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COSMOLOGY AND REDSHIFT IN COSMIC DUST

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Abstract: Based on the Planck law of quantum mechanics, cosmic dust cannot conserve galaxy light by a temperature increase because the quantum size of the dust requires the heat capacity of the constituent atoms to vanish. Conservation therefore proceeds by the re-emission of the galaxy light adjusted to the EM confinement given by the dust dimensions. Typically, the dust redshifts the galaxy light beyond that given by the true recession redshift thereby overstating velocities to the extent that to hold the galaxies together dark matter is thought to exist. Because of the ubiquity of cosmic dust in the Universe all astronomical velocity measurements based on redshift are highly overstated, the consequences of which are of great importance in cosmology. Cosmic dust is shown to explain the flat galaxy rotation curves of spiral galaxies without dark matter and negate an accelerating Universe based on redshift showing the fartherist known supernovae brighter than expected. Recently, the discovery of the transparent Ghost galaxy absent cosmic dust showing a falling rotation curve and the absence of dark matter affirms cosmic dust, and not dark matter is the source of the long-standing flat rotation curves.

Keywords: cosmology, dark matter, cosmic dust redshift

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1. Introduction

Since the 1970's, dark matter was thought to exist because the rotational velocities V found [1] in Andromeda M31 and other low-redshift galaxies ($z<0.001$) were characterized by flat rotation curves having higher velocities than expected from the falling curves given by Newtonian mechanics, suggesting dark matter was present to hold the galaxies together. The M31 rotation velocities were inferred from the redshift of the nitrogen NII line, the consequence of which was that flat rotation curves became the signature of the existence of dark matter.

However, high-redshift (0.6<z<2.6) galaxies in the distant Universe were recently found [2] to have falling rotation curves suggesting the absence of dark matter. Similarly, the recently discovered DF2 galaxy was found [3] to have a falling rotation curve suggesting the absence of dark matter. DF2 is called the Ghost galaxy because it is transparent suggesting dark matter is not present because of the absence of cosmic dust. What this means is modern cosmology faces a dilemma as dark matter should not depend on the transparency of a galaxy or whether a galaxy is in the local or distant Universe.

Unlike the data for the M31 galaxy that shows flat rotation curves out to 24 kpc, the criticism of the falling rotation curves in the high-redshift galaxies reported in [2] is the data was only taken out to about 10 kpc - not long enough to verify the curve is indeed falling. Since extended data can be resolved by future work, the emphasis in this paper is placed on the critique of flat rotation curves in M31 and specifically, to the unanswered question posed by Rubin and Ford in [1] as to what causes the decrease in intensity of the nitrogen NII line with increasing distance from the galaxy nucleus. However, the dependence of dark matter on absence of cosmic dust in the Ghost galaxy is also discussed.

2. Proposal

In the spiral M31 galaxy, the redshift of the NII line used to infer rotation velocity V occurs upon absorption in cosmic dust distributed throughout the galaxy, the submicron dust particles concentrated in the outermost spiral arms. For clarity, only three dust particles are illustrated in Figure 1.

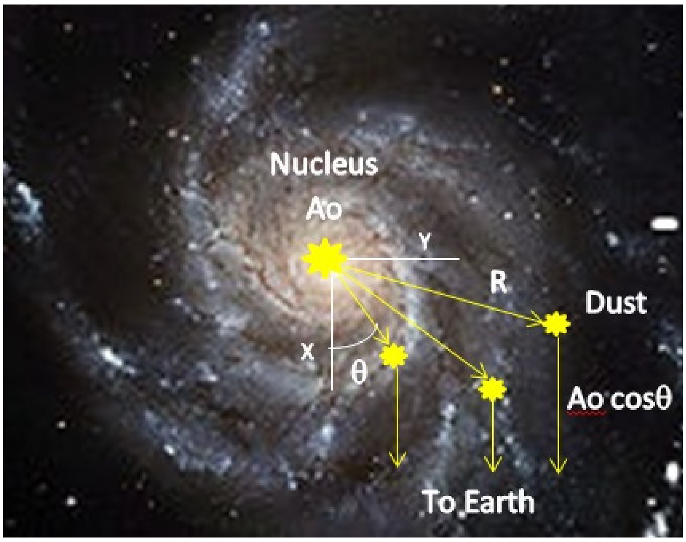

Figure 1: Flat rotation curves from cosmic dust particles in spiral galaxies

The cosmic dust particles are located relative to the galaxy nucleus with x-axis oriented in the direction of the observer on Earth by radius R and angular position θ coordinates. The distance y from the nucleus to the dust particles is $y = R \sin\theta$. Ultraviolet radiation from stars within the nucleus is assumed to produce an intensity Ao of ionized NII nitrogen at 658.3 nm moving spherically outward from the nucleus shown by arrows until absorption by a dust particle. The redshifted NII line is re-emitted in the direction of the incident NII line momentum. Hence, the line intensity of the redshifted NII line to the Earth decreases by $Ao\cos\theta$. Consistent with observation [1], the velocity V of the rotation curve is determined from the redshift z of NII which is nearly uniform across the galaxy while the NII line intensity decreases with distance y from the nucleus and vanishes as θ approaches 90 degrees.

3. Background

The redshift in cosmic dust went unnoticed for almost a century because the light-matter interaction of galaxy light including the NII line was assumed to follow classical physics allowing the heat capacity of the atoms in nanoscopic dust particles to conserve the galaxy photon by an increase in temperature. But the heat capacity of the atom given by the Planck law of QM is not scale invariant being finite at the macroscale while vanishing at the nanoscale. QM stands for quantum mechanics. Conservation of the galaxy photon is therefore only possible by a non-thermal mechanism proposed here to be simple QED.

4. Simple QED

Simple QED relies on the high surface-to-volume ratios of cosmic dust where the NII line is absorbed almost entirely in the dust surface placing the dust atoms under the EM confinement necessary for the heat capacity to vanish. Since the surface heat cannot be relieved by thermal expansion, non-thermal standing EM radiation is created having half-wavelength $\lambda o/2 = d$ as the energy of the NII line adjusts to the EM confinement defined by the dust dimensions. The speed of light c corrected for the refractive index n of the dust gives the Planck energy E of the redshift NII line, $E = h(c/n)/\lambda o$. On Earth, the NII line is observed to have wavelength λo with redshift $z = (\lambda o - \lambda)/\lambda$, where $\lambda o = 2nd$ and $\lambda = 658.3$ nm. Once the Planck energy of the NII line absorbed in the dust surface is expended in forming the redshifted NII line, the EM confinement vanishes and the redshifted NII line is free to travel to the Earth. See diverse simple QED applications in nanostructures at http://www.nanoqed.org/, 2010-2018.

5. Discussion

The shape of the galaxy rotation velocity V curve depends on the redshift z of the NII line in the absorption at each dust particle throughout the galaxy located at distance y from the nucleus is, $V(y) = cz$. But z depends on the refractive index n of the dust, typically silicates, while the diameter d of the dust varies, $d < 500$ nm. For the wavelength λ of the NII line, the dust redshift z increases with the diameter d of the absorbing dust particle. For the wide range of dust redshifts z in the galaxy, the velocity $V(y)$ curve produces a wide velocity spectrum, but does not give the flat rotation velocity curve observed [1] for M31.

However, this is not a problem in practice because the range on the measurement of redshift z is usually limited, e.g., in M31, z was limited < 0.001, and therefore only redshifts near the NII line at 658.3 nm were measured. But dust redshifts $z >> 0.001$ do indeed occur in the NIR and FIR, but were not reported in [1] for M31 because emphasis was placed on detection of redshift z near the NII line. Since silicates having $n = 1.3$ give the corresponding dust diameter $d = 253.2$ nm, the flat rotation velocity curve in M31 is produced by the redshift from all dust diameters near 253.2 nm in the galaxy.

One way of assessing the effect of cosmic dust on the validity of recession velocities is to measure the redshift of at least two galaxy lines, say the NII line at 658.3 nm and the Hα line at 656.28 nm. If both lines give the same z, the redshift measurement gives valid recession velocities, but if not, cosmic dust is measured. In practice, the average velocity for all spectral lines is computed, but unless all velocities are the same, the computed average is invalid. In M31, the Hα line was used with the NII line, but Hα was reported [1] only weakly observed near the nucleus and outer galaxy radius suggesting dust and not recession redshift were measured.

Similar to dark matter as redshift in cosmic dust of M31, accelerated Universe expansion [4] from the observation that Supernovae based on brightness were found closer than expected based on redshift is an illusion because the redshift of cosmic dust does indeed make the Supernovae appear farther away. If Supernovae observations are corrected for cosmic dust, the Universe is not expanding consistent with the static and dynamic Universe once proposed by Einstein.

6. Conclusions

The low-redshift M31 spiral galaxy having a flat rotation curve is the consequence of redshift of the NII line in cosmic dust which requires the intensity of the NII line to decrease with the distance from the nucleus.

Flat galaxy rotation curves depend solely on cosmic dust having nothing to do with dark matter allowing galaxy dynamics at both low and high redshift to be governed by Newtonian mechanics.

References

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