The Lyman-α forest and distances to quasars

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Halton Arp's hypothesis, that quasars and active galactic nuclei (AGNs[1]) have a very large intrinsic component to their redshifts, which is unrelated to their cosmic distance from Earth, is strongly rejected by the Standard Model (big bang) community. It is claimed, that the many lines of the Lyman alpha forest in the spectrum of most quasars prove that they are very far away. Also, it is claimed that *increasing* Lyman-α (alpha) forest lines are connected with *increased* values of redshift, so supporting large distances. Is that observation true?

The argument for the Lyman-α (alpha) forest of spectral lines comes with several unprovable assumptions. It is assumed that there exist clouds of hydrogen gas between distant quasars and Earth that absorb ultraviolet light at the wavelength of the Lyman-α line of hydrogen, which is about 122 nm. Quasars also emit light in a strong Lyman-α emission line. The idea is illustrated in figure 1. The hydrogen gas clouds may be the surrounds of galaxies in the intervening space.

In the Standard Model a Hubble-law-like relationship is derived from the cosmology for all redshifts, resulting from cosmological expansion of the universe. Hydrogen clouds are assumed to absorb light from the assumed background quasars, and thus it follows that in an expanding universe all hydrogen clouds have smaller redshifts than any chosen background quasar since the hydrogen clouds are not as distant. As a result the absorption lines are all on the blue or shorter wavelength side of the quasar emission line, as shown in figure 1.

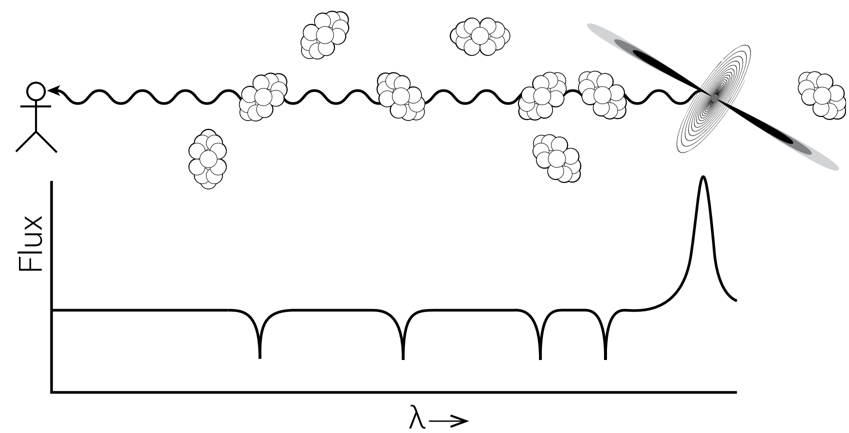

Figure 1. Graphic illustration of alleged hydrogen clouds in the foreground of a quasar. The bottom axis is the wavelength of the quasar light as seen in an optical spectrum (from Wright, ref. 3).

Figure 1 shows a quasar with its Lyman-α emission line (peak) redshifted from the ultraviolet emission to a wavelength in the red end of the optical spectrum when received at the observer. Four Lyman-α absorption lines (dips) from four intervening clouds, which the light intersects on its journey to Earth, as the universe expands, are shown to the left of the emission line. This illustrates the redshift of those clouds at different stages of the alleged expansion history of the universe and therefore by the Hubble law at distances proportional to their redshifts. In figure 1, the same Lyman-α absorption line is seen at higher and higher redshifts, due to the expansion of the universe, while the emission line of the quasar is seen in the red region of the spectrum instead of in the ultraviolet region where it would be for an un-redshifted spectrum.

Figure 2 shows two actual quasar spectra.[2] The top one is from the nearby quasar 3C 273, the first historically to be detected, with a

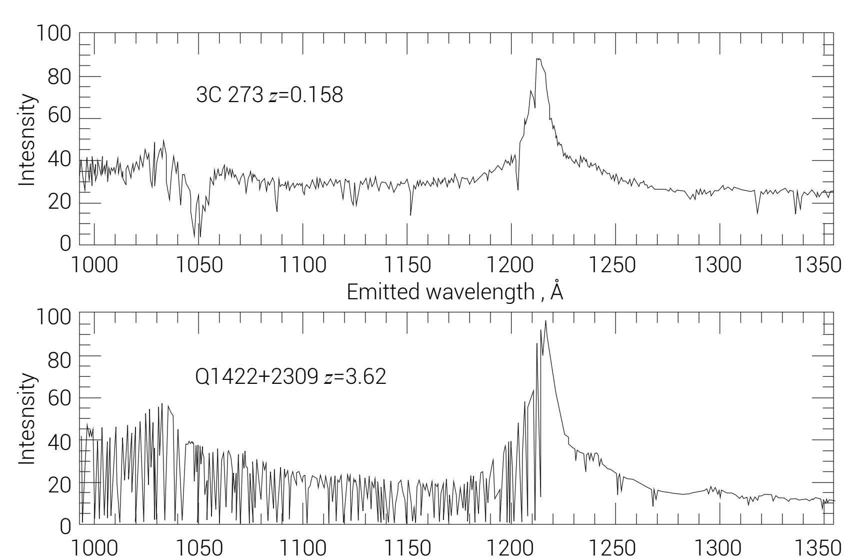

Figure 2. Two quasar spectra. The top one from a quasar with a redshift of z = 0.158 and the bottom one with a redshift of z = 3.62, shifted to a common scale in emitted wavelength. (After ref. 2.)

relatively small redshift (z = 0.158), and the bottom one is from a large redshift (z = 3.62) quasar Q1422+2309. The higher redshift spectrum (bottom panel) is shifted so that the emission line matches the lower redshift spectrum.

> "The 3C 273 data are the average of two pre-refurbishment exposures totalling 49 minutes with HST's Faint-Object Spectrograph. The spectacular data for 1422+2309 come from 7-hour Keck I HIRES spectrum at resolution of 6.6 km/s, which comprised 94,000 spectral pixels in the original data provided by Mike Rauch. The data have been averaged down to more closely match the 3C 273 results, and make the graph a little more legible."[2]

If the hydrogen gas clouds that result in these absorption lines are much more numerous at high redshifts it would mean you should get a high density of many absorption lines. Thus this is called a forest and the bottom panel of figure. 2 is said to illustrate this 'fact'.

It has then been argued that the increasing trend of more absorption lines at greater redshift indicates more hydrogen clouds between source and observer, and this then is evidence that quasar redshifts are due to cosmological expansion. One astronomer, who argues against Arp's intrinsic redshifts for quasars, writes:

> "We know that there are a small number of very big clumps of hydrogen in the distant Universe: the galaxies. We also know that smaller galaxies, the dwarf galaxies, are very much more common. Most of the clouds in the Lyman alpha forest are much less massive than dwarf galaxies and these small clouds are much more numerous. We can only see these very low mass clouds by the absorption they produce in the strongest line of the most abundant element: Lyman alpha. Thus by studying the Lyman alpha forest we can learn about the density fluctuations in the Universe on the smallest observable scales."[3]

But there seems to be some circularity in this argument. *The forest is evidence for the existence of the many hydrogen clouds, but astronomers only 'detect' the existence of these clouds from the host of absorption lines in the forest.* How do we know there are many small clouds between the quasars and the observer? The answer is *the forest of absorption lines*. Thus it follows that now we know the absorption lines indicate the existence of the hydrogen clouds, it is expected that they would generate many absorption lines at their respective redshift distances. The astronomer argues against Arp's hypothesis as follows:

> "Note that if Arp were correct and quasars had a redshift much larger than the redshift due to their distance, then there should be a gap on the blue side of the Lyman alpha emission line before the absorption lines began. Such gaps are not seen. So if Arp were correct the Lyman alpha forest would have to be an intrinsic property of the quasar, which would be a very unlikely situation. Distant galaxies are seen which also show the Lyman alpha forest, so we know that the intervening clouds do exist. For Arp to be correct the intrinsic absorption lines would have to act exactly like the intervening clouds would act under the standard hypothesis that the quasar redshift is entirely cosmological."[3]

Arp's intrinsic redshift hypothesis

Arp and other astronomers proposed that quasars have an intrinsic component to their redshifts and thus those redshifts are not largely due to the expansion of the universe. Arp and others admit the possibility of a Hubble-law-like distance relationship for normal undisturbed galaxies but in the quasars and AGNs there is a strong intrinsic component. This has come about from their detection of quasar-galaxy associations.[4] They found examples of where galaxies appeared to have quasars physically associated with them, even a quasar in the foreground of a low redshift galaxy.[5] Arp proposed the ejection of quasars from the core of AGNs and as a result quasar redshifts are often found in pairs (with redshift values approximately the same) around a putative parent galaxy. Also it has been found that the quasar redshifts preferably are found at certain discrete values (0.062, 0.30, 0.60, 0.96, 1.41, 1.96, 2.64, …) named after Karlsson.[6] In respect to a collection of quasars which Arp and his colleagues examined he wrote:

> "For multiple quasars near galaxies we found that the predicted periodicities [discrete Karlsson redshift values] were fit by the formula at the 94% confidence level. If we made the small correction for the redshift of the parent galaxy, the confidence level increased to 95%. If we omitted one of the 14 groups which was discordant, the confidence level rose to 99.5%. But in establishing the reality of the periodicity the results are overwhelming. ... the confidence is 99.997% or only one chance in about 33,000 of being accidental."[7]

Some lines of quasars are found with the same redshift at a big bang epoch where such structures should not exist.[8]

But the Lyman-α forest may be a property of the quasars, and if so, it does not follow that it indicates a distance increase with an increase in density of absorption lines. This is discussed in a 2012 paper by Chris Fulton and Halton Arp, published in the leading astrophysics journal the *Astrophysical Journal*:[9]

> "The standard model posits that the Lyα Forest is generated en route as radiation from a quasar passes through intervening galaxies leading to absorption at redshifts lower than the emission redshift of the quasar. The test of the theory comes from the redshifts distributed en route, which should match the distribution of intervening structures.
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> "On the other hand, the intrinsic redshift [Arp's] hypothesis posits that the Lyα Forest comes from absorption in the quasar itself, presenting the question of how the forest arises. The variable mass hypothesis (Narlikar & Das 1980) would predict lower particle masses at younger age and therefore higher redshifts. If one is arguing for periodic (quantized) redshifts, then one would expect that after transforming to the rest frame of the host galaxy redshifts that the absorption line redshifts, should show up at Karlsson values. This idea can be tested with the large databases available now, such as our investigation of the 2dF data.
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> "One then argues that a galaxy has multiple creation epochs and when light from a created quasar comes to the observer, it passes through clouds of matter created earlier than the quasar, so as to have lower redshift than the quasar, thus producing absorption redshifts. So, one testable prediction that can distinguish the Standard Model from our hypothesis is the distribution of absorption features in the Lyα Forest. In contrast to the Standard Model, our hypothesis predicts that absorption features will be distributed at Karlsson values. We propose that detailed observations and investigations could be made of the galaxy–quasar systems identified by our detection algorithm, using quasars at higher redshift that display the Lyα Forest, to ascertain if the redshifts of quasar absorption features are consistent with Karlsson redshifts, thus categorically distinguishing our hypothesis from the Standard Model."

It would seem that Arp's hypothesis is not ruled out by the Lyman-α forest observations in quasar spectra. I am not saying that the Standard Model hypothesis for the Lyman-α forest is unreasonable, but that it is not the only possible explanation.

In fact, the same old problem pops up again—that is, how do you know anything in the cosmos when you have no direct access to the cosmos as one might have in a laboratory experiment? There are potentially multiple mechanisms that might result in the same observations and how do you exclude all except the one that you decide is the correct one? In the case of the Standard Model of the big bang origin of the universe, it is now assumed to be true and all observations are now fitted into that belief system. That type of thinking has led to many ludicrous conclusions especially many dark fudge factors.[10]

Conclusion

When other evidence is considered (ejection of quasars from AGNs, quantized intrinsic redshifts, etc.) besides the Lyman-α forest of absorption lines there is evidence that contradicts the notion that the forest lines indicate the standard '*the greater the redshift the greater the distance*' rule in the cosmos. If that rule—known as the Hubble law at small redshifts—is not correct for quasars and AGNs then it undermines the fundamental foundation of the Standard Model of big bang cosmology—the expansion of the universe. And if there was no expansion there was no big bang!

The Bible says: "In the beginning God [not the big bang] created the [universe]" (Genesis 1:1).

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