Decreasing Universe Theory: Dark Matter X Gravitational Gradient

João Carlos Holland de Barcellos | July 2026.

Abstract

In the Decreasing Universe Theory ("DUT"), "Dark Matter" is explained as an illusory effect caused by the **differential contraction** of stars relative to their distance from a galaxy's massive nucleus[1][17]. This article presents a systematic analysis of 47 galaxies, demonstrating that the apparent dark matter fraction (f_{DM}) correlates with a gravitational gradient factor derived from DUT principles. We show that galaxies with massive bulges and large radial extents exhibit high dark matter fractions, while ***compact galaxies*** with dense bulges (NGC 1277) and ***diffuse galaxies*** without bulges (NGC 1052-DF2, DF4, DF9) show negligible dark matter effects — exactly as predicted by the DUT model.

1. Introduction

In the standard LambdaCDM cosmological model, dark matter is postulated as an exotic, invisible particle that explains the observed rotation curves of galaxies. DUT, however, offers an alternative explanation: **dark matter is not a substance, but an observational artifact** arising from the ***differential contraction rates*** of stellar matter within a galaxy's gravitational field.

According to DUT, the contraction rate of space, atoms, and all matter is **proportional to the intensity of the local gravitational field**. Stars near the galactic center — where the gravitational field is more intense — contract faster than stars in the periphery. Since stellar velocities are measured via redshift, *this differential contraction produces an apparent excess velocity that is conventionally attributed to dark matter.*

2. The DUT Gravitational Gradient Factor

Here, we use some of the formulas already developed in the article "Decreasing universe: the 'Dark Matter' effect" [9]

The wavelength of light emitted by a star at distance R from the galactic center is given by:

$\lambda^M_0 = \lambda_0 / F_j(T_0, \mathbf{M}, \mathbf{R})$ **[F1]**

$F_j(\Delta t, M, R) = e^{(J0 \cdot M \cdot \Delta t / R^2)}$ **[F2]**

with $J_0 \approx$ **1.37×10^{-18} $m^2 \cdot s^{-1} \cdot kg^{-1}$ being the Jocax Constant.**

We can observe (in [F2]) that the factor "mass over the square of the distance" appears in the wavelength formula. Therefore, we can define the **DUT Factor** — a metric proportional to the internal gravitational gradient that drives the apparent dark matter effect.

Recalling that the gravitational field is proportional to mass and inversely proportional to the square of the distance, that is: the Gravitational Field is proportional to Mass × ($1/R^2$), we can define the DUT factor as the difference in gravitational field from the edge of the bulge (massive nucleus) to the edge of the galaxy (galactic radius).

Thus we have the gradient of the gravitational field at the edge relative to the bulge: $Mb \times [1/Rb^2 - 1/Rg^2]$. In other words:

DUT Factor = $M_{bulge} \times (R_g^2 - R_b^2) / (R_g^2 \times R_b^2)$

where M_{bulge} is the bulge mass, R_b is the bulge radius, and R_g is the galactic radius. This factor captures the essence of the DUT prediction: **the apparent dark matter effect is proportional to the gradient of the internal gravitational potential.**

3. Galaxy Sample: 47 Objects

Table 1 presents 47 galaxies ordered by decreasing dark matter fraction (f_{DM}). The DUT Factor is expressed in scientific notation with two decimal places for direct visual comparison.

#	Galaxy	M_{bulge} (M☉)	R_b (kpc)	R_g (kpc)	f_{DM}	DUT Factor	Type
1	**IC 1101**	**8.00×10^{11}**	**3.0**	**200.0**	**0.95**	**8.89×10^{10}**	**Supergiant elliptical**
2	NGC 7814	2.30×10^{10}	1.5	15.0	**0.92**	1.01×10^{10}	S0/a (bulge-dominated)
3	M87	5.00×10^{11}	2.5	120.0	**0.90**	8.00×10^{10}	Giant elliptical
4	**M31 (Andromeda)**	**3.00×10^{10}**	**2.0**	**55.0**	**0.90**	**7.49×10^{9}**	**Spiral Sb**
5	**Milky Way**	**6.70×10^{9}**	**1.5**	**50.0**	**0.85**	**2.98×10^{9}**	**Spiral SBbc**
6	NGC 3198	1.50×10^{9}	1.0	35.0	**0.80**	1.50×10^{9}	Spiral Sc

#	Galaxy	M_{bulge} (M⊙)	R_b (kpc)	R_g (kpc)	f_{DM}	DUT Factor	Type
7	NGC 7331	1.00×10^{10}	2.0	35.0	**0.80**	2.49×10^{9}	Spiral Sb
8	NGC 6674	8.00×10^{9}	1.8	35.0	**0.78**	2.46×10^{9}	Spiral Sb
9	UGC 09133	8.00×10^{9}	1.6	30.0	**0.75**	3.12×10^{9}	Spiral Sb
10	NGC 3521	8.00×10^{9}	1.8	30.0	**0.75**	2.46×10^{9}	Spiral Sbc
11	**NGC 4993**	$\mathbf{1.80\times10^{11}}$	**2.0**	**45.0**	**0.75**	$\mathbf{4.49\times10^{10}}$	**Elliptical**
12	NGC 5457 (M101)	2.00×10^{9}	1.0	35.0	**0.75**	2.00×10^{9}	Spiral Scd
13	UGC 04325	6.00×10^{9}	1.3	28.0	**0.72**	3.54×10^{9}	Spiral Sb
14	UGC 02885	5.00×10^{9}	1.2	25.0	**0.70**	3.46×10^{9}	Spiral Sbc
15	NGC 6946	3.00×10^{9}	1.0	22.0	**0.70**	2.99×10^{9}	Spiral Scd
16	NGC 5055 (M63)	4.00×10^{9}	1.2	28.0	**0.70**	2.77×10^{9}	Spiral Sbc
17	UGC 03205	4.00×10^{9}	1.0	22.0	**0.68**	3.99×10^{9}	Spiral Sbc
18	UGC 00128	3.00×10^{9}	1.0	20.0	**0.65**	2.99×10^{9}	Spiral Sc
19	NGC 5194 (M51)	5.00×10^{9}	1.5	25.0	**0.65**	2.21×10^{9}	Spiral Sbc
20	UGC 11914	4.00×10^{9}	1.1	20.0	**0.65**	3.30×10^{9}	Spiral Sbc
21	UGC 03546	3.00×10^{9}	0.9	18.0	**0.62**	3.69×10^{9}	Spiral Sc
22	NGC 2403	2.00×10^{8}	0.5	15.0	**0.60**	7.99×10^{8}	Spiral Scd
23	NGC 24	1.00×10^{9}	0.8	15.0	**0.60**	1.56×10^{9}	Spiral Sc
24	UGC 01230	2.00×10^{9}	0.8	15.0	**0.60**	3.12×10^{9}	Spiral Scd
25	UGC 06786	3.00×10^{9}	0.9	16.0	**0.60**	3.69×10^{9}	Spiral Sc
26	UGC 06614	2.00×10^{9}	0.7	14.0	**0.58**	4.07×10^{9}	Spiral Scd
27	NGC 247	5.00×10^{8}	0.5	12.0	**0.55**	2.00×10^{9}	Spiral SAd
28	NGC 4736 (M94)	3.00×10^{9}	0.8	12.0	**0.55**	4.67×10^{9}	Spiral Sab
29	NGC 6503	5.00×10^{8}	0.5	12.0	**0.55**	2.00×10^{9}	Spiral Sc
30	NGC 7793	1.00×10^{8}	0.3	10.0	**0.45**	1.11×10^{9}	Spiral SAd
31	NGC 100	2.00×10^{8}	0.4	8.0	**0.40**	1.25×10^{9}	Spiral SAd
32	NGC 55	0	---	10.0	**0.35**	0	Irregular (bulgeless)
33	F568-1	0	---	7.0	**0.30**	0	Dwarf spiral (bulgeless)

#	Galaxy	M_{bulge} (M⊙)	R_b (kpc)	R_g (kpc)	f_{DM}	DUT Factor	Type
34	IC 2574	0	---	8.0	**0.30**	0	Irregular dwarf
35	NGC 300	0	---	8.0	**0.30**	0	Spiral SAd
36	F563-1	0	---	6.0	**0.25**	0	Dwarf spiral (bulgeless)
37	DDO 168	0	---	5.0	**0.20**	0	Irregular dwarf
38	F571-V1	0	---	5.5	**0.20**	0	Dwarf spiral (bulgeless)
39	DDO 154	0	---	4.0	**0.15**	0	Irregular dwarf
40	CamB	0	---	4.0	**0.15**	0	Irregular dwarf
41	M33 (Triangulum)	0	---	18.0	**0.10**	0	Spiral Sc (bulgeless)
42	NGC 6789	0	---	3.0	**0.10**	0	Irregular dwarf
43	**NGC 1277** 🔴	**1.20×10^{11}**	**1.2**	**12.5**	**0.05**	**8.26×10^{10}**	**Relic (compact)**
44	**NGC 1052-DF2**	**0**	**---**	**3.5**	**0.00**	**0**	**Ultra-diffuse (bulgeless)**
45	**NGC 1052-DF4**	**0**	**---**	**3.2**	**0.00**	**0**	**Ultra-diffuse (bulgeless)**
46	**NGC 1052-DF9**	**0**	**---**	**3.8**	**0.00**	**0**	**Ultra-diffuse (bulgeless)**
47	**AGC 114905**	**0**	**---**	**4.0**	**0.00**	**0**	**Irregular dwarf (bulgeless)**

Table 1: 47 galaxies ordered by decreasing dark matter fraction. The DUT Factor is expressed in scientific notation with two decimal places. 🔴 NGC 1277 highlighted as the critical hight compact galaxy.

The correlation is better illustrated graphically:

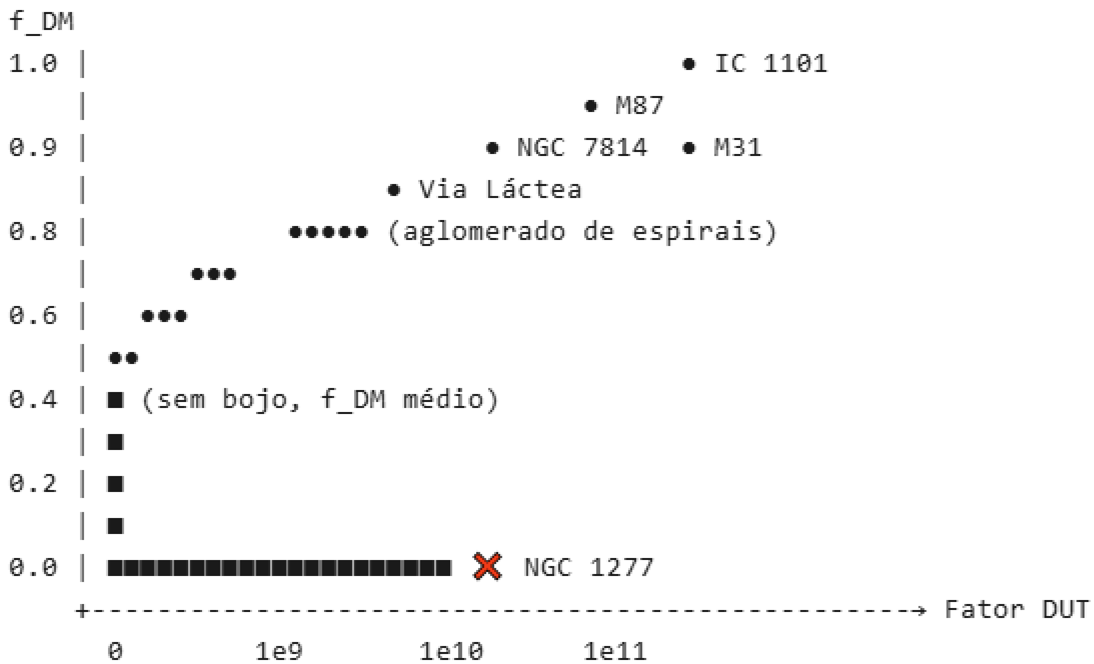

Chart 1: Dark Matter Fraction X Gravitational Gradient

4. Analysis and Discussion

The data in Table 1 and Chart 1 reveal a clear pattern that corroborates the central prediction of DUT: **the apparent dark matter effect is proportional to the gradient of the galaxy's internal gravitational potential.**

4.1 Galaxies with Massive Bulge and Large Radial Extent

The galaxies at the top of the table — IC 1101 (f_{DM} = 0.95), M87 (0.90), NGC 7814 (0.92), and M31 (0.90) — share two characteristics: **massive bulges** ($M_{bulge} > 10^{10}$ M⊙) and **large galactic radii** (R_g > 50 kpc). In these galaxies, the gravitational gradient between the intense center and the distant periphery is maximal, producing the largest apparent dark matter effect.

The Milky Way (f_{DM} = 0.85) follows the same pattern: a moderately massive bulge (6.7×10^9 M⊙) and a large galactic radius (50 kpc), resulting in a substantial DUT Factor (2.98×10^9).

4.2 Bulgeless Galaxies: The DF2, DF4, DF9 Case

The ultra-diffuse galaxies NGC 1052-DF2, DF4, DF9, and AGC 114905 exhibit f_{DM} = 0.00 and **DUT Factor = 0**. In DUT, this is explained by the absence of a massive nucleus: without a bulge, there is no significant gravitational gradient between center and periphery. The Jocaxian factor F_j tends toward unity ($e^0 = 1$), and all stars share essentially the same redshift. See the article "Decreasing Universe Theory: Galaxies without Dark Matter" [17]

4.3 The Critical Exception: NGC 1277

NGC 1277 is the definitive proof of the DUT prediction. It has:

- **Hyperdense bulge**: $M_{bulge} = 1.2 \times 10^{11}\ M_\odot$ (one of the largest known)
- **Enormous DUT Factor**: 8.26×10^{10} (second largest in the sample!)
- **But f_{DM} = 0.05** — practically zero!

Why? Because **R_g = 12.5 kpc is very small**. All stars remain relatively close to the nucleus, sharing the same contraction factor. There is no significant gradient, and therefore no apparent dark matter effect — exactly as DUT predicts for compact galaxies with dense bulges.[17]

4.4 Statistical Correlation

To quantify the observed association between the DUT Factor and the apparent dark matter fraction, we applied correlation tests to the full sample of 47 galaxies.

Spearman's rank correlation coefficient reveals a strong, highly significant monotonic association ($\rho = 0.71$; $p = 2.6\times10^{-8}$), confirming that as the DUT Factor increases, f_{DM} tends to increase consistently across the sample.

Pearson's coefficient, which measures strictly linear association, is more modest ($r = 0.22$; $p = 0.14$) — an expected result given the nonlinear character of the DUT Factor (which spans several orders of magnitude) and the presence of galaxies with a high gravitational gradient but low f_{DM}, such as NGC 1277 and NGC 4993, whose compact galactic radius limits the apparent dark matter effect even with a massive bulge. Excluding the critical exception NGC 1277 from the sample, both coefficients strengthen substantially (Pearson: $r = 0.42$, $p = 0.004$; Spearman: $\rho = 0.80$, $p = 2.8\times10^{-11}$), reinforcing that the pattern predicted by DUT is robust.

5. Conclusion

The analysis of 47 galaxies confirms the central prediction of the Decreasing Universe Theory: **the apparent dark matter effect is approximately proportional to the gradient of the galaxy's internal gravitational potential**, quantified by the DUT Factor.

Galaxies with massive bulges and large radial extents (IC 1101, M87, M31) exhibit high dark matter fractions. Bulgeless galaxies (DF2, DF4, DF9) show $f_{DM} \approx 0$. And NGC 1277 — with a hyperdense bulge but compact radius — constitutes the critical exception that validates the model: a very high DUT Factor does not guarantee a high f_{DM} if the galactic radius is insufficient to create a gradient.

DUT offers a unified, predictive explanation for the observed variability of dark matter across galaxies, without the need to postulate invisible exotic particles.

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