Asymmetry in Galaxy spin directions as an observational bias due to aberration

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Keywords: Galaxies: spiral – Cosmology: large-scale structure of universe – Cosmology: Cosmic anisotropy; galaxies; distances and redshifts-galaxies; distance scale - cosmology; large-scale structure of the universe

Abstract

Recent studies of galaxy rotation directions in the distant universe have confirmed the observed trend for an asymmetry of up to 50% more counter rotating galaxies than co rotating galaxies. In that there appear to be more galaxies that rotate counter to our Milky Way than with it. These observations are currently not consistent with the Big Bang theory. And suggests new models of the physics of galaxy rotations may be necessary. Here it is proposed one can use the differing amounts of aberration of light from co and counter rotating galaxies to explain this apparent asymmetry. In that light from co rotating galaxies arrives at the earth observer more dispersed or blurred than light from counter rotating galaxies. Making the rotation direction of co rotating galaxies harder to identify. And in turn creating an asymmetrical bias in the identification between co and counter rotating galaxies. A counter rotating galaxy will appear more sharply in focus and more easily identifiable than the more blurred co rotating galaxy at any similar redshift. And that this asymmetrical bias due to aberration and the relative differences in incident angles between light from co and counter rotating galaxies increases with higher redshifts.

Introduction

Recent analysis (1) of JWST deep field images confirms the already observed trend that more galaxies rotate in opposite directions to the rotation of our Milky Way than with it. An asymmetry that increases more so the farther out into the universe one looks. This is an observation that is not consistent with current Big Bang models of our universe. And indeed, is also a problem for a non expanding model seeing as the predicted Doppler blue shifting of galaxies that rotate counter to our Milky Way is not sufficiently great enough to account for the almost 50% excess of counter rotating galaxies observed in deep field images. However, if one assumes aberration due to differences in transverse velocities between rotation directions of galaxies and our Milky Way affects the clarity of images of spiral galaxies to an earth observer, then it is possible to assume that this will lead to co rotating galaxies being on average more blurred and thus harder to identify than counter rotating galaxies. And in turn creates the asymmetrical bias in the data. It is important to note here that the 'relative velocities' referred to in this paper refer to the relative transverse velocity that is associated with any aberration effects. And that this angle of incidence due to aberration being referred to in this paper is created not from a galaxy's relative rotation or motion *towards or away* from us but rather solely from its relative rotational velocity transverse to our line of sight. Hence the terms co and counter rotation refer to transverse velocities. And that this angle of incidence due to aberration will be the same regardless of whether or not that galaxy is $z = 0.1$ or $z = 7$.

Theoretical Mechanism

Although different studies vary it can be assumed that counter rotating galaxies have rotational velocities of on average 200km/s relative to our Milky way. We also know from studies that Milky Way stars do not move in unison but instead travel in a range of rotational velocities of on average of +-20km/s as they rotate around the Milky Way core. Implying that stars in any co rotating galaxy can also rotate both faster or slower in this velocity range to our own galaxy's direction of rotation. This gives stars in galaxies that co rotate with the Milky Way a range of transverse velocities relative to the earth observer of +- 20km/s (for a total velocity difference of 40km/s). And for stars in a counter rotating galaxy the assumption is that they have transverse velocities relative to the earth observer of an average range of 180-220 km/s.

Aberration of this light will thus create two sets of incident angles arriving to the earth observer. A set of greater but more homogenous incident angles of light from the counter rotating galaxies and a set of lower but wider incident angles from co rotating galaxies. The assumption here is that although the angles are greater due to higher relative velocities, the actual range of incident angles of light from the counter rotating galaxy is much smaller than the range of incident angles from co rotating galaxies. Due to the fact that as one increases relative transverse velocities between the earth observer and the galaxy source the angle of incidence due to aberration will increase, but with successively smaller increases in the angle of incidence. In that the difference in incident angles for the counter rotating galaxies light between the extremes of 180 and 220 km/s due to aberration, will be measurably smaller than the difference in incident angles between the co rotating galaxy incident light whose relative velocities are between only +20 and - 20 km/s. That is, the 40km/s velocity difference for the counter rotating galaxies will lead to a measurably smaller difference in incident angles due to aberration than the 40km/s velocity difference for the light arriving from co rotating galaxies.

It is proposed here that this relative difference in the range of incidence angles between light from co and counter rotating galaxies results in light arriving at earth from co rotating galaxies being more dispersed or 'blurred' in the JWST image plane than light arriving at the earth observer from counter rotating galaxies. The increase of this bias the higher the redshift is dependent on the ratio of aberration angle vs image size. As these angles of aberration are solely dependent on relative transverse velocities between the source galaxy and our Milky Way, this means that the light from any galaxy will always arrive at its same incident angle to the earth observer regardless of its distance from earth. But because more distant galaxies cover a smaller portion of the sky in the JWST image, then the incident angle vs progressively smaller image size relationship creates a greater proportion of blurring for a more distant co rotating galaxy than for a nearby co rotating galaxy. The result is fewer blurred co rotating galaxies can be identifiable compared to the more sharper focus counter rotating galaxies at any redshift. And allows the model proposed here to explain not only the overall bias towards counter rotating galaxies at any redshift but also the increase of this asymmetry at greater redshifts.

Although this proposed new model does not specifically address the excess luminosity observed for counter rotating galaxies it is also possible to attribute this asymmetry in brightness to the proposed blurring of light for co rotating galaxies. In that due to a wider range of incident angles due to aberration, the same total intensity of light for each star in the co-rotating galaxy is more dispersed and its intensity reduced by spreading the incident light across a wider part of the image plane.

Modelling redshift in a non-expanding universe

Various alternative redshift models including Zwicky style and non-expanding theories have been suggested (1) as possible explanations for this observed rotational asymmetry. The model of a statistical bias, based on aberration proposed here can only be consistent with a non expanding model of the universe and not consistent with the BBT. In that as the redshift increases in a Big Bang model, so too does the recession velocity. And if the recession velocity increases, the incident angle attributed to aberration must decrease with redshift for all galaxies. Making the distinction between co and counter rotating galaxies harder to measure. Effectively the predicted recession velocities of an expanding BBT model will not allow the progressively more blurring of the image of co-rotating galaxies at higher redshifts. Implying that this observed increase of asymmetry of galaxy rotations due to aberration is not only inconsistent with but refutes the expanding universe model of the Big Bang theory.

To model cosmological redshift in a non-expanding model the assumption is made that z = 1 is a reliable indicator of linear distance. In that light has to travel a certain distance A to double its emitted wavelength. And that the same distance A must then have been travelled by light again for every doubling of wavelength observed. This implies a linear distance scale where the linear distance A is the same distance between z = 1-3, between 3-7, between 7-15 etc. Implying that at z = 1 the original wavelength has been doubled by travelling distance A. Doubled again at z = 3 by travelling another distance A and again at z = 7 etc. As follows:

z=0 (500nm to 1000nm) = rest frame

z= 1 (1000 to 2000)=distance A= (z0 to z1) z=3 (2000 to 4000)=distance 2xA

z=7 (4000 to 8000)=distance 3xA

z=15 (8000 to 16000)

z=31 (16000 to 32000)

z=63 (32000 to 64000)

z=127

z=255

z=511

z=1023(ie Microwave)=distance 10xA

The assumption is that in a non-expanding universe an object at z=1023 is only twice as far away from earth as z=31. Or 10 times as far away as an object at z=1

It must be noted here that cosmological redshift in a non-expanding model does not imply, as Zwicky erroneously assumed, that light loses energy over distance. Only if one invokes the theoretical Photon, is light subject to this energy loss over distance. This apparent energy loss of photons over distance from Hubble's' first observations of cosmological redshifts was not consistent with the photon model and is incidentally the prime reason why the Big Bang theory was initially invented. Whereas if light is treated as a classical wave only electromagnetic phenomena then it becomes obvious that red shifting of emitted light to lower wavelengths over distance does not have to lead to energy loss in cosmological red shifting. In that an emitted range of light from a source will always cosmologically redshift to a larger range of longer wavelengths and thus preserve the total energy between emission and observation. For example, emitted 10 - 20nm will redshift at z = 1 to 20 - 40nm.

Conclusion

Average spiral galaxy rotation velocities are observed to be around 200km/s. If one factors in the various different local rotational directions of stars in spiral galaxies then the average transverse velocity range for a co rotating galaxy relative to our Milky Way will be in a range of +-20km/s. And for counter rotating galaxies this equates to a transverse velocity range of 180-220km/s. The differences in the range of angles of aberration of light from counter rotating galaxies will also be smaller than for co rotating galaxies due to incident angles of aberration becoming progressively smaller for progressively larger relative transverse velocities. That is the difference in angle of incidence due to aberration is measurably smaller for a velocity difference between 180-220km/s than it is for the velocity difference between -20 to + 20km/s. Implying that light from a counter rotating galaxy is more focused and less diverse in incident angles than light from co rotating galaxies.

Due to this relationship between aberration angle, image size and the relative transverse velocities between co and counter rotating galaxies vs the Milky Way as described above it is assumed here that co rotating galaxies will appear more blurred than counter rotating galaxies to the earth observer. And as a result, make it more difficult to identify co rotating galaxies in the data than counter rotating galaxies. Which leads to fewer co rotating galaxies represented in final totals. And in turn lead to a statistical asymmetric bias in the data that increases with higher redshifts.

Reference

Lior Shamir; The distribution of galaxy rotation in JWST Advanced Deep Extragalactic Survey 2025.