Big Bang and Tired Light
For Explaining Unified Field Theory

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When Hubble discovered the redshift in starlight per distance, various theories were proposed to explain it: Tired Light, Steady State, and Big Bang. Tired light, as somehow connected to gravity according to Fritz Zwicky, did not pass the Tolman Brightness Test and was discarded. Big bang eventually prevailed over Steady State with the discovery of the microwave background radiation.

Big Bang had to be connected with relativity theory, as with regard to a Cosmological Principle whereby the visible portion of the universe is relatively isotropic and homogenous. This principle allows us to perceive the universe as if we are at its center. If we were instead at its edge, the gravitational curvature of spacetime, according to general relativity theory, bends light such that we see center stars as if they are outside stars. However, the bending of light should decrease as the universe expands and gravitational force relatively weakens. Somehow the curvature needs to remain constant. This constancy is indicated by condition of a singularity from which the expansion of the universe is assumed to have originated. Indeed a relativistic condition of a relatively homogenous universe is that observers inside and outside a field of gravity perceive local light speed and relative motion the same as if no field exists. They only perceive events outside the field as relatively modified, as faster relative motion or shorter orbital distance. This relativistic condition further suggests the observable universe should remain perceivably the same as it expands, such that the Hubble Constant for the rate of expansion should remain the same.

This constancy of appearance of the universe is further indicated by a mathematical relation of the Hubble Constant and the ratio of gravitational force to electrostatic force. At a distance $2r_n$ equal to the diameter of the nucleus of the hydrogen atom (approximately 5.8 X 10^{-12} centimeters), the recessional speed v of a Hubble Constant value of H ≈ 71 kilometers per second per million parsecs ≈ 2.3 X 10^{-18} something per second is Hd = v ≈ 1.3 X 10^{-29} centimeters per second, such that recessional speed per light speed approximates very close to the ratio of the gravitational force $Gm_p/(r_n)^2$ of the proton mass m_p to the electrostatic force $e^2/m(r_n)^2$ of the electron mass m_e:

$$\frac{H(2r_n)}{c} \cong \frac{1.3\ \times 10^{-29} cm \cdot sec^{-1}}{3 \times 10^{10} cm \cdot sec^{-1}} \approx 4.4 \times 10^{-40} \cong \frac{Gm_p m_e}{e^2}$$

The present theoretical value of the Hubble Constant is slightly less than the value here assumed, but there are complications with regard to inhomogeneous and homogeneous natures of gravity and a Cosmic Principle. The principle of equivalence relates free fall as relative motion, such that there is no internal awareness of gravitational acceleration in free fall. However, such tidal effects as with the free fall towards the moon occur because of the inhomogeneous nature of gravity having various effects on different parts of Earth at different distances from the moon. Gravity is thus determined according to space-time curvature. To the contrary, gravity canceling out gravity becomes relatively homogeneous on a larger scale, allowing the principle of equivalence of free fall and relative motion to take effect.

The rate of expansion also appears to have increased, which relates to another problem in that there appears not enough mass to maintain the space-time curvature of the singularity. Yet, we still appear to be nearly at the center of the universe, apart from a slight effect of gravitational in-homogeneity. Dark matter is assumed to exist as the missing mass. As for the increase in the rate of expansion, dark energy is assumed to exist as an antigravity force consistent with Einstein's Cosmological Constant. Dark matter is indicated by the rotational speeds of galaxies being greater than what their gravitational mass appears to allow.

Dark energy is consistent with a tired light explanation of gravity as well as Einstein's Cosmological Constant. A minute absorption of light energy by space provides a vacuum effect for explaining the cause of gravity, and the minute absorption of light energy by space provides a minute force consistent with conservation of momentum. Since the energy is only gradually absorbed, its effect is long range, consistent with the ratio of gravitational to electromagnetic force.

The Tolman Brightness Test concluded that the observable effect of an expanding universe differs from tired light due to the recession of stars' increasing distance decreasing their energy density of starlight received by the observer. There was some observational variation, but it was not to the fourth power as originally predicted. Hubble's original prediction of the expansion rate was also about ten times what it is now observed to be, as the true nature of the universe during Hubble's time was not yet established. It is still not established in that the relativity of effects still complicates how it is observed. The Cosmological Constant, for instance, could provide relatively more antigravity force in places where there is relatively less density of matter within more dense regions of matter.

Tired light theory is also consistent with the probability condition of quantum theory in that there is only a minute probability of an atomic particle being detected. For instance, only a minute number of neutrinos passing through Earth and our bodies interact for their detection by us. If the tired light and the recessional speeds are somehow relatively the same with regard to the redshift loss of energy, it would seem to provide a more unifying theory to explain all the discrepancies of astronomical observations.

A particular confirmation of Big Bang theory is the black body spectrum of a microwave background radiation, which relates to the fourth power of temperature. The density of the nucleus of the hydrogen atom is also approximately to the fourth power greater than the density of the hydrogen atom: Dividing d by the ratio of the proton mass to the electron mass approximates to the diameter of the hydrogen nucleus. Since the value of volume to size is to the third power, it plus the ratio of mass renders a ratio to the fourth power.

A fourth power ratio is also evident with regard to the ratio of gravitational potential to electrostatic potential of the hydrogen atom with regard to a distance per second of a drift velocity approximating to a microwave radiation wavelength:

$$\frac{m_a u^2}{m_a c^2 \left[1 - \frac{u^2}{c^2}\right]} - \frac{m_a u^2}{m_a c^2} \approx \frac{m_a u^4}{m_a c^4} \approx \frac{G m_a^2}{e^2} \approx 8 \times 10^{-37}$$

The drift velocity relates to an average velocity u of an atomic particle moving in a particular direction of an electric field. For an electric current of three amperes moving through a cubic meter of copper wire, the drift velocity is calculated as 0.00028 meters per second. The velocity u ≈ 0.284 meters per second is about a thousand times greater than the drift velocity of the copper wire, but the copper wire is about 10^6 times denser than the hydrogen atom. Since velocity u in the above approximation is in proportion to the square root of mass, it approximates very close to a microwave wavelength.

Rationale for the drift velocity is with regard to a Druid Model and Ohm's Law. Paul Drude proposed colliding electrons move in zigzag paths while drifting in the opposite direction of an electric field. Ohm's Law is sometimes expressed as a current density per *frictional* resistance. Such a frictional resistance could also relate to the long range effect of tiring light according to quantum probability.

The fourth order effect has been proposed by such theorists as Charles Lucas Jr. He derived it according to a combination of the Lorentz Force and the Coulomb force. His formula has relativistic factors even though he himself denounces relativity theory.

Tired light thus appears to be a simpler explanation of observation than is big bang theory. However, more energetic events are more rare: They are predicted to occur according to the probability conditions of quantum physics, as does our observable universe occur one in every 13.8 billion years. Both explanations might thus be part of an all embracing more general theory, such as with regard to a multiverse. However, if they are somehow mathematically equivalent, then how it is that an expanding universe does not appear to expand?

Paul Dirac also became curious of mathematical relations with regard to the Hubble Constant and such parameters as atomic masses and radii, the gravitational constant G and light speed c. Similarly, for instance, the Hubble Constant H, light speed c, proton mass m_p, electron mass m_e, nuclear radius of the hydrogen atom r_n, radius of the electron r_e, the gravitational constant G, and the electrostatic unit of charge mathematically relate in the manner

$$m_p \approx \frac{2Hcr_nr_e}{G}$$

$$\frac{H(2r_n)}{c} \approx \frac{Gm_p}{r_ec^2} = \frac{Gm_pm_e}{m_ec^2r_e} = \frac{Gm_pm_e}{e^2} \cong 4.4 \times 10^{-40}$$

Dirac reasoned that such equality could be more than coincidence, but if the universe is expanding at a constant rate, then the value of H should decrease with expanding distance between galaxies. He assumed G decreases as the universe expands. If it is also assumed that e^2 likewise decreases the same, such that the perceptional decrease in G is relatively nullified by the same decrease in e^2, then the universe could be either expanding or static according to the unification of the big bang with tired light.

How does tired light and expansion equate with regard to the Tolman Brightness Test? If the drift velocity as a fourth order relativistic effect is an additional gravitational effect to the tiring of light according to the Hubble Constant, then they equate.

Lyndon Ashmore has proposed a tired light theory consistent with quantum physics. The only difference of it and quantum physics is that it contains a constant k of proportionality that is remarkably equal to exactly one cubic meter, such that

$$H_2 = \frac{hr_e}{m_e k} \approx 64\ kilometers\ per\ second\ per\ million\ parsecs$$

H_2 is Ashmore's assumed value of the Hubble Constant, and h = 2πħ is the Plank constant. The constant k as exactly one cubic meter coincides with the average cosmic density of the universe as had been determined by astronomical observation.

That k equals exactly one cubic meter is also consistent with the theory of general relativity inasmuch as the density of the universe in ratio to the nuclear density of a hydrogen atom equals the ratio of the gravitational and electrostatic forces of the proton and electron in the hydrogen atom.

The average density ρ of the universe in relation to H_2 and the radius R and mass M of the universe , as according to Einstein's formula, is

$$\rho = \frac{3H_2^2}{8\pi G} = \frac{3c^2}{8\pi R^2 G} \approx \frac{3(2GM)}{8\pi R^3 G} = \frac{3M}{4\pi R^3}$$

Since the dimensional value of the Hubble Constant refers to a velocity per distance, H_2 converts to light speed c for a critical radius R in relation to the gravitational escape velocity squared as c^2 = 2GM/R.

The density of the universe in ratio to the density of an atomic nucleus of the hydrogen atom further approximates to the ratio of the gravitational and electrostatic forces between the proton and electron in the manner

$$\frac{3M}{4\pi R^3} \div \frac{3m_p}{4\pi r_n^3} = \frac{Mr_n^3}{m_p R^3} \cong \frac{Gm_p m_e}{e^2} = \frac{Gm_p}{r_e c^2}$$

By substitution

$$\frac{3H_2^2}{8\pi G} \div \frac{3m_p}{4\pi r_n^2} \cong \frac{Gm_p}{r_e c^2}$$

$$H_2 \cong \frac{2G^2 m_p^2}{r_n^3 r_e c^2}$$

In ratio to H

$$\frac{H_2^2}{H^2} = \frac{2G^2 m_p^2}{r_n^3 r_e c^2} \div \frac{G^2 m_p^2}{4r_e^2 r_n^2 c^2} = \frac{8r_e}{r_n}$$

The respective radii relate to internal and potential energies as

$$r_e = \frac{e^2}{m_e c^2}$$

$$r_n = \frac{e^2}{m_p v^2}$$

Hence

$$\frac{8r_e}{r_n} = \frac{8e^2}{m_e c^2} \div \frac{e^2}{m_p v^2} = \frac{8m_p v^2}{m_e c^2}$$

The ratio of the Hubble Constant values squared thus equate as 8 proton potential energies per internal energy of the electron.

The factor 8 could relate to the ratio of escape velocity to orbital speed of free fall and to a slower light speed in a gravitational field. The escape velocity is greater than the orbital speed by the square root of 2, and by the Schwartzschild Metric light speed at a maximum Schwartzschild radius is c' = c/2. If c' is the actual escape speed of the field and c'' is its orbital speed, then $(c'')^2$ is 8 times less than c^2, such that

$$\frac{8v^2}{c^2} = \frac{8v^2}{4c'^2} = \frac{2v^2}{c'^2} = \frac{2v^2}{\left[\left(\sqrt{2}\right)c''\right]^2} = \frac{v^2}{c^2}$$

The fraction on the right is indicative of a relativistic effect, as slower light and relative motion in a gravitational field, according to the approximation

$$\frac{1}{1 - \frac{v^2}{c^2}} \approx \frac{v^2}{c^2}$$

The speed v also relates to theoretical orbital speeds of the electron around the atom and the proton around the nucleus of the atom, and $v/c = e^2/(\hbar c) = 1/(137.036)$, as the fine structure constant.

The ratio of H_2 to H thus relates to relativistic effect in support of other results indicating the unity of Big Bang and Tired Light with regard to a unified field of gravitational and electrostatic forces.