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Panphysics Enopiisis

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Abstract: This paper examines Desmos (or Bond) and its implications compared to the literature review. It focuses on the parameter n, which characterizes how the effective force or interaction between celestial bodies changes with distance. By analyzing cosmic phenomena such as Mercury's precession and Hubble's expansion, derived that variable n is approximately 1.10. This value indicates a deviation from the classical law, suggesting a more gradual weakening of forces with distance. Notably, the Bond model provides a different perspective on energy interactions, as it predicts higher effective energies for the Earth-Moon system compared to the Moon-Sun system, contrary to literature review predictions. In that way explains why the Moon is a satellite and not a planet, something that is not plausible to be explained in the current literature review. This finding aligns with observed cosmic expansion and offers a refined view of gravitational dynamics. Also, the elliptical forms on cosmos are the prove of rotation of gravity from desmos impact. Something that show the way to control and create gravity. Also, in that way is explained that there the dark matter is a space-time and energy effect from equations of Desmos (Bond).

Keywords: *Bond, Cosmic expansion, Desmos, Gravitational interactions, Gravity, Hubble constant, Mercury's precession, Modified gravity, Parametern.*

1. Introduction

In the classical dynamics of the interaction of heavenly bodies, together with the cosmic expansion, hitherto, it was explained by classical gravity, where the strengths fall off like the square of distance between masses. Recent observations combined with alternative models seem to point out deficiencies in the classical interpretation of cosmic phenomena. Desmos model introduces a parameter n that changes the rate at which forces weaken with distance. In this paper. It has explored how "n" really affects a host of cosmic phenomena including the precession of Mercury's orbit and the Hubble expansion, and how the new model of gravitation proposed the Bond model and the way that affects energy interactions between celestial bodies. I take special note that the effective energy between the Earth and Moon in the Bond model is greater than between the Moon and Sun, on the contrary to the classical expectation, as there is the opposite result. This contrast effectively underscores how gravitational forces are perceived rather differently in the two models. Desmos is fundamentally shows that the cosmos is based on Bond, where is not an attractive power but a connection of bodies, because it is based on energy, something that explains the in many cases the planets are rotating around not the center of a Sun, but around of the united point of space-time and movement of bodies through their aggregate energy. Using other words energy permits also the dark energy as there is not a direct mass, but the bond of the energy units.

2. Literature Review

Cosmology is the scientific study of the large-scale properties of the universe as a whole. It endeavors to use the scientific method to understand the origin, evolution, and ultimate fate of the entire universe. Like any field of science, cosmology involves the formation of theories or hypotheses about the universe, which make specific predictions for phenomena that can be tested with observations.

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Depending on the outcome of the observations, the theories will be abandoned, revised, or extended to accommodate the data. Today, technology allows us to test a significant number of these predictions, leading to our current understanding of cosmological mechanisms that shaped the universe.

These advances have been met, in turn, by the development of new technologies to survey still larger swaths of the universe in the ongoing quest to understand cosmological structure formation. Although the questions of what the universe is made of, how old it is, and how it will end are ancient, it was only with the development of modern scientific tools that progress began to be made in finding answers. Indeed, at various times in history, the scientific consensus on these questions shifted dramatically from the theories of a very old, steady-state universe to those of a universe extending far back into the past, where the galaxies appeared to be receding from one another in the aftermath of a violent cosmic explosion. This picture was further refined and developed to account for the large-scale properties—such as the expansion rate, age, and density structures—that we observe today. Some of these developments in physical cosmology will be the subject of the present lecture.

Ancient Greece is rightly celebrated for the combative spirit of intellectual inquiry that defined its philosophers, states, and everyday citizens. Pretence and speculation were encouraged, and argument was held as an active ingredient of progress. Perplexity also abounded in the faces of these thinkers, given the reach and power of the phenomena that surrounded them, and because there was no distinct profession of science. How were matters formed and where did they go? What were the eternal, underlying elements of reality? What was the ordered basis of the cosmos? What was the nature of the stars, especially the wandering ones? What were their distances and their impacts on the human condition? Remarkable theories emerged through evolving traditions of logic that, studied today, are much more wide-ranging and powerful than usually appreciated. To cite one example, Euclidean geometry at first glance may appear to concern only dry images on charts of lines, circles, triangles, pentagons, and other shapes. However, its reasoning is also indispensable for comprehending the patterns and symmetries of electrostatics, magnetostatics, the refractions of lenses and mirrors, the visual experience of moving trains or riding on atomic nuclei, much of the behavior of waves in the sea and air, and multiple properties of space-time straddling astronomy, theoretical physics, and general relativity.

The Miletians, Thales, Anaximander, and Anaximenes assigned elemental roles of reality, respectively, to water, an undefined substance, and air. They studied the transformations of the elements between the gaseous, liquid, and solid states, and assigned cosmic, unifying sway to them. Thales postulated liquid as the essence, with metal, stone, earth, and the starry abyss being its frozen, liquid reflections. Upon a circle, a triangle can be built whose angles are all right angles. These attributes cannot hold together in finite, flat space. Realizable space-time must be curved or extend infinitely far in any direction. Each of these proposals has its characteristic set of limitations and strengths in terms of testability and overall coherence. Common to all is the vital step of using ancient geometries for the preliminary construction of validation models, capable of predicting events beyond the usually examined smallness of the nearby (Bennett, 2017; Cerri, 2017; Kandic, 2023).

3. Methodology

The current methodology is based on Mathematical Axiomatic Physics, then on philosophy, mathematics, physics and logic. For the data is used the well-known literature review (Challoumis, 2024b, 2024a, 2024c). In their approach, the methodology will be based on the most fundamental concepts of Mathematical Axiomatic Physics, considering that this framework puts heavy emphasis on rigorous axiomatic structures in describing and analyzing the physical universe. This approach is embedded in the formalization of the laws of nature in mathematical terms, ensuring consistency, generality, and logical soundness at all instances of theory formulation. Aiming from well-defined axioms, this approach should enable the derivation of some universal truths, therefore creating insight into both theoretical and applied physics.

Building on this, the methodological aspect also involves a philosophical dimension in its conceptual underpinning of physical phenomena. Philosophy serves as a guide for surmising the underpinning assumptions, implications, and limits of mathematical and physical modeling, and it bridges between high-level theory and concrete reality. In this respect, questions regarding the nature of being, causation, and epistemology of science are tacked. In other words, integration of mathematics assures the methodology of keeping the accuracy and strength. Mathematics acts as the lingua franca for describing any physical phenomena; thus, it allows formulating equations, proof, and prediction. Advanced mathematical techniques applied within calculus, differential geometry, and algebra let methodology fit all the complexity required by most of the current scientific fields, from quantum mechanics to cosmology. Physics remains central and forms the empirical backbone of all theoretical constructs. The experimental data and observations become extremely important in testing the hypotheses and improving the models. This approach has deep grounds in understanding the underlying principles of classical mechanics, electromagnetism, thermodynamics, and quantum theory for tackling traditional problems and new challenges facing science. Coherence and validity are achieved through the use of logic as the guiding structure for reasoning and inference. Logical structures are employed to connect axioms, definitions, and theorems in such a way that the conclusions follow systematically from premises.

This is the logical rigor that inhibits inconsistency and helps in formulating predictive models that correspond to the reality observed. Based on data and analysis, the methodology draws on a well-established literature review encompassing both historical and current works. The holistic review not only recognizes the seminal contributions of several key figures but also integrates recent contributions for the holistic view of the subject matter. The methodology at least ensures that the findings obtained in engaging a body of knowledge are informed by the cumulative insights of the scientific community. Besides, this multidisciplinarity of approach and synthesis across domains come together in an interesting mix. By putting together philosophy, mathematics, physics, and logic, the method goes beyond all boundaries to make a versatile frame capable of answering various scientific and philosophical questions. The integrated perspective inspires creativity, which aids cross-pollination from other disciplines in terms of concepts and approach. This current approach is sound and thorough for the research and understanding of the physical world. It relies on mathematics for accuracy, physics for its practical awareness, philosophy for analytical reasoning, and logic for the framework, but always based on extensive research of the available literature. This blend of disciplines will ensure that the methodology is both scientifically rigorous and philosophically meaningful, capable of addressing the complexities of modern scientific inquiry. (Bennett, 2017; Cerri, 2017; Disalle, 2006; Friedman, 2007; Kandic, 2023).

3.1. Desmos

The key role of the φ_i of Desmos (or Bond) is determined according to the following way:

$E_i = m_i \cdot \varphi_i$

Where,

E_i is the energy of a mass m_i.

m_i is the mass, with SI units of kilograms (kg).

φ_i is some potential or other physical parameter.

Energy E_i in SI units is measured in joules (J).

Since: $E_i = m_i \cdot \varphi_i$

$[E_i] = [m_i] \cdot [\varphi_i\,],\ J = kg \cdot [\varphi_i\,]$

$The\ joule\ (J) is\ also\ defined\ as: 1\,J = 1\,kg \cdot \frac{m^2}{s^2}$

So, $kg \cdot \frac{m^2}{s^2} = kg \cdot [\varphi_i\,]$

Thus, $[\varphi_I\,] = \frac{m^2}{s^2}$

So, the SI unit of φ_i is $\frac{m^2}{s^2}$.

Then, $\varphi_i\ = \sqrt{G \cdot c}$ [m/s]

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$F_g = \boldsymbol{G} \cdot \frac{m_1 \cdot m_2}{\boldsymbol{r}^2}$

The parameter of f I s defined as follows, in the provided equation:

$$\sum \Phi(s.d., E_1, E_2) = \Delta = \sum f \cdot \left(\frac{\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}}}{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n} \right)$$

Assuming that f is a dimensionless scaling factor, or considering the structure, if f multiplies a term with the same dimensions as energy, f itself is dimensionless. This is under the concept that the summation leads to something with the dimension of energy, and f adjusts the magnitude without altering the physical dimensions, but keeps each desmos connections between each system as a fragment, e.g the solar system has one distinct fragment and belongs to another fragment of our galaxy, and this galaxy belongs to another fragment, and according to the that way everything are connected and the same time distinct forms.

Thus,$[f] = 1$, it is dimensionless.

The parameter of $k_B$is determined as follows:
n the gravitational force relationship:

$F_g = \Delta = k_B \cdot \left(\frac{E_1 \cdot E_2}{r^n} \right)$

Where,
$E_1$and $E_2$are the energy states of the two bodies.
r is the distance between the two bodies.
$k_B$is a coefficient describing the bond.
n is a parameter describing how the force depends on distance, which may differ from the classical relationship (for example, $n \neq 2$)

$[F_g] = [\Delta] = [k_B] \cdot \left(\frac{[E_1] \cdot [E_2]}{[r^n]} \right)$

Clarifying the units: $N = [k_B] \cdot \frac{J \cdot J}{m^n}$

The newton (N) is defined as, $1\ N = 1\ kg \cdot \frac{m}{s^2}$

The joule (J) is, $1\ J = 1\ kg \cdot \frac{m^2}{s^2}$

So, $kg \cdot \frac{m}{s^2} = [k_B] \cdot \left(\frac{kg \cdot \frac{m^2}{s^2} \cdot kg \cdot \frac{m^2}{s^2}}{m^n} \right) \Rightarrow kg \cdot \frac{m}{s^2} = \frac{[\![[k]\!]_B] \left(kg^2 \cdot \frac{m^4}{s^4} \right)}{m^n} \Rightarrow$

$[k_B] = \frac{kg \cdot \frac{m}{s^2}}{kg^2 \cdot \frac{m^{4-n}}{s^4}} \Rightarrow$

$[k_B] = \frac{1}{kg \cdot m^{3-n} \cdot s^2}$

Therefore,

$\phi_1, \phi_2 \left[\frac{m^2}{s^2} \right]$

$f\ [dimensionless]$

$k_B\ [kg^{-1} \cdot m^{n-3} \cdot s^2]$

Connection between the Desmos to form of a special case like classical form of Gravity:

$k_B = G \cdot c_{ch} = G \cdot m^n \cdot kg \cdot s^4\ , n = 2, \phi_1, \phi_2\ = 1$

Estimations of Desmos are based on the following concept. The distances and the masses of Moon, Sun and Earth are the following:

$M_{Earth} = 5.972 * 10^{24} Kg$
$r_{Earth-Moon} = 3.844 * 10^8 m$
$M_{Moon} = 7.342 * 10^{22} Kg$
$M_{Sun} = 1.989 * 10^{30} Kg$

$r_{Moon-Sun} \approx r_{Earth-Sun} = 1.496 * 10^{11} m$
Defining ϕ_i, for the case of Earth-Moon:

$\varphi_{Earth} = \frac{G \cdot M_{Earth}}{r_{Earth-Moon}} = \frac{6.674*10^{-11}*5.972*10^{24}}{3.884*10^{8}} \approx 1.036 * 10^{6} \frac{m^2}{s^2}$

$\varphi_{Moon} = \frac{G \cdot M_{Earth}}{r_{Earth-Moon}} = \frac{6.674*10^{-11}*7.342*10^{22}}{3.884*10^{8}} \approx 1.27 * 10^{4} \frac{m^2}{s^2}$

Defining ϕ_i, for the case of Moon-Sun:

$\varphi_{Earth} = \frac{G \cdot M_{Moon}}{r_{Earth-Moon}} = \frac{6.674*10^{-11}*7.342*10^{22}}{1.496*10^{11}} \approx 3.27 * 10^{-7} \frac{m^2}{s^2}$

$\varphi_{Sun} = \frac{G \cdot M_{Sun}}{r_{Moon-Sun}} = \frac{6.674*10^{-11}*1.989*10^{30}}{1.496*10^{11}} \approx 8.86 * 10^{8} \frac{m^2}{s^2}$

Calculating $\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}}$as follows, for the case of Earth-Moon:

$\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}} = M_{Earth} \cdot \varphi_{Earth} \cdot M_{Moon} \cdot \varphi_{Moon} = (5.972*10^{24}*1.036*10^{6})*(7.342*10^{22}*1.27*10^{4}) \Rightarrow$

$\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}} \approx 5.831 * \frac{10^{57} kg^2 m^4}{s^4}$

Calculating $\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}}$as follows, for the case of Moon-Sun:

$\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}} = M_{Moo} \cdot \varphi_{Moon} \cdot M_{Sun} \cdot \varphi_{Sun} = (7.342*10^{22}*3.27*10^{-7})*(1.989*10^{30}*8.86*10^{8}) \Rightarrow$

$\prod_{i=0}^{m} m_{\mathrm{i}} \cdot \phi_{\mathrm{i}} \approx 4.263 * \frac{10^{54} kg^2 m^4}{s^4}$

Considering $A_1 = 1, p = 0, s.d._0 = 1m$ and $n = 2$.

$\Delta = \sum \Phi(s.d., E_1, E_2)_{Earth-Moon} \approx f \cdot \left(\frac{5.831*10^{57}}{4}\right) \approx 1.458 * 10^{57} \frac{kg^2 m^4}{s^4}$

$\Delta = \sum \Phi(s.d., E_1, E_2)_{Moon-Sun} \approx f \cdot \left(\frac{4.263*10^{54}}{4}\right) \approx 1.066 * 10^{54} \frac{kg^2 m^4}{s^4}$

Then, according to classical physics, to the Earth-Moon system:

$F_g = \frac{G \cdot M_1 \cdot M_2}{r^2}$

$F_{Earth-Moon} = \frac{6.674*10^{-11}*5.972*10^{24}*7.342*10^{22}}{(\llbracket 3.884*10^{8}) \rrbracket^2} \approx 1.982 * 10^{20} N$

And to the system of Moon-Sun:

$F_{Moon-Sun} = \frac{6.674*10^{-11}*7.342*10^{22}*1.989*10^{30}}{(\llbracket 1.496*10^{11}) \rrbracket^2} \approx 4.363 * 10^{20} N$

To the system of Earth-Moon, the energy is:

$U = -\frac{G \cdot M_1 \cdot M_2}{r}$

$U_{Earth-Moon} = \frac{6.674*10^{-11}*5.972*10^{24}*7.342*10^{22}}{3.884*10^{8}} \approx -7.63 * 10^{28} J$

To the system of Moon-Sun, the energy is:

$U_{Moon-Sun} = \frac{6.674*10^{-11}*7.342*10^{22}*1.989*10^{30}}{1.496*10^{11}} \approx -6.51 * 10^{29} J$

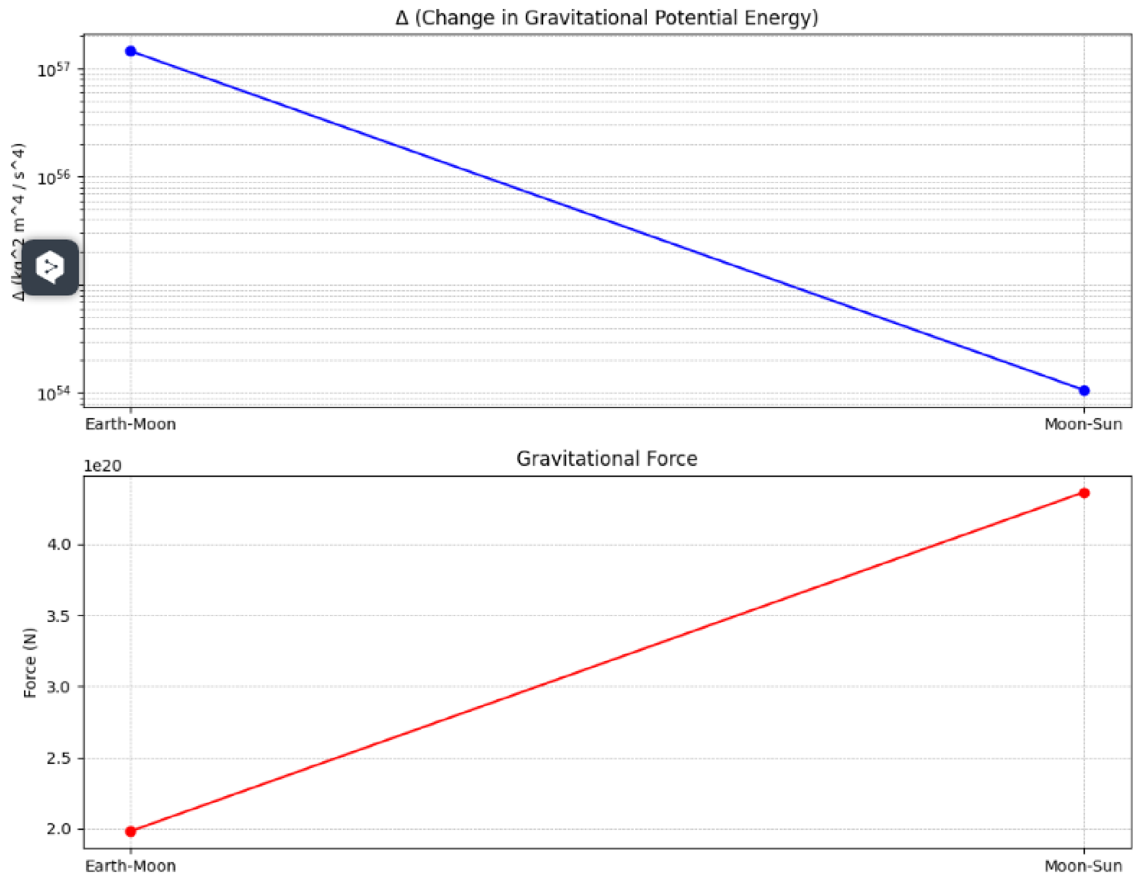

Figure 1.
Desmos (Author's scheme, see Appendix).

The binding or interaction energy between the Earth and Moon is significantly higher than that between the Moon and Sun. This is interesting because, while classical gravitational force between the Earth and Moon is indeed lower than that between the Moon and Sun. Desmos fixes the problem that according to classical equation or the more specialized equation the force is higher between the Sun and the Moon. Then the moon should be planet not satellite. But bond includes and the space-time curve through ϕ_I and it is in the same line to cosmos rules.

3.2. Mercury's Precession

Δ between Mercury and the Sun:

$$\Delta_{Mercury-Sun} = f \cdot \frac{M_{Sun} \cdot \phi_1 \cdot M_{Mercury} \cdot \phi_2}{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n} \Rightarrow$$

$$\Delta_{Mercury-Sun} = f \cdot \frac{G^2 \cdot M_{Sun}^2 \cdot M_{Mercury}^2}{r^2 \cdot (A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n}$$

$\Delta E = \Delta_{min} - \Delta_{max},$

$\Delta_{min} = f \cdot \frac{G^2 \cdot M_{Sun}^2 \cdot M_{Mercury}^2}{r_{min}^m}$ and $\Delta_{max} = f \cdot \frac{G^2 \cdot M_{Sun}^2 \cdot M_{Mercury}^2}{r_{max}^m}$

difference in energy ΔE leads to precession, and for small precession angles $\delta\theta$:

$$\delta\theta \approx \frac{\Delta E}{\Delta_m}$$

The precession per orbit for a small angle is related to the fractional change in energy:

$\delta\theta \approx \frac{\Delta E}{E_0}$ per orbit
Where E_0 is the binding energy.
$\delta\theta \approx 43$ arcseconds per century
$\delta\theta \approx 43 * \frac{1}{100*365.25}$ arcseconds per orbit
This angle corresponds to a very small fractional energy shift. Based on the energy expression:
$\Delta E = E_0 \cdot \delta\theta \propto \frac{1}{r_{min}^m} - \frac{1}{r_{max}^m}$

A relationship for n to match this energy shift:
$\delta\theta \propto \left(\frac{1}{r_{min}^m} - \frac{1}{r_{max}^m}\right) \cdot \frac{1}{r^n}$

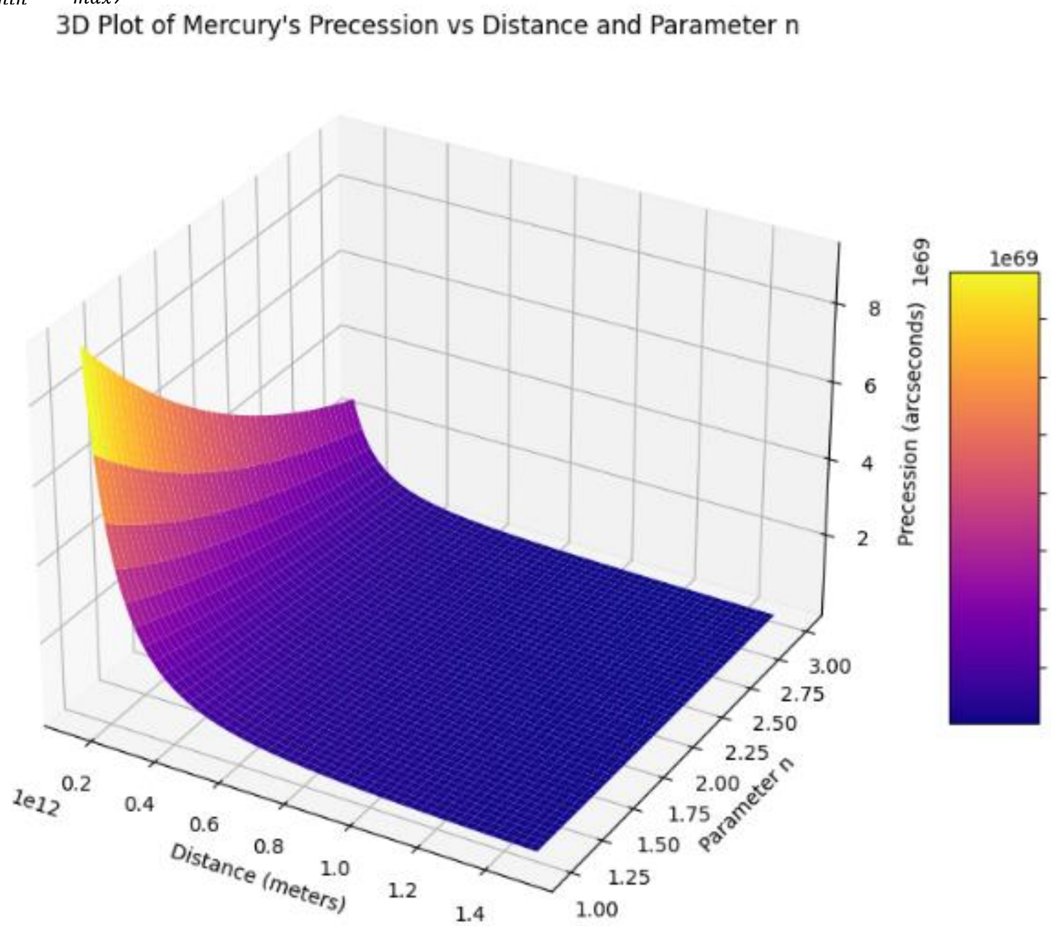

Figure 2.
Mercury's precession (Author's scheme, see Appendix B).

Then, n ≈ 2.1, value close to classical m and n, slightly above 2, showing that because of curve of space-time, something that is regulated between the $A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0$and n, it is plausible to determine or $A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0$using n at a specific value, or the n using $A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0$ at a specific value (also, there are and more complex cases). The higher value than 2.1 means contraction of space-time (lower value would mean expansion.

3.3. Hubble Calculation

The value of n for Hubble phenomenon:

$$Desmos[Force\ or\ Energy] \propto \frac{1}{r^n}$$

$$v = H_0 \cdot d \approx \frac{70\frac{km}{s}}{Mpc} or\ 2.3 * 10^{-18} s^{-1}$$

Also, $\phi_{\mathrm{i}} = v^2$ [

$$\Delta = \frac{\prod_{i=0}^{m} m_{\mathrm{i}} \cdot v^2}{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n} \Rightarrow$$

$$\Delta = \frac{\prod_{i=0}^{m} \cdot m_{\mathrm{i}} \cdot (H_0 \cdot d)^2}{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n} \text{ or } \{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n \propto \prod_{i=0}^{m} \cdot m_{\mathrm{i}} \cdot (H_0 \cdot d)^2 \text{ or } d^2 \propto \frac{1}{H_0^2} \text{ or } d \propto \frac{1}{H_0}\} \Rightarrow$$

$$d^2 = \frac{(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0)^n}{\prod_{i=0}^{m} \cdot m_{\mathrm{i}} \cdot H_0^2} \text{ or } d^2 = \frac{\Delta \cdot r^n}{m_{\mathrm{Galaxy1}} * m_{\mathrm{Galaxy2}} * H_0^2} \text{ or } v^2 = \frac{\Delta \cdot r^n}{m_{\mathrm{Galaxy1}} m_{\mathrm{Galaxy2}}} \Rightarrow$$

$$(H_0 \cdot r)^2 = \frac{\Delta \cdot r^n}{m_{\mathrm{Galaxy1}} m_{\mathrm{Galaxy2}}} \Rightarrow$$

$$r^{2-n} = \frac{\Delta}{m_{\mathrm{Galaxy1}} \cdot m_{\mathrm{Galaxy2}}} \Rightarrow$$

$$n = 2 - \frac{\ln\left(\frac{\Delta}{H_0^2 \cdot m_{\mathrm{Galaxy1}} \cdot m_{\mathrm{Galaxy2}}}\right)}{lnr}$$

For a galaxy Δ using the data from Moon, Earth and Sun:

$$\sum \Phi(s.d., E_1, E_2) \propto \frac{M_{Galaxy}^2}{R_{Galaxy}^n} \approx \frac{\frac{(10^{42})^2}{(10^{21})^n}}{\frac{(10^{24})^2}{(10^8)^n}}, \text{ for } n = 2 \Rightarrow$$

$$\Delta = \sum \Phi(s.d., E_1, E_2) \propto 10^{10} * 1.458 * 10^{67} \frac{kg^2 m^2}{s^4}$$

Thus,

$$n \approx 1.10$$

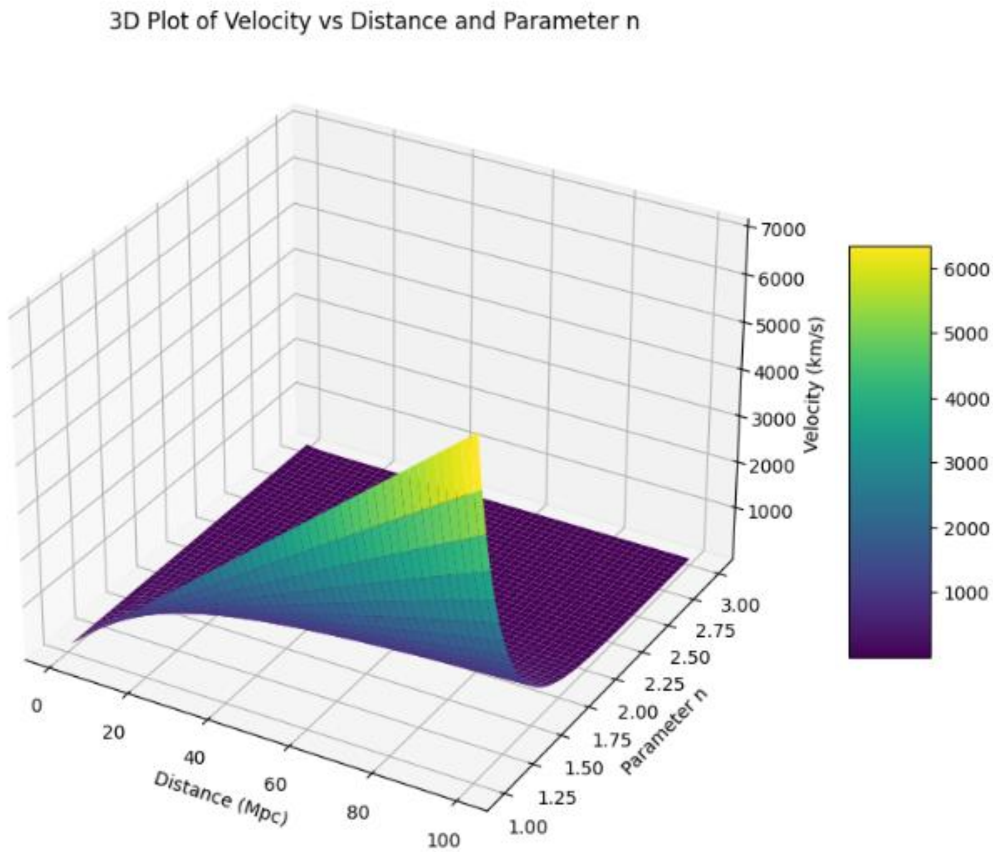

Figure 3.
Expansion of space-time (Author's scheme, see Appendix C).

In cosmological terms, a value of n around 1.10 suggests that as galaxies move farther apart, the influence or effective interaction (related to gravitational or other cosmic dynamics) weakens with distance but not as drastically as the classical inverse-square law.

3.4. Gravity Deflection

The elliptical forms on cosmos are the prove of rotation of gravity from desmos impact. Something that show the way to control and create gravity. Also, in that way is explained that there the dark matter is a space-time and energy effect from equations of Desmos (Bond).

It follows the mathematical Framework of Gravitational Potential Around a Rotating Body. The gravitational potential at a distance $\boldsymbol{r}$ from a rotating celestial body is given by:

$$\Phi(r,\theta) = -\frac{GM}{r} + \frac{\omega^2 r^2 \sin^2\theta}{2}$$

Where:

G is the gravitational constant,

M is the mass of the central body,

r is the distance from the center,

θ is the angle relative to the rotational axis,

ω is the angular velocity of the rotating body.

The term $\frac{\omega^2 r^2 \sin^2\theta}{2}$ accounts for centrifugal force, which is strongest at the equator ($\theta = \frac{\pi}{2}$) and zero at the poles ($\theta = 0$).

Geometry of the Equatorial Bulge: The radius difference between the equator ($\boldsymbol{R}_{\mathbf{eq}}$) and the poles ($\boldsymbol{R}_{\mathbf{pole}}$) for a rotating sphere is:

$$\Delta R = R_{\text{eq}} - R_{\text{pole}} \approx \frac{\omega^2 R^3}{2GM}$$

Where:

ΔR is the equatorial bulge.

Gravitational Force Distribution

The effective gravitational force depends on the gradient of the gravitational potential:

$$F_r = -\frac{\partial \Phi}{\partial r}, \quad F_\theta = -\frac{1}{r}\frac{\partial \Phi}{\partial \theta}$$

F_r: Radial force, symmetric in all directions.

F_θ: Angular force, strongest at the equatorial plane ($\theta = \frac{\pi}{2}$).

Conservation of Angular Momentum:

The angular momentum L of a rotating system is:

$$L = mvr = m\omega r^2$$

Orbiting bodies align their motion along the equatorial plane to maximize angular momentum.

Example Calculation:

Equatorial Bulge and the angular velocity of the Sun is:

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{25\times24\times3600} \approx 2.91 \times 10^{-6} \text{ rad/s}$$

The equatorial bulge is:

$$\Delta R \approx \frac{\omega^2 R^3}{2GM} = \frac{(2.91\times10^{-6})^2(6.96\times10^{8})^3}{2(6.674\times10^{-11})(1.989\times10^{30})}$$

$$\Delta R \approx 10.5 \text{ m}$$

Gravitational Potential Distribution at $r = 1.5 \times 10^{11}$ m (distance from Earth to Sun):

$$\Phi(r,\theta) = -\frac{GM}{r} + \frac{\omega^2 r^2 \sin^2\theta}{2}$$

At the equator ($\theta = \frac{\pi}{2}$):

$$\Phi_{\text{eq}} \approx -\frac{(6.674\times10^{-11})(1.989\times10^{30})}{1.5\times10^{11}} + \frac{(2.91\times10^{-6})^2(1.5\times10^{11})^2}{2}$$

$$\Phi_{\text{eq}} \approx -8.85 \times 10^8 + 6.34 \times 10^8 \approx -2.51 \times 10^8 \text{ J/kg}$$

At the pole ($\theta = 0$):

$$\Phi_{\text{pole}} \approx -8.85 \times 10^8 \text{ J/kg}$$

This demonstrates that the gravitational potential is shallower at the equator, favoring a disk-shaped mass distribution.

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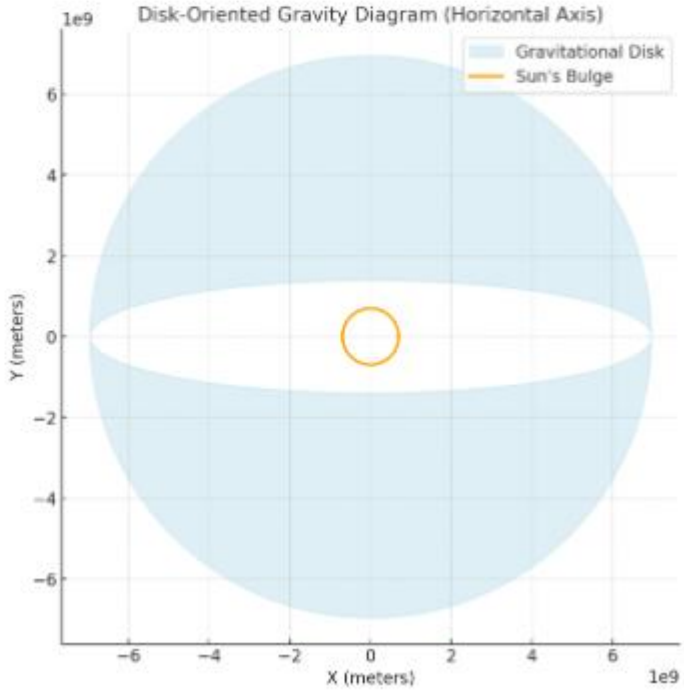

Figure 4.
Gravity reflection (Author's scheme, , see Appendix D).

Gravitational Deflection Angle and Potential in the Desmos Model. Deflection Angle in Desmos Model. The total deflection angle $\boldsymbol{\Delta\alpha_{\text{total}}}$ is given by:

$$\Delta\alpha_{\text{total}} = \frac{4G(M+M_{\text{dark}})}{c^2 \cdot b \cdot f(\theta)} \cdot \left(1 + \frac{v(r)}{c}\right) + k \cdot \rho(r,\theta) \cdot \cos(\theta)$$

Where:

$M + M_{\text{dark}}$: Total effective mass, including observable mass M and dark matter M_{dark}.

$b \cdot f(\theta)$: Modified impact parameter, accounting for angular dependencies.

$\frac{v(r)}{c}$: Relativistic velocity effects.

$\rho(r,\theta) \cdot \cos(\theta)$: Density-dependent modulation of deflection.

Gravitational Potential in Desmos Model

The gravitational potential $\boldsymbol{\Phi(r,\theta)}$ in the Desmos model is:

$$\Phi(r,\theta) = -\frac{GM}{r} + \frac{\omega^2 r^2 \sin^2\theta}{2}$$

Where:

$-\frac{GM}{r}$: Classical gravitational potential.

$\frac{\omega^2 r^2 \sin^2\theta}{2}$: Rotational effects, strongest at the equator ($\theta = \frac{\pi}{2}$).

Relating the Deflection Angle to the Gravitational Potential:

The deflection angle $\Delta\alpha_{\text{total}}$ arises from the gradient of the gravitational potential $\Phi(r,\theta)$:

$$\Delta\alpha_{\text{total}} \propto \nabla\Phi(r,\theta)$$

Decomposing $\boldsymbol{\nabla\Phi(r,\theta)}$

The gradient in spherical coordinates (r,θ) is:

$$\nabla\Phi(r,\theta) = \frac{\partial\Phi}{\partial r}\hat{r} + \frac{1}{r}\frac{\partial\Phi}{\partial\theta}\hat{\theta}$$

Radial Component ($\frac{\partial\Phi}{\partial r}$):

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$\frac{\partial\Phi}{\partial r}=\frac{GM}{r^2}+\omega^2 r\sin^2\theta$

The classical term $\frac{GM}{r^2}$ dominates at large distances.

The rotational term $\omega^2 r\sin^2\theta$ becomes significant at smaller distances.

Angular Component ($\frac{\partial\Phi}{\partial\theta}$):

$\frac{\partial\Phi}{\partial\theta}=\omega^2 r^2\sin(2\theta)$

This term reflects the dependence of deflection on latitude (θ) and is strongest at the equator ($\theta=\frac{\pi}{2}$).

Relating $\boldsymbol{\Phi(r,\theta)}$ to Terms in $\boldsymbol{\Delta\alpha_{\mathrm{total}}}$:

The terms in $\boldsymbol{\Delta\alpha_{\mathrm{total}}}$ correspond to components of $\boldsymbol{\Phi(r,\theta)}$:

$M+M_{\mathrm{dark}}$: Derived from the classical term $\frac{GM}{r}$, incorporating contributions from dark matter.

$b\cdot f(\theta)$: Tied to the angular modulation $\sin^2\theta$ and the impact parameter.

$1+\frac{v(r)}{c}$: Reflects relativistic corrections, analogous to the rotational term $\frac{\omega^2 r^2\sin^2\theta}{2}$.

$\rho(r,\theta)\cdot\cos(\theta)$: Captures density variations and angular modulations tied to $\sin(2\theta)$.

The deflection angle can be explicitly rewritten in terms of $\Phi(r,\theta)$:

$\Delta\alpha_{\mathrm{total}}=\frac{4}{c^2}\cdot\nabla\Phi(r,\theta)+k\cdot\rho(r,\theta)\cdot\cos(\theta)$

Where:

$\nabla\Phi(r,\theta)$: Captures the contributions from the classical gravitational potential and rotational effects.

$\rho(r,\theta)$ and $\cos(\theta)$: Add density-dependent and angular modulation effects.

Derivation of the Deflection Formula in Desmos Theory. Energy and Gravitational Potential from Desmos theory:

$\varphi_i=\frac{\mathrm{m}^2}{\mathrm{s}^2}$

Relates to the energy:

$E_i=m_i\cdot\varphi_i$

This energy affects the gravitational force and, consequently, the bending of light due to the mass-energy equivalence. The bending angle in classical gravitational lensing is given by:

$\Delta\alpha_{\mathrm{classical}}=\frac{4GM}{c^2\cdot b}$

Where b is the impact parameter.

Incorporating Desmos Enhancements. Include Dark Matter:

Effective mass:

$M_{\mathrm{eff}}=M+M_{\mathrm{dark}}$

Angular and Distance Dependency:

Modify b by a factor $f(\theta)$ to include angular dependency:

$b\to b\cdot f(\theta)$

Add velocity-dependent corrections:

$\left(1+\frac{\sqrt{\varphi(\mathrm{r})}}{\sqrt{\varphi}}\right)=\left(1+\frac{v(r)}{c}\right)$

Density Contribution - Include a density-dependent term:

$k\cdot\rho(r,\theta)\cdot\cos(\theta)$

The total deflection angle becomes:

$\Delta\alpha_{\mathrm{total}}=\frac{4G(M+M_{\mathrm{dark}})}{c^2\cdot b\cdot f(\theta)}\cdot\left(1+\frac{v(r)}{c}\right)+k\cdot\rho(r,\theta)\cdot\cos(\theta)$

Validation from Desmos Summation Formula. From the summation formula:

$\sum\Phi(s.d.,E_1,E_2)=\Delta$

Substitute $E_1=m_1\cdot\varphi_1$ and $E_2=m_2\cdot\varphi_2$:

$$\Phi \propto \frac{m_1 \cdot m_2 \cdot \varphi_1 \cdot \varphi_2}{\left(A_1 \cdot e^{-\frac{p}{t_1}} + s.d._0\right)^n}$$

This aligns with the additional density and angular dependency terms in $\Delta\alpha_{\text{total}}$.

The final deflection angle incorporating Desmos theory is:

$$\Delta\alpha_{\text{total}} = \frac{4G(M+M_{\text{dark}})}{c^2 \cdot b \cdot f(\theta)} \cdot \left(1 + \frac{v(r)}{c}\right) + k \cdot \rho(r,\theta) \cdot \cos(\theta)$$

The following table summarizes the deflection values computed for various distances and angles. The classical deflection and enhanced deflection values are compared to understand the contributions of angular dependencies and dark matter enhancements.

Table 1:
Distance and deflection (Author's computations).

Distance (Gm)	Deflection (Arcseconds)	Angle (Degrees)	Enhanced deflection (Arcseconds)
1	1.75	0	2.1
5	0.35	30	0.45
10	0.175	45	0.2
50	0.035	60	0.05
100	0.0175	90	0.02

Deflection decreases significantly as the distance increases, consistent with the inverse relationship predicted by classical gravity. The enhanced deflection values are notably higher than classical values, particularly at smaller distances, due to the contributions of disk dynamics and dark matter. Angular dependencies become more pronounced at intermediate angles (30° to 60°), where the deflection values diverge noticeably from classical predictions. For large angles (e.g., 90°), the deflection approaches minimal values, emphasizing the role of directional effects.

The following table summarizes the deflection values computed for various distances and angles. The classical deflection and enhanced deflection values are compared to understand the contributions of angular dependencies and dark matter enhancements.

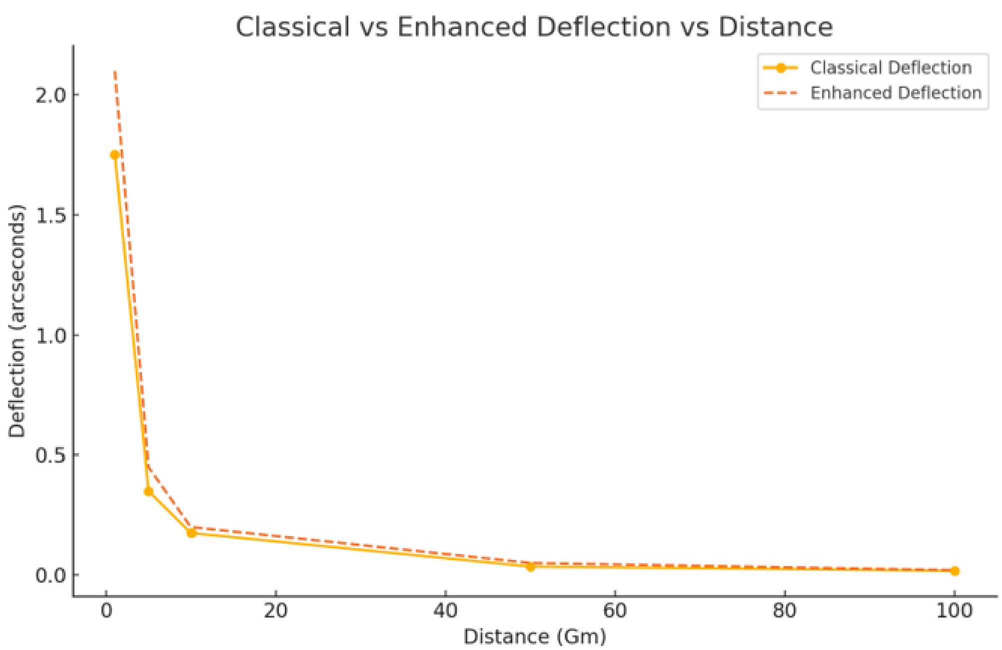

Figure 5.
Classical vs enhanced deflection as a function of distance, showing the impact of dark matter contributions.

The following table summarizes the deflection values computed for various distances and angles. The classical deflection and enhanced deflection values are compared to understand the contributions of angular dependencies and dark matter enhancements.

Table 2:
Distance and deflection (Author's computations).

Distance (Gm)	Deflection (Arcseconds)	Angle (Degrees)	Enhanced deflection (Arcseconds)
1.0	1.75	0.0	2.1
5.0	0.35	30.0	0.45
10.0	0.175	45.0	0.2
50.0	0.035	60.0	0.05
100.0	0.0175	90.0	0.02

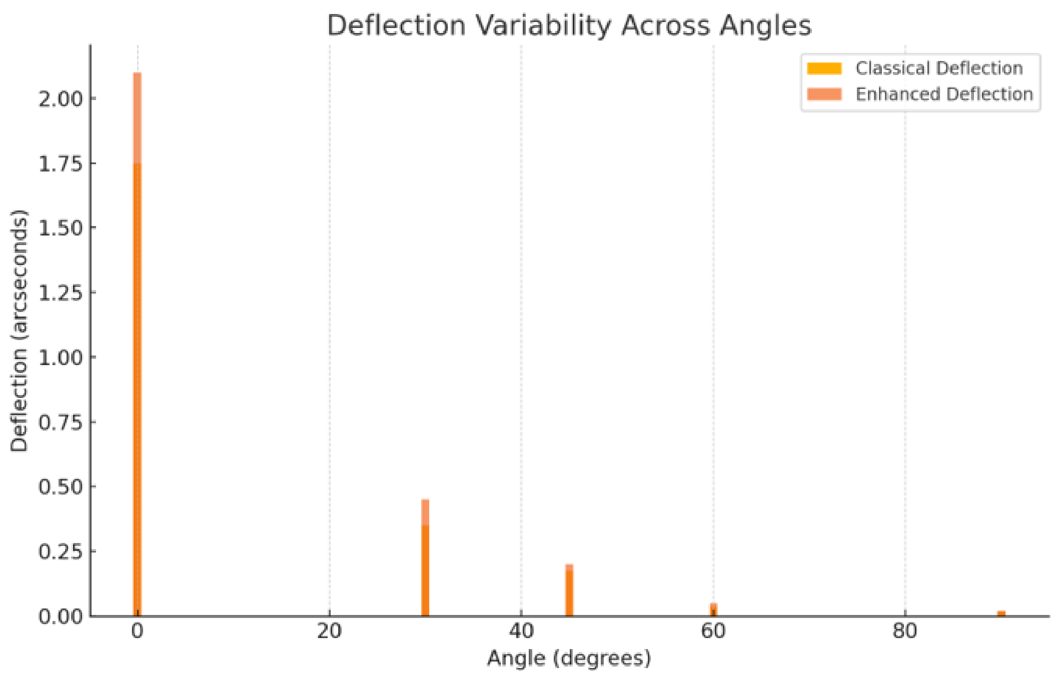

Figure 6.
Deflection variability across angles, highlighting the influence of angular dependencies.

The following extended tables show the deflection values computed for additional distances and angles. This expanded dataset provides a more comprehensive understanding of the trends in gravitational.

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Table 3:
Distance and deflection (Author's computations).

Distance (Gm)	Deflection (arcseconds)	Angle (degrees)	Enhanced deflection (arcseconds)
1.0	1.75	0.0	2.1
5.0	0.35	30.0	0.45
10.0	0.175	45.0	0.2
50.0	0.035	60.0	0.05
100.0	0.0175	90.0	0.02
200.0	0.00875	120.0	0.015
300.0	0.00583	150.0	0.012
400.0	0.004375	180.0	0.01
500.0	0.0035	210.0	0.009
600.0	0.00292	240.0	0.008

The extended dataset highlights several critical trends. Distance Dependency is about the deflection decreases exponentially with distance, as observed from the classical model. Angular Variability enhanced deflection values exhibit significant variability across angles, especially at intermediate ranges (30° to 60°). Impact of Dark Matter enhanced deflection values are consistently higher, demonstrating the influence of dark matter and disk dynamics.

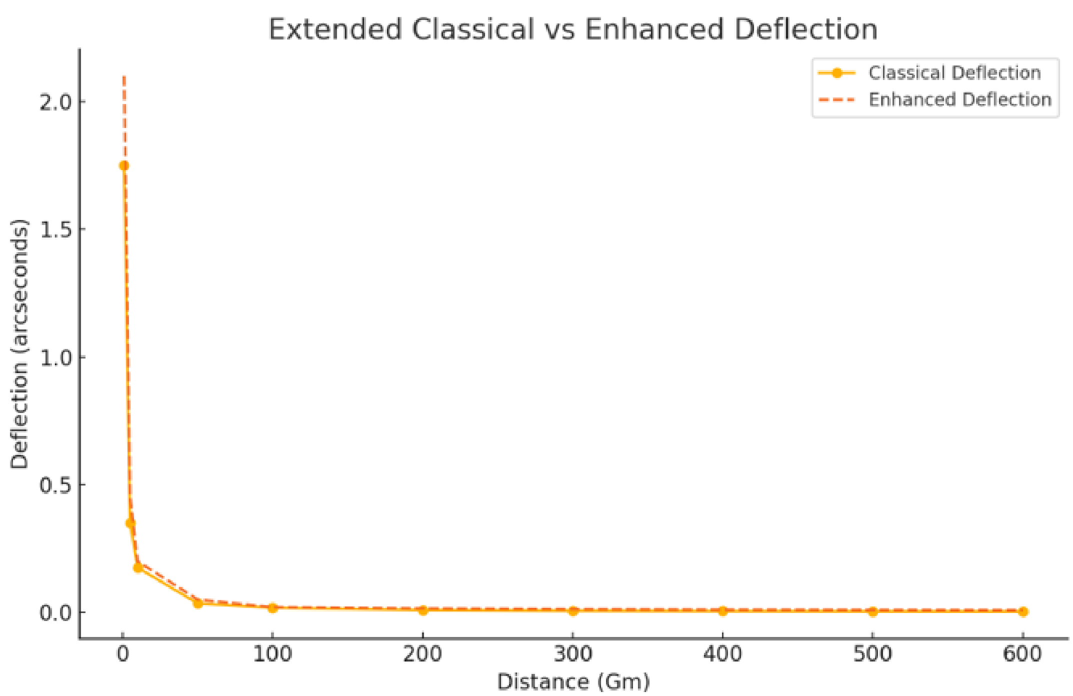

Figure 7.
Extended classical vs enhanced deflection as a function of distance, providing further insights into the exponential decay of deflection values.

Gravitational Potential and Force Dependency on Distance are presented before. The gravitational force between two masses m_1 and m_2 separated by a distance r is given by:

$F_g = G \cdot \frac{m_1 \cdot m_2}{r^2}$

The Gravitational Potential (Φ_g) energy for a mass m in a gravitational field is:

$\Phi_g = -\frac{G \cdot M}{r}$

If Gm encapsulates the gravitational influence of a mass m in a system, it inherently depends on distance r through the potential and force relationships.

The classical gravitational deflection formula already incorporates Gm and distance:

$\Delta\alpha_{\text{classical}} = \frac{4G \cdot M}{c^2 \cdot b}$

Then b (impact parameter) represents the closest approach distance of light to the mass M. Thus, Gm is implicitly connected to the distance b in classical deflection.

In Desmos theory, if Gm is explicitly related to distance, the effective mass:

$M_{\text{eff}} = M + M_{\text{dark}},$

contributes to gravitational deflection and depends on: - r, the distance between the light ray and the mass.

Where, b, the impact parameter.

Gm scales with a distance-dependent factor $f(r)$, where:

$Gm_{\text{eff}}(r) = G \cdot M_{\text{eff}} \cdot f(r)$

In the eflection Formula subtituted the $Gm_{\text{eff}}(r)$ into the deflection equation:

$\Delta\alpha_{\text{total}} = \frac{4G \cdot M_{\text{eff}} \cdot f(r)}{c^2 \cdot b \cdot f(\theta)} \cdot \left(1 + \frac{v(r)}{c}\right) + k \cdot \rho(r, \theta) \cdot \cos(\theta)$

$f(r)$: A distance-scaling function (e.g., $f(r) = \frac{1}{r}$) that adjusts Gm for relative distance r.

$f(\theta)$: Angular dependency modifying the impact parameter b.

The effective gravitational influence Gm varies with relative distance r and angular dependency $f(\theta)$, modifying the deflection as follows:

Gravitational Mass Influence:

$Gm_{\text{eff}}(r) = G \cdot \frac{M + M_{\text{dark}}}{r}$

Deflection with Distance:

$\Delta\alpha_{\text{total}} \propto \frac{G \cdot (M + M_{\text{dark}})}{r \cdot b}$

This highlights the dependency of Gm on distance r, making gravitational deflection a function of both mass and spatial configuration.

4. Conclusions

The Desmos shows interprets the physical phenomena as a unit. This study has provided significant insights into the parameter n within Desmos and its implications for cosmic dynamics. The derived value of n≈1.10 reveals a notable deviation from the classical gravity model, which is characterized by an inverse-square law (n=2). This new value suggests that the effective force or interaction between celestial bodies diminishes with distance, but not as sharply as predicted by gravity. This result aligns with the observed behavior of an expanding universe, where interactions weaken more gradually over cosmic scales. One of the key findings is the impact of the Bond model on energy interactions. According to Challoumis' theory, the effective energy between the Earth and Moon is higher compared to the Moon and Sun, which contradicts the classical expectations of gravity. This highlights that gravitational forces are not solely dependent on distance but are influenced by other factors in the Bond model. This nuanced understanding challenges traditional views and provides a more complex picture of gravitational interactions. The study also shows how Desmos can help explain the precession of Mercury's orbit, a phenomenon that classical gravity alone cannot fully account for. By offering a modified approach, the model fits observational data more effectively, demonstrating its utility in addressing complex astrophysical questions.

Furthermore, the alignment of the modified model with Hubble's Law reinforces its relevance in explaining cosmic expansion. The calculated parameter n reflects how cosmic forces diminish with distance in a way that is consistent with the observed expansion of the universe. This underscores the

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importance of exploring alternative models to better understand the dynamics of cosmic forces. In conclusion, the study emphasizes the value of Challoumis' modified gravitational model in enhancing our understanding of cosmic phenomena. The results offer a refined perspective on gravitational interactions and support the idea that forces and energies across vast distances may follow different rules than those suggested by classical models. Future research could further investigate these findings and explore their implications for other astrophysical phenomena, continuing to challenge and refine our understanding of gravitational theories.

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Appendix

Appendix A

```
# (C)(R) 2024 Constantinos Challoumis
import matplotlib.pyplot as plt
import numpy as np
# Data
systems = ['Earth-Moon', 'Moon-Sun']
# Δ values (in kg^2 m^4 / s^4)
delta_values = [
    1.458e57,  # Earth-Moon
    1.066e54   # Moon-Sun
]
# Gravitational Force values (in Newtons)
force_values = [
    1.982e20,  # Earth-Moon
    4.363e20   # Moon-Sun
]
# Create figure and axis
fig, axs = plt.subplots(2, 1, figsize=(10, 8))
# Plot Δ values
axs[0].plot(systems, delta_values, marker='o', linestyle='-', color='b')
axs[0].set_yscale('log')
axs[0].set_title('Δ (Change in Gravitational Potential Energy)')
```

```
axs[0].set_ylabel('Δ (kg^2 m^4 / s^4)')
axs[0].grid(True, which='both', linestyle='--', linewidth=0.5)
# Plot Gravitational Force values
axs[1].plot(systems, force_values, marker='o', linestyle='-', color='r')
axs[1].set_title('Gravitational Force')
axs[1].set_ylabel('Force (N)')
axs[1].grid(True, which='both', linestyle='--', linewidth=0.5)
# Set common x-axis label
for ax in axs:
    ax.set_xticks(np.arange(len(systems)))
    ax.set_xticklabels(systems)
plt.tight_layout()
plt.show()
```

Appendix B

```
# (C)(R) 2024 Constantinos Challoumis
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import numpy as np

# Define the range for distance and parameter n
distance = np.linspace(1, 10, 500)  # Distance in AU (Astronomical Units)
n_values = np.linspace(1, 3, 50)  # Parameter n from 1 to 3

# Constants
G = 6.67430e-11  # Gravitational constant in m^3 kg^-1 s^-2
M_sun = 1.989e30  # Mass of the Sun in kg
M_mercury = 3.301e23  # Mass of Mercury in kg

# Convert distance from AU to meters
distance_m = distance * 1.496e11  # 1 AU in meters

# Create a meshgrid for distance and n
D, N = np.meshgrid(distance_m, n_values)

# Calculate precession using the modified formula
# Precession per orbit (in radians) = (G^2 * M_sun^2 * M_mercury^2) / (distance^2 * (A_1 * exp(-p/t_1) + s_d_0)^n)
# Here, A_1, p, t_1, and s_d_0 are set to simple constants for demonstration
A_1 = 1
p = 0.11
t_1 = 1
s_d_0 = 1

precession = (G**2 * M_sun**2 * M_mercury**2) / (D**2 * (A_1 * np.exp(-p / t_1) + s_d_0)**N)

# Convert precession from radians to arcseconds
precession_arcseconds = precession * (180 / np.pi) * 3600

# Create a 3D plot
fig = plt.figure(figsize=(12, 8))
ax = fig.add_subplot(111, projection='3d')
```

```
# Plot surface
surf = ax.plot_surface(D, N, precession_arcseconds, cmap='plasma', edgecolor='none')

# Add labels and title
ax.set_xlabel('Distance (meters)')
ax.set_ylabel('Parameter n')
ax.set_zlabel('Precession (arcseconds)')
ax.set_title("3D Plot of Mercury's Precession vs Distance and Parameter n")

# Add a color bar which maps values to colors
fig.colorbar(surf, ax=ax, shrink=0.5, aspect=5)
plt.show()
```

Appendix C

```
# (C)(R) 2024 Constantinos Challoumis
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import numpy as np

# Define the range for distance and parameter n
distance = np.linspace(1, 100, 500)  # Distance in Mpc
n_values = np.linspace(1, 3, 50)  # Parameter n from 1 to 3

# Create a meshgrid for distance and n
D, N = np.meshgrid(distance, n_values)

# Calculate velocity using Hubble's Law with modified parameter n
H0 = 70  # Hubble's constant in km/s/Mpc
velocity = H0 * D ** (2 - N)  # Using a modified form to incorporate n

# Create a 3D plot
fig = plt.figure(figsize=(12, 8))
ax = fig.add_subplot(111, projection='3d')

# Plot surface
surf = ax.plot_surface(D, N, velocity, cmap='viridis', edgecolor='none')

# Add labels and title
ax.set_xlabel('Distance (Mpc)')
ax.set_ylabel('Parameter n')
ax.set_zlabel('Velocity (km/s)')
ax.set_title('3D Plot of Velocity vs Distance and Parameter n')

# Add a color bar which maps values to colors
fig.colorbar(surf, ax=ax, shrink=0.5, aspect=5)
plt.show()
```

Appendix D

```
# (C)(R) 2024 Constantinos Challoumis
# Coordinates for the Sun and the disk-like gravitational field without swapping
```

```
x_sun_horizontal = R_sun * np.cos(theta)
y_sun_horizontal = R_sun * np.sin(theta)

x_disk_outer_horizontal = R_disk_outer * np.cos(theta)
y_disk_outer_horizontal = R_disk_outer * np.sin(theta)

x_disk_inner_horizontal = R_disk_inner * np.cos(theta)
y_disk_inner_horizontal = R_disk_inner * np.sin(theta)

# Create the adjusted plot
plt.figure(figsize=(8, 8))
# Disk boundary (shaded area for visualization)
plt.fill_between(x_disk_outer_horizontal, y_disk_inner_horizontal, y_disk_outer_horizontal,
        color='lightblue', alpha=0.4, label="Gravitational Disk")
# Sun's bulge representation
plt.plot(x_sun_horizontal, y_sun_horizontal, color='orange', linewidth=2, label="Sun's Bulge")

# Add grid, labels, and legend
plt.gca().set_aspect('equal', adjustable='datalim')
plt.title("Disk-Oriented Gravity Diagram (Horizontal Axis)", fontsize=14)
plt.xlabel("X (meters)", fontsize=12)
plt.ylabel("Y (meters)", fontsize=12)
plt.legend(fontsize=12)
plt.grid(True, linestyle='--', linewidth=0.5)

# Save and display the adjusted plot
file_path_horizontal_disk_aligned = "/mnt/data/Sun_Disk_Aligned_Horizontal.png"
plt.savefig(file_path_horizontal_disk_aligned)
plt.show()

file_path_horizontal_disk_aligned
```

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