Galaxies and Non-Existence of Dark Matter, Milky Way

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ABSTRACT

Following the article published by a team of scientists from China and Australia, in an article published in July 2022 in the Monthly Publications of the Royal Astronomical Society, where they adopt a translation speed of the sun in the order of 240,000 km/s and a different quantification of the amount of matter existing in the accretion disk. The Royal Astronomical Society paper made use of the same methodology used an the article published by this author, in the *International Journal of Physics,* 2021, 9(1), 36-41, DOI: 10.12691/ijp-9-1-4 Open access article, Galaxies and Dark Matter. In that paper, I present the changes caused due to the acceptance of the new proposed values of velocities and masses.

(Keywords: universe, gravitation, potential, gravity, velocity, mass, physics, variable)

Galaxies and Dark Matter: ijp-9-1-4 (7).pdf

THE ABSENCE OF DARK MATTER IN GALAXIES

Dark Matter Concept

In cosmology, dark matter is a human creation in order to justify the distribution of matter in galaxies and its rotation in block. It is a speculative type of matter that interacts only gravitationally, and therefore its presence can be inferred from gravitational effects on visible matter, such as galaxies.

Although not directly observable, scientists believe that dark matter exists because of its consequences on gravitational effects, as visible matter that moves and distributes in space cannot explain the rotation curves of galaxies.

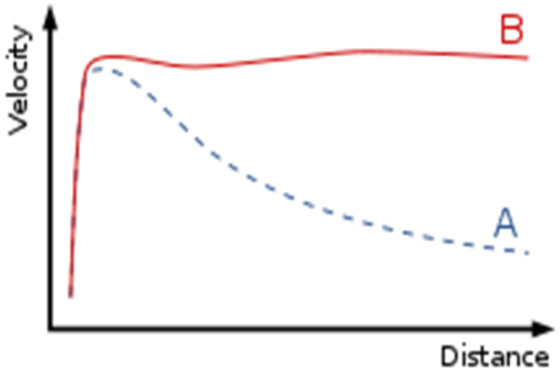


Figure 1. Rotation Curve of a Typical Spiral Galaxy: Predicted (A) and Observed (B). Dark matter can explain the "flat" appearance of the velocity curve over a large radius. (“Dark matter” – Wikipedia 2025)

Study Method: Analysis of Galactic Structure

Four arms were drawn, the outer arm in orange, the Scutum-Centaurus arm in yellow, the Sagittarius arm in blue, and the Perseus arm in red.

We divided the plane of the galaxy into eight quadrants, 0.125 turns, to study the value of the radius of each arm between each quadrant.

We consider a symmetry to exist at the time of the initial creation of the galaxy and therefore measure what the gravitational radius is for a location. at multiple positions of +0.125 turn, i.e. at the locations of n + 0.125, n + 0.25, n + 0.375, etc.

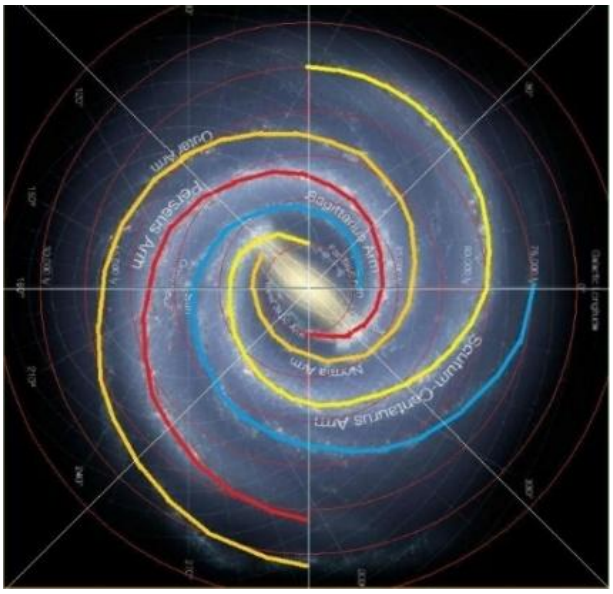


Figure 2: Milky Way, Milky Way Arm Marking and 8 Quadrants (Wikipedia, 2025)

Table 1: Radius and Number of Turns.

Oranje	Radius	Turns
	ly	n
	62 570	n
	55 880	n+0,125
	45 960	n+0.250
	40 510	n+0,375
	34 230	n+0,500
	29 000	n+0,625
	22 930	n+0,750
	19 750	n+0,875
	14 960	n+1,000
	12 390	N+1,125

We take for granted the information that the Sun is 26,000 light-years from the center of the galaxy and that it has a rotational speed of 240.000 m/s within the galaxy.

Therefore, we were able to calculate the number of laps made at each point of the galaxy, considering:

The speed of rotation of the Sun in the Galaxy will always be constant. We must also consider the average orbital perimeter of the Sun given the expansion of the Galaxy.

Therefore,

L - Total distance traveled by the Sun in its translational motion.

P_m – Average travel perimeter of the Sun.

I – Age of the Universe, 15 200 284 022 Years

V_{tSun} – Translation speed of the Sun

C – Speed of Light

$L = I * 365.2564 * 24 * 3600 * V_{tSun}$ = $1,15129x10^{+23}$m

$P_m = \frac{2*\pi*26000*365.2564*24*3600*C}{2}$ = 7,72779*10^{+20} m

Nº laps= $\frac{L}{P_m}$ =148,981 laps

Analysis of the Amount of Matter and its Distribution

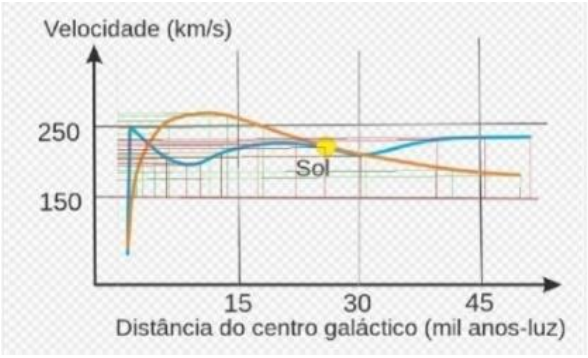


Figure 3: Velocity Measured from the Solar System (Blue), Velocity Calculated based on the amount of Visible Mass (Orange). (Milky Way, Wikipedia, 2025).

For the calculation of the matter necessary to cause the equilibrium of the previous table, we consider that only the matter inside the radius will contribute to the calculation of the potential, (square of the velocity of displacement) created.

$M=\frac{RV_{tSun}{}^2}{G}$

V_{tSun}= K R

$M=\frac{K^2R^3}{G}$

ρ = (K^2 R^3)/(4/3 πR^3 G) ;

ρ = K^2/(4/3 πG) R^3

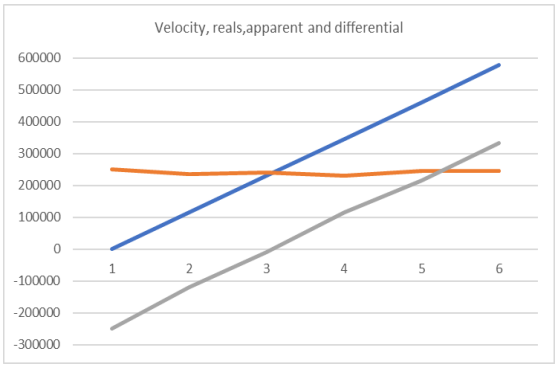
ρ = W

For this to happen, the translation speed proportional to the radius, the density of matter must be constant in the galaxy.

Sun Rotating in the Opposite Direction of the Galaxy's Rotation

The Sun will take 204.1 million years to complete one revolution around the Milky Way and 201.5 million years to complete a full rotation on itself, rotating in the opposite direction to the rotation of the galaxy. Let's look at the graphical representation.

Figure 4: Velocity, Real, Apparent, and Differential.



Blue – Actual rotation speed of the galaxy
Orange - Apparent speed of rotation of the galaxy
Grey – Real rotation speed of the solar system

Table 2: Radius, Velocity, Average Perimeter, Space Traveled, Number of Turns, and Value of the Inner Mass at the Radius.

Translation Speed	Proportional speed	%	Radius Al	Radius m	Average perimeter = 1/2 of the per. total	L traveled	number of turns	Inner mass
139 020	138 092	0	14 960	1,41535E+20	4,44645E+20	6,67900E+22	150,210	4,09944E+40
240 000	240 000	0,00%	26 000	2,45983E+20	7,72779E+20	1,15306E+23	149,210	2,12341E+41
317 034	315 969	0,34%	34 230	3,23846E+20	1,01739E+21	1,52314E+23	149,710	4,87814E+41
576 612	577 569	-0,17%	62 570	5,91968E+20	1,85972E+21	2,77024E+23	148,960	2,94965E+42

Table 3: Speed Differential.

Part of the radius	Speed Real (Blue)	Apparent velocity (Orange)	Differential Speed (Grey)	Real Speed (Yellow)
0	0	250 000	-250 000	250 000
0,2	115 514	235 000	-119 486	119 486
0,4	231 028	240 000	-8 972	8 972
0,6	346 542	230 000	116 542	-116 542
0,8	462 055	245 000	217 055	-217 055
1	577 569	245 000	332 569	-332 569

Quantity of Matter

Analyzing the calculations we performed, we obtained a quantity of matter of 2.94891E+42x10^42 kg for a translation speed of 577,569 m/s and a radius of 62,570 al.

It is important to note that this distribution of matter would imply a relatively constant density relative to the volume, and this matter is also distributed in the accretion disk.

In the results, there is a gradual increase in the density of matter from the periphery towards the central zone, with an increase of about 1.66%.

This distribution of matter does not seem unrealistic, since the galaxy initially had a spherical shape and thus the accretion disk gradually captured much of the matter, keeping it at the same distance it had from the center of the galaxy.

It is possible to question the number of stars in the periphery. But if, however, we consider a disk thickness of approximately 5 al., the average density would be about 2.83x10^-17 kg/m3, which seems practically undetectable to us.

It is important to note that this distribution of matter would imply a relatively constant density relative to the volume, and this matter is also distributed in the accretion disk.

We consider there to be between 5.50x10^11 solar masses, or 1.1x10^42 kg, and 1x10^12 solar masses, equivalent to 2x10^42 kg, as published by a team of scientists from China and Australia, in an article published in July 2022 in the Monthly Publications of the Royal Astronomical Society.

Considering a total mass of the galaxy of 2.94891x10^42 kg, which implies an average density of 3.39373E-21 kg/m3, we conclude that the mass of the accretion disk corresponds to a percentage between 40.69% and 67.82% of the total mass of the galaxy, which corresponds to an average density outside the accretion disk between 2.01282E-21 kg/m3 and 1.0921 0E-21 kg/m3.

Therefore, a very significant part of the matter still gravitates outside the accretion disk.

In this sense, the presence of dark matter does not appear to be necessary to explain the practically block-like motion of galaxies and clusters.

Dark Matter Does Not Exist

We don’t need to “Invent” dark matter to explain the block rotation of galaxies. As we can see, we don't need any dark matter to explain the roughly block rotation of galaxies.

Both the theoretical model and the analysis of the distribution of matter in the accretion disk and the possible distribution of the remaining non-visible matter can indicate a distribution with homogeneous mass density in volume.

All the matter retained in the accretion disk continued to occupy the same place in the radius that it already occupied in the galaxy. In other words, matter continues to maintain the same distance from the center of the galaxy. However, due to the immense size of galaxies, it is difficult to detect the density of the free material that is gravitating them.

The Earth is not isolated, but interacts with the interstellar medium, receiving particles from various sources, such as the remains of explosive stars, celestial bodies and clouds of gas and dust. It is estimated that around 5,200 tons of matter enter the Earth's atmosphere and settle on its surface each year.

To estimate the volume of space that the Earth crosses in a year, we can consider its radius plus 20% referring to the extension of the atmosphere and the gravitational force. We can also add the speeds of the solar system (240,000 m/s) and the Earth's orbit around the Sun (29,300 m/s) to obtain the speed of the Earth in the galaxy. With this data, we can calculate that the volume of space covered by the Earth is approximately 1,56677E+27 m3/year.

If we admit that the density of matter in space, in the accretion disk, the average density between 7,047E-21 kg/m3 and 1,17456E-20, we will have 5200 tons falling to the Earth. In other words, the density of matter in the accretion disk zone varies between twice and 3.5 more than the average density of the galaxy, which seems reasonable to accept.

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