

Review of: "Evidence-based cosmology and galactic rotation curves"

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Potential competing interests: No potential competing interests to declare.

General comment

In this article, standard cosmology is criticised, an alternative is brought in and terrestrial experiments for testing central aspects of it are proposed. A particular research question is not really made explicit. In section 4, an experiment with a Sagnac interferometer is described. This has in the present version been extended by a similar experiment with a Mach-Zehnder interferometer (section 4.1). Thereby the focus of the article is moved to these experiments. However, these are not even mentioned in the present Abstract, and sections 1-3 are also concerned with other aspects of cosmology. Various shortcomings of standard cosmology are there in effect replaced by various different shortcomings of a sketchy model in which supermassive black holes in the centre of galaxies rotate their local 'superfluid space' (or 'ether'), which is claimed to be the physical origin of galactic rotation curves, as described in previous articles by Šorli et al. Although their outcome is uncertain, the described experiments lend the article some weight.

Specific comments

The Abstract needs to be rewritten since it still reflects deficiencies that have already been amended in this version. It is also necessary to mention the planned experiments described in section 4, which test a unique aspect of Šorli's cosmological model.

Passage prior to Section 1.1, beginning with "In addition, whether the expansion of space would cause the cosmological redshift as a kind of Doppler effect is questionable": This reflects a misunderstanding. The cosmic redshift is usually considered as a Doppler effect (caused by relative motion). This is what the FLRW metric suggests. It is alternatively considered as an effect of a uniform expansion of "space". In this case, there arises no Doppler effect (except from proper motion). However, the redshift-distance relation is noticeably different between these alternatives. This difference is reduced if dark energy is introduced.

In your response, you wrote "I know the idea of time-invariant space is unusual". However, this idea is not so unusual, and I meant to criticize primarily the denial of the physical existence of time and the claim that the universe itself is timeless.

Middle of section 1.1: Like most readers, I have no doubt about the physical reality of proper time. It can be expressed as the number of periods of a standard radiation. Spatial distance can be expressed as half the number of waves of the same radiation sent towards a mirror and reflected back. If anything, it might be reasonable to deny the physical existence

of one-way distances and – in the absence of time – that of any spatial distances. I recognize that you are not alone in your view of time, but time cannot “emerge from a timeless law that governs change” (Barbour [5]) simply because there can neither be any change nor can anything emerge in the absence of time.

2nd passage of section 4: “Today we know that the local ether around the Earth moves and rotates with the Earth...”: Neither here nor elsewhere it is advisable to mention a minority point of view and present it as if it was the view of the majority.

Titles of sections 4 and 4.1: The unproven assertions expressed here presuppose a positive outcome of the planned experiments. They need to be replaced by titles that remain adequate even if the outcome should be negative.

Last statements before sections 4.1 and 5: In ref. [13], dark energy is, surprisingly, considered as “the fundamental primordial field of the universe”. Dark energy from areas around a galaxy is said to push towards its center, where the dark energy density has its minimum. This difference in dark energy density is considered to generate gravity. However, dark energy is nothing else than a fudge factor invoked in big bang models in order to compensate for the discrepancy between the apparent redshift-distance relation and the different one predicted by the original FLRW metric. Raising the status of this error to that of a fundamental primordial field makes everything much worse, in particular in an allegedly bijective approach.

In section 4.1, there should be an introduction to Mach-Zehnder interference.

I do not think that the rotation of the motor will have the expected effect, but I consider it worthwhile to do the experiments and it is an advantage to have the expected results described beforehand.

Minor comments

Last statement before section 1.1: Gravitational > Cosmological

Mack-Zender > Mach-Zehnder

List of references: bring the info into the same order – either in that of [7] or [13].