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Redshift Quantization Explained

State

Public

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The redshift is an effect observed in astronomical data in which the color of light from distant objects is shifted toward longer wavelengths (the red end of the spectrum).

In this short article, we shall not try to examine thoroughly every attempted interpretation of the red shift, but we shall briefly examine a few generally well-known ones and primarily focus on a relatively new one.

The following are some well-known conventional explanations of redshift:

1. Gravitational redshift (Einstein shift) 1
2. Doppler effect
3. Cosmological redshift (space expansion)

After a brief review of the above conventional redshift explanations, I shall present a more recent and novel interpretation and examine some of its ramifications for the origin of the universe.

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1) Gravitational redshift

Photons lose energy while traveling out of a gravitational region, such as away from a gravitational mass, like a galaxy. Lower energy photons look redder. Therefore, there is the gravitational redshift:

> ...electromagnetic waves or photons travelling out of a gravitational well (seem to) lose energy. This loss of energy corresponds to a decrease in the wave frequency and increase in the wavelength, known as a redshift. 2

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2) Doppler effect

Per the Doppler effect, waves of light get stretched due to motion of the source of the light away from the observer.

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3) Cosmological redshift (expansion of space)

Waves of light are stretched, similar to the Doppler effect, but the lengthening is due to the expansion of space itself. This is also known as the *cosmological redshift*.

Also, note that more than one of these mechanisms may be in effect; that is, one mechanism does not necessarily rule out the others. However, there are problems with the conventional explanations.

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4) Problems with gravitational redshift

Calculations show gravitational redshift to be a small effect. 3 Also quoting the classic text *Gravitation*, by Wheeler, Misner, and Thorne:

> Observed quasar redshifts of z ~ 1 to 3 cannot be gravitational in origin; objects with gravitational redshifts larger than z ~ 0.5 are unstable against collapse. 4

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5) Problems with the Doppler effect

5.1) Galaxies required to travel too fast

As more distant galaxies were discovered and larger redshifts were noted, it became apparent that conventional explanations required these galaxies to be moving at speeds approaching the speed of light, which is a problem. This requires high acceleration to near relativistic velocities, which would disrupt galaxies.

Quoting the classic text *Gravitation* by Wheeler, Misner, and Thorne:

> Nor are the quasar redshifts likely to be Doppler; how could so massive an object be accelerated to v ~ 1 [the speed of light] without complete disruption? 5

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6) Problems with expanding space (cosmological redshift)

Expanding space is the preferred explanation in the classic text *Gravitation* by Wheeler, Misner, and Thorne:

> No one has ever put forward a satisfactory explanation for the cosmological redshift other than the expansion of the universe. 6

The same text, based on an analysis by Schmidt, argues the following:

> Observed quasar redshifts of z ~ 1 to 3 cannot be gravitational.... Nor are the quasar redshifts likely to be Doppler.... The only remaining possibility is a cosmological redshift. 7

However, the expansion of space explanation also has problems.

6.1) Different redshifts in the same galaxy

Different redshifts have been observed in the same galaxy.

> Several well-studied galaxies, including M51 and NGC 2903, exhibited two distinct redshifts. Velocity breaks, or discontinuities, occurred at the nuclei of these galaxies. 8

If expansion causes the redshift, then different redshifts in the same galaxy would mean that the galaxy is breaking apart! This breaking apart of such galaxies is not observed.

6.2) Changing expansion rates

To fit the data, expansion needs to be slowed initially, then accelerated later, which is hard to explain. 9

6.3) Quantization

Another vexing problem has been how to explain the recent discoveries of quantization of the redshift. This refers to the apparent clumping together of redshifts at certain values, skipping other values between them. Conventional explanations fail to account for this.

6.4) Centering of quantization shells on earth

Not only is the redshift quantized, but the quantization appears in concentric spherical shells that are centered on the earth! Some have suggested this indicates that the earth is the center of the universe.

There are other problems with the expansion of space redshift explanation, not listed here due to space constraints. 10

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7) Another redshift interpretation that avoids the above problems

There is one interpretation that explains the puzzles of quantization and avoids the other problems mentioned above. In this interpretation, instead of the light wavelengths being stretched while in transit between the source star or galaxy and earth, the wavelengths are not stretched while in transit but are already longer or "redder" at the time of emission from the distant source object, and the wavelength remains the same while traveling from the source to earth. This removes any requirement for the distant galaxies to be traveling away from earth at high, relativistic speeds to account for the wavelength change in transit by the Doppler effect or by expansion. Why? The wavelength does not need to change at all while in transit! The redshift was present at the instant the light was emitted and started its journey to earth.

Even the redshift data that suggested an initial slowing expansion, followed by accelerating expansion, can be explained without recourse to the assumption of expansion. (Though beyond the scope of this article, this is dealt with in Chapter 5, pages 170–171 of *Cosmology and the Zero Point Energy*.)

(Note: So, instead of the redshift occurring in transit, redshift occurs before transit. The light is redshifted when emitted from the distant source. I am not saying that the proposed mechanism is the only cause of redshift. There can be different causes of redshift. For example, real Doppler effects may in fact contribute to measured red or blue shifts, especially for nearby galaxies. We here are dealing with the major redshift cause throughout the cosmos, especially the cause related to those fairly high redshifts that have been used to specify the apparent age of the universe.)

7.1) How it works

The question then becomes, why is the light already redshifted at the time it is emitted from distant galaxies? The wavelength of emitted light is determined by the electron orbitals in the atom that emits the photon. As an electron moves between different orbitals with different energy levels, energy is either absorbed or emitted, depending on whether the electron gains or loses energy. If the energy difference between orbitals is lower in the ancient past, then the ancient, emitted photons will have longer (redder) wavelengths.

Let’s probe a little deeper; the question now becomes, why would the orbital energies be different—lower—in the past than they are now? To answer this, let’s consider what factor determines those orbital energies. The research of Hal Puthoff and others indicates that the vacuum energy of space maintains electron orbitals, 11 ,12 ,13 and that without this energy input, atoms would collapse. Quoting from University of Connecticut professor Ronald Mallett:

> A hydrogen atom consists of a positive proton orbited by a negative electron. As the electron revolves around the proton it should continuously lose energy and eventually collapse into the proton. Since this is not what happens, something else had to be going on. 14

The question is what else is going on to prevent the collapse of the atom? Mallett continues:

> Bohr suggested that the key to the problem was quantum theory. In quantum theory, the energy cannot be lost continuously, as energy is not continuous. This means that the electron has to stay in a fixed orbit, called its energy level, because it cannot lose energy continuously. 14

Bohr’s answer is the typically accepted answer in physics. However, physicist Puthoff says that:

> ...classical physics tells us that atoms, which can be likened to a miniature solar system with electron planets orbiting a nuclear sun, should not exist.
>
> The circling electrons should radiate away their energy like microscopic radio antennas and spiral into the nucleus. But atoms do exist, and multitudinous other phenomena which don’t obey the rules do occur.
>
> To resolve this cognitive dissonance physicists introduced quantum mechanics, which is essentially a set of mathematical rules to describe what in fact does happen. But when we re-ask the question, “why didn’t the electron radiate away its energy?” the answer is, basically, “well, in quantum theory it doesn’t.”
>
> It’s at this point that not only the layman but some physicists can begin to feel that someone’s not playing fair. 11

Also, Puthoff’s research indicates that the energy input to the electrons of atoms is equal to the energy they

radiate. Thus, this vacuum energy maintains electrons in orbit, as well as prevents atoms from collapsing throughout the universe. Puthoff's work indicates another alternative to the conventional quantum mechanical explanation for this puzzle of why the atom does not collapse.

Now we can surmise that if the emitted light is redder than normal on earth today or has a longer wavelength, then the atom that emitted the light had lower energy electron orbitals. This lower energy in the electron orbitals in turn implies the vacuum energy was less when the redshifted light was emitted.

We now have the next even deeper question: Why would the vacuum energy be lower for galaxies at great distances? The answer lies more in the distance in time than the distance in space. More distant objects are more ancient. The light from those objects was emitted not only at a great distance from earth, but also at a more ancient time in the past. Thus, the farthest, most distant, concentric shell is also the most ancient shell. The redshifted light we receive from it left longer ago in the past, than did light from the closer shells.

If this effect was due to distance or spatial location only, then those concentric shells of quantized redshift would indicate an actual phenomenon that was actually centered on earth. If, on the other hand, the concentric shells are due to time, then even if we were on the opposite side of the universe, we would still see concentric redshift rings centered on us since the farther away the object—no matter from where we are viewing it—the farther into the ancient past the light that we observe would have been emitted.

So, the next question becomes: Why would the vacuum energy have been less in the past?

One consideration is that if evidence indicates this happened, even if we may not know how to explain it, the fact remains that evidence indicates such. For example, long before electricity was thoroughly understood, we used it in motors, etc. And gravity was used in levers and other devices long before that. It can be argued that even today, we still do not have complete understanding of both electricity and gravity. Regardless, the point should be obvious. However, such evidence does indeed exist for the lower vacuum energy in the early universe. 15 16

So, the chain of causation is as follows. First the vacuum energy was lower in the past. This resulted in lower orbital electron energies and lower energy differences between orbitals. Emitted light thus had longer wavelengths, resulting in redder light, if the light was emitted in the early days of the universe.

This explains the redshift. The question remains, however, of the quantization observed—those pesky concentric shells centered on earth, so difficult (seemingly) to explain!

The answer to this question is relatively simple. Electron orbitals in atoms don't just gradually gain energy and expand. No, there is a gap—an energy gap for orbitals, skipping intervening energy levels. This quantum jump in electron orbital energy levels and electron energies results in the quantum jump or gap in the observed redshift since the redshift is directly caused by these orbital energy differences.

In fact, this model provides tools for calculating the redshift gaps that should be seen. Those gaps between the quantized redshift shells have been calculated. They are identical to the measured and observed values discussed by Tifft and Arp!

> ... this approach then predicts, and predicts exactly, all the quantization 'velocities' that Tifft and Arp have discussed, namely 2.667, 5.33, 8.00, 16.0, 24.0, 72.0, 144, 216, and 288 km/s.17

The centering of the shells on earth now becomes simple; this is because the rings are based on time, not distance. This is because the vacuum energy (and therefore orbital energies) gradually changed over time. Abundant evidence for this is given in Setterfield's *Cosmology and the Zero Point Energy*.

Farther away objects would have more redshift, so even if observing from the opposite side of the universe, we should see the same pattern of redshift shells centered on us.

This is the amazing aspect of this model. It not only predicts and explains the redshift, but it also explains the quantization of the redshift and the apparent centering of the quantization redshift shells on the earth. Beyond that, it even predicts the actual measured values of the gaps between those concentric shells!

Another point in favor of this explanation is that it helps to resolve the violation of energy conservation for light speed decay, as pointed out in the article "Does changing speed of light violate energy conservation?" in which the redshift was hypothesized to have been present at the time of emission of light from distant galaxies. 18

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8) The origin of the universe

This proposed explanation of the redshift then helps support that energy conservation is not violated by faster light speed in the past. This in turn indicates that distant galaxies may not be as old as conventionally accepted, based on their age determination by the current speed of light. A younger universe would then be supported, and some arguments against young earth creation for the origin of the universe would be answered.

I am sure questions abound. For many answers, the best source is probably the book *Cosmology and the Zero Point Energy* by Setterfield.

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