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Evolution of the Hydrogen Atom: An Alternative to the Big Bang Theory

Ghassan H. Halasa

***Abstract*—**Elementary particles are created in pairs of equal and opposite momentums at a reference frame at the speed of light. The speed of light reference frame is viewed as a point in space as observed by observer at rest. This point in space is the bang location of the big bang theory. The bang in the big bang theory is not more than sustained flow of pairs of positive and negative elementary particles. Electrons and negative charged elementary particles are ejected from this point in space at velocities faster than light, while protons and positively charged particles obtain velocities lower than light. Subsonic masses are found to have real and positive charge, while supersonic masses are found to be negative and imaginary indicating that the two masses are of different entities. The electron's super-sonic speed, as viewed by rest observer was calculated and found to be less than the speed of light and is little higher than the electron speed in Bohr's orbit. The newly formed hydrogen gas temperature was found to be in agreement with temperatures found on newly formed stars. Universe expansion was found to be in agreement. Partial mass and charge elementary particles and particles with momentum only were explained in the context of this theoretical approach.

***Keywords*—**Evolution of Matter, Multidimensional spaces, relativity, Big Bang Theory

I. Introduction

All throughout the history of mankind the origin and evolution of the universe has been a great wonder. Sir Isaac Newton wrote the first universal gravitational law. Maxwell introduced his famous four electromagnetic equations. The solution of these equations showed an electromagnetic wave traveling at the speed of light, which is a universal constant based on the permittivity and permeability of free space. Fascinated with this result, Albert Einstein introduced the theory of special and general theory of relativity. Alexander Friedman, in 1922 solved Einstein's field equations showing that the universe was expanding. Einstein refused to accept Friedman's solution, when later he retracted his opposition. In 1927, a Roman Catholic priest, George Lemaitre independently calculated Friedman solution and again he suggested that the universe is expanding [1]-[4]. Expanding universe was also supported by Hubble in 1929. Hubble found a correlation between distance of galaxies and the amount of red shift in the galaxy's light [5]. In 1931, Lemaitre proved that the universe is homogenous [6]. He went further with his predictions, extrapolating backward in time when he found that the matter of the universe would reach an infinite density and temperature at a tiny point in space at a finite time in the past, "Primeval Atom" [7]. It was Hoyle in a radio broadcast who gave the name "Big Bang" in 1949 [3]. F. Hoyle, H. Bondi and T. Gold [8] developed the 'steady state model' as a different approach to Lemaitre's primeval atom theory. They concluded that the cosmological principle was valid for space and time. This theory was found to be not accurate [9]. Hoyle updated the steady state model by the Quasi-steady State model in 1993 [10]. Hoyle said that the universe was created from 'entirely extraneous special dimension' [11], this statement will be explored later in this paper. Alan Guth, proposed his 'inflation' theory in 1981.This theory says that in the early moments, following the big bang, there was an extremely rapid expansion of the universe, driven by false vacuum state due to repulsive gravitational action [12], [13]. Eric Lerner [14] presented evidence that the Big Bang theory was contradicted by observations and that another approach, 'plasma cosmology', which hypothesized a universe without beginning or end, far better explained what we know of the cosmos. Ned Wright reputed Lerner's plasma cosmology model [15]. Wright is a strong supporter of the big bang theory [16].

Albert Einstein once said: "I have a deep faith that the principles of the universe will be both simple and beautiful". In this simple analysis it will be shown that the origin of the hydrogen atom, the simplest form of matter, is created as proton/electron pair in a reference frame at the speed of light. Both electrons and protons are ejected simultaneously with equal momentums but opposite in direction from the speed of light reference frame. The exit of equal and opposite momentums keeps the speed of light reference frame undisturbed, while the electrically neutral universe is guaranteed. Electrons obtain speeds higher than that of light, while protons' speeds are lower than that of light. Einstein's theory of special relativity and Lorentz transformations do not rule out the existence of reference frame being at the speed of light as long as this reference frame does not originate at speeds lower or higher than that of light. It will be shown that, according to the theory of special relativity, the speed of light reference frame is not observed by rest observer. Hoyle [8] introduced two basic ideas:

(1) the universe was created at 'extraneous special dimension
(2) the big bang started as continuous flow of neutrons, guaranteeing universe neutrality.

Corresponding author, Ghassan Halasa is with the University of Jordan, Amman, Jordan. Phones: Residence: +962-6-581-9415, Office: +962-6-535-5000, Ext: 22845, Cell: +962-77-742-2224. E-mail: halasa@ju.edu.jo

It will be shown that the special dimension does exit and the neutrons are not other than electrons and protons produced on continuous bases at a point in space. The electrons and protons are created in pairs such that the electrical neutrality of the universe is guaranteed, as pointed out by Hoyle. Some theories predicted the existence of tachyons [17], particles that travel faster than the speed of light. These theories were never given much attention. In fact they were viewed as pure science fiction. In this work it will be shown that the electrons and all negatively charged particles are the objects that travel faster than light**.**

II. Evolution Of Hydrogen Atom Versus The Big Bang Theory

Throughout the history of mankind a question was raised on how the universe came into being. The Big Bang theory answered partially this question by stating that the universe began in a state of extremely high density and extreme heat 13.7 billion years ago and has been expanding since that particular instant that marked the origin of the universe [6]. 'The big bang is the generally accepted cosmological theory; the incorporation of developments in elementary particle theory has led to the inflationary universe version. There is a total agreement that the big bang theory is not a theory about the origin of the universe. Rather, it describes the development of the universe over time [9], [11]. Since 1931, the big bang theory has been generally accepted by the wider scientific community for being the theory of the origin of the universe. This theory is criticized by the wider religious community and few physicists [18]. The big bang theory may be criticized by the fact that only one short duration explosion occurred during 13.7 billion years. This theory does not predict successive explosions after the first. Another criticism may be added on what happened to the laws of conservation of energy and momentum before and after the explosion and where and how the dense matter and intense heat came from. Hoyle [8] said that 'it must have come from another dimension'. He also predicted that the initial and subsequent processes consisted of neutrons that later disintegrated into protons and electrons. This prediction is important to guarantee the universe electrical neutrality.

In this theoretical work we will show that electrons and protons, the constituents of all matter, were created in pairs at an inertial reference frame traveling exactly at the speed of light 'c'. This reference frame is the ground state of all matter. It will be shown that the electrons and the protons, the constituents of the hydrogen atom, the basis of all matter, are created in pairs at a point in space, not observed by an observer at rest. According to the theory of special relativity, the speed of light reference frame is observed as point in space according to the rest observer. This theoretical approach assumes that electrons are ejected in the direction of the speed of light attaining a speed higher than 'c', while protons are ejected in the opposite direction of 'c' attaining a speed lower than that of light. The final destination of the proton is to rest or to zero velocity, while the electron reach velocity higher than that of the speed of light, and continues to keep that speed on a continuous basis. An observer at rest cannot detect the point of ejection because the speed of light reference cannot be detected by the rest observer according to the theory of special relativity and Lorentz transformation equations, as will be shown later. After the ejection and according to the rest observer, the ejected electron and proton pair seem to be emerging from nowhere (the point in space). It will be shown in the next section that the newly formed mass of the electron is negative and imaginary, while the proton mass is real. The imaginary and real masses of the electron and proton indicate that the two masses, of the electron and proton are of different entities. The negative sign may indicate the electronic charge. The two newly formed particles attract each other, or attempt to go back to the speed of light reference frame, their ground state. This tendency of attraction may explain the electrostatic attraction between positive and negative charges. The two particles are unable to recombine, because such action requires infinite amount of energy if they reenter the speed of light barrier. Stopping at Bohr's orbit and compensating part of the energy available due to the excess speed of the electron. The excess kinetic energy associated with the difference in the electron velocity between Bohr's and final velocity after it exited the speed of light, may be converted into heat, associated with the newly formed hydrogen atom. A striking result shows that the electron speed is in agreement with the electron speed in Bohr's s-orbit as viewed by rest observer. The heat associated with the newly formed atom was found to be $1.5 \times 10^{6^\circ}$ C. This temperature is found in newly formed stars,

III. Lorentz Transformation and Independent Spaces

Assume an event E_1 (x_1, y_1, z_1, t_1) in an inertial reference frame at rest, equivalent to an event E_2 (x_2, y_2, z_2, t_2), in another reference frame traveling at a velocity v as observed by the same rest observer. E_2 coordinates may be written as linear combinations of the coordinates in E_1. The constants of the relationship are evaluated from initial conditions together with the experimental fact of the consistency of the speed of light in all reference frames. The results are the famous Lorentz transformations for any space time event based on Einstein's theory of special relativity. The equations are [19], [20]:

$$x_2 = \frac{x_1 - vt_1}{\sqrt{1-(v/c)^2}} \qquad (1)$$

$$y_2 = y_1$$

$$z_2 = z_1$$

$$t_2 = \frac{t_1 - (v/c^2)x_1}{\sqrt{1-(v/c)^2}} \qquad (2)$$

And the velocity transformations are:

$$\dot{x}_2 = \frac{\dot{x}_1 - v}{1-(v/c^2)\dot{x}_1} \quad (3)$$

$$\dot{y}_2 = \frac{\dot{y}_1\sqrt{1-(v/c^2)}}{1-(v/c^2)\dot{x}_1} \quad (4)$$

$$\dot{z}_2 = \frac{\dot{z}_1\sqrt{1-(v/c)^2}}{1-(v/c^2)\dot{x}_1} \quad (5)$$

Where the dotted terms are derivative with respect to time, system 1 is at rest, system 2 is traveling at constant velocity v. It is assumed that the x-coordinates of both systems coincide and their velocities are in the same direction. The left hand side of equations (3), (4) and (5) are the velocity transformations. Notice also that subscript 2 in equation (1) denotes measurements in reference frame 2 as measured by traveler on system 2, while the subscript 1 denotes the measurement recorded by the rest observer in system 1.

The mass transformation equation is:

$$m_1 = \frac{m_2}{\sqrt{1-v^2/c^2}} \quad (6)$$

Where m_2 the mass as measured on system 2, while m_1 is the traveling mass as measured by the rest observer. For v_2=c, the mass on the moving system would be infinite. When v_2>c, equation (6) becomes

$$m_1 = \frac{m_2}{i\sqrt{\sqrt{v^2/c^2}-1}} = -\frac{im_2}{\sqrt{v^2/c^2-1}} \quad (7)$$

Where i is the imaginary number, or $\sqrt{-1}$. Equation (7) states that when the speed of the reference frame exceeds 'c' the mass becomes negative and imaginary. The negative sign is an indication of the charge of the supersonic mass and the imaginary term is an indication that the mass is made of a material or entity different than that of the subsonic mass. This is a clear indication that the electron and proton entities are different.

Assume a pair of events (x_1, t_1) and (x_{11}, t_{11}) in system 1 corresponds to two events in system 2, (x_2, t_2) and (x_{22}, t_{22}) in system 2 as measured by observer in system 1. For t_1=t_{11}, the distance Δx_2=x_{22}-x_2 as observed by system 1 and is equivalent to Δx_1=x_{11}-x_1, applying equation (1)

$$\Delta x_1 = \Delta x_2\sqrt{1-(v/c)^2} + v(t_{11}-t_1) = \Delta x_2\sqrt{1-(v/c)^2} \quad (8)$$

Similarly for x_1=x_{11}, applying equation (2)

$$\Delta t_1 = \Delta t_2\sqrt{1-(v/c)^2} + v(x_{11}-x_1) = \Delta t_2\sqrt{1-(v/c)^2} \quad (9)$$

Equation (8) implies that the measured distance in system 2 shrinks as the velocity v approaches the velocity of light 'c', as observed by the rest observer. If we assume a hypothetical situation where a reference frame exists at the speed of light c, then Δx_1=0 for v=c. This means that the rest observer observes the space of the reference frame traveling at the speed of light as zero volume space, where the three dimensional space is reduced to an infinite thin y-z plane. Similarly for other rest observers at another location, observing a traveler in the speed of light inertial reference frame traveling along the y and z axes. They would also observe the space shrinks to x-z and x-y planes respectively. The intersection of the three planes y-z, x-y and x-z define a point in space with zero volume. The same result can be achieved if the velocity have x, y, and z components. In general, for any rest observer observes an inertial reference frame with resultant velocity c occupying zero space. This point is the location where the big bang occurred in the big bang theory. Conversely, for an observer riding on the speed of light reference frame would also observe the rest observer as traveling away with a resultant speed '–c'. In similar analysis, this traveler observes the rest reference frame also to occupy zero space. Consequently, the rest and the speed of light reference frames are two independent spaces, where observers in the two reference frames cannot detect each others or they occupy different dimensions. This is similar to multi dimensional spaces existing in parallel worlds as found in science fiction. This speed of light dimension was predicted by F. Hoyle in his paper in reference 11. This implies that our universe is one dimension while the speed of light reference frame is another dimension; both dimensions are independent where neither dimension detects the other.

Equations (6) and (8) indicate that a rest observer detects the speed of light reference frame as a point in space with infinite mass density. This is the starting point of the big bang theory. Note that this situation is true for a rest observer only. For traveler riding on the speed of light reference frame, he would observe his own reference frame to be in normal situation with finite volume and mass as it exists on the rest reference frame where all laws of classical physics apply. According to this reasoning, it is difficult to conceive the big bang theory. For a universe with the size of our universe, where it must had the true size and mass in the speed of light reference frame, to slow down and flow into our universe in 10^{-37} seconds. Accordingly, in a better explanation, the universe must have evolved on a continuous basis with continuous flow of matter in small quantities.

When v>c, then equations (8) and (9) become

$$\Delta x_1 = \Delta x_2\sqrt{1-(v/c)^2} + v(t_{11}-t_1) = i\Delta x_2\sqrt{(v/c)^2-1} \quad (10)$$

$$\Delta t_1 = \Delta t_2 \sqrt{1-(v/c)^2} + v(x_{11} - x_1)$$
$$= i\Delta t_2 \sqrt{(v/c)^2 - 1} \qquad (11)$$

Equations (10) and (11) indicate that time and space in the supersonic reference frame is pure imaginary term.

IV. Evolution of Proton and Electron

Theory of special relativity asserts that mass can never reach the speed of light because it requires infinite amount of energy to achieve this goal. On the other hand, this theory does not rule out the existence of inertial reference frame being at that speed if such a frame exists originally at that speed and as long as it does not deviate from that speed. Based on this assumption let us assume the existence of three inertial reference frames. The three reference frames are:

a- Reference frame R_1 at rest; 'subsonic' reference frame
b- Reference frame R_2 traveling at the speed of light, c; 'sonic' reference frame
c- Reference frame R_3 traveling with a constant speed v_3 m/s higher than the speed of light; 'supersonic' reference frame

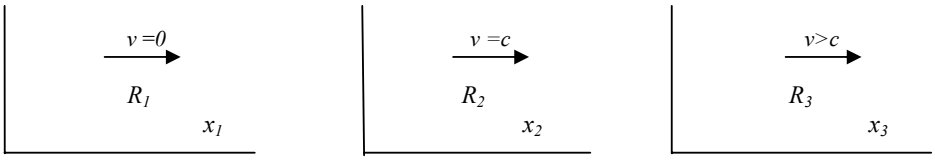

Fig. 1 The three reference frames, R_1 the rest reference frame (subsonic), , R_2 the speed of light reference frame(sonic), R_3 reference frame at velocity v higher than the speed of light (supersonic)

It is assumed that the x-axis of the three reference frames coincides. It is also assumed that the velocities of the last two reference frames lie along the positive x-axis, as shown in figure (1). Einstein's theory of special relativity and Lorentz transformations tells us that an observer in R_1, does not observe R_2, while observing R_3, floating in pure imaginary space with negative imaginary mass.

Assume a particle in R_2 obtaining very lower velocity than light (v_2<c); this particle is said to be transferred from sonic to subsonic reference frame. For this subsonic particle, real space expands and mass is transformed into real and finite. On the other hand, for a particle obtaining speed higher than light (v_3>c); this particle is said to be transferred to the supersonic reference frame. For this supersonic particle, imaginary space expands and mass becomes finite in the negative imaginary form. In summary, subsonic particles are real and occupy real space, while supersonic masses are imaginary and negative occupying imaginary space. This is illustrated in figure (2)

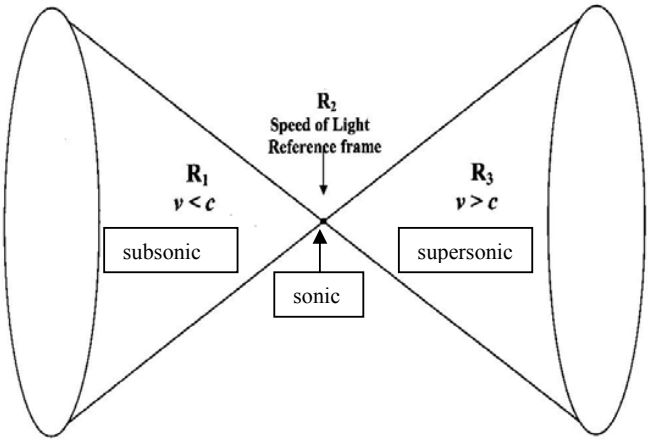

Fig. 2 Transfer of objects from R_2 to: R_1 where mass is real and positive and real space, R_3 where mass is imaginary and negative and imaginary space

We are ready now to introduce the evolution of the Hydrogen atom. As an illustration, assume a spaceship traveling at the speed of light in R_2. Also assume that an observer at rest in R_1 attempts to detect the spaceship. As explained earlier, the observer in R_1 detects a point in space with infinite mass density. There are no known instruments available at rest that can detect infinite mass density with zero volume. Therefore, the rest observer fails to detect the spaceship traveling in R_2. Although R_1 cannot detect R_2 and the assumed spaceship in it, the sonic traveler exists in his own inertial reference frame where all laws of classical physics apply.

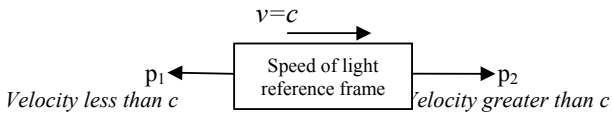

Fig. 3 Speed of light reference frame, R_2, p_1 ejected at speed at a speed lower than c while p_2 ejected at a speed higher than c

The traveler on the spaceship now ejects simultaneously two particles p_1 and p_2 along the line of the ship's motion, as illustrated in figure (3). p_2's velocity is in the ship's direction of motion while p_1's velocity is in the opposite direction. As observed by the subsonic observer, particle p_1 have subsonic speed while the supersonic particle p_2 have supersonic speed. For the ship to keep its original speed, direction and position the ejected particles must have equal and opposite momentums P_1 and P_2, thus

$$P_1 = P_2 \qquad (12)$$

where P_1 and P_2 are the momentums of p_1 and p_2 respectively. The rest observer now detects two objects emerging from a point in space. His instruments now detect p_1 and p_2 having a speed lower and higher than the speed of light respectively. He also observes p_1's mass start decreasing from infinity in the real form, while its volume starts expanding in the real form. The rest observer also observes p_2 to be floating in imaginary space, with its dense mass changing into less dense mass in the negative imaginary form. Particle p_1 slows down until it comes to rest in R_1. p_2's velocity increased to v_3 and stays in R_3.

The above spaceship hypothetical example can be extended to the evolution of the proton and electron. The particles p_1 and p_2 are now proton and electron respectively, where the supersonic mass is the electron. This assumption may be supported by the observed fact that electrons are always in continuous motion and never been found to be at rest, while protons can be found at rest.

Before proceeding, it is necessary to show that energy and momentum are conserved in the inertial reference frames R_1 and R_3.

For subsonic particles, distance, time, and mass are real and finite according to (8), (9) and (6). Hence, velocity and mass are real and therefore, mass energy, kinetic energy and momentum are real

$$\begin{aligned} E_m &= mc^2 \\ E_k &= 1/2\, mv^2 \\ P &= mv \end{aligned} \qquad (13)$$

Where, E_m, is the mass energy, E_k is the kinetic energy and P is the momentum. Equations (13) clearly indicate that energy and momentum in the subsonic space are real and positive.

For v>c, equations (10) and (11) show that distance and time are pure imaginary, the velocity in R_3 is defined as

$$v = \Delta(\text{ix})/\Delta(\text{it}) \qquad (14)$$

equation (14) clearly shows that the velocity of the particle, or electron, in the supersonic inertial reference frame as real. It was mentioned earlier that the mass of the electron is considered as real and positive, because it can be measured in real space exactly as the proton's mass can be measured in R_1. The negative imaginary terms associated with the electron's mass can be dropped because they are considered as indication for its material types. Accordingly, Equations (13) apply to the supersonic masses as well as to the subsonic masses. Therefore, the total energy and momentum of both electrons and protons must be conserved during their initial injection and in their final destination on both sides of the speed of light. This is true at any speed with the understanding that masses may be relativistic. As a result, the momentums of p_1 and p_2 must be equal together with both particles' total energies. The total proton and electron energies must be the same at the moment of their exodus from R_2 and up to their final destination. Their energies would be:

$$\frac{P_1^2}{m_p} = \frac{P_2^2}{m_e} \qquad (15)$$

Where; P_1 and P_2, m_p and m_e are the momentums and the masses of the proton and electron respectively. Since the proton came to complete stop, its total energy must be just the rest mass energy of the proton, while the total energy of the electron is the sum of its mass and kinetic energies.

The electron's pure imaginary space is finite as compared to the proton's space. The electron's imaginary space may be considered as a subspace of the proton's real space. This may define a complex Euclidean space. Mathematically, complex space is generalized space.

The proton total mass energy is

$$E_p = m_p c^2 \qquad (16)$$

where the proton's kinetic energy is zero.

As for the electron, its total energy is the sum of its mass energy plus its kinetic energy

$$E_e = E_m + E_k \qquad (17)$$

where E_e the electron total energy, E_m the electron mass energy and E_k the electron kinetic energy. Equation (17) becomes

$$E_e = m_e c^2 + \frac{1}{2} m_e v_3^2 \qquad (18)$$

Note that the measured electron mass at rest, or in R_1, is the actual real mass of the electron mass in R_3 since it is assumed to have continuously the speed v_3. The law of conservation of energy indicates that the energy in (16) and the energy in (18) are equal.

$$m_p c^2 = m_e c^2 + \frac{1}{2} m_e v_3^2 \qquad (19)$$

Rearranging terms in (19), and setting c=1 light-year/year (lyr/yr), v_3 is found to be

$$v_3 = \sqrt{\frac{2(m_p - m_e)}{m_e}} = 60.584\ lyr/yr \qquad (20)$$
$$= 1.8175 \times 10^{10} m/s$$

Note that v_3 in (20) is the velocity as measured by an observer in R_3. Use Lorentz velocity equations (3), (4) and (5) to transform the electron velocity v_3 from reference frame R_3 to the rest reference frame velocity v_1 in R_1. Equations (4) and (5) reduce to zero since it is assumed that the velocity components in the y and z directions are zeroes. Equation (3) with simple arrangement of terms becomes

$$\dot{x}_1 = \frac{\dot{x}_2 + v}{1 + (v/c^2)\dot{x}_2} \qquad (21)$$

where; $\dot{x}_1$ is the transformed velocity v_3 as measured in R_1, $\dot{x}_2$ is the velocity of the electron in R_3 and v is the velocity of the reference frame R_3. It is obvious that the electron velocity has the same velocity as the supersonic reference frame. Thus, $\dot{x}_2 = v = v_3$, and (21) becomes

$$v_1 = \frac{v_3 + v_3}{1 + (v_3/c^2) v_3} \qquad (22)$$

v_3 as in (20) have units in lyr/yr and is assumed to be much larger than one, then equation (22) is reduced to

$$v_1 = \frac{2v_3}{v_3^2} \qquad (23)$$

Plugging in the value of v_3 in equation (20) above, equation (23) yields

$$v_1 = 0.00330 \text{ ly/yr} = \mathbf{9.9x10^6\ m/s} \qquad (24)$$

The electron velocity in (24) is the actual electron velocity as measured by the rest observer. The figure in (24) is in the order of the electron velocity in the 1s orbit in Bohr's hydrogen atom model which is 2.2×10^6 m/s [21]. The electron's kinetic energy difference between its early creation energy and its binding energy in the hydrogen atom is:

$$\Delta E_k = 1/2\ m_e v_1^2 - 1/2\ m_e v_H^2 \qquad (25)$$

Where v_H is the electron velocity in Bohr's model and v_1 is as in (24). The excess energy in (25) above is the electron energy difference between its early creation at velocity as in (24) above and the electron energy in Bohr's orbit. Plugging values in (25), the excess energy is

$\Delta E_k = 4.245 \times 10^{-17}$ J per one hydrogen atom

Or

$$\Delta E_k = 2.016 \times 4.245 \times 10^{-17} = 8.559 \times 10^{-17} \text{J per one hydrogen molecule} \qquad (26)$$

The energy in (26) is multiplied by Avogadro's number $N_A = 6.022 \times 10^{23}$ mol^{-1} to find the energy in one mole of hydrogen gas,

$$\Delta E_k = 8.559 \times 10^{-17} \times 6.022 \times 10^{23} = 5.1536 \times 10^7 \text{ J/mole} \qquad (27)$$

The energy in (27) is converted into heat energy. Taking the hydrogen specific heat $= C_p = 32.58$ J/ mol-°C at high temperature [22]. The temperature associated with newly created hydrogen gas would be

$$\Delta E_k = C_p \times \Delta T \qquad (28)$$

Where: ΔE_k is the figure in equation (27), and ΔT is the temperature increase associated with newly created hydrogen gas above the absolute zero. Plugging values in (28) and solving for ΔT:

$$\Delta T = \frac{5.1536 \times 10^7}{32.58} = 1.58 \times 10^6 °\text{C} \qquad (29)$$

The temperature in (29) is close to temperatures found on newly formed stars, which is enough to cause fusion reaction, resulting in the formation of elements in nature [23].

V. Evolution of Elementary Particles

From the above analysis it can be affirmed that the ground state of electrons and protons as well as all elementary particles is the speed of light. The electrostatic attraction between electrons and protons is explained from the fact that the electrons and the protons tend to attract each other so that they can return to their ground state which is the speed of light. The reason why electrons and protons cannot fuse together to return to their ground state is because both particles must re-pass the speed of light barrier requiring infinite amount of energy because of their huge mass when they approach the speed of light. Therefore, the exit of all particles from the speed of light reference frame is a one way process only.

Some of the formed electrons and protons may not combine to form hydrogen atoms and thermal energy, but they may continue to move closer to recombine exhausting all their energy through fusion, but not annihilation. In this regard, as explained earlier, they cannot pass the speed of light barrier, but they may become a neutral entity with or without excess energy. All the energy available must equal to the electrostatic attraction potential between the electron and the proton, or

$$m_p c^2 + m_e c^2 + \frac{1}{2} m_e v_3^{\,2} = 2 m_p c^2 = \frac{1}{4\pi\varepsilon_o} \frac{q^2}{r} \qquad (30)$$

Where the left side in (30) is as defined in equation (18), q is the electronic charge (1.602×10^{-19} Coul), ε_0 is the permeability in free space ($1/36\pi \times 10^{-9}$ F/m) and r in meters is the electron proton distance (center to center).
Solving for r in (30),

$$r = 7.67 \times 10^{-19} \text{ m} \qquad (31)$$

The figure in (31) is the smallest possible size of the assumed neutral entity. This entity size is much smaller than the neutron size. Future research is needed to relate this assumed entity to the neutron with excess thermal energy.

In the above analysis it was assumed that the x-axis is the direction of the speed of light and the direction of the ejected velocities of the electrons and protons. In the general case, the process of ejection of particles may be assumed to be a random process where particles could exit the speed of light in all directions. The exits of these particle pairs have one constraint which is the sum of the momentums of both exiting particles must be zero.

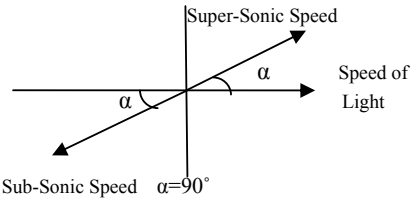

Fig. 4 Random Exiting Process

Figure (4) shows a pair of exiting particles at angle α with the x-axis, the direction of the speed of light. The projection of the two speeds along the x-axis is

$$v_x = v \, Cos \, \alpha \qquad (32)$$

where, v_x is the projection of the exiting particle 's velocity along the x-axis and v the actual exiting velocity. Equation (32) indicates that the exiting particles have lower exit velocity than the particles exiting along the direction of the speed of light. Consequently, the particles exiting with velocities in (32) obtain lower mass and possibly lower charge. These particles may be related to elementary particles with partial mass and partial charge. α may vary between zero and 90°. For α to be close to 90°, the exiting pair has no components along the x-axis, therefore, such particles have no mass or charge but only momentum. Neutrino may be a good example of this type.

VI. Universe Expansion

The term rest was used in the above analysis to signify the last speed the proton reached. A question may arise, is this rest term an absolute measure? The answer may be no; meaning that the proton could be slowing down still further beyond zero speed, or the zero reference frame. The further the proton slows down, the lighter the mass is and the larger space. The lighter the mass of everything cannot be detected by normal measuring instruments. The larger space supports the theory of universe expansion.

VII. Conclusion

As viewed by rest observer, the origin of the hydrogen atom was found to be created at a point in space traveling at the speed of light. This point in space is the ground state of all matter, as explained in the big bang theory. At this point electron-proton pairs are created with equal and opposite momentums. Electrons obtain a velocity larger than the speed of light, while, protons' velocity is lower than the speed of light. The electron speed was calculated as viewed by the rest observer and found to be little higher than the electron's speed in Bohr's model. The difference between the electron's calculated speed and the speed as calculated by Bohr's orbit was found to be associated with kinetic energy converted into heat energy found on newly formed stars. Creation of

elementary particles was explained in the context of this work. Universe expansion was also found to be in agreement of this work.

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Ghassan H. Halasa Born in Amman, Jordan in 1944. Ph.D in Electrical Engineering, University of Missouri, Columia, Missouri, in 1976, MSc in Electrical Engineering, University of Misssouri, Columbia, Missouri, 1973. BSc in Physics, Murray State University, Murray, Kentucky. Current employment, University of Jordan, Amman, Jordan.