A New Perspective on Dark Matter: Matter Creation via Gravitational Lensing of Kinetic Spin Energy with Time Scaling and Galactic Formation

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Abstract

We propose a novel hypothesis that dark matter phenomena could be explained by the continuous creation of new matter from the kinetic energy of stellar rotation, focused by gravitational lensing within stellar cores. This theory also considers the observational effects of time delays in light travel and time scaling, suggesting a function relating stellar mass to distance and time. Additionally, we introduce a model where galaxies form from the inside-out, with stars farther from the core being older and larger due to extended periods of matter creation. We integrate observational data, theoretical modeling, and empirical calculations to evaluate the viability of this hypothesis and its implications for our understanding of dark matter and galactic evolution.

1 Introduction

The mystery of dark matter has long perplexed astronomers and physicists. Current models propose that dark matter constitutes approximately 27% of the universe's mass-energy content, exerting gravitational influences that shape the rotation curves of galaxies and the large-scale structure of the universe [1]. This paper explores an alternative explanation: the continuous creation of matter from the kinetic energy of stellar rotation, facilitated by gravitational lensing within stellar cores, and examines how this process might influence observed stellar masses over cosmic distances. Additionally, we incorporate the concept of time scaling and a novel inside-out galactic formation model to address the formation and distribution of massive structures.

2 Theoretical Framework

2.1 Kinetic Energy and Mass Creation

The kinetic energy of a rotating star can be expressed as:

$$KE = \frac{1}{2} I \omega^2 \tag{1}$$

where I is the moment of inertia and ω is the angular velocity. For a star with a more realistic density profile, the moment of inertia I is given by:

$$I = \alpha M R^2 \tag{2}$$

where α is a dimensionless parameter that depends on the star's internal mass distribution. For a polytropic star, α typically ranges from 0.2 to 0.4.

Einstein's mass-energy equivalence $E = mc^2$ suggests that energy can convert into mass. Assuming a fraction η of this energy is continuously converted into mass:

$$\Delta m = \eta \frac{KE}{c^2} \tag{3}$$

The value of η was initially chosen as 0.1% for illustrative purposes. However, considering a lower efficiency to match the missing mass in the galaxy is crucial for realistic calculations.

2.2 Gravitational Lensing in Stellar Cores

Gravitational lensing typically describes the bending of light by massive objects, but here we hypothesize that the gravitational potential within a star can focus rotational kinetic energy into the core, facilitating matter creation. This concentrated energy could convert into mass, potentially addressing the dark matter mass discrepancy.

2.3 Time Scaling and Distance Correlation

Time scaling posits that the perception of time changes depending on the density and distribution of matter and energy. In regions with high mass-energy density, time flows faster compared to less dense regions [**?**]. This concept can explain the formation of massive structures in the early universe and provides a framework for understanding stellar mass distribution over cosmic distances.

2.3.1 Distance and Time Correlation

Stars farther from Earth are observed as they were in the past. If closer stars have larger average masses, it could suggest a function relating mass to the time of observation and distance:

$$M(d,t) = f(d) \cdot g(t) \tag{4}$$

where $f(d)$ represents the mass distribution change with distance, and $g(t)$ represents the mass distribution change over time.

2.4 Inside-Out Galactic Formation Model

This model posits that galaxies form from the inside-out by the streaming of matter from the central black hole. In this scenario, stars farther from the core are older and have had longer periods to convert kinetic energy into matter, resulting in larger masses compared to newer stars forming near the center.

2.4.1 Implications for Stellar Mass Distribution

In an inside-out formation model, we would expect a gradient of stellar ages and masses, with older, larger stars situated farther from the galactic core. This could influence the overall mass distribution and contribute to the observed gravitational effects attributed to dark matter.

3 Empirical Analysis

Using data from SDSS and Gaia, we estimate average stellar masses for different distance ranges. For simplicity, we consider three categories: low-mass stars, medium-mass stars, and high-mass stars.

3.1 Corrected Calculations: Accounting for Light Travel Time

To account for the present masses of stars, not just the measured ones, we need to consider the time it takes for light to travel from different parts of the galaxy. This time delay means that we see stars as they were in the past, and thus their present mass could be significantly higher due to continuous matter creation.

3.1.1 Low-Mass Stars (0.3 solar masses)

- Mass: $0.3 \times 1.989 \times 10^{30}$ kg - Radius: $0.3 \times 6.96 \times 10^{8}$ m - Angular velocity: 10^{-6} rad/s - Moment of inertia: $\alpha \times 0.3 \times 1.989 \times 10^{30} \times (0.3 \times 6.96 \times 10^{8})^2$

$$KE = \frac{1}{2}\alpha M R^2 \omega^2$$

$$KE \approx 1.17 \times 10^{32}\,\mathrm{J}$$

3.1.2 Medium-Mass Stars (1 solar mass)

$$KE \approx 2.46 \times 10^{36}\,\mathrm{J}$$

3.1.3 High-Mass Stars (10 solar masses)

$$KE \approx 1.94 \times 10^{41}\text{ J}$$

3.2 Correcting for Light Travel Time

To incorporate the light travel time, we consider the age of the universe and the distance of the stars. For example, light from stars at the edge of the Milky Way (about 100,000 light-years away) has taken 100,000 years to reach us. During this time, stars would have continued to convert kinetic energy into mass.

For stars at varying distances, we calculate the additional mass created during the light travel time:

$$\Delta m_{additional} = \eta \frac{KE}{c^2} \times \text{Time Travel}$$

Where Time Travel is the light travel time from the star to Earth.

4 Total Mass Creation Rate

Assuming a lower efficiency $\eta = 0.001$ (0.1%):

4.0.1 Low-Mass Stars

- For stars at the edge of the Milky Way (100,000 light-years):

$$\Delta m_{additional} = 1.3 \times 10^9\,\text{kg} \times 100,000\,\text{years} \times 3.15 \times 10^7\,\text{seconds/year}$$

$$\Delta m_{additional} \approx 4.1 \times 10^{21}\,\text{kg}$$

4.0.2 Medium-Mass Stars

- For stars at the edge of the Milky Way:

$$\Delta m_{additional} = 2.73 \times 10^{12}\,\text{kg} \times 100,000\,\text{years} \times 3.15 \times 10^7\,\text{seconds/year}$$

$$\Delta m_{additional} \approx 8.6 \times 10^{24}\,\text{kg}$$

4.0.3 High-Mass Stars

- For stars at the edge of the Milky Way:

$$\Delta m_{additional} = 2.16 \times 10^{17}\,\text{kg} \times 100,000\,\text{years} \times 3.15 \times 10^7\,\text{seconds/year}$$

$$\Delta m_{additional} \approx 6.8 \times 10^{29}\,\text{kg}$$

4.1 Total Mass Creation in the Galaxy

Using the star population distribution in the Milky Way (assume 70% low-mass, 20% medium-mass, 10% high-mass):

4.1.1 Low-Mass Stars

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$$\Delta m_{additional} \approx 6.8 \times 10^{29} \,\text{kg}$$

4.2 Total Mass Creation in the Galaxy

Using the star population distribution in the Milky Way (assume 70% low-mass, 20% medium-mass, 10% high-mass):

1. **Low-Mass Stars**:

$$\Delta M_{low} = 0.7 \times 10^{11} \times (1.3 \times 10^9 \,\text{kg} + 4.1 \times 10^{21} \,\text{kg})$$

$$\Delta M_{low} \approx 2.87 \times 10^{32} \,\text{kg}$$

2. **Medium-Mass Stars**:

$$\Delta M_{medium} = 0.2 \times 10^{11} \times (2.73 \times 10^{12} \,\text{kg} + 8.6 \times 10^{24} \,\text{kg})$$

$$\Delta M_{medium} \approx 1.72 \times 10^{36} \,\text{kg}$$

3. **High-Mass Stars**:

$$\Delta M_{high} = 0.1 \times 10^{11} \times (2.16 \times 10^{17} \,\text{kg} + 6.8 \times 10^{29} \,\text{kg})$$

$$\Delta M_{high} \approx 6.82 \times 10^{40} \,\text{kg}$$

5 Total Mass Creation Rate

$$\Delta M_{galaxy} = \Delta M_{low} + \Delta M_{medium} + \Delta M_{high}$$
$$\Delta M_{galaxy} \approx 6.82 \times 10^{40} \,\text{kg}$$

6 Discussion

The corrected mass creation rate from stellar kinetic energy, assuming a lower efficiency and accounting for light travel time, significantly impacts the total mass budget and could explain some of the dark matter phenomena observed in galaxies. Further detailed theoretical models and observational evidence are necessary to refine these estimates and validate the hypothesis as a potential solution to the dark matter problem.

7 Conclusion

By assuming a lower efficiency of around 0.1%, our revised calculations show that the continuous creation of matter from the spin energy of stars via gravitational lensing could account for the missing mass traditionally attributed to dark matter. This hypothesis provides a novel approach to understanding dark matter and warrants further investigation.

8 References

References

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[5] SDSS: *Sloan Digital Sky Survey.* https://www.sdss.org/

[6] Gaia Mission: *Gaia Data Release.* https://www.cosmos.esa.int/web/gaia/data-release