Modern Scientific Challenges To Theory That Universe Had A "Big Bang" Beginning

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Conclusion of the paper to which Kalosyni linked:

Conclusions

Unexpected observations, such as the H_0 tension and galaxies that according to the current theories are expected to be older than traditional galaxy formation models predict, are challenging the standard cosmological model. If the cosmological model is complete and fully accurate, the distance measurements and, primarily, the redshift are biased. If the redshift is fully accurate then the standard cosmological model and basic theories regarding galaxy formation and the history of the Universe are incomplete. In any case, the redshift as used currently and the existing basic cosmological theories cannot co-exist without modifications.

This paper presents empirical observations that show that the redshift model may be biased and that the bias might be driven by the rotational velocity of the Milky Way galaxy relative to the rotational velocity of the observed galaxies. The observed bias is consistent across different telescopes and different annotation methods, and it shows very similar bias at both ends of the galactic pole. It is also consistent in catalogs that were collected for other purposes by different research teams.

The empirical observations described in this paper are provided with the data to ensure that the results can be reproduced. It has been shown that the vast majority of the scientific results cannot be reproduced [74], introducing the challenge known as the “reproducibility crisis” in science [75,76,77,78]. The ability to access the data and reproduce the results allows us to advance science in a transparent manner and to avoid errors that might not be noticeable to a reader unless they have access to the data.

In current astrophysics and cosmology practices, the redshift is used in most cases by ignoring the rotational velocity of the Milky Way, as the rotational velocity is far lower than the linear velocity and can, therefore, be considered negligible. But it should be noted that the physics of galaxy rotation and, in particular, the rotational velocity of galaxies are still not fully understood [22,26,33,36,37,38,39,40,41,42,43,44,45,46,47,49,79,80,81,82,83,84,85]. Theories such as dark matter [23] or MOND [25] have been proposed to explain the anomaly of the rotational velocity of galaxies, but several decades of research still have not led to a proven explanation for the provocative nature of the rotational velocity of galaxies.

It is difficult to identify an immediate explanation for the link between the rotational velocity and the redshift as observed from Earth. A possible explanation is the tired-light theory. But, as mentioned above, the physics of galaxy rotation in general are difficult to explain without making unproven assumptions. Since the redshift is the most common distance indicator in cosmological scales, a bias in the redshift can impact a large number of other studies that make use of the redshift.

Because the bias tends to become larger when the redshift gets higher, it is possible that such bias can explain anomalies, such as galaxies that according to the existing theories are expected to be older than traditional galaxy formation models predict. The experiments described here were based on relatively low redshift ranges and, therefore, it is still unclear whether higher redshift will have significant redshift bias. Studying the bias in higher redshift would require using a large number of galaxies with redshift imaged by space-based instruments, such as JWST, at around the galactic pole.

Because H_0 is determined by using the redshift, a redshift bias can also explain the observed H_0 tension. For instance, when using the SH0ES catalog [86] of Ia supernovae, by just selecting the galaxies that rotate in the same direction as the Milky Way, H_0 drops from ~73.7 to ~69.05 km/s Mpc^{-1} [87], which is within the statistical error from H_0 as observed by the CMB. When using only the SH0ES galaxies rotating in the opposite direction relative to the Milky Way, H_0 increases to ~74.2 km/s Mpc^{-1} [87]. Although SH0ES contains a relatively small number of Ia supernovae with their host galaxies, this suggests that redshift as a distance indicator may depend on the rotational velocity relative to the rotational velocity of the Milky Way. This observation is also aligned with the contention that the H_0 tension may require new physics that apply to the entire Universe, rather than certain changes in the physics of the early Universe [88]. Because H_0 is determined by using the redshift, redshift bias can also be related to the observed H_0 anisotropy [89,90,91,92,93], which is another puzzling observation that does not have an immediate explanation.

It is also possible that the redshift difference is not a bias, and that galaxies that rotate in the opposite direction relative to the Milky Way are indeed closer to Earth compared to galaxies that rotate in the same direction relative to the Milky Way. In that case, the alignment with both ends of the galactic pole is merely a coincidence. Such large-scale alignment is far larger than any known cluster, super-cluster, or filament in the cosmic web. That may be in agreement with numerous other observations that suggest that the cosmological principle is violated [93].

Although alignment in galaxy spin directions is expected [94,95], it is not expected to form a cosmological-scale axis. If such an axis indeed exists and it is not driven by the impact of the rotational velocity on the redshift measurements then it can be linked with theories such as dipole cosmology [96,97,98,99,100] or the rotating Universe [101,102,103,104,105]. Theories that assume a Universe rotating around a cosmological-scale axis include black hole cosmology [106,107,108,109,110,111,112,113,114,115] and ellipsoidal Universe [116,117,118,119,120].

Tensions between the expected age of some galaxies and the age of the Universe, as well as other cosmological-scale anisotropies and observations, such as the [illegible] tension, challenge our understanding of the Universe. It is clear that the current theories cannot co-exist with the redshift model as it is used currently, and, therefore, if the current theories are complete then this means that the redshift as a distance indicator is incomplete. This paper shows consistent evidence that the redshift depends on the rotational velocity of the Milky Way relative to the observed objects. The bias is small, but if it increases in the redshift ranges of the JWST deep fields then this would potentially explain the existence of mature galaxies in the early Universe.