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Redefining Redshift as Attenuation

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Abstract

As light travels extreme distances through space, its frequency slowly diminishes (attenuates). We observe this phenomenon as a *redshift*, the tendency of visible light to drop toward the red end of the spectrum. Unfortunately, for over 100 years redshift has been misinterpreted as a Doppler effect, a fundamental error upon which have been built popular but misconceived cosmological theories. This study explains the true nature of redshift and provides a formula for estimating the rate at which light attenuates over extreme distances.

Introduction

Over extreme distances, light attenuates according to the following equation $C = \lambda f$

Where c = speed of light; λ = wavelength of light; and f = frequency of light wave.

The farther light travels, the greater the degree to which its frequency slowly diminishes as its wavelength correspondingly increases. We observe this phenomenon as a "redshift", i.e. the tendency of visible light to drop toward the red end of the spectrum. The farther away a galaxy is, the more its light shifts toward the red end of the spectrum.

If a distant source emits light in the middle of the spectrum, it can be in the red end of the spectrum by the time we receive it. If, however, that source emits light in the blue end of the spectrum, it will have redshifted but could still be in the blue range by the time we receive it. There is no such thing as a "blueshift" whereby wavelengths shorten and frequency increases. All light is redshifted. Light cannot behave in any other way.

Because the surface temperature of the Sun is 5, 5000 C, it emits light in the yellow range of the spectrum. A star with a surface temperature of 12,0000 C emits light in the blue end of the spectrum, and one with a surface temperature of 3,0000 C emits light in the red end of the spectrum [1].

If Star ***X*** at a temperature of 7,0000C and Star ***Y*** at 12,0000C are the same distance from Earth, we could simultaneously be receiving light from ***X*** in the red end of the spectrum and light from ***Y*** in the blue end of the spectrum. The temptation is to conclude that light from ***X*** is redshifted and light from ***Y*** is blueshifted, but that would be a mistake. The light from both ***X*** and ***Y*** is being attenuated (redshifted) at the same rate. It is only because light from ***Y*** started out at a much higher frequency that it has not yet dropped into the red range of the spectrum.

Light from the following nebulae in the 700 to 5,000 light-year range is predominantly blue at source: Helix NGC7293, Iris NGC7023, and Swan's Crescent NGC6888 [2]. Supernovae SN1885A and SN1986J (in Andromeda), SN1994D and SN2007bi (in Virgo), and SN1987A (in the large Magellan Cloud) emit intense blue and violet light that by the time it reaches us has been redshifted from its very high frequency at source but still appears to us to be in the blue range of the spectrum [2].

The light we receive from binary star systems (within a distance range of 8 to 90 ly) regularly alternates between being in the red and blue ranges of the spectrum. Examples of such binary systems include Alpha Centauri, Sirius, Beta Lyrae, 61 Cygni, Procyon, 55 Cancri, and Algol [2]. When these binary stars are at their farthest distance from each other, we experience their light as being in the red range of the spectrum. When each pair of stars is lined up one behind the other, we observe their light as being in the blue range of the spectrum. Lined up stars together generate more intense heat than either does separately, thus synergistically raising the frequency of emission of their combined light to much higher than either star emits independently of the other.

A Century of Errors

Unless one knows the frequency of light emitted at source, there is no way to know by how much it has been redshifted by the time it reaches the observer. For over 100 years, astrophysicists have not paid enough attention to frequency at source. They falsely assume that what they are witnessing are galaxies in motion and mistakenly use redshift to indicate a presumed velocity of motion. This is the logical error of circular reasoning, i.e., inadvertently including one's conclusion in the assumption, then using the assumption to prove the conclusion.

In 1915, astronomer Vesto Slipher observed that light from some spiral nebulae is redshifted and jumped to the conclusion that what he was witnessing was a light source rapidly moving away from the observer and somehow stretching the wavelength of light it emits [1**]**. He also observed light received from Andromeda to be in the blue spectrum and falsely concluded that this must be because this galaxy is somehow shrinking the wavelength of its light as it rapidly approaches us.

Slipher did not appreciate how light attenuates and thought he was witnessing a Doppler effect. In redshift there is an actual increase in wavelength. In Doppler, there is only the illusion of a change in wavelength. Redshift and Doppler are fundamentally different. Redshift is attenuation whereas Doppler is distortion. To presume they are the same "Doppler-redshift" is rather like referring to a line in geometry as a straight-curve.

Light waves are transverse (i.e., oscillate perpendicular to their path) and do not require any medium through which to travel. Sound waves are longitudinal (i.e., vibrate parallel to their path) and propagate by compression and rarefaction of the medium through which they travel (e.g., air, water, solids).

If the source of a sound is moving toward you, identical length waves hit your ear more frequently, distorting the perceived sound to a higher frequency. As a sound source moves away from you, identical length waves hit your ear less frequently, distorting the perceived sound to a lower frequency. This is the Doppler Effect.

Suppose an ambulance heading towards you at 70 km/h emits musical note **A** (frequency 440 Hz, wavelength 0.773 m). Suppose also that the first note you hear as the siren comes into earshot is **Bb** (466 Hz). As the ambulance passes by, you hear the true **A**440. After the siren passes, you hear in the distance **Ab** (415 Hz). The wavelength of the sound emitted by the siren (0.773 m) never changes. Both the **Bb** and **Ab** are distortions of the true **A**440 sound.

In 1927, Edwin Hubble compounded the Slipher error by presuming that galaxies are receding from the Milky Way and the farther they are away; the faster they are receding [2]. Hubble estimated presumed radial velocities of 46 star clusters on the unwarranted assumption that they were travelling on straight line paths diverging from a presumed central colossal explosion [3]. Because of its false redshift assumption, "Hubble's law" is a failed theory [2]. Yet, it has become the foundation of the prevailing belief that the universe is expanding and at an accelerating rate.

In 1931, astronomer Georges LeMaître published the English version of his earlier paper, "A homogeneous Universe of constant mass and growing radius accounting for the radial velocity of extragalactic nebulae" [4]. LeMaître initially called his theory the "hypothesis of the primeval atom" and described it as the "cosmic Egg exploding at the moment of creation", which speculation belongs to the realm of metaphysics rather than physics. Because of its false redshift assumption, cosmic egg theory is a failed theory [2]. Yet, it has become the foundation of the prevailing belief that the universe began from a "big bang" singularity, which notion is both logically and scientifically impossible [2].

In 1933, Fred Zwicky inferred the hypothetical existence of "missing mass" (later called "dark matter") to explain an unknown force of gravitational attraction that appears to be keeping the universe from expanding too quickly [5]. Alleged dark matter cannot be seen by telescopes, nor detected by any other means. Light passes right through dark matter, which neither emits nor absorbs electromagnetic radiation of any kind. Dark matter does not interact with normal matter and does not participate in nuclear fusion. Dark matter has none of the properties of matter nor any properties at all because dark matter does not exist. It is an invalid theory derived from the fatally flawed Hubble's law theory that is based on erroneous interpretation of redshift attenuation [2].

In 1998, Adam Riess, Saul Perlmutter, and Brian Schmidt claimed to have discovered the existence of hypothetical dark energy, a gravitationally repulsive force believed to oppose the gravitational attraction of dark matter [6]. The gravitational effect of dark matter was supposedly slowing down the alleged expansion rate of the universe. When redshift measurements of supernovae seemed to suggest that the universe was expanding at an accelerating rate, then dark energy was postulated to be an unseen force opposing dark matter, thereby reducing its effects. Redshift, however, is not a measurement of motion. The universe is not expanding [2]. There are no mysterious forces playing tug-of-war with its alleged rate of expansion, no dark matter and no dark energy opposing dark matter.

NASA uses redshift as a measure of cosmic distance but falsely presumes that said distance is a function of how far a given galaxy has travelled with respect to the Milky Way since the time of the alleged "big bang" singularity [2]. A typical false conclusion drawn from this presumption is that the Milky Way is heading toward the Leo constellation at the rate of 300 km/s [7].

Rate of Attenuation

Galazy GN-z11 enables us to estimate rate of attenuation over its distance of 13.39 billion light-years. Light from GN-z11 is dull red, and its frequency is documented by NASA as being in the low red range of the spectrum [8, 9].

Suppose that GN-z11's frequency at source (***fs***) is 590 THz (mid spectrum) and its frequency received (***fobs***) is 410 THz (low red). This would mean that over 13 Gly, frequency from GN-z11 has dropped by 180 THz. This is equivalent to frequency dropping every billion light-years by 2.75% of the frequency of the previous billion light-years. We can thus express redshift attenuation (RA) by the following equation in which distance (***D***) is expressed in incremental units of one billion light-years (Gly).

RA **= *f*obs = *f*s** (0.9725) ***D***

When its frequency drops below 400 THz, light is no longer visible. It continues at the speed of light but as electromagnetic energy that cannot be seen. This would happen for GN-z11 at 14.6 Gly – which means that an observer located 2 Gly from Earth in the opposite direction would not be able to see GN-z11 at all.

At a distance of 10 Gly, the frequency of light from a sun-like star emitting at 525 THz (yellow range) drops below the visual threshold of 400 THz. Thus, we have no way of knowing how many stars within the outer range of our telescopes may be invisible to us.

The Hubble Space Telescope creates for us a spherical horizon with radius of about 13.4 Gly. We have no way of knowing how many galaxies there may be at or beyond 15 Gly because their light will have dropped below the visual threshold of 400 THz at a distance of at least 400 million light-years before it reaches us.

It is a convenience of nature that there should be a maximum distance that visible light can travel. If this were not so, the night sky would be ablaze with a patchwork blanket of light rendering us incapable of distinguishing one celestial object from another. We would never be able to understand the cosmos or our place in it.

Conclusion

Over extreme distances through space, the energy of light gradually diminishes (attenuates). As its frequency slowly reduces, its wavelength correspondingly increases. We observe this phenomenon as a redshift, the tendency of visible light to drop toward the red end of the spectrum. Redshift measurements suggest that the energy of light emitted from far distant galaxies may eventually drop beneath visibility at ranges from 10 to 14 billion light-years, depending on its frequency at source.

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