Gravity – When Push Comes to Shove?

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Since first proposed by Fatio in 1690 and allegedly enhanced by LeSage in 1748, one possible explanation for gravity is that it is a pushing force theory that involves 'shadowing' of omnidirectional gravity particles that impinge on all matter so as to make gravity appear as an attractive phenomenon. At least for a special case (large distance between spheres), a mathematical model that assumes gravity to be a pushing force, with shadowing and including the possibility of acting throughout the shadowed corridor of the sphere with attenuation effects, suggests a possible alignment with one of the known effects of gravity, namely that it is inversely proportional to the square of the distance between the spheres' centers. This hopefully lends some credence to the theories first proposed by Fatio and LeSage, and since supported by many dissident physicists, including Schroeder, et al., and members of the Gravity Group of the John Chappell Natural Philosophy Society. It is offered as one small contribution to furthering examination of this possible explanation.

1. Introduction

Since first proposed by Fatio in 1690 before the Royal Society in London, and submitted poetically in 1731 to the Paris Academy of Science, the concept of gravity as a pushing force has existed (and been roundly discredited by mainstream physicists). Popularized and allegedly enhanced by LeSage in 1748 (and equally dismissed as Fatio's), this theory involves 'shadowing' of omnidirectional gravity particles that impinge on all matter so as to make gravity appear as an attractive phenomenon (Figure 1). [1]

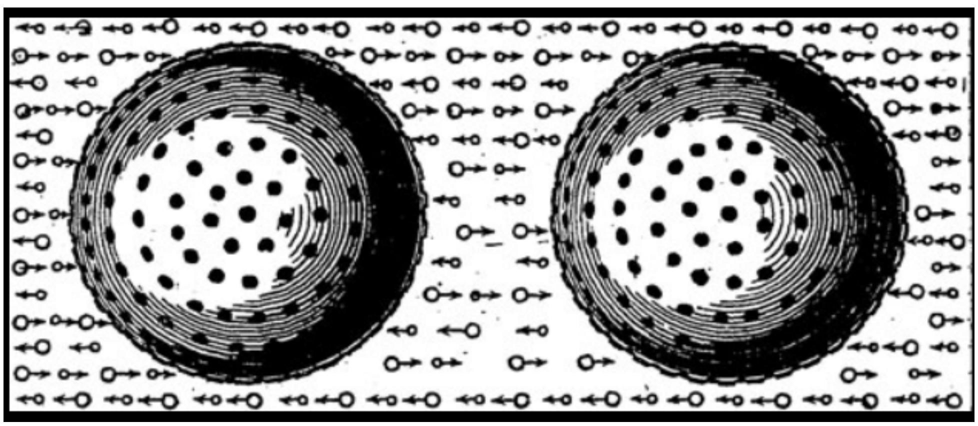

FIGURE 1. LeSage's Original Illustration

Despite its repeated rejection, this theory has survived and even been revived by dissident physicists as mainstream physicists continue to struggle with an explanation for gravity and search for the elusive 'gravity waves' or 'gravitons' implied by their theories. Of especial note is the work of Schroeder, et al., and members of the Gravity Group of the John Chappell Natural Philosophy Society (formerly the Natural Philosophy Alliance). [2] This paper builds on some of these efforts and others to offer one possible mechanism by which gravity can be viewed as 'pushing' rather than 'pulling.'

2. Shadowing

Although proposed in connection with gravity as a four-dimensional wave phenomenon, the concept of shadowing is inherent to explanations of gravity as a pushing force. Simply said, as shown in Figure 2, "[i]f a force is transmitted to a body from 'something' pushing on it from all directions, the body would remain stationary as all the forces would cancel out [Figure 2.a]. However, if a second body is brought close to the first one, part of the impinging force on body 1 would be blocked out and cause a net push towards body 2 [Figure 2.b]. Similarly, body 1 would case a push on body 2 towards body 1, resulting in what would appear to an observer to be an attraction between the two bodies." [3]

With this concept in mind, I examine a potential mathematical model that at least bears the appearance of aligning with one of the known effects of gravity, namely that it is inversely proportional to the square of the distance between the spheres' centers.

3. A Mathematical Model?

Figure 3 is a more detailed extension of Figure 2 where the shadowing from two bodies on one another is shown as the area between them enclosed by the dashed lines. The spheres are separated by a distance 'd' between their centers and have respective radii and masses of 'R' (larger), 'r' (smaller), $4\pi PR^3/3$ (larger) and $4\pi\rho r^3/3$ (smaller), assuming densities of 'P' (capital rho) and 'ρ,' respectively, for the larger and smaller spheres. The grey arrows represent the omnidirectional pushing forces (be they particles, waves or some combination) that remain 'unshadowed' and exhibit 'shadowing' angles of 2ϕ and 2θ on the smaller and larger sphere, respectively, due to the larger and smaller sphere, respectively.

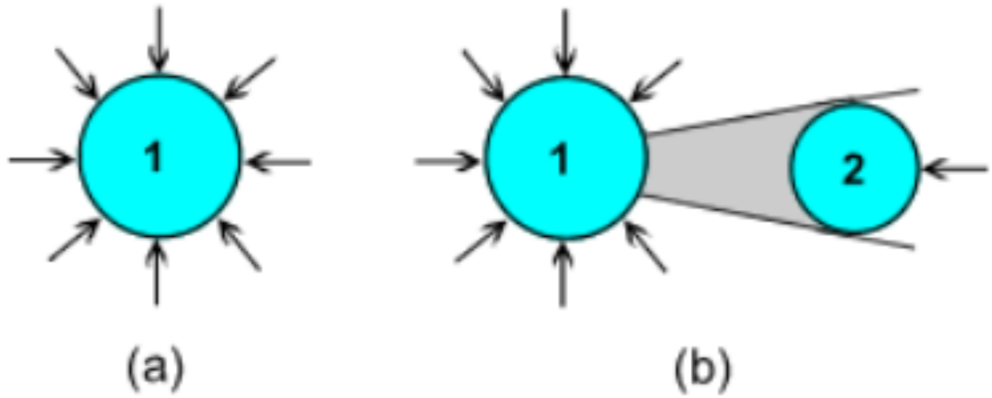

FIGURE 2. **The 'Shadowing' Effect of Two Bodies Resulting in an 'Attraction'**

The net pushing force on each sphere results from the area over which the pushing forces are not offset by equal and opposite pushing forces diametrically opposed, i.e., the cones of radii R and r with solid angles ϕ and θ, respectively. Considering the case where the spheres are far apart, i.e., $d \gg R$ (and since $R \geq r$, $d \gg r$), the geometry simplifies as shown in Figure 4 (relative lengths of r and R vs. d greatly exaggerated for clarity). Effectively, both triangles become right, such that $\sqrt{(r^2 + d^2)}$ and $\sqrt{(R^2 + d^2)} \rightarrow d$, $\sin\theta \rightarrow R/d$, $\sin\phi \rightarrow r/d$, and both $\cos\theta$ and $\cos\phi \rightarrow d/d = 1$.

The net pushing force on each sphere will be proportional to the cross-sectional area subtended by the cones of radii R and r, i.e., $\pi(R \sin\phi)^2$ and $\pi(r \sin\theta)^2$, respectively for the larger and smaller sphere. Effectively the pushing force acts along a vector parallel to that between the centers of the two spheres. With $d \gg R$ (and r), these each simplify to $\pi(Rr/d)^2$. Each sphere also has inertia proportional to its mass, such that each pushing force will be resisted. Accelerating each sphere will be proportional to the exerted force divided by the mass, such that the accelerations become $[\pi(Rr/d)^2]/[4\pi PR^3/3] = 3r^2/4RPd^2$ for the larger sphere and $[\pi(Rr/d)^2]/[4\pi\rho r^3/3] = 3R^2/4r\rho d^2$ for the smaller sphere. Both can be seen to be inversely proportional to the square of the distance between their centers ($1/d^2$).

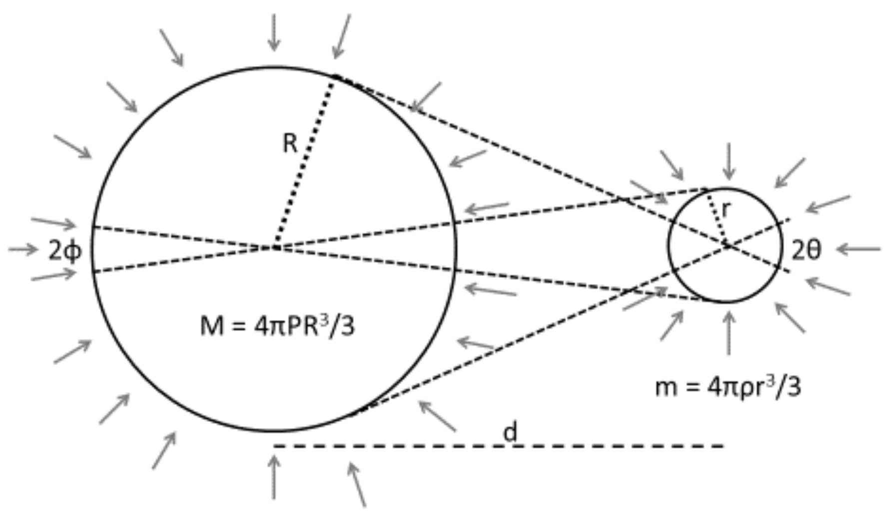

FIGURE 3. **Schematic for Interaction of Two Spheres with 'Shadowing'**

Strictly speaking, these accelerations need to be multiplied by the change in momentum per unit area from the impinging particles, denoted here as 'Δ' in units of $(kg\text{-}m/s^2)(1/m^2) = kg/m\text{-}s^2$. The first term represents the change in momentum (kg-m/s/s) from the impinging particles; the second the inverse of the impingement area. Therefore, the accelerations are more accurately written as $3r^2\Delta/4RPd^2$ for the larger sphere and $3R^2\Delta/4r\rho d^2$ for the smaller sphere. Dimensionally, each acceleration now appears in units of m/s^2, as expected.

3.1 Interaction throughout the Spheres

So far, we have only considered the spheres as solids, i.e., the pushing force acts only at the surface. However, Fatio, LeSage, Schroeder, et al., and others who espouse gravity as a pushing force usually assume that it works throughout the target, i.e., throughout the sphere. If so, then we should consider the pushing force acting not only just at the cross-sectional area of impingement but throughout a cylinder extending through the sphere whose axis parallels the vector that connects the centers of the two spheres. Therefore, if we include the linear distance through each sphere, effectively multiplying the previous results by the diameter, we obtain the following for the accelerations: $(3r^2\Delta/4RPd^2)(2R) = 3r^2\Delta/2Pd^2$ for the larger sphere and $(3R^2\Delta/4r\rho d^2)(2r) = 3R^2\Delta/2\rho d^2$ for the smaller sphere. Again, the dependence on the inverse square of the separation distance is evident, but now without the inverse dependence on the radius of the sphere itself (the dependence on the square of the radius of the other sphere, that is the one that 'shadows,' remains).

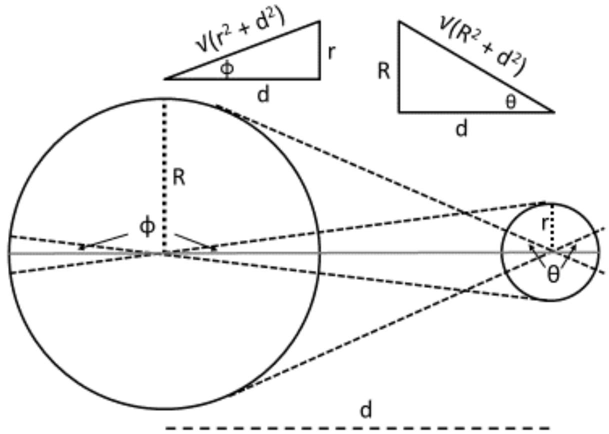

FIGURE 4. Schematic for Interaction of Two Spheres with 'Shadowing' when Far Apart

Proponents of gravity as a pushing force sometimes assume that, in addition to the shadowing effect, the force itself may be somewhat attenuated as it passes through the sphere. Attenuation over a linear distance 'x,' such as passing along the axis of the interaction cylinder, is usually modeled as an exponential decrease, such as $1/\exp(\mu x)$, where 'μ' is some form of attenuation coefficient. For our example, it would seem reasonable to assume that any attenuation coefficient should be some function of the density, i.e., F(P) for the larger sphere and f(ρ) for the smaller. Including this additional factor in the acceleration as another multiplier yields the following: $3r^2\Delta/\{2Pd^2\exp(2RF[P])\}$ for the larger sphere and $3R^2\Delta/\{2\rho d^2\exp(2rf[\rho])\}$ for the smaller. Once again, the dependence on the inverse square of the separation distance is evident, but now with some reduction due to attenuation.

3.2 Comparison

A ratio of the accelerations (larger to smaller) on the two spheres yields the following:

$$|3r^2\Delta/\{2Pd^2\exp(2RF[P])\}|/|3R^2\Delta/\{2\rho d^2\exp(2rf[\rho])\}| = (r^2/R^2)(\rho/P)\exp\{2(rf[\rho] - RF[P])\}$$

Since $R \geq r$, the squared first term likely dominates, unless $P >> \rho$ (e.g., comparing a neutron star to a typical star) or $F(P) >> f(\rho)$. Therefore, the acceleration on the larger sphere should most often be less than that on the smaller, implying less movement toward their mutual barycenter on the part of the larger sphere when compared to the smaller. This is consistent with what is observed.

4. Summary

At least for a special case (large distance between spheres), a mathematical model that assumes gravity to be a pushing force, with shadowing and including the possibility of acting throughout the shadowed corridor of the sphere with attenuation effects, suggests a possible alignment with one of the known effects of gravity, namely that it is inversely proportional to the square of the distance between the spheres' centers. This hopefully lends some credence to the theories first proposed by Fatio and LeSage, and since supported by many dissident physicists, including Schroeder, et al., and members of the Gravity Group of the John Chappell Natural Philosophy Society (formerly the Natural Philosophy Alliance). It is offered as one small contribution to furthering examination of this possible explanation.[1]

5. References

1. *https://en.wikipedia.org/wiki/Le_Sage%27s_theory_of_ gravitation*
2. Schroeder, Ramthun and de Hilster. 2015. "Gravity is a Pushing Force," Proceedings of the First Annual Chappell Natural Philosophy Society Conference, August 6-8, 2015, Florida Atlantic University, pp. 47-51.
3. *http://www.esotericscience.com/Gravity.aspx*

[1] Subsequent to composing this article, I discovered a sophisticated derivation of Newton's gravitational equation from LeSage's attenuation concept which addresses not only the inverse proportionality to the distance between two objects but also the direct proportionality to the product of their masses (Mingst and Stowe, "Derivation of Newtonian Gravitation from LeSage's Attenuation Concept," *http://www.mountainman.com.au/le_sage.htm*).

GRAVITY: WHEN PUSH COMES TO SHOVE?

Dr. Raymond HV Gallucci, PE

5th Annual John Chappell Natural Philosophy Society Conference

Seattle, WA (U. of Washington)
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OVERVIEW

- First proposed by Fatio in 1690 (and sent in 1731 to the Paris Academy of Science), then enhanced by LeSage in 1748 - Gravity is a pushing force that involves "shadowing" of omnidirectional particles that impinge on all matter so as to appear as an attractive phenomenon.
  - Consider special case of large distance between spheres: Mathematically model gravity as a pushing force, with shadowing and including the possibility of acting throughout the shadowed corridor of the sphere with attenuation effects, to suggest a possible alignment with one of the known effects of gravity - it is inversely proportional to the square of the distance between the spheres' centers.
  - Lend some credence to the theories of Fatio and LeSage and since supported by many dissident physicists, including members of the Gravity Group of the John Chappell Natural Philosophy Society.

FATIO AND LESAGE

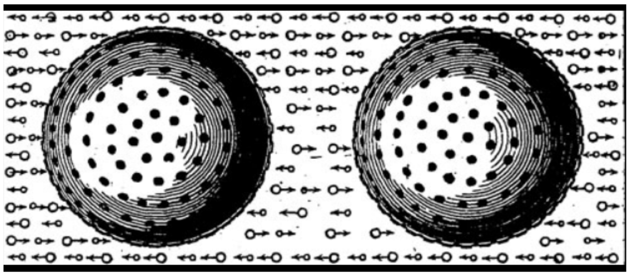


FIGURE 1. LeSage's Original Illustration

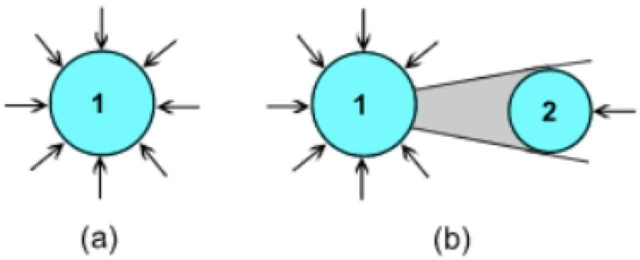


FIGURE 2. The 'Shadowing' Effect of Two Bodies Resulting in an 'Attraction'

Despite repeated rejection, this theory has survived and even been revived by dissident physicists as mainstream physicists continue to struggle with an explanation for gravity and search for their elusive "gravity waves" or "gravitons." Proposed in connection with gravity as a four-dimensional wave phenomenon, "shadowing" is inherent to explanations of gravity as a pushing force. "If a force is transmitted to a body from 'something' pushing on it from all directions, the body would remain stationary [Fig. 2.a] … [I]f a second body is brought close to the first one, part of the impinging force on body 1 would be blocked out and cause a net push towards body 2 [Fig. 2.b]. Similarly, body 1 would case a push on body 2 towards body 1, resulting in what would appear to an observer to be an attraction between the two bodies." (*http://www.esotericscience.com/Gravity.aspx*)

"SHADOWING" SPHERES (1)

Two spheres separated by "d" between centers with radii "R" and "r" and masses $4\pi PR^3/3$ and $4\pi\rho r^3/3$. Grey arrows are omnidirectional pushing forces (particles, waves or combination?) that remain "unshadowed" at angles 2φ and 2θ.

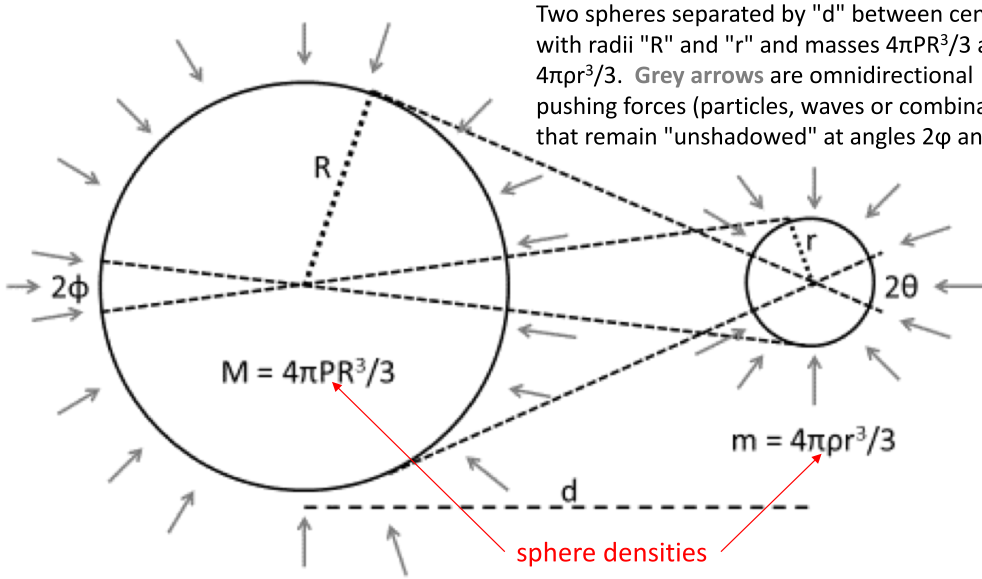
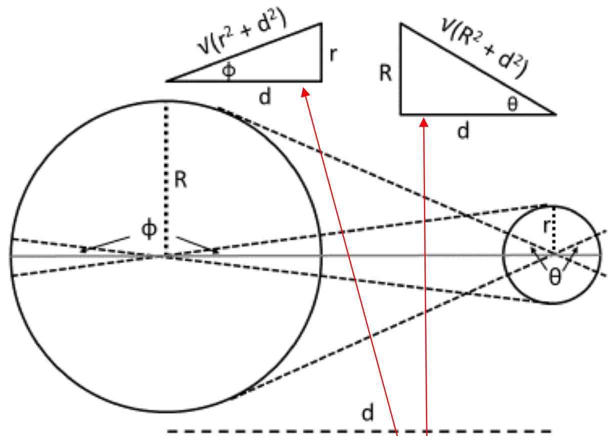


FIGURE 3. Schematic for Interaction of Two Spheres with 'Shadowing'

“SHADOWING” SPHERES (2)



Net pushing force results from area over which the pushing forces are not offset by equal and opposite pushing forces diametrically opposed, i.e., the cones of radii R and r with solid angles φ and θ, respectively.

FIGURE 4. Schematic for Interaction of Two Spheres with ‘Shadowing’ when Far Apart

When far apart, i.e., d >> R (and since R ≥ r, d >> r), the geometry simplifies (any exaggeration for clarity). Effectively, both triangles become right, such that $\sqrt{r^2 + d^2}$ and $\sqrt{R^2 + d^2}$ → d, sin θ → R/d, sin φ → r/d, and both cos θ and cos φ → d/d = 1.

“SHADOWING” SPHERES (3)

- Net pushing force on each sphere ∝ cross-sectional area subtended by the cones of radii R and r, i.e., $\pi(R \sin \varphi)^2$ and $\pi(r \sin \theta)^2$, effectively acting along a vector parallel to that between the centers of the two spheres.
  - With d >> R (and r), these each simplify to $\pi(Rr/d)^2$.
  - Each sphere has inertia ∝ mass, resisting each pushing force. Accelerating each sphere ∝ exerted force divided by the mass, such that the accelerations become:
    - Larger sphere = $[\pi(Rr/d)^2]/[4\pi P R^3/3] = 3r^2/4RPd^2$
    - Smaller sphere = $[\pi(Rr/d)^2]/[4\pi\rho r^3/3] = 3R^2/4r\rho d^2$
  - Both ∝ inverse square of distance between their centers ($1/d^2$).

“SHADOWING” SPHERES (4)

- Strictly speaking, these accelerations, $3r^2/4RPd^2$ and $3R^2/4r\rho d^2$, need to be multiplied by the change in momentum per unit area from the impinging particles, denoted here as "Δ" in units of (kg-m/s²)(1/m²) = kg/m-s².
  – The first term (kg-m/s²) represents change in momentum (kg-m/s/s) from the impinging particles.
  – The second (1/m²) represents the inverse of the impingement area.
  – Accelerations are more accurately written as $3r^2\Delta/4RPd^2$ and $3R^2\Delta/4r\rho d^2$. Dimensionally, each acceleration now appears in units of m/s², as expected.

INTERACTION WITHIN SPHERES (1)

- So far, we have only considered the spheres as solids, i.e., the pushing force acts only at the surface. However, Fatio, LeSage, Schroeder, et al., and others who espouse gravity as a pushing force usually assume that it works throughout the target, i.e., throughout the sphere.
- Consider the pushing force acting not only just at the cross-sectional area of impingement but throughout a cylinder extending through the sphere whose axis parallels the vector that connects the centers of the two spheres.

INTERACTION WITHIN SPHERES (2)

- Include the linear distance through each sphere, effectively multiplying the previous results by the diameter to obtain the following accelerations:
  - Larger sphere = $(3r^2\Delta/4RPd^2)(2R) = 3r^2\Delta/2Pd^2$
  - Smaller sphere = $(3R^2\Delta/4r\rho d^2)(2r) = 3R^2\Delta/2\rho d^2$
  - Again, the dependence on the inverse square of the separation distance is evident, but now without the inverse dependence on the radius of the sphere itself (previously, $3r^2\Delta/4RPd^2$ and $3R^2\Delta/4r\rho d^2$)
    - Dependence on the square of the radius of the other sphere, that is the one that "shadows," remains).

INTERACTION WITHIN SPHERES (3)

- Proponents of gravity as a pushing force sometimes assume that, in addition to the shadowing effect, the force itself may be somewhat attenuated as it passes through the sphere.
  - Attenuation over a linear distance "x" is usually modeled as an exponential decrease, such as $1/e^{\mu x}$, where "µ" is some form of attenuation coefficient. Assume that any attenuation coefficient should be some function of the density, i.e., F(P) for the larger sphere and f(ρ) for the smaller.
  - Include in the acceleration as another multiplier yields:
    - Larger sphere = $3r^2\Delta/2Pd^2e^{2RF(P)}$
    - Smaller sphere = $3R^2\Delta/2\rho d^2e^{2rF(\rho)}$
  - Once again, the dependence on the inverse square of the separation distance is evident, but now with some reduction due to attenuation.

INTERACTION WITHIN SPHERES (4)

- A ratio of the accelerations (larger to smaller) on the two spheres yields the following:
  - $\frac{3r^2\Delta/2Pd^2e^{2RF(P)}}{3R^2\Delta/2\rho d^2e^{2rf(\rho)}} = \frac{r^2}{R^2}\frac{\rho}{P}e^{2(rf[\rho]-RF[P])}$
    - Since R ≥ r, the squared first term likely dominates, unless P >> ρ (e.g., comparing a neutron star to a typical star) or F(P) >> f(ρ).
  - Acceleration on the larger sphere should most often be < on the smaller, implying less movement toward their mutual barycenter on the part of the larger sphere, consistent with observation.

SUMMARY

- At least for large distance between spheres, a mathematical model that assumes gravity to be a pushing force, with shadowing and including possible attenuation throughout the shadowed corridor of the sphere, suggests a possible alignment with one of the known effects of gravity - inverse proportionality to the square of the distance between the spheres' centers.
  - This hopefully lends some credence to the theories first proposed by Fatio and LeSage, and since supported by many dissident physicists.
    - Subsequently, I discovered a derivation of Newton's gravitational equation from LeSage's attenuation concept which addresses not only the inverse proportionality to the distance but also the direct proportionality to the product of their masses (Mingst and Stowe, "Derivation of Newtonian Gravitation from LeSage's Attenuation Concept," *http://www.mountainman.con.au/le_sage.htm*).