Cosmic Dust and Cosmology

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Abstract: Since Hubble, cosmology based on Doppler's redshift of galaxy light is taken of proof the Universe as finite beginning and expanding since the Big Bang. However, cosmic dust that permeates the \Universe is shown to negate Universe expansion, or at the very least, require corrections in measured Hubble redshift. Hubble redshifts include the redshift by cosmic dust so as to grossly over-predict galaxy velocities. Because of cosmic dust, the Universe may not be expanding, and if so,, the outstanding problems in cosmology would be resolved by Newtonian mechanics.

Keywords: cosmology, cosmic dust, redshift, quantum mechanics, QED

1. Introduction

Cosmologically, man has pondered the origin of the Universe. Human know life has a beginning and an end, and it is only natural to think the Universe also has a beginning and an end. Yet, for thousands of years, the Universe was considered static and infinite - without a beginning and end. However, Einstein in 1916 introduced his field equations that required the Universe to not be static and infinite, but rather finite and expanding. Since the notion of a static Universe is foreign to human experience that everything has a beginning and end, Einstein's field equations provided the theoretical basis to suggest the Universe is finite and expanding. But lacking experimental basis, the expanding Universe lay dormant until 1929 when Hubble showed the light from distant galaxies was red-shifted. Interpreted by Doppler's effect, Hubble's redshift was taken as proof the Universe was expanding consistent with Einstein's field equations.

Since Hubble's discovery, cosmologists claim Doppler's redshift proves the Universe as finite beginning and expanding since the Big Bang. Whether galaxies are moving away from the Earth is determined by measuring the redshift of the light emitted from the atoms on the galaxies. Indeed, by interpreting the redshift by the Doppler effect, the velocity of the galaxy is thought measured thereby supporting the notion of an expanding Universe. However, not all agreed. Since Hubble's discovery, numerous theories have been proposed to explain galaxy redshift without the Doppler effect so as to place in question the expanding Universe. Nevertheless, cosmologists now generally consider the Universe as expanding only because Doppler's effect is the most convenient interpretation (Corasaniti, 2008) of the redshift of galaxy light.

If, however, galaxy redshift could be shown to have a non-Doppler origin, the Universe need not be expanding. Redshift without an expanding Universe is important because the outstanding problems in cosmology would be resolved by Newtonian mechanics.

2. Purpose

Show galaxy light is redshift upon absorption in NPs of cosmic dust. NP stands for nanoparticle having sub-micron dimensions. However, the purpose is not to show cosmic dust NPs give the same redshift for all wavelengths of galaxy light as in the Doppler effect, but rather to suggest the redshift by the Doppler effect needs to be corrected for cosmic dust that permeates the Universe.

3. Theory and Analysis

QED is proposed as the mechanism by which the EM energy of a galaxy photon is redshift upon absorption in a cosmic dust NP under TIR confinement. QED stands for quantum electrodynamics, EM for

electromagnetic, and TIR for total internal reflection. QED induced redshift is a consequence of QM that forbids the atoms in NPs under TIR to have the heat capacity to increase in temperature upon absorbing the EM energy of the galaxy photon. QM stands for quantum mechanics. The TIR confinement of the absorbed galaxy photon is only momentary. In effect, TIR sustains itself, i.e., absent NP absorption there is no TIR confinement. Upon absorption, the EM energy of the galaxy photon creates is redshift depending on the properties of the NP. Redshift only occurs as the NP absorbs a single galaxy photon, i.e., blueshift having energy greater than that of the galaxy photon violates the conservation of energy does not occur.

The QM restriction on the heat capacity may be understood by the Einstein-Hopf relation for the atom as a harmonic oscillator that for temperatures of 300 and 2.7 K is shown in Fig. 1.

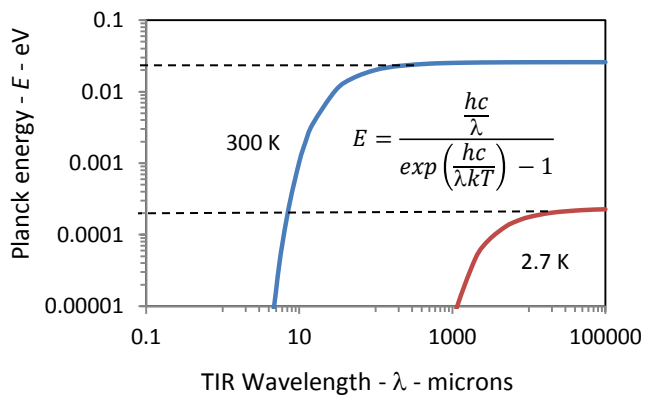

Figure 1. Planck energy of the atom as a Harmonic oscillator
In the inset, *E* is Planck energy, *h* Planck's constant, *k* Boltzmann's constant,
λ the TIR wavelength, *T* absolute temperature, and *c* the velocity of light.

Unlike classical physics allowing the atom to always have heat capacity from the macro to the nanoscale, QM restricts the heat capacity of the atom to the macroscale. Classical physics noted by dotted lines at 300 and 2.7 K in Fig. 1 shows the macroscale correspond to λ > 30 and 3000 microns, respectively. Instead, the QM heat capacity at the respective temperatures for λ < 0.8 and 1000 microns is reduced > 2000 and 20 X from classical theory, the consequence of which is the NP cannot conserve the absorbed galaxy photon by an increase in temperature.

Lack of heat capacity by QM forbids EM energy conservation in NPs by an increase in temperature, and instead, conservation proceeds by QED inducing the EM energy of the single galaxy photon to be redshift light to the TIR frequency of the NP. Why is TIR the important?

In 1870, Tyndall showed light is confined by TIR to the surface of a body if the refractive index of the body > than that of the surroundings. Since NPs have high surface to volume ratios, absorbed EM energy is therefore confined almost totally in the NP surface thereby directly exciting the TIR mode of the NP. Simply put, the galaxy photon wavelength is stretched to fit the NP circumference. The QED redshift galaxy photon created is observed on Earth at wavelength λ_o,

$$\lambda_o = \pi n D = 2\pi n a \tag{1}$$

where, *D* is the NP diameter, and $a = D/2$ is the NP radius. The redshift *Z* is,

$$Z = \frac{\lambda_o - \lambda}{\lambda} \tag{2}$$

where, λ is the wavelength of the galaxy light. Cosmic dust measurements (Li & Draine, 2002) give the range of NP radii from a = 0.005 to 0.25 micron. Fig. 2 shows the redshift Z of Lyα and Hα lines for

amorphous silicate having n = 1.5. At the upper bound NP radius of 0.25 microns, the Lyα and Hα lines have Z = 11 and 1.2, respectively. Hence, the cosmic dust correction to Hubble redshift for the Lyα line is far greater than Hα.

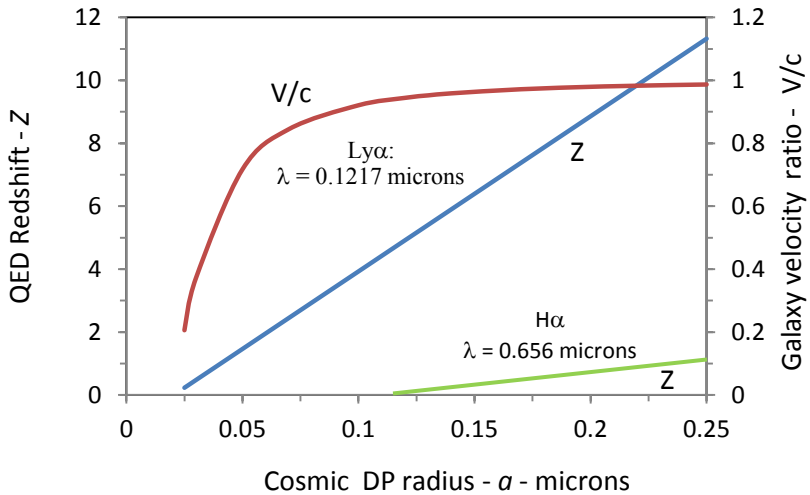

Fig. 2 QED Induced Redshift of Lyα and Hα lines
Amorphous Silicate: n = 1.5

4. Discussion

4.1 Expanding Universe

The QED induced redshift is caused solely by the absorption of the galaxy photon in cosmic dust having nothing to do with an expanding Universe. Given that galaxy light is unequivocally absorbed by cosmic dust on its way to the Earth, the high galaxy velocities V inferred from the Doppler interpretation of Hubble redshift Z may be meaningless as the galaxy need not be receding at all. Relative to the velocity of light c, the Doppler velocity V of galaxies with redshift Z is,

$$\frac{V}{c} = \frac{(Z+1)^2 - 1}{(Z+1)^2 + 1} \tag{3}$$

Fig. 2 shows the galaxy velocity V inferred by the Doppler redshift of the Lyα photon is a significant fraction of c even at low Z, e.g., for a = 0.025 microns, Z = 0.23 and V = 0.2 c. Therefore, any implied relation of Dark Energy (Riess, et. al) from Supernovae light to an expanding Universe is questionable. What this means is the Universe may still be expanding and Dark Matter and Energy may still exist, but Universe expansion cannot be proven from redshift measurements of Supernovae light. Moreover Hubble redshift is questionable proof the Universe began in the Big Bang suggesting the notion once proposed by Einstein of a static Universe in dynamic equilibrium is a more credible cosmology.

4.2 Black Hole Mass

Astronomers based on Doppler redshift measurements of stars orbiting black holes infer 50 billion solar masses at the center of the black hole are required to allow the star moving near the speed of light to stay in orbit. In contrast, QED induced redshift by cosmic dust in the line of sight of the optical measurement

suggests the star velocity is highly exaggerated thereby placing in question the presence of large solar masses in black holes.

4.3 Corrections of Hubble Redshift

The Hubble redshift by the Doppler effect gives the same Z for ALL wavelengths while QED induced redshift depends on wavelengths. Historic data (Minkowski and Wilson, 1956) supports the Hubble redshift for at low Z < 0.05, but excludes the Lyα lines that give the largest QED induced redshifts. Today, support for the Doppler effect at high *Z* is rarely reported. Therefore, to obtain valid Hubble redshift, measured Z is proposed corrected using measured Z for Lyα and Hα lines,

$$Z_{Hubble} = Z_{meas} - \left(Z_{Ly\alpha} - Z_{H\alpha}\right) \tag{4}$$

4.4 Other Consequences

QED induced redshift in cosmic dust alters ALL astronomical measurements, a summary of which is given in the APRIM – 2014 Presentation (Prevenslik, 2014) with the consequences:

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Dark Energy not needed to explain a Universe that is not expanding
Period-luminosity relation qualified in Cepheid stars
Dark Matter not required in Gravitational Lensing
Galaxy Rotation Problem resolved without Dark Matter
No need for MOND to explain Galaxy Rotation Problem
Tolman Surface Brightness reduction by (1 + Z)
Explain the Independence of Redshift in Sunyaev-Zeldovich Effect
Light Curve dilation in Supernovae Explosions without Universe expansion

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