

Can Light from the Earth Reach a Distant Galaxy? (or Can Light from a Distant Galaxy Reach the Earth?)

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The standard cosmology assumes that our Universe began about 13.8 Gy ago from a singular Big Bang event and from then until today the Universe has been expanding. As a result of this expansion, all nearby and distant galaxies¹ in the Universe are observed to recede away from Earth and *vice versa*. This speed v , according to the standard cosmology, can be lower or higher or equal to the speed of light c .

In all viable cosmological models, the recession speed v exceeds the speed of light (or $v > c$) for the distant galaxies with $z > 1.5$ [1]. The light from Earth would not reach the distant galaxy if it moved faster than the light (or $v > c$). If the redshift of the distant galaxies $z < 1.5$ then their recession speed v is less than the speed of light (or $v < c$) and the light from Earth would reach these galaxies. In this case, the Earth's light will catch up with the distant galaxy and its observer would have seen Earth in the past even, in some cases, as far back as when it was formed. For an observer associated with the galaxy and the Earth, it would be *vice versa* except that the light of the distant galaxy even with $v \geq c$ would reach the Earth [2].

From the point of view of the Earth's observer, the distant galaxy was born in the cosmological past, and he is, in relation to it, in the cosmological future. However, an observer of this galaxy would conclude that the "present-time" Earth is in the past and that he is, in relation to Earth in the cosmological future. Or as we already concluded in our previous note [3], there seems to be no past or future in the current mode of expanding Universe, and hence only the present.

References

- [1] P. I. Premović, *Nearby and distant galaxies: a brief note*. The General Science Journal, August 2024.
- [2] T. S. Davis and C.H. Lineweaver, *Superluminal recession velocities*. AIP Conf. Proc. 555, 348–351 (2001).
- [3] P. I. Premović, *Future and past in the current model of expanding Universe*. The General Science Journal, September 2023.

¹ We define nearby galaxies as those galaxies whose redshift z is from 0.001 to 0.1 (or $0.001 \leq z \leq 0.1$) and distant galaxies those having redshift $z > 0.1$. Of course, there is no sharp boundary between nearby and distant galaxies [1].

