The Recycling Universe

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The Recycling Universe is similar to Steady State Cosmology except that it is neither assumed to be finite nor expanding. The Hubble Constant relates instead to a loss of energy in similar manner of the tired light' theory proposed by Lyndon Ashmore. His theory entails a quantum loss of energy absorbed by plasma in intergalactic space. The absorption of light energy is in proportion to the energy of the photon absorbed and reemitted, as according to the probability conditions of quantum principles. The captured energy becomes an increasing cosmic microwave background radiation. In the Recycling Universe the CMBR constitutes a recycling process. There is a Doppler shift from relative motion and gravity of light interacting with plasma and matter that results in the gravitational effect itself. In addition, the plasma in intergalactic space absorbs the CMBR for replacing galaxies and stars that burn out of existence.

1. Introduction

Space surrounding matter is assumed to be comprised of a plasmatic state of equilibrium according to the relative distribution of matter at large. As plasma is pushed closer to matter it becomes denser and experiences more stress, and it converts to a radiant energy that scatters about in tunneling away from matter according to the conditions of space-time curvature as described by general relativity theory (GRT).

The conversion process requires that light and the interacting medium both have mass. That light has mass for momentum and energy exchange is verified by mathematical example to comply with conservation of mass and momentum according to special relativity theory (SRT).

Because an exchange of mass also occurs in plasmatic space apart from matter, the inertial condition of space is explained in accordance with the Schwartzschild metric. Further explanation is with regard to singularities and black holes that are indicated by the Schwartzschild metric.

The Hubble Constant is then formulated mathematically in relation to the ratio between gravitational and electromagnetic forces. However, the value of the Hubble Constant from the resulting formula differs from one offered by Lyndon Ashmore. A comparison of them is therefore provided with explanation. The purpose here is not to prove his theory is incorrect. To the contrary, it is recognized as founded on empirical data and established principles of quantum physics. The issue is for it to fit into a more complete theory, as one that includes relativity theory with a recycling process wherefore the tired light energy collected in intergalactic space has purpose in contributing to the gravitational effect.

2. Light with Mass

Light is defined as a particle called a photon having no rest mass because SRT describes a particle as increasing in infinite mass in order not to accelerate to light speed. However, although light has no rest mass, it is never at rest. It can therefore have mass, as acquiring infinite mass pertains more particular to the process of acceleration. The real mystery pertains to why light tends to move at the same speed whereas particles of matter move at variable speeds, but the concern here is only with the transfer of mass between light and matter.

Light has momentum and energy. Matter and antimatter convert to pure energy, which is light. This result is not inconsistent with theory in that matter and antimatter cancel each other. However, even in the absence of antimatter matter converts to light and vice versa by means of elastic collisions between them.

When there is an inelastic collision between two masses the total mass remains the same regardless of the inertial system of relative motion from which the event is viewed. Elastic collision is inelastic collision plus the reverse of inelastic collision, but it includes a transfer of mass from one to the other in conserving total momentum. This condition applies not only between particles of matter; it applies to collisions between particles of light and matter as well. Light thus has mass.

This transfer of mass is verified by example in showing conservation of momentum from conservation of mass. Let unit rest mass $m_0 = 1$ with momentum $m_0(0) = 0$ relative to observer A absorb a photon of momentum $m_x c$ such that m_0 and the photon move away from observer A at velocity $.6c$. The total mass before inelastic collision is $m_x c + m_0(0)$. After inelastic collision it is $(m_x + m_0)(.6c)$. Since the total mass is conserved it equates in the manner

$$m_x c + m_0(0) = (m_x + m_0)(.6c)$$

$$m_x c = .6 m_x c + .6 m_0 c$$

$$.4 m_x = .6 m_0$$

$$m_x = \frac{3}{2} m_0$$

The total momentum before the collision was

$$\left(\tfrac{3}{2}\right)(1) = \tfrac{3}{2} \text{ units}$$

After the collision it is

$$\left(\tfrac{3}{2} + 1\right)\left(\tfrac{3}{2}\right) = \left(\tfrac{5}{2}\right)\left(\tfrac{3}{5}\right) = \tfrac{3}{2} \text{ units}$$

Total momentum of inelastic collision is thus conserved along with conservation of mass.

To add the reverse process for elastic collision let a photon be emitted from the combined masses $m_x + m_0$ now at rest with observer B. The photon is emitted relative to observer B with equal energy in the opposite direction it was absorbed from. Relative to observer B the change in rest mass m_0 and its change in velocity and momentum is therefore the same emitting the photon as it was for absorbing it. Relative to observer A, however, the new velocity calculates according to the addition of velocities formula, where $v = v_1 = v_2$

$$v_{12} = \frac{2v}{1+\frac{v^2}{c^2}} = \frac{2(.6)}{1+.36} = \frac{15}{17}c$$

The relative mass becoming of m_0 relative to observer A is

$$m_2 = \frac{m_0}{\sqrt{1-\left(15/17\right)^2}} = \frac{17}{8}m_0$$

The units of momentum becoming of m_0 relative to observer A are

$$\left(\frac{17}{8}\right)\left(\frac{15}{17}\right) = \frac{15}{8}$$

For conservation of momentum these units of momentum need to be numerically the same in the opposite direction. They are calculated in manner of the Doppler formula in relation to the recessional velocity between observer A and the source from which the photon is emitted:

$$m_{xb} = m_x\left|\frac{1-v_{12}}{1+v_{12}}\right|^{1/2} = \frac{3}{2}\left|\frac{1-15/17}{1+15/17}\right|^{1/2} = \left(\frac{3}{2}\right)\left(\frac{1}{4}\right) = \frac{3}{8}$$

The total units of mass relative to observer A are

$$\frac{17}{8}+\frac{3}{8} = \frac{20}{8} = \frac{5}{2}$$

The total units of momentum relative to observer A remain as

$$\left(\frac{17}{8}\right)\left(\frac{15}{17}\right)-\left(\frac{3}{8}\right)(1) = \frac{18}{8}-\frac{3}{8} = \frac{12}{8} = \frac{3}{2}$$

Relative mass and momentum are therefore conserved with regard to the elastic collision between light and matter by way of a transfer of mass-energy between light and matter.

3. Inertial Space

It is assumed that gravity results from the conversion of inertia from the space-time medium into light energy. A condition of inertial space-time is evident with the retardation of light speed and all other events in a gravitational field. This retardation principle was explicitly derived in accordance with the Schwarzschild metric:

$$ds^2 = c^2dt^2\left(1-\frac{2GM}{rc^2}\right)-\frac{dr^2}{1-\frac{2GM}{rc^2}}-r^2d\theta^2-\sin^2\theta\, d\varphi^2 \qquad (1)$$

The interval ds is with regard to invariance of the interval and dt and dr are increments of time and distance where the gravitational field of mass M is homogeneous within an infinitesimal volume of space wherefore conditions of SRT and Newton's theory of gravity apply. The square root of $2GM/r$ in the relativistic factor $1-2GM/rc^2$ is the escape velocity of the field.

If the event describes a photon then the difference between its actual change in position and its observed change in position (in view of the principle of simultaneity) is zero, such that $ds = 0$. By omitting the polar coordinates $d\theta$ and $d\varphi$ the metric becomes

$$0 = \left(1-\frac{2GM}{rc^2}\right)dt^2-\frac{dr^2}{1-\frac{2GM}{rc^2}}$$

$$\frac{dr^2}{dt^2} = c^2\left(1-\frac{2GM}{rc^2}\right)^2 \qquad (2)$$

$$\frac{dr}{dt} = c\left(1-\frac{2GM}{rc^2}\right) = c'$$

The relative speed of light in a gravitational field is thus less than unity.

The Schwartzschild metric also indicates a condition similar to SRT. In SRT light represent a limiting aspect that matter neither equals nor exceeds. The same limiting aspect is echoed with the square of the escape velocity of the field as $rc^2 = 2GM$, whereby dr^2 becomes infinite. Schwartzschild referred to this result as a singularity. Neither he nor Einstein considered the singularity as real, but it nonetheless became the foundation for the existence of black holes and the origin of the Big Bang.

Einstein in opposing the singularity as a physical reality debated it with Oppenheimer. Stephen Hawking later acknowledged the black hole is contrary to the laws of thermodynamics and applied the probability condition of quantum physics as a remedy. Worm holes were thus assumed to exist along with white holes for tunneling into other universes or dimensions and vice versa. The singularity has also been retained so that our universe is somehow created within a speck of space to expand and absorb additional dark energy. However, these theories depend on how the Schwartzschild limit applies to the real world. If light has mass, and if the gravitational effect results from the absorption and emission of light, then the Schwartzschild limit can be avoided.

4. Electromagnetic Gravity

If gravity occurs by way of an interaction of light with plasma and matter, then the ratio between gravitational and electromagnetic forces is fundamental to theory. The two most fundamental masses of the atom are the proton and electron. By substituting $m_ec^2r_e$ for ke^2 as its parameters, the ratio of forces takes the form

$$\frac{Gm_pm_e}{ke^2} = \frac{Gm_p}{r_ec^2} = 4.4\times10^{-40} \qquad (3)$$

Eq. (3) equates to the Hubble Constant in the manner

$$\frac{2H_1r_n}{c} = \frac{Gm_p}{r_ec^2} \qquad (4)$$

By multiplying both sides by $2r_nc$ and dividing them by $4r_n$ the equation obtains the form

$$H_1 r_e = \frac{2Gm_p c}{4r_n c^2} = \frac{c - c\left(1 - \frac{2G\,m_p}{r_n c^2}\right)}{4} \tag{5}$$

Eq. (5) is consistent with Eq. (2) in that in both equations the retardation of light speed is according to the square of the relativistic factor. However, Eq. (2) is not for comparing events according to different frames of reference. It relates to a relativistic-cosmic-red shift in light spectra.

If the observable part of the universe is limited to the distance $R_1 = H_1/c$, then Eq. (3) also relates in the manner

$$\frac{ke^2}{R_1} \approx \frac{Gm_p m_e}{2r_n} = \frac{1}{2} m_e v_e^2 = \frac{1}{2} m_p v_p^2 \tag{6}$$

The electric charge of the electron spread out through the observable universe thus appears to be the kinetic energy of either the proton or electron as the part of their relative mass from the Doppler red shift of the Hubble Constant.

Eq. (6) could be a coincidence, but it would be one that is particularly unique to our observable universe. Black holes, for instance, have a limit to the Schwartzschild radius r of the metric, but a shorter r corresponds to a greater value of H according to a shorter radius for the escape velocity $2GM/R$. The black hole in regard to this analysis is thus an observable universe in itself with a different value of H.

The light from distant stars is also from the past, which has implications with regard to different theory. Big Bang theory, for instance, requires a greater Hubble Constant for a constant rate of recession from relatively closer stars. However, for it to be in agreement with observation it assumes that the rate of expansion increases by way of an increase in dark energy. Connecting the Hubble Constant with gravity also indicates a different value for H with regard to different masses, but it only pertains to the universe at large that is now relatively the same as it was in the past according to tired light theory.

That the gravitational effect results from the absorption and emission of light does not mean the absorption and emission of light therefore causes gravity. It lends to numerous effects. Particles of matter absorb and emit light apart from the gravitational effect, as stars emit light in compliance with the laws of thermodynamics. Part of this emitted light is absorbed in intergalactic space. Part of it is used to create new galaxies and stars. Part of it resupplies the repulsive energy of the plasmatic medium for it to maintain the gravitational effect, but it also results in an observable universe as part of an infinite universe in resolution of Olber's Paradox. The observable part of the universe is thus according to the relation $HR_1 = c$. The radius R_1 from the observer to the observable part of the universe thus has the same limit that relative motion of mass does.

As for tired light theory being in agreement with observation, given the values of the gravitational constant G, the electron and proton masses, the electron radius and light speed, the value of H_1 calculates as 70.9 km/sec/Mpc. The value of the Hubble Constant calculated from the data collected by WMAP is 70.5 ± 1.3 km/sec/Mpc.

5. Comparing Tired Light Theories

Another value of the Hubble Constant is 64 km/sec/Mpc according to Lyndon Ashmore's quantum equation relating it to the product of the Planck constant and the electron radius per product of the electron mass and 'one' cubic meter [1].

Ashmore's theory entails a loss of energy in proportion to the energy of any photon absorbed and reemitted by the plasma in intergalactic space. The proportional loss of energy is also according to the probability conditions of quantum principles and depends on the density of the plasma (as 99% of the mass-energy of the universe). One cubic meter is thus an empirical value determined by observation. The relation has further support in that Eric J. Lerner established a constant relation in atomic and cosmic vortexes in relation to mass density per distance [2]. However, exactly one cubic meter seems too coincidental and 1.0109 cubic meters for a Hubble Constant of $H_2 = 62.7$ km/sec/Mpc equates to equation (1) in relation to Einstein's critical mass density for a closed universe in ratio to the nuclear mass density of the hydrogen atom.

The critical mass density for a closed universe is

$$\rho_c = \frac{3H_2^2}{8\pi G} \tag{7}$$

The critical mass density in ratio to the nuclear density of the hydrogen atom is

$$\frac{\rho_c}{\rho_n} = \frac{3H_2^2}{8\pi G} \div \frac{m_p}{\frac{4}{3}\pi r_n^3} = \frac{H_2^2 r_n^3}{2Gm_p} = 4.2 \times 10^{-40} \tag{8}$$

By equations (3), (4) and (8) we obtain

$$\frac{H_2^2 r_n^3}{2Gm_p} = \frac{Gm_p m_e}{ke^2} = \frac{Gm_p}{r_e c^2} \tag{9}$$

In relation to Eqs. (6) and (8) Eq. (9) becomes

$$\frac{H_2^2 r_n^2 r_e c^2}{2Gm_p} = \frac{Gm_p}{r_n} = \frac{2ke^2}{R_1 m_e} \tag{10}$$

By substituting $2GM/R_1$ for c^2, $m_e c^2 r_e$ for ke^2 and c/H_1 for R_1 Eq. (10) becomes

$$\frac{H_2^2 r_n^2 r_e (2GM)}{2Gm_p R_1} = \frac{2ke^2}{R_1 m_e} = \frac{2r_e c^2}{R_1}$$

$$\frac{H_2^2 r_n^2 M}{m_p} = 2c^2 = \frac{4GM}{R_1} = \frac{4GMH_1}{c} = \frac{4GMH_1^2 R_1}{c^2}$$

$$H_2^2 = \frac{4GH_1^2 R_1 m_p}{r_n^2 c^2} = \frac{2H_1^2}{r_n} = \frac{2H_1^2}{r_n}\left(1 - \frac{2Gm_p}{r_n c^2}\right)$$

$$\frac{H_2^2}{H_1^2} = \frac{2R_1}{r_n} = \frac{2R_1}{r_n}\left(1 - \frac{2Gm_p}{r_n c^2}\right) \tag{11}$$

The ratio of H_2 and H_1 squared thus equals twice the ratio of the observable universe and nuclear radius ratio minus the relativistic contraction of twice that ratio.

6. Conclusion

Einstein inserted a cosmological constant into his field equations for keeping a finite universe from collapsing by gravity. Alexander Friedmann subsequently determined an infinite number of models were possible. However, for serious consideration they need to be theoretically consistent with observation. For The Recycling Universe to be consistent with theory a more rigorous formulation of it in compliance with general relativity theory needs to be accomplished. Initial implications are nonetheless promising. Besides being in agreement with the observational value of the Hubble Constant there are interpretations to consider with regard to infinities.

In The Recycling Universe a relativistic Doppler shift in light spectrum allows for an interpretation of the limiting aspect of the Schwartzschild radius analogous to light speed representing a limiting aspect of relative motion. As mass-energy conglomerates there is a relativistic decrease in it that contributes to the gravitational effect itself in compliance with the laws of thermodynamics. An objection to this explanation would be that light absorbed eons ago by black holes should be coming out of them if they are not truly black holes. However, if light is scattered every which way in intergalactic space then it becomes a source of dark energy.

Infinities with regard to a point charge of the electron are explained away by the mathematical process of renormalization. This explanation can easily be reinterpreted as the electron being in equilibrium with light of a particular frequency. It is thus not a point charge to begin with.

Some critics would associate plasmatic space as ethereal. The absorption and emission process is invisible except for the gravitational effect itself, but it is also in compliance with conservation laws and the principle of equivalence. Indeed, the equilibrium state of plasmatic space and matter adjusts to a change in relative motion as well to a change in the relative distribution of mass. Inertial mass and gravitational mass are thus equivalent.

References

[1] L. Ashmore, **Big Bang Blasted**, (BookSurge, LLC, 2006).

[2] E. J. Lerner, **The Big Bang Never Happened** (Vintage Books, 1991).