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Notes: Do We Live in A Godel Universe

Anthony Maccini

Flat 9, Fairhall Court, 114-124 Kingcharles Road, Surbiton, KT5 BQL, England

*Corresponding author details: Anthony Maccini; anthonymaccini@hotmail.com

ABSTRACT

In 1949 Kurt Godel suggested in a paper, that the universe might be rotating, and that such a universe would contain closed time like curves. Now in 2025, a paper published by Lior Shamir on his study with the James Webb space telescope (JWST), has discovered a majority of galaxies in the early universe, that all have clockwise rotation, which is not random, but an anomaly, suggesting that the universe is rotating, supporting Godel's idea of a rotating universe and also implies that our universe may contain closed time like curves.

Keywords: closed time like curves; galaxies; rotating galaxies.

INTRODUCTION

In 1949 Kurt Godel published a paper [1] with solutions to Einstein's field equations, where he showed that the universe could be rotating, that light cones would be tilted, and would result in closed time like curves so that an observer traveling the whole length of the universe would return to their starting position in their own past.

In 2025 a paper published by Lior Shamir [2] found evidence from the James Webb space telescope (JWST) that in the distant past of the early universe, there was a majority of galaxies with clockwise rotation, higher than galaxies in our own time, that this is not random, but an anomaly, as suggested by Godel that if the galaxies acted like gyroscopes, would be a sign that the universe is rotating. If this turns out to be true, it could also imply that closed time like curves exist, and that nature allows this.

GODEL UNIVERSE

In 1949 Kurt Godel discovered a new solution to Einstein's field equations [1]. He suggested that tilted light cones might occur naturally if the entire universe were both static and in a state of uniform rotation. This universe would not rotate around any single point. But if we chose a point arbitrarily as the origin of a coordinate system and moved away from the origin, we would find that the tilt of light cones gradually increased until, at a certain distance, we would encounter a great ring of light cones stretching around the universe, each one tilted so far forward that the future light cone of a given event overlapped the past light cone of another. It would be possible to send a light signal through all these light cones.

Because to an outside observer, the path of this signal would be nearly horizontal, it would display rather peculiar behavior. In Godel's words, the light signal will come back exactly the same moment at which it is sent. Moreover, he observed, that since a light path can be approximated as closely as you wish by a path of a material particle, you can even travel into the past on a rocket ship of sufficiently high velocity.

Even if there was no evidence that the universe was rotating, Godel's work had significance, it showed that past-ward time travel was not prohibited by any known law of nature. At the time there was no evidence that the universe was rotating. But that Godel had not given up on the idea, if galaxies themselves act as gyroscopes, if the universe was rotating, the axes of rotation of individual galaxies would not be entirely random.

EVIDENCE

But now there is a paper by Liar Shamir [2], 'The distribution of galaxy rotation in JWST advanced deep extragalactic survey', who has presented observational evidence from the James Webb space telescope (JWST) that there is a majority of galaxies that have the opposite spin of rotation in the early universe to the spin of the Milky Way and other galaxies (counter-clockwise), acting as Godel suggested like gyroscopes, showing that the universe is rotating and that there may be a closed time like curves in our universe.

Liar Shamir says in his abstract: JWST provides a view of the universe never seen before, and specifically fine details of galaxies in deep space. JWST advanced deep extragalactic survey (JADES) is a deep field survey, that provides an unprecedentedly detailed view of galaxies in the early universe. The field is also in relatively close proximity to the Galactic pole. Analysis of spiral galaxies by their direction of rotation in JADES shows that the number of galaxies in that field that rotate in the opposite direction relative to the Milky Way galaxy is ~50 percent higher than the number of galaxies that rotate in the same direction relative to the Milky Way.

The analysis is done using a computer-aided quantative method, but the difference is so extreme that it can be noticed and inspected even by the unaided human eye. These observations are in excellent agreement with deep fields taken at around the same footprint by the Hubble Space Telescope and JWST. The reason for the difference may be related to the structure of the early universe, but it can also be related to the physics of galaxy rotation and the internal structure of galaxies. In that case, the observation can provide possible explanations for other puzzling anomalies such as $H_\circ$ tension and the observation of massive mature galaxies at very high redshifts.

Lior Shamir says further in his paper: One of the observations enabled by the ability of JWST to identify high visual details of galaxies in the alignment between the galaxy direction of rotation as observed by JWST and the direction of rotation of the Milky Way. Namely, JWST shows a much higher number of galaxies that rotate in the opposite direction relative to the Milky Way. That can be observed in JWST deep fields taken at close proximity to the Galactic pole. When spiral galaxies are located around the Galactic pole, their direction of rotation can determine whether they rotate in the same direction relative to the Milky Way, or in the opposite direction relative to the Milky Way.

When done manually, the determination of the direction of rotation of a galaxy can be a subjective task, as different annotators might have different opinions regarding the direction towards a galaxy rotates. A simple example is the crowdsourcing annotation through Galaxy Zoo 1 (Land et al. 2008), where in the vast majority of the galaxies different annotators provided conflicting annotations. Therefore, the annotations were made by a computer analysis that followed a defined symmetric model. Yet the advantage of the analysis of the relatively small JWST deep field is that it can be inspected by the human eye to ensure that the annotations of the galaxies are consistent and that no population of non-annotated galaxies that could change the outcome of the analysis exists.

The difference between the number of galaxies that rotate in opposite directions was also noted when using Earth-based telescopes (MacGillivray & Dodd 1985: Longo 2011; Shamir 2012, 2016, 2019, 2020, 2021, 2022). Namely, it has been shown that the difference between in the number of galaxies that rotate in opposite directions increases as the redshift gets higher (Shamir 2019, 2020, 2022, 2024), which might suggest that the difference becomes larger in the deep universe as imaged by JWST.

This shows that in the distant past of the universe, the majority of galaxies had a clockwise rotation different from today. Shamir says further:

If the observation shown here indeed reflects the structure of the universe, it shows that the early universe was more homogeneous in terms of the directions towards which galaxies rotate, and becomes more chaotic over time while exhibiting a cosmological-scale axis that is close to the Galactic pole. And additional cosmological model that requires the assumption of a cosmological-scale axis is the theory of a rotating universe, (Godel 1949; Ozsvath & Schucking 1962; Ozsvath & Scucking 2001; Sivaram & Arun 2012; Chechin 2016; Campaneli 2021; Seshavatharam & Lakshminarayana 2021).

As you can see from this paper, these galaxies rotations may not be random, where there is a majority of galaxies rotations are opposite our Milky Way and other galaxies, which may be an anomaly.

CONCLUSION

It appears due to the majority of galaxies rotating in the opposite direction in the past, the universe, might not be totally random, hinting at the possibility that the universe might be rotating and expanding at the same time, and supporting Godel's idea of a rotating universe. If our universe is indeed rotating, then perhaps closed time like curves exist in our universe and are not prohibited by nature. There is also one other point worth mentioning. If the universe is infinite can it rotate? And if an infinite universe can't rotate, would this imply that the universe is finite?

REFERENCES

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