Supernovae Ia Light Curves Show a Static Universe

Lyndon Ashmore
C/O Dubai College. P.O. Box 837. Dubai. UAE.
e-mail: webmaster@lyndonashmore.com

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High redshift broadening of supernovae light curves, taken at face value, is the only direct evidence for expansion and is often used to discount Tired Light Theories. However, the authors of these papers look at high redshifts since these results are said to give "*conclusive evidence for expansion*." But what of the smaller redshifts?, what do they show? This paper reviews supernovae aging data and shows that if we ignore Malmquist biases and that fact that brighter supernova Ia do have intrinsically broader light curves, then the main stream supernovae evidence is that whilst there may be expansion at high redshifts, there is no time dilation and therefore no expansion at low redshifts. That is, if we are to believe the main stream version of supernovae light curves then we must believe that the Universe is presently static.

These results are then compared to average Hydrogen cloud separation in the Lyman alpha forest in quasar spectra. These also show that at high redshifts the average spacing between Hydrogen clouds reduces as the redshift increases – showing evidence that the clouds are moving further apart with time and therefore expansion. However, at low redshifts the average spacing is constant - again showing a static Universe in the region. Is it just coincidence that both sets of data show expansion at high redshifts and a static Universe at low redshifts?

Together, both sets of data are consistent with a Universe that did expand in the past but stopped expanding some time ago. The density of the Universe would then be equal to the critical density and we would have reached the point where the expansion has been arrested. There is then no need for inflation, 'dark energy' or 'dark matter.' However, in this static epoch of the Universe the Hydrogen clouds and supernovae at low redshifts have differing redshifts dependent on distance. It is proposed that in this scenario, redshifts are due to the New Tired Light theory alone.

1. Introduction

The wavelengths of spectral lines emitted by atoms in distant galaxies have a longer wavelength on arrival here on Earth than those same spectral lines produced in a laboratory. This phenomenon is known as redshift.

The idea that these redshifts were caused by an expanding Universe was first put forward by the Belgium Priest Georges Lemaitre who is said to have convinced both Einstein and Hubble that redshift was caused by expansion. Einstein had introduced a 'cosmological constant' to balance his equations and allow for a static universe. Hubble did convert these redshifts to 'velocities' (in view of the Doppler effect), but once Zwicky showed that these redshifts could be caused by photons of light losing energy on their way (Tired Light) Hubble immediately went back to using redshifts on the basis; '*because that is what we measure*.' [1] The term 'Tired Light' covers many theories where basically the photons of light lose energy as they travel through intergalactic space; this reduces their frequency and increases their wavelength. The photons have been redshifted.

Tired Light theories assume a static Universe whilst the Big Bang Theory assumes an expanding one.

Whilst an expanding universe is generally accepted by mainstream science, the idea of 'Tired Light' has never really gone away. One of the main reasons is the lack of direct evidence in favor of one theory or the other. It was only at the very end of the twentieth century that 'supernova time dilation' was put forward as a way of discriminating between the two theories and the two ideas of either an expanding or a static universe.

2. Supernovae Time Dilation

It was proposed that there is a type of supernova, type Ia, which have standard light curves and generally follow the same pattern as they go through their final death throws.

Time dilation is a relativistic effect.

To understand time dilation simply, imagine standing at the end of a street alongside a friend who is holding a digital clock directly in front of you. As the clock display ticks off the minutes one by one you see time pass by.

Now let your friend stand some distance down the street. The clock still ticks away the minutes but it now takes time for the light to get to you. The clock shows 12:00 but it takes the light time to reach you - so you see the clock strike 12:00 a little after it really did. The same when the display turns to 12:01, you will see the time change a little after the actual event. However, whilst you will observe the time on your friends clock as being a little slow, the minutes will tick by on your friend's clock at the same rate as they do on your own. This is not time dilation.

Now ask your friend to run away from you as fast as he can holding the clock so that you can still see the display. When it strikes 12:00 you see it happen a little later - just like before as the light carrying that information takes time to travel to your eyes. During the next minute your friend has moved further away from you. So when the clock turns to 12:01 the light carrying this information has further to travel than before and so it takes longer to travel to your eyes. You see the clock turn to 12:01 not a minute after you saw it strike 12:00, but more than a minute later. As your friend runs down the street away from you, the light carrying the information of the minutes ticking away has further and further to travel. It takes longer and longer to reach you and you now see his clock as running slow.

This, simply put, is the basis of time dilation. In an expanding universe, the more distant the supernova the faster it would be moving away from the Earth and thus the greater the time dilation it would exhibit – i.e. the longer it would take for its light curve to rise and fall.

In a static universe there would be no time dilation and thus all supernovae light curves would take the same time to rise and fall.

Originally, the light curve width (the time taken for a supernova to go bright and then go dark) was used as a measure of time dilation. This has now generally been disregarded since not all supernovae Ia have the same brightness and it is known that the brighter the supernova Ia the broader the light curve i.e. brighter supernova Ia take longer to 'brighten then darken' than dimmer ones. This brought accusations of a Malmquist bias since to view more distant supernovae Ia one had to look for brighter events as the dimmer events would not be seen at these distances. Brighter supernovae have broader light curves. Malmquist bias.

In the process of a supernova Ia exploding, different elements come through the photosphere at different times and it is by looking at the time interval between various spectra of the different elements appearing that time dilation is now measured. There is still the problem of dispersion since we are looking at times of arrival of specific wavelengths and it is known that different wavelengths travel at different speeds in the Intergalactic medium. Big Bang Theorists assume that all wavelengths of light travel at the same speed in Intergalactic Space – an assumption which is known to be incorrect [2]. In this paper we will take the results verbatim and go along with the Big Bang theory in terms of data collection and processing – even though it could well be that different wavelengths travel at different speeds and so some take longer to arrive than others.

Errors are huge and so workers in this field tend to look at very distant supernova where the so called 'time dilations' are larger than any errors in measurement and assert that they 'prove' the expanding universe 'correct' and a static universe with Tired Light as 'wrong.'

As always in cosmology, we are not comparing like with like. The further away the supernovae the further in the distant past that event took place. If we accept these supernovae results at face value and accept, for the sake of argument, that they do show 'time dilation' then the results do not show that the universe is expanding 'now,' only that it expanded in the past. The question is, do nearby supernovae show time dilation?

3. The Data

Recently, the data collected from thirty five supernovae giving both their aging rates and redshifts (both near and far) was published. In the Big Bang Theory, a graph of aging rate against redshift should have a gradient of $(1+z)^{-1}$, and so a graph of aging rate against $(1+z)^{-1}$ should be a straight line with gradient unity. Blondin et al [3] took all the data together and claimed victory for expansion.

In Fig. 1 the dotted line shows the linear line of regression for all the data whilst the solid lines show the linear lines of regression for the separate data (near and far). Whilst all the data has been subjected to the same analysis, the nearby data clearly does not agree with the distant data.

Fig 2 shows these nearby supernovae's aging compared to their redshifts. The data points show no sign of time dilation increasing with redshift.

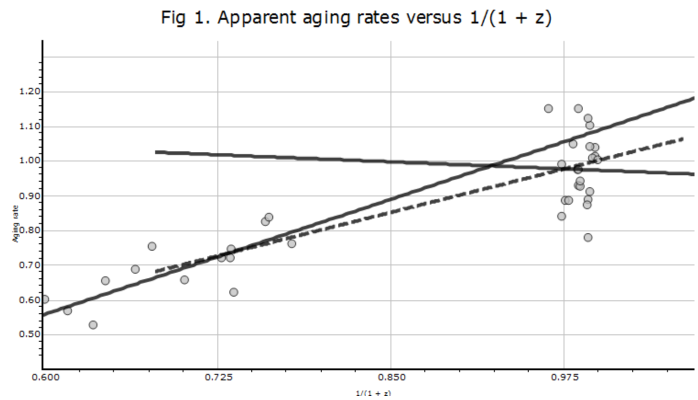

Fig. 1. Apparent aging rates versus 1/(1+z)

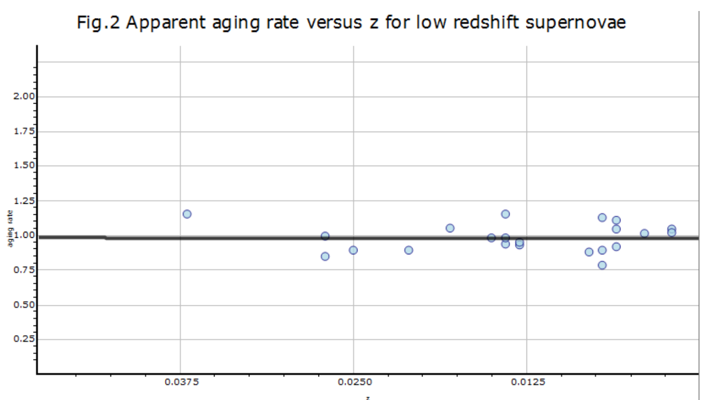

Fig. 2. Apparent aging rates versus z for low redshift supernovae

It must be remembered that errors are large. If we take all the data at face value, there is evidence of expansion in the past but not in the present.

By itself this result is not conclusive but when we compare it to the average separation between Hydrogen clouds in the spectra of Quasars it becomes of interest – because these show the same trend over the same redshift regions.

Again, if we take the results of the Big Bang theory at face value, Quasars are said to be very distant objects and the light that reaches Earth has been travelling towards us for almost the entire life of the universe. On its way the light passes through clouds of Hydrogen atoms which absorb certain frequencies of light characteristic of that atom and produce a dark line in the spectrum. These are then redshifted until it meets the next Hydrogen cloud and so on. In this way a pattern is built up called the Lyman α forest and, like a High School ticker timer, we can see the average distance between the Hydrogen clouds over the history of the universe.

Researchers 'line count' - that is finding the average number of lines per unit redshift dN/dz. In an expanding universe dN/dz will increase as the redshift increases since the clouds would have been closer together in the past than they are now and thus the density of lines will increase. In a static universe dN/dz will be constant as the clouds will be evenly spaced. The reciprocal of dN/dz gives the average cloud separation and is shown in Fig. 3.

In the past, these too show expansion effects in that the clouds get further and further apart as the universe ages and redshift reduces. But in terms of cosmological history, they have recently become evenly spaced – showing that the universe is at present, static [4,5].

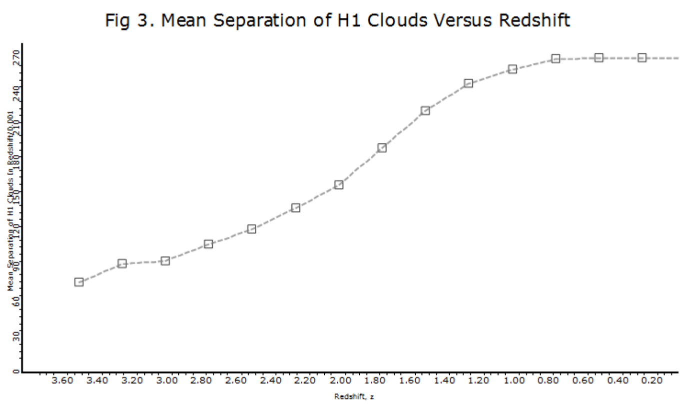

Fig. 3. Mean separation of Hydrogen (H1) clouds versus redshift

4. Conclusion

As stated earlier, the errors in the supernovae aging are large and it could be that the aging of nearby supernovae is not significant and masked by the errors. However, Fig. 2 shows no evidence of aging with redshift for nearby supernovae. These supernovae lie in the region $0 \le z \le 0.037$ and this is the same region where the Hydrogen clouds are evenly spaced – again showing no expansion.

The supernovae that do show aging as per the Big Bang Theory all have a redshifts above $z = 0.28$ and they show that the aging increases with redshift. Once again, these results agree with those from the average Hydrogen cloud separation. The clouds become closer and closer together as the redshift increases – showing expansion.

Taking these results at face value, both show a universe that expanded in the past but has stopped. This would give us a flat universe and do away with the need for inflation or dark matter. Inflation and dark matter were only introduced to prop up an expansion theory unable to explain experimental results. It would also make the Universe much, much older than that predicted by the Big Bang Theory.

If the Universe has stopped expanding then present day redshifts would have to be caused by something other than expansion and it is proposed that this effect is New Tired Light (NTL) where photons of light are absorbed and re-emitted by the electrons in the plasma of intergalactic space which recoil both on absorption and re-emission. Energy is transferred to the recoiling electrons. The photons lose energy, their frequency is reduced and their wavelength extended. They have been redshifted [6,7].

References

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