to be dependent on the transverse

speed of inherent radiation (i.e. speed of light) of the universe. From values of c presented in Table 2, g-m values were computed and used to evaluate atomic mass of the elements Ab, H and Am in each of the three universes. The results are compared in Table 3 with corresponding values obtained with eqn. (1) presented in the annexure.

Table 3: Comparison of Atomic Mass Values calc. from eqns. (1) and (8)

	$c^*=2.98538x10^1$	$c^o=3.71535x10^{-12}$	$c'=3.71535x10^{-12}$	
Element	Eqn. (1)	$g\text{-}m_1$(col.7-1)	$g\text{-}m_2$(col. 7-3)	$g\text{-}m_2$(col. 7-4)
Ab	$7.3624x10^{-48}$	$7.4347x10^{-48}$	$9.600x10^{-4}$	$4.8802x10^{-4}$
H	$1.5078x10^{-44}$	$1.5099\ x10^{-44}$	1.9661	0.9831
Am	$4.7432x10^{-38}$	$4.7893\ x10^{-38}$	238.8916	$3.0923.x10^6$

Note:

[1] $g\text{-}m_1 = 1.35639274x10^{50}Hz.g^{-1}$ (absolute universe).

[2] $g\text{-}m_2 = 2.0832202x10^3Hz.g^{-1}$ (visible & invisible analogue universes).

[3] Column number in parenthesis indicates location of value in the annexure.

[4] Atomic mass of an element is calculated from the relevant g-m, and frequency values of the element specific to the ref. frame.

Calculation of atomic mass values for H in each of the three universes is illustrated.

Absolute universe

$m^*_{abs} = \vartheta^*_R \times g\text{-}m_1^{-1} = 2048 \times 7.372496x10^{-48} = 1.50989\ x10^{-44}\ g.atom^{-1}$

Visible universe

$m^o_r = \vartheta^o_r \times g\text{-}m_2^{-1} = 4096 \times 4.8003x10^{-4} = 1.9661 g.u^{-1}$

Inv. Analogue universe

$m'_r = \vartheta'_r \times g\text{-}m_2\text{-}^1 = 2048 \times 4.8003x10^{-4} = 0.9831 g.u^{-1}$

The results are in line with our assumption that atomic mass of a chemical element is universe specific. It would imply therefore that current literature value [22] of the standard gram-mass, $g\text{-}m_1 = 1.35639274 \times 10^{47}Hz.kg^{-1}$, is inadvertently in error as it applies to our universe; it relies on the use of ϑ and c values of radiation inherent in the absolute frame to define atomic mass in the visible frame. The present results would suggest that correct definition of the standard kilogram-mass for our universe should be: 'The mass of a body at rest whose equivalent energy equals the energy of photons whose frequencies sum to $2.083220Hz.kg^{-1}$'.

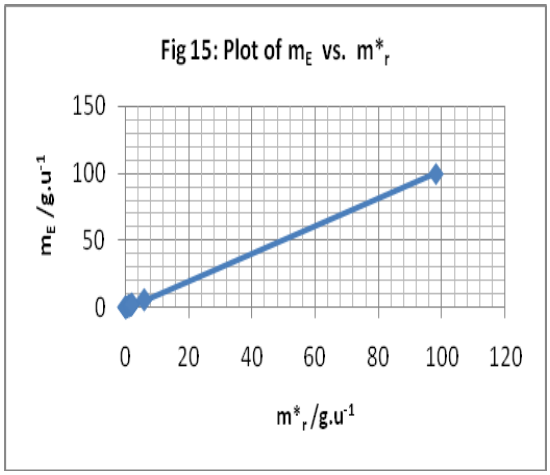
3.8 Significance of Absolute Atomic Mass Value to Nuclear Physics

Figure 15 is a correlation of literature values [23] of atomic mass, m_E, of some elementary particles (of the microcosm) with corresponding values of relative atomic mass, m^*_r. of unknown elements (of the macrocosm); actual values are also provided in Table 4 to ease reference. The correlation gives the usual perfect straight line indicative of similarity of mass-energy matrices of a universe. The figure is quite similar to Fig. 11; the two figures would seem to illustrate respectively mass-energy matrix flux from the invisible analogue universe (m'_r) to absolute (m^*_r) and from the absolute to our visible universe (m_E). Linear correlations have been interpreted as indicative of similarity of mass-energy matrices; in this respect Fig. 15 would identify the unknown elements of our universe jointly with matrices of our visible universe and those of the (invisible) absolute universe.

Figure 15 presents with significant implications (see Table 4); it identifies elementary particles with unknown elements of Russell's periods (octaves) 1 to 3 i.e. Ab to Ng, showing that although these elements belong to the visible universe they nonetheless share common mass-energy matrices with the (invisible) absolute universe. There is no problem with the electron and hydrogen; they are both familiar species with calculated atomic masses that are in line with established values. The electron is identified here with the first element of Russell's periodicity (i.e. Ab); indeed instances exist in which the electron is known to function like an under-sized element [24, 25]. The present implication to the effect that by virtue of mass value similarities, the known elements He, Li, B and Tc might identify with matrices of the invisible frame and have common atomic mass values with the elementary particles D^oD^o, $D^{\pm}$, B^o and Z^o respectively raises significant questions that should attract further investigation.

Table 4: Comparison of values of mass (m/g.u^{-1}) of sub-atomic particles and elements of Russell's octaves 1-3

Elementary Particles	Mass	(Unknown) Elements	Mass
$e^{\pm}$	0.0005	(Ab)	0.0005
$\mu^{\pm}$	0.1134	(Vt)	0.0938
$\eta^{\pm}$	0.1498	(Tr)	0.1562
$\kappa^{\pm}$	0.5299	D	0.5000
$P^{\pm}$	1.0072	H	1.0000
$\Sigma^{\pm}$	1.2768	(L)	1.2500
Xi	1.4116	(Ha)	1.5000
Ω	1.7954	(Ng)	1.7500
D^oD^o	2.008	He	2.0000
$D^{\pm}$	2.0069	Li	2.0000
B^o	5.6584	B	5.9999
Z^o	99.7	Tc	98.000



IV. CONCLUSIONS

The results of this investigation have revealed that:

- Reality comprises three universes labeled here Invisible Absolute, our Visible and Invisible Analogue of the Visible. These are orthogonally positioned relative to one another and contain the same set of elements with simultaneous periodicity; as a result the same laws of physics apply to all three. The two invisible universes constitute the micro- while our visible universe constitutes the macro-cosm.
- Electron, deuterium and tritium are full-fledged elements in their own rights which, along with technetium although belong to the visible universe nonetheless, have common mass-energy matrices with the microcosm.
- Matter comprises exclusively e-m wave pockets with no solid matter whatsoever. The nucleus of an element other than the electron must therefore be a compactly knitted form of e-m wave pockets of preceding elements.
- Frequency values defining the atom presented long ago were found valid for realistic proof of Einstein's mass-energy equation. The results show that visible light does not originate in our universe but radiates from the absolute universe.
- Empirical proof of Einstein's energy equation provided further evidence in support of three universe structure of the cosmos. Furthermore, it is shown that each of the three universes has its inherent e-m radiation the transverse speed (i.e. its unique speed of light) of which determines atomic mass values of constituent chemical elements.
- Transverse speed of inherent e-m radiation (i.e. speed of light) of our visible universe and its invisible analogue are equal and 22 orders of magnitude less than that of the absolute. The results identify this radiation with the cosmic microwave background (CMB) of our universe.
- Value of the standard gram mass (SGM) as currently presented in the literature, $1.35639272x10^{47}Hz.kg^{-1}$, refers to the absolute universe; the visible universe and its invisible analogue have the common value, $2.0832202xHzkg^{-1}$.

Remarkable agreement of findings of this investigation with established concepts strongly recommends the cosmogony put forward long ago by Walter and Lao Russell. It is able to give a picture of reality that easily provides tenable explanations where conventional cosmogony is yet incapable. It is obvious that wider scientific interest in this cosmogony could unravel many more shadowy areas still awaiting satisfactorily resolution.

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