Spiral Galaxy Rotation Profiles in Shadow Gravity

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Abstract:
Since the 1930's it has been noticed that reported stellar rotation in spiral galaxies does not conform to theoretical predictions of current mathematical gravitational theories. In this work we will derive and examine stellar rotation profiles of spiral galaxies using only the basic tenets of Shadow (Pushing) Gravity[i] (SG). We demonstrate that this process naturally produces rotation profiles in accordance with observations.

Introduction:
From the perspective of Shadow Gravity, the concept of the perfect fluid[ii] defined in the General Theory of Relativity (GR) is a real, physical entity containing momentum and energy. As with all physical fluids, this *Perfect Fluid*[iii] would consist of underlying individual elements (*the Fatio/LeSage Hypothesis*[iv]) that would adhere to the tenets of basic kinetic theory. Devoid of internal stressors, a perfect fluid is a medium of uniform density with energy density (ϕ) that does not vary with position. This forms the *flat space-time* concept of GR.

Introducing any material body (*field attenuator*) into this medium changes everything. In both GR and SG the material body becomes '*a source of stress*' that creates a non-uniform momentum/energy density profile in the region surrounding the body. In GR, this non-uniform profile is described as a *curvature* in the energy/momentum tensor that mathematically represented as a perfect fluid. Under these conditions the entire system will be forever *curved* - only asymptotically returning toward the *flat* state at great distances from the source. This succinct description demonstrates that the two different perspectives (SG & GR) are functionally equivalent and complementary. The difference between GR and SG is that for GR the perfect fluid is considered only a mathematical analogy. For SG the perfect fluid is a physically real medium. As real, in SG this fluid provides a causal explanation of how and why matter becomes sources (*stressors*) in the perfect fluid. In this work we focus upon what must happen to this region's energy intensity as it travels through multiple bodies (Stars) collected within spiral galaxies.

Concept Analysis:
In GR both the gravitational constant (G) and light speed (c) are considered universal constants of nature that are unchanging by definition. In SG the gravitational constant is a physical property of the medium, that

is the product of two distinct physical quantities: the momentum/energy flux ϕ [*kg/m-sec²*] of the perfect fluid at any given positon in space (*x,y,z,t*) and the square of the mass attenuation coefficient (ψ) [*m²/kg*] of masses. In SG the gravitational constant $G = \phi\psi^2$. If ϕ changes, so does G. As discussed earlier any material body must, by the very nature of the attenuating process, act to reduce the local magnitude of ϕ. As long as the magnitude of the total attenuation within any material body is sufficiently small, the overall impact on the value of G is negligible. Given that the flux ϕ at any spatial position (*x,y,z,t*) is the overall result of spherical 4π impingement, the reduced contribution component of any embedded body drops with its physical shadow. This means the magnitude of flux ϕ rapidly recovers its general background value as one moves away from the surface of any finite body.

For SG the gravitational force is the result of the net imbalance (*differential pressure*) resulting from diametrically opposing current vectors; and the total 4π flux is not relevant. Only the overlapping physical shadowing cast by the attenuating bodies causes these pressure differentials, thus net forces. For spherical bodies such as stars at separation distances many orders of magnitude greater than their physical dimensions, this differential flux problem reduces to a simple linear analysis.

If we assume that energy will be removed from flux as a fraction of the impinging energy, along any one dimensional line the reduction in magnitude of flux passing through any single attenuator is given as:

$$\Phi' = \Phi e^{-\psi \rho D} \quad [1]$$

where D is the attenuator effective physical thickness, ρ is the material density, and ψ is the mass attenuation coefficient (*m²/kg*). Equation 1 above is also found to be applicable to any penetrating radiation attenuation processes.

Given equation 1, for any single body the net differential (δ) along a vector line is:

$$\delta = \Phi(1 - e^{-\psi \rho D}) \quad [2]$$

The flux differential is a vector quantity that points toward the center of the attenuating object. For any two spherical bodies when $\psi\rho D$ of both bodies are much less than unity it has been formally demonstrated that the net force equation becomes Newton's expression, $F = GMm/r^2$ [v].

Now, consider two or more such bodies along this line. Given an initial flux value ϕ the total differential at the end of the sequence would be:

$$\delta = \Phi(1 - e^{-\boldsymbol{n}\psi\rho D}) \quad [3]$$

where ***n*** is the number of bodies along this line. The magnitude of the flux is sequentially reduced by passage through each body by $e^{-\psi\rho D}$… As an example consider four such bodies (*1, 2, 3, 4*). Bodies 1 & 4 experience a current of magnitude $\phi_x(1 - e^{-3\psi\rho D})$ and bodies 2 & 3 $\phi_x(e^{-\psi\rho D} - e^{-2\psi\rho D})$. As one can see, 1 & 4 have a higher flux differential, thus inward thrust than bodies 2 & 3. We can expand equation 3 to encompass any number of bodies along a line:

$$\delta = \Phi(e^{-\boldsymbol{n}\psi\rho D} - e^{-\boldsymbol{m}\psi\rho D}) \quad [4]$$

where ***n*** is the number of bodies count inward from the left and ***m*** is the number of bodies count inward from the right. The outermost body experiences the greatest inward force. As one moves inward the force between adjacent bodies weakens as the outer bodies reduce the inbound flux from the opposing directions steady reducing the net differential. This is the direct result of the attenuation of the flux passing sequentially through each attenuator along the line.

Evaluation Results:

A very simple static computer simulation was built to evaluate the equation shown above and produce cumulative results of this process. M-33 (*Triangulum Galaxy*[vi]) was chosen to compare with the result of this evaluation. The results of the evaluation are provided in Figure 1, and the published observed profile for M-33 is shown in Figure 2. The curves are strikingly similar. The curves even share the upward 'flip' in the curve data starting at the ~ 30,000 light year radii.

The parameters that were used in the M-33 simulation model are:

Φ = 1.00E+20 Joules/m³

Ψ = 8.17E-16 m²/kg

n = 2600 intersecting Stars of 1 Solar mass, density, and diameter

Galactic Diameter = 100,000 light years

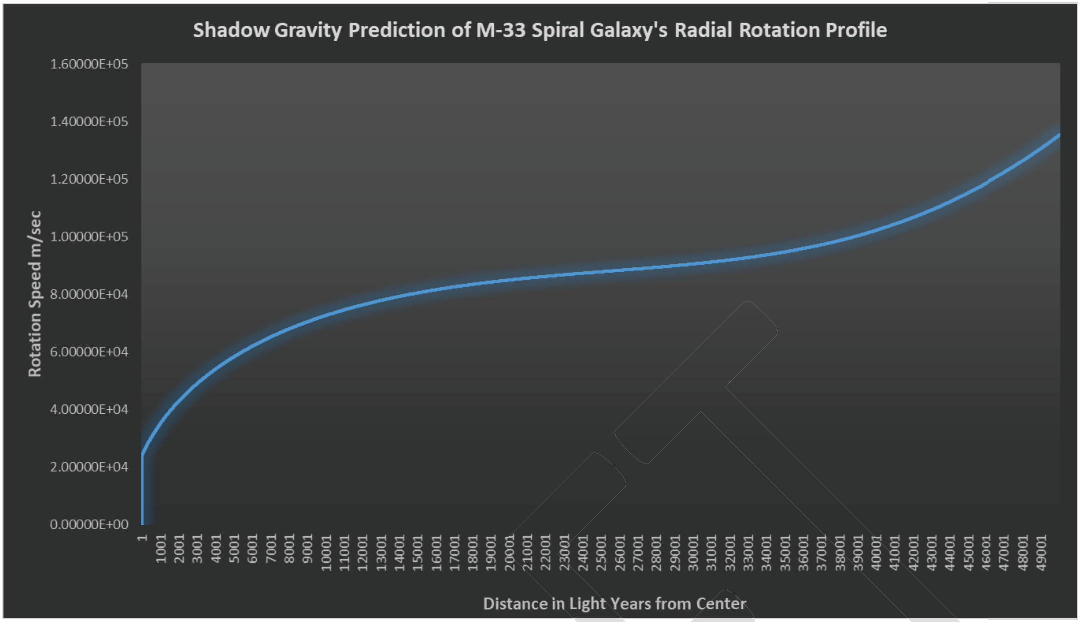

Figure 1

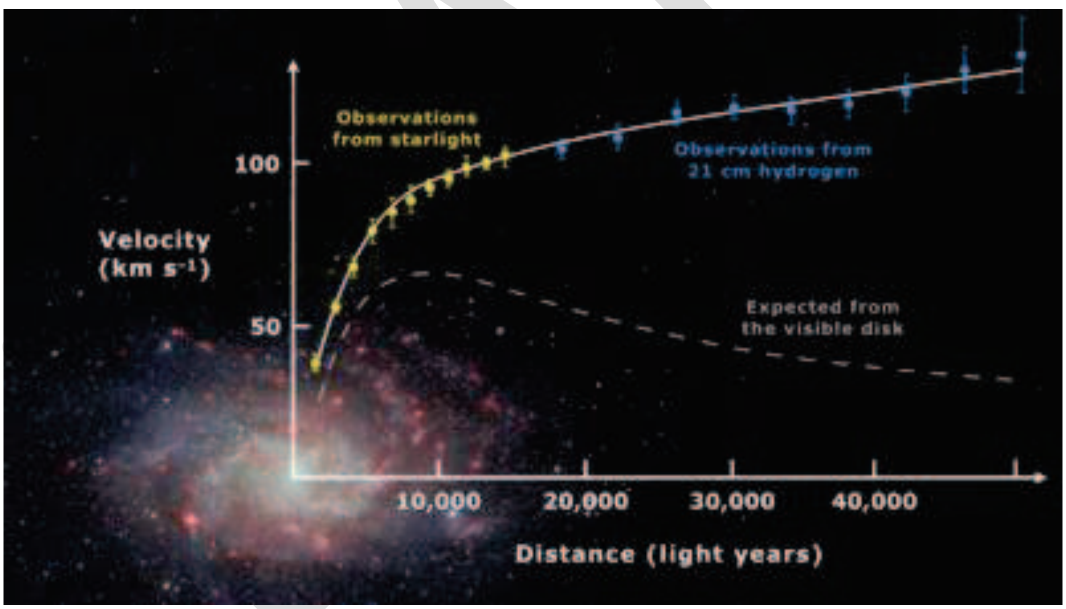

Figure 2

Conclusions:

This evaluation of the effect of Shadow (Pushing) Gravity reproduces the observed behavior of spiral galaxies. The modeled effect is proportional to the overall relative constant alignment of massive material bodies in line along the plane of rotation. For galactic structures where such alignment is minimal (such as giant elliptical galaxies and globular clusters) the effect will be greatly reduced and minimized.

Another result of the SG model is that the term we call the gravitational constant (G) will be subject to constant slight variations -- it will not be a strictly constant value. G will be the sum product of the 4π impinging flux at any instant in time for that specific location. As massive objects throughout the solar system, galaxy, and universe move, the actual value of G reflects these changes. Slight variations in the value of G are to be expected.

Comments:

This evaluation was limited to assuming a static situation and does not attempt account for the finite propagation speed of gravitation, stellar movements … etc. The fact is it would take 100,000 years for a gravitational 'ray' to traverse this galaxy and the stellar masses are constant motion throughout that period. The basic assumption used herein is that given these dynamic factors any vector line would encounter the equivalence of 2600 stellar mass units of attenuation of an equal mean free path during transit. This is only meant to be a proof of concept, that the resulting profile produces results striking similar to observation without any other 'ad hoc' postulates needed. Clearly more realistic dynamic analyses are neede.

References:

[i] https://en.wikipedia.org/wiki/Le_Sage%27s_theory_of_gravitation
[ii] https://link.springer.com/article/10.1007/BF02721690
[iii] https://en.wikipedia.org/wiki/Perfect_fluid
[iv] https://en.wikisource.org/wiki/The_Le_Sage_Theory_of_Gravitation
[v] http://www.tuks.nl/pdf/Reference_Material/Paul_Stowe/Stowe_in_PushingGravity.pdf
[vi] https://en.wikipedia.org/wiki/Triangulum_Galaxy