

Hartnett's expanding 5D universe does not solve the starlight travel time problem

In his popular book *Starlight, Time and New Physics*¹ and the paper “A 5D spherically symmetric expanding universe is young”,² published in this journal, John Hartnett suggests that the light of the most distant galaxies can reach Earth within days as measured by clocks on Earth. His theory is based on a five-dimensional cosmology developed by Moshe Carmeli,³ coupled with an accelerated expansion during the Creation Week. Hartnett argues that during this episode the clocks on Earth ticked much slower than clocks attached to distant galaxies, which move away from Earth according to the Hubble law. However, in this letter I show that Carmeli's theory does not allow for such a time dilation to occur.

The amount of time dilation is to be inferred from the five-dimensional line element of Carmeli's theory. Neglecting gravity, it is given by $ds^2 = \tau^2 dv^2 - dr^2 + c^2 dt^2$, with $\tau = H_0^{-1}$, the inverse of the Hubble constant.⁴ Hartnett now considers an inertial clock, co-moving with a distant galaxy in an expanding universe. As he writes,⁵ such a clock is subject to the Hubble law $v = H_0 r$. In the rest frame of the galaxy, the line element reduces to $ds^2 = c^2 dT^2$ with T the proper time of the clock. In the rest frame of the Earth, dv and dr do not vanish. However, since the clock respects the Hubble law, we have $dv = H_0 dr = \tau^{-1} dr$, and the two first terms in the line element cancel. Therefore, $ds^2 = c^2 dt^2$, with t the proper time on Earth. Since ds is supposed to be equal in all

frames of reference, it follows that $dT = dt$ (contra Hartnett).

Does the situation change when taking gravity into account? In this case, the line element is given by $ds^2 = \tau^2 dv^2 - (1 + (1 - \Omega)r^2/c^2\tau^2)^{-1} dr^2 + c^2 dt^2$, with Ω the mass/energy density of the universe.⁶ The Hubble law changes accordingly to $dr/dv = \tau(1 + (1 - \Omega)r^2/c^2\tau^2)^{-1/2}$.⁷ Therefore, the first and the second term in the line element sum again to zero for galaxies subject to the Hubble law. Therefore, $dT = dt$ as in the case without gravity. Interestingly, Hartnett agrees that “clocks, co-moving with the galaxies in the Hubble expansion, would measure the same proper time”.⁸ If Hartnett would be consequent, he would therefore have to conclude that clocks on Earth tick at the same rate as cosmic clocks.

How then does Hartnett arrive at the wrong conclusion that time dilation could have occurred during the Creation Week? The reason is that in the corresponding sections he erroneously treats v and r as independent variables. At first, he assumes that the motion of the galaxy through space is negligible ($dr/dt \rightarrow 0$)⁹ and neglects the corresponding terms in his subsequent calculations. Shortly afterwards, he inconsistently postulates that $dv/dt \gg c/\tau$,⁹ ignoring that this is incompatible with his earlier assumption because, for comoving clocks, velocity and distance are related by the Hubble law. In other words, it is not possible that the following three conditions obtain at the same time: dr/dt is small; dv/dt is large; the clock is co-moving. The first two conditions could only be met by violating the last condition, for instance by a rapid oscillation of the clock. However, there is no physical reason and no experimental evidence for galaxies to oscillate in such a way. Correctly, Hartnett would have to keep terms with dr/dt , which would later cancel the corresponding terms proportional to dv/dt . Curiously, just before the erroneous paragraph, Hartnett admits

that $dr/dt \rightarrow 0$ implies $dv/dt \rightarrow 0$ but neglects this right afterwards.¹⁰

In conclusion, comoving clocks subject to the Hubble flow tick at the same rate in Carmeli's 5D cosmology. Therefore, no time dilation would have occurred during an accelerated expansion during the Creation Week and Hartnett's model consequently does not solve the starlight travel time problem.

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References

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- Carmeli, M., Five-dimensional cosmological theory of unified space, time and velocity, *Nuclear Physics B—Proceedings Supplements* 124:258–63, 2003 | doi.org/10.1016/S0920-5632(03)02118-2.
- Equation 1 of ref. 2.
- Footnote 14 of ref. 2.
- Equation A4.27 of ref. 1.
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- Hartnett, ref. 1, p. 131.
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- Hartnett, ref. 2, p. 70.

» John Hartnett replies:

I agree mostly with the arguments presented by the author of this letter. There are some minor details and assumptions I might disagree with but that is now moot as I have already abandoned the Carmeli model for similar reasons to those cited.

I admitted this in November of 2016. I had by that time essentially given up looking for an answer there (see bible.scienceforum.com/2016/11/19/my-use-of-carmelis-cosmology-a-valid-solution/).

Using the Cosmological Special Relativity (CSR) approach (either 4D or 5D), i.e. no gravity, one discovers

inconsistencies which were never resolved. As a result, I made several assumptions in that paper that I now recognise as unjustifiable. The problem really is that Carmeli's time and velocity coordinates in any 5D theory are not independent and the inconsistencies flow from there.

In fact, Carmeli's 4D CSR theory of only space and velocity is inconsistent with his 4D general theory Cosmological General Relativity (CGR), i.e. after he added in gravity. And Carmeli never developed a full general theory of space, time, and velocity which includes gravity. I also found other problems with Carmeli's theory when he attempted to apply it to a 5D universe. None of those were ever resolved.

I have moved on and now think that the very best hope for a biblical creationist model of the universe and the starlight and time question is one involving the *conventionality thesis*. See for example dl0.creation.com/articles/p130/c13061/j33_3_115-121.pdf and dl0.creation.com/articles/p130/c13059/j33_1_71-77.pdf.

The conventionality thesis and the one-way speed of light is God's gift to biblical creationists. Even the atheists acknowledge its validity.

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