Cause of the galactic linear red shift

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Objective

This work shall examine the cause of the linear red shift of galactic light. Two different possible theories of a cosmic timeline will be discussed and compared for this purpose:

1. The linear red shift of galactic light and the expanding cosmos (Big Bang Theory)
2. The linear red shift of galactic light and the constant cosmos, which does not have the qualities of a perfectly round sphere

Foundation of the cosmic time line

The following theories are based on the realization that time must be considered in every room geometrical model with cosmic dimensions. If, for example, 10 events happen on a particular route in a certain order, the point of view relative to the time line is critical. In this context, a logical establishing of facts is crucial.

In the universe, all visible events are transmitted to the observation points by light waves. Light spreads through space at 300,000km/second. Colloquially, we are *looking* into space and can *see* the past. However, this expression is physically incorrect. Our *vision ray* does not reach any objects within our field of vision. It is the light that hits the retina in our eyes. This sounds simple and unimportant; nevertheless, it is the key to understanding the linearity of the galactic red shift.

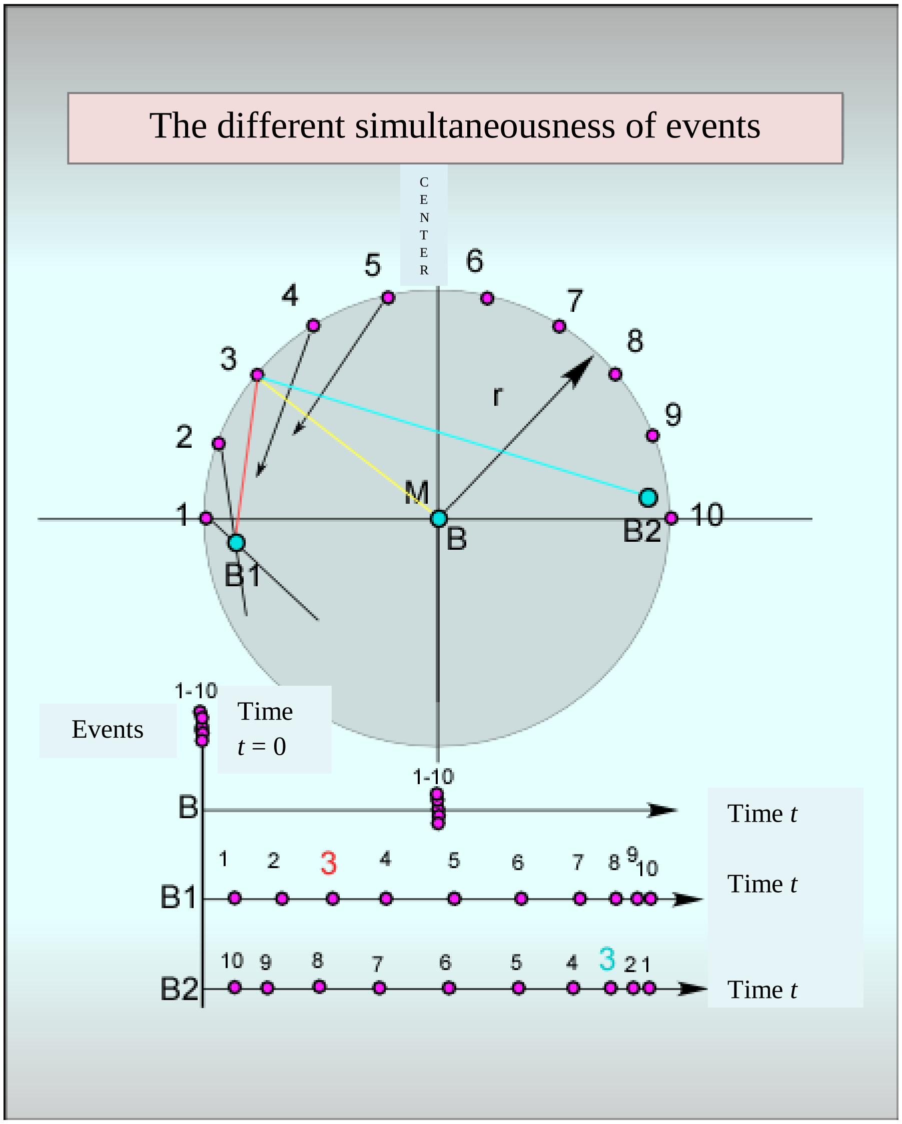
The linearity of the red shift always pertains to linearity from the point of an observer on Planet Earth. Hence, it is necessary to determine the exact location of Planet Earth in the space – time system. In addition, the validity of common theories about the universe should be compatible with the observed linearity of galactic red shift, which requires the separation of Planet Earth and an inertial forum. Albert Einstein explained the different times for the same events with his illustration about jumping cows. Depending on the observation location, the cows either jump simultaneously or one after the other:

> *Three cows are standing at a great distance to each other on an electric fence. At one end of the fence, the farmer sets the pasture fence under power. At the other end, Albert Einstein observes the cows. The power reaches the first cow and it jumps up in surprise. A little later, the power reaches the second cow, and it too jumps up in surprise. The third cow also jumps as the power reaches it. From a general observer's point of view, the cows jumped one at a time. Seen from the farmer's point of view, the cows did the same, but somewhat delayed, somewhat later, and in greater intervals, because in order for the farmer to see the cows jump, the light had to rush back the distance that the electricity had travelled at the speed of*

light. Albert Einstein, at the other end of the fence, however, saw the cows jump at the same time.

How is this possible?

When the first cow jumped, the light from this event rushed towards Albert Einstein at the speed of light. It reached the second cow together with the electricity. The second cow jumped and the light from this event travelled towards Albert Einstein together with the light from the first cow's jump. The same principle applies to the third cow. Consequently, the light from all three events reached Albert Einstein at the exact same time. Hence, from Albert Einstein's point of view, the cows jumped at the same time.



This is a nice story with a serious background, for it illustrates how an observation site changes the description of events.

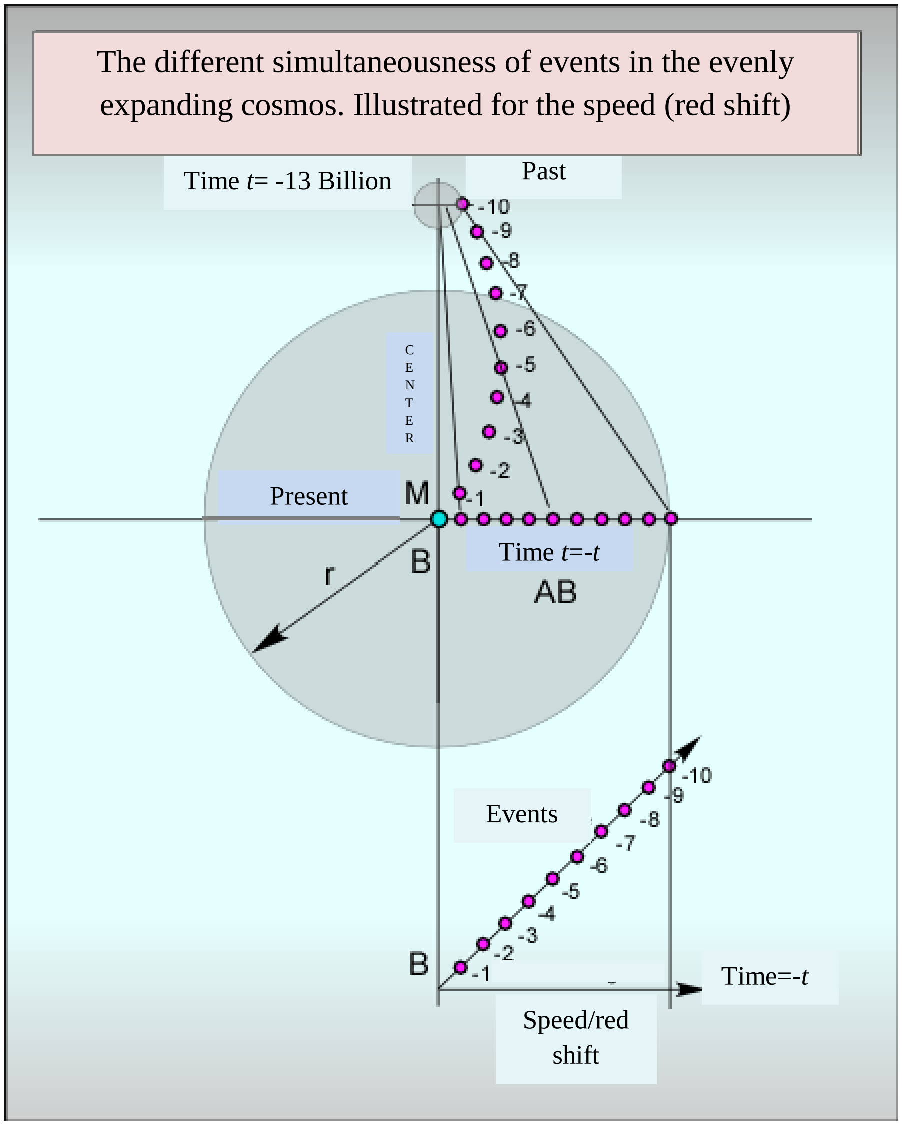
Figure 1

Ten flashing lights are located at the edge of a round surface. Three observers (B1, B, and B2) are supposed to describe the flashing of the lights. The general (location independent) inertial observer flashes all ten lights at the same time. These are events one through ten at $t = 0$ as shown in *figure 1*.

The only observer who sees the lights flashing simultaneously is observer B in the middle. All the lights are at the same distance from the middle, which means the lights reach B at the same time (with the same delay after $t = 0$). The other two observers (B1 and B2) provide contradictory descriptions. According to them, the lights flash in order (or in reverse order depending on the location). The points of observation as well as the time line of events are crucial for the order of the observed events.

The red shift of galactic light in the uniformly expanding cosmos

The requirements for a uniformly expanding cosmos are a location-independent inertial observer, a linear expansion of space, and an even distribution of masses in the universe. With the even expansion of space in all directions, all galaxies move away from each other evenly.



Hence, the inertial observer sees a linear red shift with a temporal equality of events.

However, how is the event observed from the center of the universe? Do the descriptions of events at two different locations match?

Figure 2

The entire cosmos is illustrated as gray round surface. At the start time of 13 billion years, the cosmos was significantly smaller. The even speed can be tracked from the small to the large circle with the help of the straight lines. For a location-independent inertial observer AB the events on the horizontal line would occur at the same time.

For a stationary observer B the light of the ten events arrives in order if time is taken into consideration. The speed of events, however, remains constant over time. Even though B sees all events at the same time, he sees ten different time periods, as the light takes time to reach the observer; the longest from event 10. Since the speed of every event is constant over time, it does not matter when the light arrives at the observer B. Hence, observer B sees a clear linearity of the red shift of the different events. The curved line results, if the events are assigned to the time they emitted light and became visible to observer B.

The red shift of galactic light in the unevenly expanding cosmos

If the speed of events changes over time, a difference in the linearity of the red shift can be expected. As assumed in the Big Bang Theory, the universe initially expanded quickly, and then slowed down in the following billion years. This should be visible in the different linearity of red shift. Should the expansion speed up again in the now, the linearity should indicate a change in linearity of red shift, as can be seen in *Figure 3*.

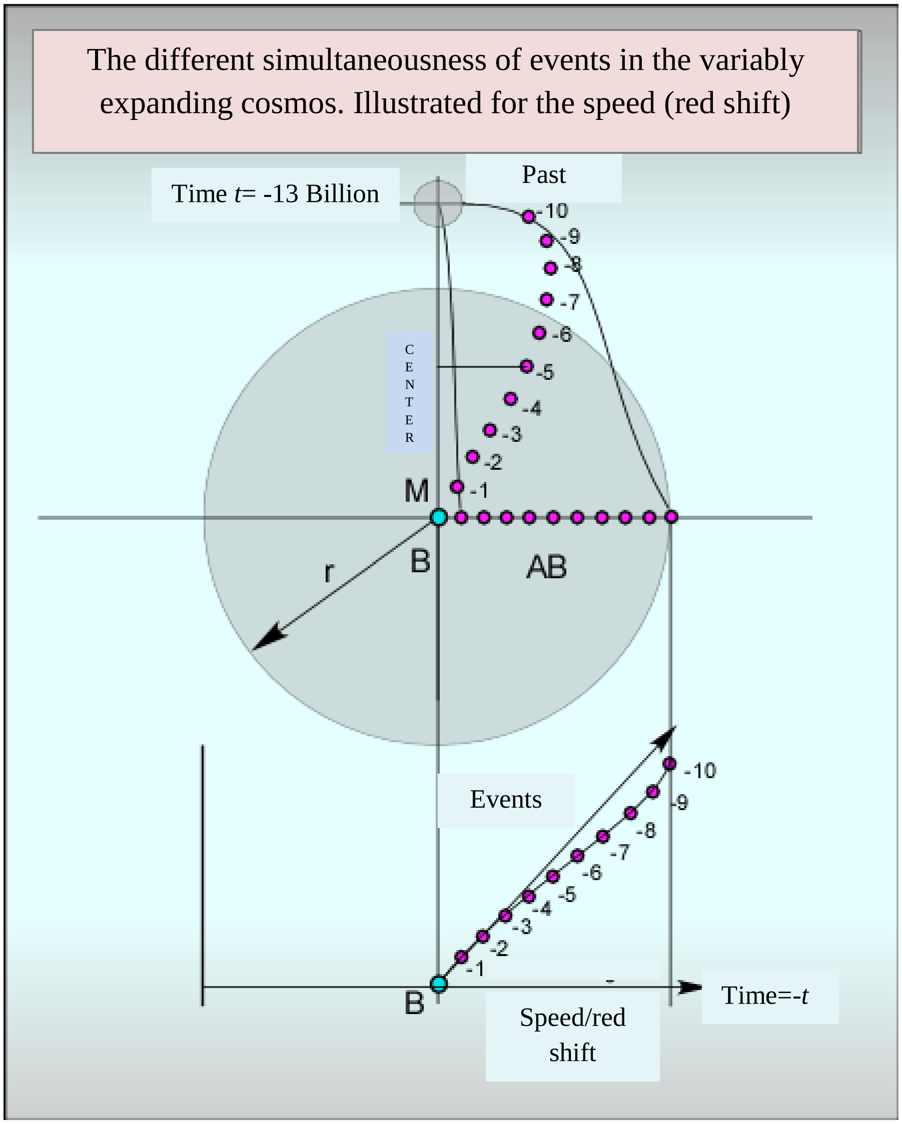


Figure 3

For differently fast event locations, the linearity of the red shift deviates. A location-independent inertial observer still sees all events on a horizontal line. However, the linearity of the red shift is different for a location-dependent observer B, because the different events have moved at inconsistent speeds after emitting light. Consequently, the nonlinear red shift of galactic light would be proof of a variable expansion of space in the universe. The nature of deviation is an indicator for the increase or reduction of expansion speed. Currently, the expansion rate appears to increase.

The red shift of galactic light in the constant cosmos (not the ideal hollow sphere)

So, is it possible to explain the galactic red shift in a constant cosmos? The work *Negative Gravity* (Krause, 2005) demonstrates that inner masses accelerate by the square of their speed towards the edge of the universe. If the locations of events are graphed in relation to time (as seen in *figure 4*), a location-independent observer AB can see the quadratic increase of red shift up to the edge, which is illustrated in the lower section of *figure 4*.

At *t* = -13 Billion, the pink event dots are fundamental. As the masses accelerate with time, they finally reach their current location after a very long time. In the now, the blue event dots are important, as the curve is much steeper than before. At some locations, the increase in speed, an increase of red shift, is nearly impossible, because the speed of light is almost reached. Only the energy content and the value *z* grow continuously. For a time-dependent observer, the red shift of galactic light is totally different. Since the galaxies inside the cosmos accelerate as they move towards the edge of the universe, a growing red shift is to be expected. Under consideration of time, the different information from event points reach observer B only from the time the light was emitted. Which means that event 10, for example, that it has the red shift from *t* = -13 billion, but basically did not experience any acceleration over time.

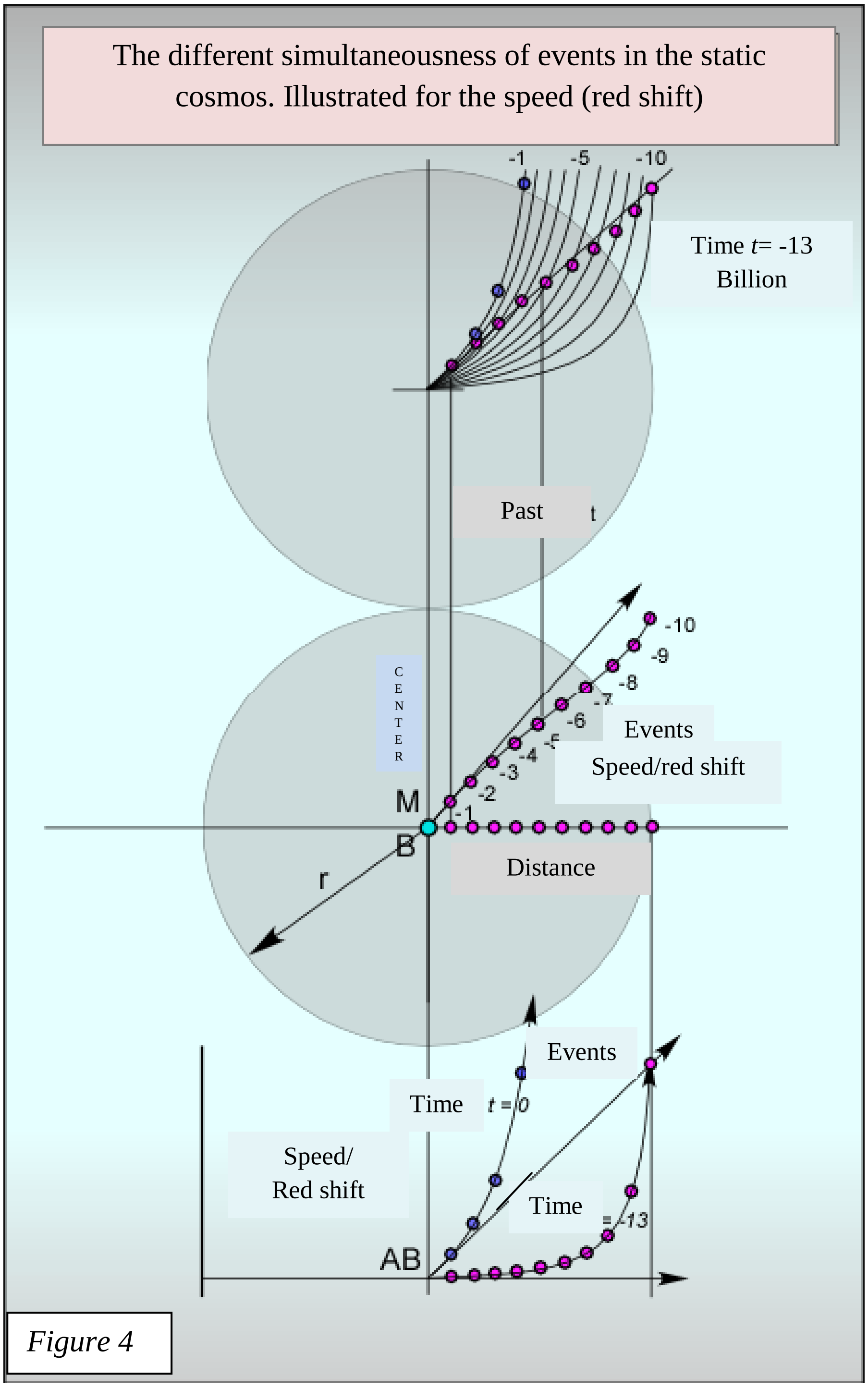


Figure 4

Figure 4

This figure displays the linear red shift from the view of a central observer in a constant universe. Event point 1 is very different compared to the other figures, because during the last time periods, it has been accelerated, so that the light emitted from ! has a higher acceleration rate than event point 10. Observer B sees a nearly linear red shift in the distance due to the unique emitting pattern of light, which is illustrated in the middle section of *figure 4*. A certain nonlinearity of red shift is granted through small mass fluctuations in the distribution of galaxies in the cosmic sphere. A complete set of red shift curves over time starting with the beginning of galactic inner mass acceleration are displayed in the upper section of *figure 4.* The pink event dots show the time during which light was emitted towards observer B. With corresponding mass distribution in the cosmic sphere, it is possible to modify the curve to the values measured in reality.

Conclusion

The nonlinear red shift of galactic light is explainable in a constant as well as an expanding universe. Nevertheless, an observer in the center of the universe cannot solely rely on the red shift of galactic light to decide in which kind of cosmos we live, because the angle expansion has to be taken into consideration too.

However, the reasons for the red shift in each model are very different. While the Big Bang Theory blames a mysterious dark energy for the observed effects (Borgeest, 2005), the not ideal sphere model relies on the gravitational force in the edge of a spatially constant universe.

References

Borgeet, U. (2005). Hubbles neuer Kosmos. Sterne und Weltraum, 2005(7). Sterne und Weltraum Verlag.

Krause, M. (2005). Die Negativegravitation in einem nicht idealen kugelfoermigen Koerper.