The Acceleration of Light.

P.J. Brouwer
Oegstgeest, The Netherlands

Correspondence: pieterjanbrouwer@casema.nl

Abstract

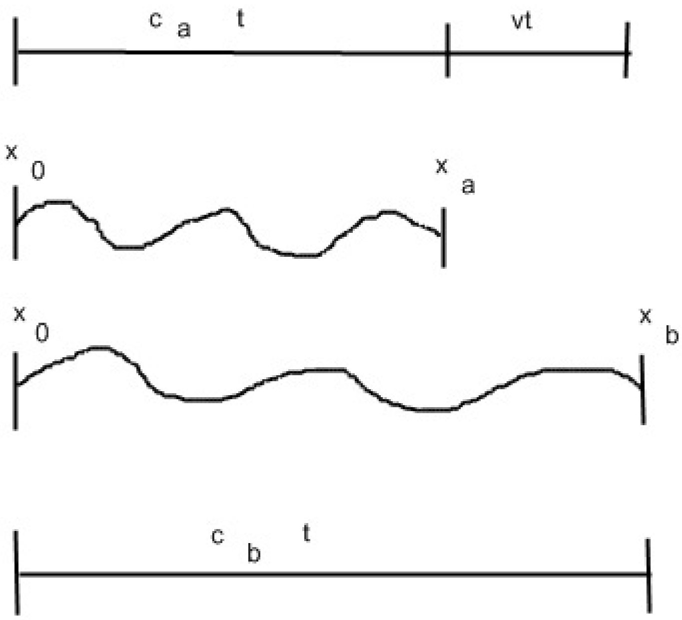
In this paper I will show that light undergoes a centripetal acceleration. The speed of light is constant in three dimensions, so the acceleration will take place in the fourth dimension. This implies that everything in the universe follows this curvature of space-time, and that therefore everything in the universe rotates in the same fashion as light. This is equivalent to stating that the universe itself rotates around the fourth dimension.

1. The Problem of Acceleration.

Light displays a red-shift, which one could explain by assuming that space expands. Because the red-shift increases with distance, one would expect that the expansion of space also increases with distance. And that implies an acceleration of light, moreover light must bridge the increasing velocity with the increasing distance it travels.

2. The Calculation of the Acceleration.

In the following we forget for a minute that the speed of light is constant. However, light with a constant speed can undergo an acceleration in singular circular motion. We do this because we will envision a linear acceleration. In order to be able to calculate the acceleration we envision two situations: one in which space does not expand and one in which it does. In the first case the light that travels through space covers a distance x_a and in the second case it covers a distance x_b. We assume this happens in the same time, with equal frequencies, the same amount of periods, but with different wavelengths. This looks as follows:



A few facts to math the picture:

$$x_b = x_a + \Delta x$$
$$x_a = c_a t$$
$$x_b = c_b t$$
$$\Delta x = vt = (\Delta c)t$$
$$c_b = c_a + \Delta c$$

And I introduce Hubble's Law: $v = Hd$

In Hubble's Law, d is the distance light travels in expanding space, which is here the distance x_b. If we choose d to be x_a the result of our following calculation will be the same except that we replace the subscript b for the subscript a, v is the velocity in which space expands, which is here also $v = \Delta c$.

Because it is the difference in speed that results in the acceleration we put it that a = v/t, which here translates as $a = \Delta c/t$.

Now we proceed with the calculation of the acceleration:

$a = \Delta c/t = Hx_b/t = Hc_b$

If we choose $d = c_a$, then $a = \Delta c/t = Hx_a/t = Hc_a$

Since the resulting term for acceleration is independent of the choice between c_a and c_b, we can simplify our formulations of $a = Hc_a$ and $a = Hc_b$ into the more general $a = Hc$. We now see that the speed of light was constant all along, since c_a and c_b gave the same outcome and have the same value a/H. We also know that the acceleration of light a is a universal constant.

3. Conclusion.

Returning to the subject of singular circular motion, we can now see that $a = Hc$ is in fact a formula that describes the relation of the speed and acceleration of light in this singular circular motion (where the curvature, and therefore the red-shift, is proportionate to the distance), the only possibility since both the speed and the acceleration of light are constant. Since our calculation applies generally in the universe, we may assume that throughout the universe light obeys to this rule and displays this motion. Further we know that light does this because of the conjecture of the universe, which we may conclude to be a volume that is circularly curved.

Finally, an illustration of the conclusion: