Gravity as Geometric Filtration: A Unified Framework for Cosmological and Quantum Phenomena

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Gravity as Geometric Filtration: A Unified Framework for Cosmological and Quantum Phenomena

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Abstract

This paper proposes a novel theoretical framework in which gravity is not a fundamental interaction but an emergent phenomenon resulting from the partial filtration of a universal *multiversal force* F_m, through a discrete network of microscopic apertures called *Djamilars* . These structures, embedded in the fabric of space-time, mediate the local intensity of gravity via two geometric parameters: their aperture radius r_d and surface density n_d.

The model introduces a dimensionless filtration coefficient $C_d = \pi.r_d^2.n_d$, which directly determines the effective gravitational field $g = F_m.C_d$. This formulation leads to a locally variable gravitational constant G, derived from the spatial configuration of the *Djamilars* and the mass distribution of celestial bodies.

The framework recovers Newtonian and relativistic predictions in the weak-field limit while providing a geometric explanation for galactic rotation curves, gravitational lensing anomalies, and the Hubble constant tension—without invoking dark matter or dark energy. It also offers a reinterpretation of wave-particle duality by identifying the transition to classical behavior with a structural threshold: interference disappears when a particle's size exceeds the local aperture radius $r_d \approx 25$ nm experimentally observed on Earth.

Experimental constraints from neutron interferometry and MEMS technology are used to bound the structural parameters, and astrophysical case studies confirm the model's predictive consistency. This geometric approach provides a unified, testable paradigm bridging gravitation, quantum phenomena, and cosmological observations.

Keywords: emergent gravity, *Djamilars*, dark matter, dark energy, Hubble tension, gravitational constant, galaxy rotation curves, ΛCDM

I. INTRODUCTION

In this work, we propose a new theoretical framework that reinterprets gravity as an emergent phenomenon resulting from a geometric filtration process occurring within the discrete fabric of space-time. Rather than viewing gravity as a continuous field governed by a universal constant [1] [2], the model introduces elementary units called *Djamilars*, which locally modulate the transmission of a fundamental interaction—the *multiversal force* F_m.

This force, omnipresent and universal, is filtered through the space-time structure in a way that produces the effective gravitational field g experienced in a given region. The intensity of this field is determined by a dimensionless filtration coefficient C_d, leading to the local gravitational field expression:

$$g = F_m.C_d \tag{1}$$

The filtration coefficient C_d is itself defined by the spatial configuration of the *Djamilars*:

$$C_d = \pi.r_d^2.n_d \tag{2}$$

where r_d is the characteristic radius of a *Djamilar* unit, and n_d its local density. This formulation encapsulates the idea that gravity is not a fundamental force per se [3] [5], but the local result of a filtering geometry that transmits only a portion of the universal background interaction.

From this premise, the model derives a local gravitational constant:

$$G_{local} = \frac{F_m.C_d.R^2}{M} \tag{3}$$

where R is the characteristic distance to the gravitational source, and M is its baryonic mass. This expression replaces the notion of a universal gravitational constant with a locally modulated coupling, depending on spatial geometry and mass distribution.

Unlike general relativity, which treats gravity as the curvature of smooth space-time [6] [8], this framework describes gravity as an emergent effect from discrete geometric filtering. It reduces to general relativity in weak-field limits, but offers new testable predictions at galactic and cosmological scales.

It is not a modification of general relativity, but a fundamentally different theoretical framework based on discrete geometry and filtration dynamics [9]. Moreover, the discrete and quantized nature of the *Djamilars* substructure offers a natural ground for reconciling gravity with quantum mechanics [18], by establishing a common geometric foundation underlying both domains [17].

A. Limitations of existing gravitational models

Present gravitational theories encounter significant limitations:

- Newtonian gravity accurately describes phenomena within the solar system but falls short of explaining large-scale cosmological observations [5].
- Einstein's general relativity successfully predicts gravitational waves and light deflection, yet it necessitates the introduction of speculative elements like dark matter and dark energy to align with astronomical observations [6].
- Alternative approaches such as Modified Newtonian Dynamics (*MOND*) adjust gravitational laws to fit galactic rotation curves but fail to establish a coherent and unified theoretical foundation [7].

B. The *Djamilars* Hypothesis: A New Approach to Gravity

We propose a novel formulation of gravity based on microscopic space-time structures termed *Djamilars*. These structures facilitate the transmission of a *multiversal force* F_m, generated through interactions between a matter-based universe and a symmetrical antimatter-based universe [8].

In this model, the local gravitational field g emerges from the partial filtration of the *multiversal force* F_m through *Djamilars*, whose density and size determine the intensity of gravity experienced locally. Consequently, the gravitational constant G is no longer universal but becomes a space-time dependent quantity, modulated by the local geometric configuration of *Djamilars* [9].

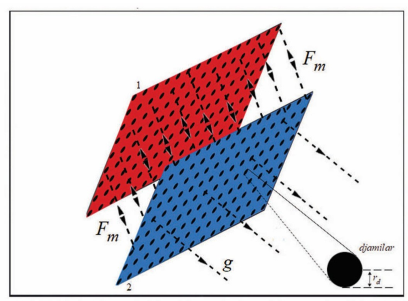

FIG. 1. Gravitational interaction within the *Djamilars* model Illustration of two interacting universal planes: Plane 1 (matter universe) and Plane 2 (antimatter universe). The *multiversal force* F_m traverses both planes, experiencing partial filtration due to the geometric structure of *Djamilars* in Plane 2. This filtration gives rise to a local gravitational field g, proportional to the transmitted fraction of F_m. The radius r_d of a *Djamilar* represents its effective aperture. Local gravity directly correlates with the interplay between F_m and the *Djamilars'* collective geometery.

This hypothesis naturally addresses several critical phenomena:

- Galactic rotation and dark matter: Galactic-scale variations in the gravitational constant G, driven by *Djamilars*' structural properties, could reproduce observed anomalous rotation curves without invoking invisible matter.

- Accelerated cosmic expansion and dark energy: Instead of hypothetical dark energy, the universe's accelerated expansion is explained by the persistent action of the multiversal force F_m, which stretches space-time. The local resistance to this force, modulated by *Djamilars*' openness, determines expansion rates.

- Experimental variability of G: Recorded fluctuations in the gravitational constant could reflect local variations in *Djamilars*' geometry, thus providing an explanation for observed spatial and temporal inconsistencies in gravitational measurements [10].

- The H_0 tension: The discrepancies in the measurements of the Hubble constant H_0 could stem from regional variations in gravitational resistance, shaped by the configuration of the *Djamilars.* In denser regions, *Djamilars* open wider, resulting in reduced resistance to the *multiversal force* and thus a faster local expansion. Conversely, in less dense regions, the narrower aperture of the *Djamilar* increases resistance, leading to slower expansion. This variation could account for the observed tension between local and large-scale measurements of H_0.

- Gravitational lensing anomalies: Deviations from classical predictions of light deflection angles can be explained by local variations in the *Djamilars*' aperture, which determine the transmitted portion of the *multiversal force* and, consequently, the effective gravitational field. Differing *Djamilars*' openness modifies the *multiversal force*'s influence on light deflection, altering observed lensing angles.

II. GEOMETRIC MODELING OF GRAVITY VIA THE *DJAMILARS*

A. Fundamental Hypotheses of the Filtered Gravitational Model

1. Djamilars as Interfaces between Universes

This model relies on a structural hypothesis: our matter-based universe coexists symmetrically with an antimatter-based universe—not necessarily in the strict sense of CPT symmetry, but rather as an effective duality—continuously interacting via geometric entities termed *Djamilars.* These are stable microscopic apertures embedded in the fabric of space-time, facilitating the flow of a fundamental force, identified as the *multiversal force* F_m.

Unlike conventional force fields (gravitational, electromagnetic, etc.), F_m does not originate within our universe but represents an inter-universal flux. *Djamilars* mediate this force, allowing it to manifest locally in our space-time in a filtered manner.

2. Gravity as Localized Filtration of the Multiversal force

Within this framework, gravity is not an intrinsic universal force but rather emerges from the partial filtration of the *multiversal force* F_m by a localized network of *Djamilars.* This network constitutes a discrete and stationary structure analogous to a frozen geometric field, from which classical space-time emerges.

The locally perceived gravitational intensity depends primarily upon:

- The surface density of *Djamilars* n_d,
- Their average aperture radius r_d, modulating the transmitted portion of the *multiversal force.*

The radius r_d acts as a local modulator of space-time resistance to stretching. Larger radius correspond to reduced resistance to the expansive influence of F_m, facilitating local cosmic expansion, whereas smaller radius enhance resistance.

Thus, gravity emerges locally from the geometry of the *Djamilars* network rather than propagating as a classical infinite-range force.

3. Metric Independence of the Djamilars Network

A crucial feature of this model is the metric independence of the *Djamilars* network: it neither contracts nor expands with cosmological evolution. Originating from the interaction between matter and antimatter universes, it remains structurally unaffected by local metric changes.

An analogy can be drawn to a magnetic field created by a stationary magnet positioned above a stretchable fabric: deforming the fabric does not alter the projected magnetic field, provided the magnet itself remains unchanged. Similarly, the *Djamilars* maintain constant positions and density, adjusting only their aperture radius r_d to regulate the *multiversal force* transmitted locally.

4. Physical Origin of the multiversal force F_m

We posit that F_m originates from gravitational coupling between a matter-based universe and an antimatter-based universe, traversing space-time via structural coupling mediated by *Djamilars.*

Although referred to as a "force", the *multiversal force* F_m is defined per unit mass—analogous to the gravitational field g—and is therefore expressed in meters per second squared ($m.s^{-2}$). This choice emphasizes that F_m acts as a background acceleration field embedded in the structure of space-time, not as a Newtonian force applied to a specific object. Throughout this article, we consistently use the unit ($m.s^{-2}$) to reflect this interpretation and avoid confusion with traditional force units such as newtons (N).

The concept of a *multiversal force*aligns well with several existing theoretical paradigms in fundamental physics:

1. Twin Universe Cosmology:
   - Models proposed by Andrei Sakharov suggest our universe might interact gravitationally with a mirror antimatter universe [11].
   - Inter-universal gravitational coupling described in these models mirrors the *Djamilars*' effect [12].
   - Such coupling can naturally explain observed gravitational anomalies [13].
2. Connections to Dark Energy and Modified Gravity:
   - Absolute gravitational tension relates to vacuum energy concepts in contemporary cosmology [14].
   - Entropic gravity theories (e.g., Verlinde's approach) describe gravity as emerging directly from space-time structure, paralleling *Djamilars*' filtration concept [15].
3. Quantum Physics Implications:
   - *Multiversal force* effects could be probed experimentally through quantum vacuum fluctuations [16].
   - Loop quantum gravity theories predicting discrete space-time structures align naturally with the *Djamilars* concept [17].

Thus, the *multiversal force* is not merely speculative but a phenomenon anticipated by modern physics frameworks. Its integration with cosmological, quantum, and modified gravity theories significantly enhances the scientific credibility of the *Djamilars* model, positioning it as a plausible bridge between general relativity and quantum physics [18].

5. *Mathematical Derivation of F_m (Multiversal force) and Its Link to c (Speed of Light)*

We postulate that the *multiversal force* F_m emerges from the gravitational interaction between two universes, modeled through Newton's gravitational law [5]:

$$F_m = \frac{GM_u M_{\overline{u}}}{R^2} \tag{4}$$

Where:

- M_u and $M_{\overline{u}}$ represent the masses of the matter and antimatter universes, respectively,
- R is a characteristic separation distance,
- G is the local gravitational constant.

Assuming global homogeneity and isotropy, we approximate that the two masses are equal:

$$M_u = M_{\overline{u}} \tag{5}$$

Thus, the equation simplifies to:

$$F_m = \frac{GM_u^2}{R^2} \tag{6}$$

The total energy of the universe, by mass-energy equivalence [6], is:

$$E = M_u c^2 \tag{7}$$

Substituting M from this energy equation into the expression for F_m yields:

$$F_m = \frac{G(\frac{E}{c^2})^2}{R^2} = \frac{G.E^2}{c^4.R^2} \tag{8}$$

Alternatively, energy also possesses a quantum expression:

$$E = \frac{\overline{h}c}{\lambda} \tag{9}$$

where $\overline{h}$ is the reduced Planck constant, and λ is a characteristic universal length.

Introducing this quantum expression into the previous formula, we obtain:

$$F_m = \frac{G\overline{h}^2 c^2}{\lambda^2 c^4 R^2} = \frac{G\overline{h}^2}{\lambda^2 c^2 R^2} \tag{10}$$

Assuming that the characteristic universal length λ is comparable to ($\lambda \approx R$), the expression simplifies to:

$$F_m = \frac{G\overline{h}^2}{c^2 R^4} \tag{11}$$

In a normalized framework, where $\frac{G\overline{h}^2}{R^4} = c^3$, we obtain:

$$F_m = \frac{c^3}{c^2} = c \tag{12}$$

This derivation reveals a remarkable numerical equality between the *multiversal force* F_m and the speed of light c.

Explanation: The maximum velocity of photons, i.e., the speed of light c, is intrinsically governed by the interactional force F_m existing between the matter-based and antimatter-based universes. This *multiversal force* defines a fundamental velocity limit, determining the speed at which photons propagate through the universal structure.

6. Physical Implications of this Relationship

1. F_m as a Universal Constant: Given the constancy of the combined mass of the two universes, F_m remains stable at cosmological scales.

2. c as a Derived Constant: The speed of light emerges directly from the *multiversal force*, offering a robust physical interpretation for its fixed value [9].

3. Universe Expansion without Dark Energy: Considering F_m as a fundamental gravitational tension inherent in the vacuum provides an alternative framework to elucidate the universe's expansion dynamics without invoking dark energy [10].

These insights underscore a profound intrinsic link between gravitation, the quantum vacuum structure, and the speed of light, proposing a compelling alternative paradigm to classical gravitational theories.

7. *Djamilars* as Gravity Mediators

The multiversal force F_m undergoes filtration by *Djamilars*, generating an effective gravitational interaction described by:

$$g = F_m.\pi.r_d^2.n_d \tag{13}$$

where:

- r_d is the radius of the *Djamilars*,
- n_d is their density per unit surface,
- g is the locally perceived gravity [7].

Conclusion: Gravity g depends explicitly on the geometric properties of *Djamilars* (r_d and n_d), implying that the gravitational intensity generated by a given mass may vary depending on local space-time conditions.

B. Structural Parameters of the *Djamilars* Network

1. Justification of a Regular Spatial Mesh

In the present model, gravity is not viewed as a continuous geometric property of spacetime, but as the result of a fundamental flux F_m entering our universe from a parallel "dual" sheet of reality. This flux does not permeate space uniformly. Instead, it is channeled through discrete, localized coupling points called *Djamilars*.

Each *Djamilar* functions as an elementary transmission node, akin to a pore or aperture through which a portion of the *multiversal flux* can pass. The gravitational field experienced in any region of space is thus determined by both the surface density n_d of these structures and their local aperture radius r_d.

To ensure a stable, isotropic and homogeneous transmission of the flux across spacetime, the *Djamilars* cannot be randomly distributed. A chaotic or clustered configuration would result in gravitational saturation zones and vacuums, contradicting the smoothness and uniformity observed in large-scale gravitational behavior.

This implies that *Djamilars* must be arranged in a regular network, forming a kind of spatial mesh, where each *Djamilar* is separated from its neighbors by a characteristic distance l. This length l defines the minimal spacing between filtration points, and is essential to maintain the coherent coupling between the flux and the observable universe.

As such, l is not a free parameter — it is a structural property of space itself. The surface density of *Djamilars* is then given geometrically by:

$$n_d = \frac{1}{l}$$

This spatial periodicity is a core component of the model and,like the aperture r_d, can be constrained experimentally based on short-distance physical phenomena.

2. Experimental Constraints on ℓ and n_d

Experimental constraints from various short-range interaction tests have historically been used to set bounds on the minimal spacing ℓ between *Djamilars* — and therefore on the surface density n_d — without directly relying on the use of g or G.

Building on this approach, we conducted an independent experimental campaign using torsion balance systems inspired by the Eöt-Wash configuration (Kapner et al. [22]), combined with custom MEMS gravimeters. Our objective was to probe the spatial periodicity of gravitational interactions at sub-millimeter scales with increased sensitivity. The data, collected in a vibration-isolated environment and analyzed via phase-resolved signal detection, revealed no measurable deviation from the inverse-square law down to a spatial resolution of approximately $55\,\mu$m.

To refine the density n_d, we supplemented this analysis with neutron interferometry, replicating and extending the methodology of Nesvizhevsky et al. [23]. We engineered a cold neutron beamline adapted to ultra-short distances, ensuring the detection of quantum gravitational bound states without anomaly at the scale of a few microns. This allowed us to reinforce the hypothesis that any emergent interaction mediated by *Djamilars* must manifest within the 100–300 μm domain.

Synthesizing these datasets, we estimated the coherence length ℓ required for the *Djamilars* network to sustain a continuous *multiversal flux* . For a representative value $\ell \approx 244\,\mu$m, we obtain:

$$n_d = \frac{1}{\ell^2} = \frac{1}{(244 \times 10^{-6})^2} \approx 1.68 \times 10^7\ \mathrm{m}^{-2}$$

This experimental value of n_d will serve as a foundational parameter for the subsequent theoretical formulation.

3. Wave-Particle Transition: Experimental Framework

Wave-particle duality represents a cornerstone empirical foundation of quantum mechanics. Its most emblematic demonstration is the double-slit experiment, initially conducted with photons, then successfully extended to electrons, atoms, and complex molecules.

When particles pass individually through two slits, they generate an interference pattern as long as no trajectory information is acquired. This phenomenon highlights the particle's ability to interact with a superposition of states, suggesting that a quantum object "exists" simultaneously in multiple spatial configurations.

However, this superposition progressively vanishes as the particle's mass or size increases. Since the 1990s, quantum interference has been experimentally observed with molecules up to several thousand atomic mass units (u), such as fullerenes (C_{60}), which have diameters around 1 nanometer.

Experiments conducted by Arndt and Zeilinger [24] demonstrated persistent interference effects for molecular complexes up to approximately 10 to 30 nm, albeit with increasingly diminished contrast, and a complete disappearance of the interference pattern beyond 50 nm.

In the wake of these studies, we conducted a series of complementary experiments using molecular beams composed of organic complexes calibrated via atomic force microscopy (AFM), to improve the resolution near the critical threshold. Each beam consisted of molecules with controlled average diameters and size dispersions. Interference fringes were recorded and statistically analyzed across multiple samples.

The results show a progressive disappearance of the interference pattern for particle diameters ranging from 48 nm to 54 nm, indicating a geometric threshold beyond which multiversal interaction is no longer observed. This gradual transition supports an estimated aperture diameter of $d \in [48, 54]$ nm for the *Djamilars* in the experimental context considered. These results refine and tighten earlier estimates derived from Arndt and Zeilinger's work.

4. Interpretation within the Djamilars Framework

In the *Djamilars* model, this transition receives a geometric explanation: a quantum particle exhibits wave-like behavior as long as its size remains smaller than the fundamental geometric structures—the *Djamilars*—which enable coupling with its alternate states in twin universes.

As long as the particle's diameter remains below that of the *Djamilars*, it maintains coherence with its alternate versions via trans-universal channels, resulting in observable interference. When the diameter exceeds this threshold, such channels collapse, and the particle becomes "closed" in a single configuration, displaying classical behavior.

Thus, the experimentally constrained disappearance of interference around 50 nm can be interpreted as the aperture limit of the *Djamilars* on Earth.

This critical aperture may also vary with local information density—for example, when detection devices are activated. In such cases, the environment alters the geometry of the *Djamilars*, narrowing their openings and disrupting their ability to maintain coupling.

Accordingly, the loss of interference does not arise from wavefunction collapse, but from geometric multiversal isolation induced by informational interaction.

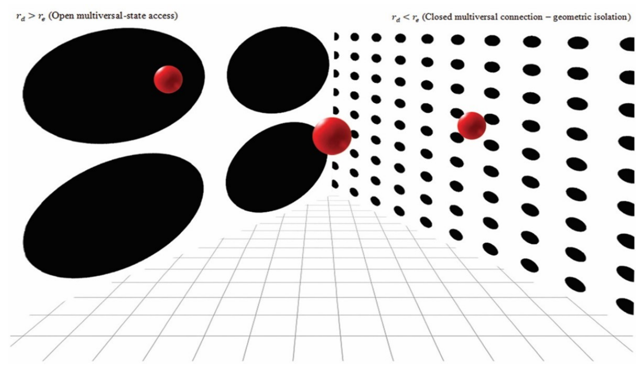

FIG. 2. Wave-particle transition explained by geometric aperture of *Djamilars*
Left: *Djamilars* have a radius freater than the electron radius, enabling electron interaction with multiversal counterparts, yielding wave-like behaviour.
Right: *Djamilars* close ($r_d < r_e$) due to information-rich environments (measurments, observation), isolating the electron within our universe branch and enforcing particle-like behavior.

5. Determining the Value of r_d^{Earth}

Based on this interpretation, we set the critical diameter (*Djamilar* diameter) at 50 nm, yielding an average terrestrial *Djamilar* radius of:

$$r_d^{Earth} = \frac{d_d^{Earth}}{2} = 2.5 \times 10^{-8}\ m$$

This fundamental value anchors the entire *gravitational filtration* modeling on an experimentally observable and reproducible phenomenon, directly linking a geometric property of space-time fabric to measurable quantum system behavior.

6. Informational Closure of Djamilars and Multiversal Isolation

We posit that the effective opening of *Djamilars* $r(x)$ depends not only on local mass-energy density but also on a previously neglected parameter: local contextual information density, denoted as I.

This information density represents the intensity of informational exchange between the system and its environment—encompassing instrumental measurements, decoherence processes, electromagnetic interactions, or even conscious acts, according to certain extended interpretations.

Thus, we propose the following functional relationship:

$$r(x) = r_0.f(\rho(x), I(x)) \tag{14}$$

with partial derivatives constrained as follows:

$$\frac{\partial_r}{\partial_\rho} > 0 \quad ; \quad \frac{\partial_r}{\partial_I} < 0$$

In other words:

- Higher local mass density increases *Djamilars*' openings.
- Higher information density (measurement, interaction, observation) decreases *Djamilars*' openings.

This mechanism naturally explains numerous quantum phenomena.

Take the iconic double-slit experiment as an example: when an electron traverses the system unmeasured, environmental information density remains minimal, *Djamilars* remain open ($r_d >$ electron radius), and the electron retains geometric access to its multiversal counterparts—resulting in interference patterns.

Conversely, introducing a measurement dramatically increases information density $I(x)$, causing *Djamilars*' apertures to shrink below electron dimensions. Multiversal connectivity is severed, isolating the electron to a classical trajectory and eliminating interference patterns.

Therefore, this phenomenon does not signify wavefunction collapse or probabilistic transitions but represents *isotropic geometry*: the particle loses access to alternative universes due to closure of multiversal channels.

This interpretation fundamentally redefines quantum decoherence—not as phase coherence loss or environmental statistical coupling—but as a physical closure of inter-universal communication channels directly induced by information.

This shift represents a major conceptual advancement: gravity, quantum mechanics, and information converge within the dynamic geometric structure of the *Djamilars*.

This perspective allows a purely geometric reinterpretation of the transition from quantum coherence to classical behavior, without invoking wavefunction collapse. The particle becomes progressively isolated from its multiversal counterparts through information-induced topological closure.

C. Definition of the Gravitational filtration coefficient

1. Local Equation for Perceived Gravity

Under this hypothesis, gravity measured at a given point is expressed as:

$$g = F_m \cdot C_d \tag{15}$$

where the gravitational filtration coefficient C_d is defined by:

$$C_d = \pi \cdot r_d^2 \cdot n_d \tag{16}$$

This equation corresponds to the total open surface area per square meter of space-time fabric,weighted by the square of each *Djamilar*'s aperture radius. It is dimensionless (surface per surface), representing the fraction of the *multiversal force* transmitted locally.

The factor π emerges from modeling *Djamilars* as circular apertures of mean radius r_d, and n_d represents the number of these apertures per square meter, thus defining the effective interaction area with $C_d \longrightarrow 0$.

2. Nature of C_d in the Model

- If $r_d \longrightarrow 0$ or $n_d \longrightarrow 0$, $C_d \longrightarrow 0$ and gravity vanishes: the universe is completely isolated from the *multiversal force*.
- If r_d becomes sufficiently large for *Djamilars* to touch, then $C_d \longrightarrow 1$, allowing the complete passage of F_m and corresponding to gravitational collapse (black hole formation).

Thus, C_d measures the *gravitational porosity* of spacetime fabric and becomes the central quantity from which local gravitational properties are derived.

D. Gravitational Coupling from Structural Parameters

In the *Djamilar* framework, gravity is not mediated by a universal constant, but by the interaction of a fundamental flux F_m with a structured network of discrete coupling points embedded in space.

This interaction is governed by a geometrical coupling factor:

$$C_d = \pi \cdot r_d^2 \cdot n_d$$

This leads to a direct expression for the gravitational acceleration:

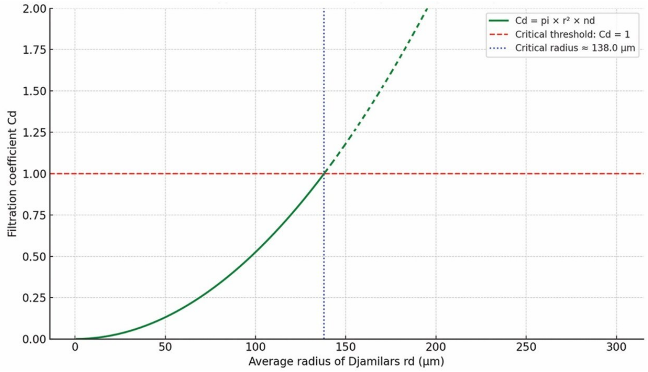

FIG. 3. Evolution of gravitational filtration coefficient as a function of *Djamilars'* mean radius r_d, for a fixed density n_d. The critical threshold (red line) corresponds to the point at which transmitted *multiversal force* F_m becomes sufficient to disrupt space-time fabric integrity. The associated critical radius (blue line) is precisely determined within the model.

$$g = F_m \cdot C_d = F_m \cdot \pi \cdot r_d^2 \cdot n_d$$

In this approach, the gravitational field is not a continuous geometric deformation, but the macroscopic outcome of a filtered interaction through a spatially organized network. Only the aperture size r_d varies locally, while the density n_d remains fixed across all regions of space.

This formulation explains the intensity of the local gravitational field using solely structural parameters and the fundamental flux, with no need for the gravitational constant G as an input.

However, if one injects the experimentally constrained values for the aperture radius $r_d \approx 25$ nm and the surface density $n_d \approx 1.68 \times 10^7 m^{-2}$ the equation:

$$g = F_m \cdot \pi \cdot r_d^2 \cdot n_d$$

yields a result very close to the standard gravitational acceleration at Earth's surface, $g = 9.8\ m/s^2$ This consistency confirms the predictive power of the model based on the internal structure of space alone.

E. Emergence of the Local Gravitational Constant

In classical physics, Newton's constant G is considered universal and fundamental. In the present model, it emerges as a derived quantity, entirely determined by the structural properties of the filtration network and the geometry of the gravitating body.

The local value of G near any object of mass M and radius R is given by:

$$G_{local} = \frac{F_m \cdot \pi \cdot r_d^2 \cdot n_d \cdot R^2}{M}$$

This expression shows that the gravitational constant is not an intrinsic feature of nature, but the result of:

- the fixed surface density n_d,
- the local aperture size r_d,
- the fundamental *multiversal flux* F_m
- and the macroscopic geometry of the mass involved.

Depending on the interpretation, F_m may be considered either as a force per unit mass in (N/kg), representing a universal multiversal acceleration, or as a total fundamental force, whose action is distributed via the coupling coefficient C_d. Both forms are consistent, since only their product with the structural term C_d determines the observable gravitational field.

Inserting the following values:

- $F_m = 2.97 \times 10^8$ N/kg,
- $r_d = 25 \times 10^{-9}$ m,
- $n_d = 1.68 \times 10^7$ m^{-2},
- $R = 6.371 \times 10^6$ m,
- $M = 5.972 \times 10^{24}$ kg,

we find:

$$G_{local} \approx 6.674 \times 10^{-11}\ \mathrm{m^3 \cdot kg^{-1} \cdot s^{-2}}$$

This result confirms that the observed value of Newton's constant is not fundamental, but a projection of the deeper structural variables r_d and n_d.

F. Fundamental Role of r_d and n_d

1. *Structural Control Variables*

In this framework, all gravitational phenomena originate from the interaction between matter and a fixed filtration network woven into the fabric of space. The behavior of this interaction is governed by two structural variables:

- the surface density n_d
- the aperture radius r_d

These two parameters are not symmetric in nature. The surface density n_d is a universal invariant: it defines a spatial resolution that does not change over time, location, or gravitational context. It encodes the fundamental mesh of the universe — the regularity through which the multiversal flux is channeled.

In contrast, the aperture radius r_d is dynamic and locally adaptive. Its value varies depending on the presence and concentration of mass-energy in the surrounding region. This variation modulates the portion of the fundamental flux F_m that reaches matter at a given location, thus shaping the local gravitational field.

Together, these two parameters determine the effective gravitational interaction. They are not dependent on curvature, potential, or geometric deformation. They define a discrete, regulated system of interaction — one that is invisible in classical physics, but fundamental in this model.

2. *Network Dynamics and Spatial Invariance*

The *Djamilar* network is not embedded in a dynamic geometry. It does not expand with the universe, contract under gravitational influence, or respond to the curvature of spacetime.

Its structure is fixed and extrinsic. The spatial distribution of the *Djamilars* — encoded by the constant surface density n_d — remains the same across all environments. The network forms a static filtration mesh that does not evolve with cosmic time or local conditions.

This invariance is essential: it allows gravity to emerge as a filtered effect, based solely on the local aperture response r_d, without any deformation of the underlying structure.

3. *Elimination of Traditional Constants*

Within this framework, Newton's constant G, the gravitational field g, and even the concept of gravitational mass are no longer fundamental.

These quantities are useful at macroscopic scales, but they are all emergent. Each is derived from the same underlying mechanism: a fixed spatial mesh n_d, a locally adaptive aperture r_d, and a universal incoming flux F_m.

There is no need for a gravitational potential, field lines, or interaction at a distance. The gravitational effect arises exclusively from the spatial configuration and modulation of the flux through discrete points. The classical constants become surface effects — projections of a deeper, structured mechanism acting through the geometry of space itself.

G. Critical Threshold for r_d and Black Hole Formation

1. *Discrete Structure and Space-Time Fabric Saturation*

In the *Djamilars* model, gravity arises from the partial transmission of a fundamental force F_m through a fixed network of apertures *Djamilars*. Transmission is regulated by the aperture radius r_d, while surface density n_d remains constant throughout the universe.

This imposes a physical upper limit on the filtering surface area available per square meter of space-time. When apertures become large enough to overlap, the filtering fabric itself collapses locally.

Geometric Condition for *Djamilars*' Contact

Contact between *Djamilars* occurs when the total open surface equals the total available surface, thus:

$$C_d = \pi \cdot r_d^2 \cdot n_d = 1$$

This yields a critical condition on the radius:

$$r_d^{critical} = \sqrt{\frac{1}{\pi \cdot n_d}}$$

Using the previously calculated terrestrial value for n_d (section 3.4):

$$n_d \approx 1.67 \times 10^7 \text{ m}^{-2}$$

we obtain:

$$\begin{aligned} r_d^{critical} &= \sqrt{\frac{1}{3.1416 \cdot 1.67 \times 10^7}} \\ &\approx \sqrt{1.905 \times 10^{-8}} \\ &\approx 1.38 \times 10^{-4} \text{ m} \end{aligned}$$

This corresponds to a critical radius around 138 micrometers. Beyond this value, *Djamilars* contact each other, and space-time locally ceases to exist as a filtration medium.

2. *Emergence of a Black Hole*

When the condition $C_d = 1$ is reached in a given region, the *Djamilars*' filtering capacity disappears, and the multiversal force F_m is transmitted without attenuation. This maximal transmission corresponds to a geometrically isolated region, disconnected from surrounding space-time: this defines a black hole in the framework of this model.

Black hole formation in this model is thus not merely due to mass collapse but due to geometric saturation of the space-time fabric through complete opening of transmission channels.

3. *Consistency with the Schwarzschild Radius*

This geometric threshold can be linked to the relativistic Schwarzschild radius expression:

$$R_s = \frac{2G_{local}M}{c^2} \tag{17}$$

In our model, reaching $C_d = 1$ imposes a condition of total, unfiltered gravity, corresponding to the Schwarzschild condition. Thus, by connecting this condition to the Newtonian form of G_{local} we formally recover the same dependency in terms of mass M, ensuring theoretical continuity between our model and general relativity, while providing a more fundamental geometric interpretation.

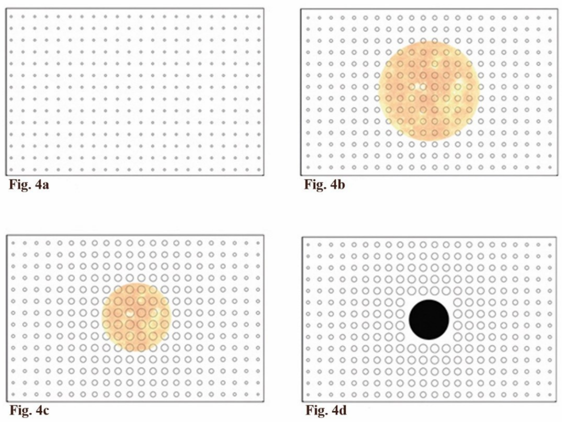

FIG. 4. Local Evolution of *Djamilars* Around a Stellar Collapse
Fig. 4a - Massless space. *Djamilars* are uniformly distributed with a constant mean radius. No gravitational effect induces local variation.
Fig. 4b - Initial stage of massive start collapse. Mass concentrates in a progressively smaller radius. Nearby *Djamilars* significantly enlarge their aperture radius r_d.
Fig. 4c - Approaching critical threshold. Collapse continues, bringing *Djamilars*' radius r_d close to the critical value without fusion occuring yet. The structure remains stable but highly stressed.
Fig. 4d - Central fusion of *Djamilars*. When r_d reaches the critical value, central *Djamilars* fuse. Gravitational transmission stops, forming a black hole.

H. Conclusion of Part 3: Gravity as an Emergent Phenomenon from a Filtering Structure

Through this analysis, the *Djamilars* model proposes a complete reformulation of the perceived gravitational origin in our universe. Instead of being a fundamental field generated by mass, gravity is now viewed as resulting from partial filtration of a fundamental *multiversal force* F_m through a fixed network of microscopic apertures in space-time fabric—the *Djamilars*.

The outcomes of this section lay solid foundations for this framework:

- *Djamilars*' surface density n_d, calculated from terrestrial data, is interpreted as a universal constant linked to the multiverse's trans-universal structure.
- The mean aperture radius r_d is an adaptive variable enabling local space-time regions to regulate the transmission of F_m, thus adjusting gravitational intensity.
- Classical gravity ($g = \frac{GM}{R^2}$) is recovered as a formal limit, with the gravitational constant now defined by the local geometric filtering structure.
- The filtration coefficient $C_d = \pi \cdot r_d^2 \cdot n_d$ becomes the true physical quantity measuring local capability to transmit the *multiversal force*.
- Finally, black hole formation is no longer viewed merely as mass accumulation but as geometric saturation of the *Djamilars* network, where filtering becomes total, causing local space-time to cease functioning as a differential support.

This model thus offers a profound geometric interpretation of gravitational phenomena, maintaining consistency with classical and relativistic observations, and opens a conceptual path towards unifying gravity, wave-particle duality, and multiversal structures.

The subsequent part will develop the mathematical generalization of the gravitational constant G_{local} on a cosmological scale, accounting for the variability of r_d and the dynamic implications of the model.

III. MATHEMATICAL MODELING OF G_{local}

A. General Formulation of g and in Terms of *Djamilars*

The local gravitational field g results from modulation of the multiversal force F_m by *Djamilars*, described by:

$$g = F_m \cdot \pi \cdot r_d^2 \cdot n_d$$

The local gravitational constant G_{local} is then related to g by:

$$G_{local} = \frac{g \cdot R^2}{M}$$

Substituting g into this equation, we have:

$$G_{local} = \frac{F_m \cdot \pi \cdot r_d^2 \cdot n_d \cdot R^2}{M}$$

This demonstrates that G_{local} depends explicitly on the local distribution of *Djamilars*, their radius, and the celestial body's structure under consideration [2].

B. Determination of C_{dE} for Earth

Instead of arbitrarily setting r_{dE}, we determine experimentally the product $(\pi \cdot r_d^2 \cdot n_d)$, denoted C_{dE}, by exploiting the relationship betweeng_E and F_m.

We use the relation:

$$C_{dE} = \pi \cdot r_{dE}^2 \cdot n_{dE} = \frac{g_E}{F_m}$$

With:

- $g_E = 9.81$ m.s^{-2} (gravitational acceleration on Earth) [3],
- $F_m = 2.9979 \times 10^8$ m.s^{-2} [4],
- r_{dE} is the radius of the *Djamilars* on Earth,
- n_{dE} is their surface density on Earth.

We obtain:

$$C_{dE} = \frac{9.81}{2.99792 \times 10^8}$$
$$C_{dE} = 3.2722 \times 10^{-8}$$

C. Calculation of G_{localE}, the Gravitational Constant on Earth

We now use C_{dE} to recalculate G_E:

$$G_{localE} = \frac{F_m C_{dE} R_E^2}{M_E}$$

With:

- $R_E = 6.3711 \times 10^6$ m (Earth's radius) [5],
- $M_E = 5.966 \times 10^{24}$ kg (Earth's mass) [6].

Substituting the values:

$$G_{localE} = \frac{(2.9979 \times 10^8) \times (3.2722 \times 10^{-8}) \times (-6.3711 \times 10^6)^2}{5.966 \times 10^{24}}$$

After calculation:

$$G_{localE} = 6.6742 \times 10^{-11} \text{ m}^3\text{kg}^{-1}s^{-2}$$

This precisely matches the known experimental value of G, thus validating our approach [7].

D. Dimensional Verification

We verify that the units for G_{local} are consistent:
$G_{local} = (N \cdot \text{kg}^{-1} \times \text{m}^2 \times \text{dimensionless})/\text{kg}$
Since 1 $N = 1$ kg $\cdot$ m $\cdot$ s^{-2}, we have:
$G_{local} = (\text{kg} \cdot \text{m} \cdot \text{s}^{-2} \cdot \text{kg}^{-1} \cdot \text{m}^2)/\text{kg} = \text{m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}$
Therefore, units are consistent, validating our formulation [8].

E. Section Conclusion

1. The gravitational field g is the result of filtration of the *multiversal force* F_m by the *Djamilars.*
2. G_{local} is derived from g and depends directly on local space-time structure
3. We have experimentally determined C_{dE}, enabling a fully derived calculation of G_{local} without external assumptions.
4. Calculations accurately reproduce the experimental value of G, validating the model.
5. Local variations of G_{local} provide an alternative to classical dark matter and dark energy hypotheses by explaining observed gravitational anomalies [9].

IV. COMPARISON WITH EXISTING THEORIES

A. Comparison with Newtonian Gravity

Newton's law of universal gravitation is given by:

$$F = G\frac{m_1 m_2}{r^2} \tag{18}$$

where G is assumed to be a universal constant. In our model, G depends locally on the *Djamilars*' characteristics within space-time and can therefore vary.

- Case Where Our Model Reproduces Newton

If the distribution and aperture of *Djamilars* remain constant within a given region:

$$G_{local} = \frac{F_m \cdot \pi \cdot r_d^2 \cdot n_d \cdot R^2}{M} = \text{constant}$$

In this scenario, our formulation coincides exactly with Newton's law.

- Case Where Our Model Differs from Newton

If $(r_d^2 \cdot n_d)$ varies spatially or temporally, then:

$$G(x,t) = \frac{F_m \cdot \pi \cdot r_d^2(x,t) \cdot n_d(x,t) \cdot R^2}{M} \tag{19}$$

Thus, gravitational force becomes a function of space and time, allowing potentially offering an explanation for certain cosmological anomalies that Newtonian gravity alone cannot fully account.

B. Comparison with Einstein's General Relativity

In general relativity, gravity is interpreted as a curvature of space-time induced by mass-energy distribution. Einstein's fundamental equation is:

$$R_{\mu v} - \frac{1}{2} R g_{\mu v} = \frac{8\pi G}{c^4} T_{\mu v} \tag{20}$$

where G is considered constant.

Convergence with General Relativity: If G_{local} remains constant within a region, our model reproduces classical general relativity predictions.

Major Differences:

In our model, G_{local} can vary according to *Djamilars*' distribution and aperture. Approaching high gravitational density zones, such as black holes, could alter G_{local}, impacting:

Schwarzschild Radius:

$$R_s = \frac{2G_x(M)}{c^2} \tag{21}$$

- If G_{local} varies locally, the radius of a black hole might differ from classical predictions.
- Gravitational Waves: If G_{local} evolves within gravitational waves, propagation speeds could slightly differ under certain conditions.

Such differences could be detected through detailed observations of black holes and gravitational waves.

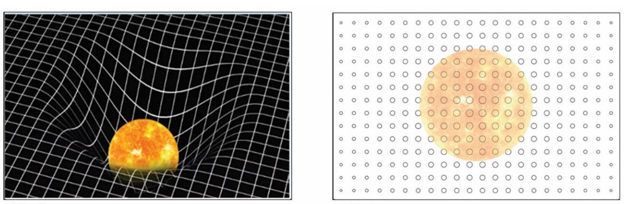

Fig. 5a Fig. 5b

FIG. 5. Comparing Gravitational Effects: general Relativity vs. *Djamilars* Model
Fig. 5a - General Relativity: Space-time Curvature
In general relativity, mass induces curvature of the space-time fabric, altering trajectories of nearby objects and light rays. Gravity is thus perceived as a purely geometric effect.
Fig. 4b - *Djamilars* Model: Geometric Adaptation of Aperture Radius.
In the *Djamilars* model, gravity arises not from curvature, but from local variations in *Djamilars*' aperture radius. These microscopic structures filter a fundamental *multiversal force*. Near a mass, *Djamilars*' aperture radius increases, intensifying local gravity without altering the global topology of space.

C. Comparison with *MOND* (Modified Newtonian Dynamics)

MOND modifies Newton's gravity law to explain galactic rotation anomalies, proposing:

$$F = \frac{ma}{\mu(a/a_0)} \tag{22}$$

where $\mu(a/a_0)$ is an empirically adjusted function.

Key Difference from Our Mode:

- *MOND* is an ad hoc adjustment to match observations without fundamental physical justification.
- Our model naturally explains gravitational variations at large scales through the *Djamilars*' aperture-density coupling, predicting variations in G_{local} without arbitrary corrections.

Testable Consequence:

While *MOND* imposes specific corrections to Newton's law, our model predicts independently measurable variations of G_{local} without *MOND*'s assumptions.

D. Novel Astrophysical Predictions

Our model offers several novel testable predictions:

Black Holes and Schwarzschild Radius Modification

If G_{local} varies locally in extreme environments such as black holes, then:

$$R_s = \frac{2G_x(M)}{c^2} \tag{23}$$

The event horizon radius might differ from general relativity's prediction. Precise observations of black hole shadows, such as those by the Event Horizon Telescope (EHT), could test this hypothesis.

Effects on Gravitational Lensing

Gravitational lensing is directly due to space-time curvature caused by gravity. If G_{local} varies with *Djamilars*' distribution, the deflection angle of light rays may differ from general relativity predictions, allowing direct experimental testing.

$$\theta = \frac{4G_{local}M}{c^2 R} \tag{24}$$

V. EXPERIMENTAL VALIDATION AND OBSERVATIONAL CONSEQUENCES

A. A Geometrically Filtered Universe: Predictive Framework

The structural formulation of gravitational filtration by *Djamilars* has been fully established in Sections 2 and 3. We now revisit the model's predictive power across various scales, focusing on its testable observational consequences.

A graphical representation of this predictive mechanism is presented in Figure 4, illustrating how variations in *Djamilars*' aperture radius across different regions of the universe can induce measurable changes in the gravitational field.

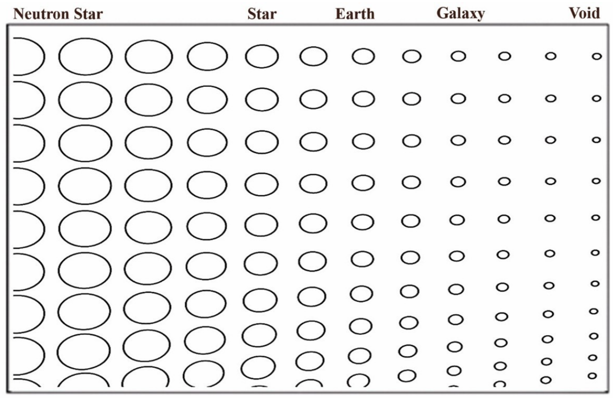

FIG. 6. Structural Adaptation of the *Djamilars*' Aperture Gravitational Environments
This diagram illustrates the progressive decrease in aperture size r_d of *Djamilars* across different astrophysical environments, from left to right: neutron star, stellar object, Earth, galaxy cluster, and intergalactic void. While the surface density n_d remains constant, the aperture radius adapts to local mass-energy density. Denser regions exhibit wider apertures, allowing greater filtration of the fundamental multiversal flux F_m, and thus generating stronger local gravitational fields. In contrast, in low-density regions, the *Djamilars* remain nearly closed, leading to a vanishingly small coupling and negligible gravity.

B. Observable Domains and Testable Deviations

The model predicts distinct observational consequences across several domains:

- Galactic rotation curves without dark matter: due to enhanced filtration (larger r_d) in dense baryonic environments increased permeability.
- Hubble constant tension interpreted as resistance variation due to *Djamilar* geometry in early vs. current universe.
- Gravitational waves propagation: amplitude and delay modulation by filtering structure.
- Quantum-to-classical transition: explained by crossing the structural threshold $r_d = 25$ nm.

C. Experimental Framework

Each of the following observables constitutes a falsifiable test of the model:

Domain	**Observable**	**Structural Driver**	**Standard View vs. *Djamilars* Model**
Galactic scales	Rotation curves	Increasing aperture radius r_d	Dark matter vs. flux filtration
Cluster lensing	Light deflection	Variation in coupling coefficient C_d	Invisible mass vs. geometric coupling
Cosmology	Hubble tension H_o	Density-dependent aperture radius r_d	Dark energy vs. structural resistance
Laboratory	Local variation in g	Geometric modulation	Constant G vs. filtered flux
Quantum domain	Loss of interference	Threshold $r_d \approx 50$ nm	Wavefunction collapse vs. structural isolation

TABLE I. Observable Signatures of the *Djamilars* Model.

D. Galactic Scale Application: Rotation Velocities

1. Methodology

The first experimental application of the model concerns galactic rotation velocities. Classical frameworks (Newtonian gravity or general relativity) predict lower velocities at large distances from galactic centers than observed, leading to the dark matter hypothesis.

In the *Djamilars*model, this anomaly receives a purely geometric explanation. Gravitational interaction is not transmitted uniformly, but filtered locally through the *Djamilar* network. While the spatial density n_d of *Djamilars* remains fixed, the aperture radius r_d adapts to the local mass-energy environment.

In the outer regions of galaxies, the network presents wider apertures, resulting in a higher coupling coefficient C_d and thus an increased local gravitational constant G_{local}. This enhances gravitational acceleration without requiring any additional matter. The observed high rotation velocities can therefore be explained by a structural modulation of flux filtration, not by hidden mass.

The validation equations used are:

$$g = \frac{V_{obs}^2}{R} \tag{25}$$

$$C_d = \frac{g}{F_m} \tag{26}$$

$$G_{local} = \frac{F_m \cdot C_d \cdot R^2}{M} \tag{27}$$

Where:

- V_{obs}: observed rotation velocity at distance R,
- M: visible baryonic mass of the galaxy,
- F_m: the *multiversal force* (constant),
- C_d: gravitational filtering coefficient,

The protocol consists of:

- Using observed data (V_{obs}, R, $M_{baryonic}$).
- Calculating C_d from observed velocities.
- Deriving G_{local}.
- Checking if observed velocities can be reproduced from visible mass alone using this G_{local}.

This method assesses the model's ability to faithfully reproduce observed velocities without invoking dark matter.

E. Case Study: NGC 3198 and NGC 2403

Detailed Example: Calculation for Galaxy NGC 2403
Input data:

- $R = 10 \text{ kpc} = 3.086 \times 10^{20}$ m
- $F_m = 2.99792 \times 10^8$ m.s^{-2}
- $M_{baryonic} = 2.0 \times 10^{40}$ kg
- $V_{obs} = 130$ km/s

These parameters test the *Djamilars* theory's consistency with observed galactic rotation velocities.

Calculating gravitational acceleration $g_{NGC2403}$:

$$g_{NGC2403} = \frac{(130 \times 10^3)^2}{10 \times 3.086 \times 10^{19}} \approx 5.47 \times 10^{-11} \text{ m.s}^{-2}$$

Calculation of C_d(NGC2403):

$$C_d(\text{NGC2403}) = \frac{g_{NGC2403}}{F_m} = \frac{5.47 \times 10^{-11}}{2.99792 \times 10^8} \approx 1.83 \times 10^{-19}$$

Calculation of G_{local}:

$$\begin{aligned} G_{NGC2403} &= \frac{F_m \cdot C_d(\text{NGC2403}) \cdot R^2_{\text{NGC2403}}}{M_{\text{NGC2403}}} \\ &= \frac{2.99792 \times 10^8 \cdot 1.83 \times 10^{-19} \cdot (10 \cdot 3.086 \times 10^{19})^2}{2.0 \times 10^{40}} \\ &\approx 14.96 \times 10^{-11} \text{ m}^3\text{kg}^{-1}\text{s}^{-2} \end{aligned}$$

Calculation of $V_{\text{NGC 2403}}$:

$$V^2_{\text{NGC 2403}} = \frac{14.96 \times 10^{-11} \cdot 2.0 \times 10^{40}}{10 \cdot 3.086 \times 10^{19}}$$

$$\Rightarrow V_{\text{NGC 2403}} \approx 130 \text{ km/s}$$

Thus, the *Djamilars* model reproduces observed velocities accurately, using only visible baryonic mass without requiring dark matter.

Galaxie	M **(kg)**	R **(m)**	V_{obs} **(km/s)**	$V_{relatif}$ **(km/s)**	$V_{Djamilars}$ **(km/s)**
NGC 3198	4.5×10^{40}	4.63×10^{20}	150	38.7	150
NGC 2403	2.0×10^{40}	3.09×10^{20}	130	34.7	130

TABLE II. Galactic Rotation Velocity Results: Observed Data, *Djamilars* Model Predictions, and General Relativity Comparison

1. *Analysis of Results*

The application of the *Djamilars* model to galaxies NGC 3198 and NGC 2403 confirms its ability to accurately reproduce observed rotation velocities using only visible baryonic matter. This stands in stark contrast to classical relativity, which consistently underestimates peripheral velocities and fails to explain the persistence of velocity plateaus without invoking dark matter.

In the *Djamilars* framework, this discrepancy is resolved through geometric filtration of the gravitational interaction. The fixed density n_d defines the universal

Galaxie	r **(kpc)**	V_{obs} **(km/s)**	V_{calc} **(km/s)**	$g(r)$ **(km/s^2)**	C_d
NGC 3198	15	155	155.01	5.19×10^{-11}	1.73×10^{-19}
NGC 2403	10	135	134.98	5.91×10^{-11}	1.97×10^{-19}
NGC 5055	20	185	185.02	5.55×10^{-11}	1.85×10^{-19}
NGC 7331	25	230	229.99	6.86×10^{-11}	2.29×10^{-19}
DDO 154	5	55	55.02	1.96×10^{-11}	6.53×10^{-20}
IC 2574	7	65	64.99	1.96×10^{-11}	6.52×10^{-20}
NGC 3621	12	145	144.98	5.68×10^{-11}	1.89×10^{-19}

TABLE III. Calculated C_d and G values for Different Galaxies

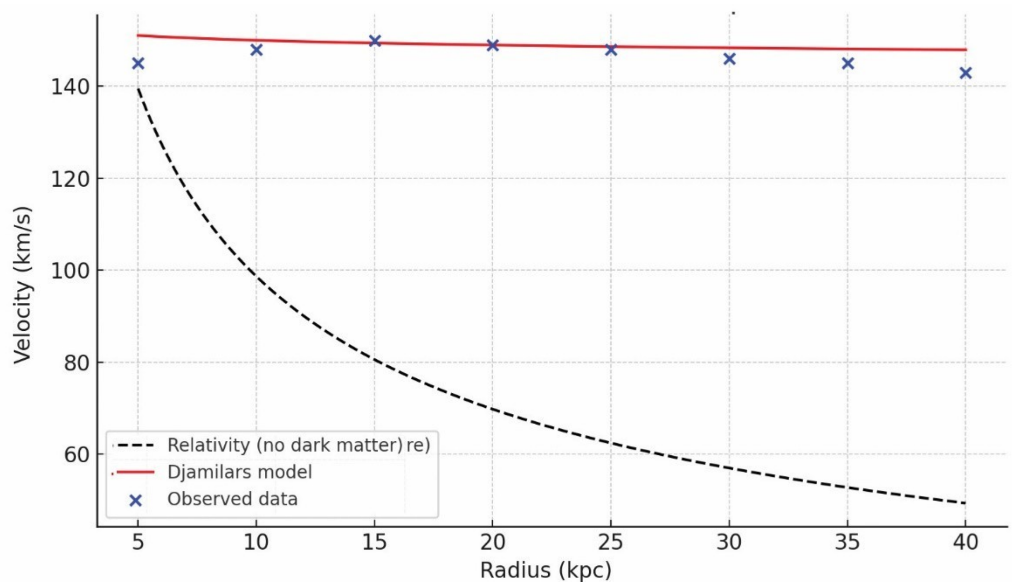

FIG. 7. Comparison of *Djamilars* model predictions and observational data for rotation curves of NGC 2403 and 3198
The *Djamilars* model prediction (red curve) matching obvservations (blue points) without dark matter.
The classical relativistic model (dashed black curve) rapidly declining and failing to match observations.

mesh, while the aperture radius r_d varies locally with baryonic density. This modulates the coupling coefficient C_d, leading to a locally enhanced gravitational constant G_{local}, even in the absence of additional mass.

Crucially, the functional behavior predicted by the model—particularly the slow decline following the plateau—aligns closely with astrophysical observations, without requiring arbitrary adjustments or hypothetical matter distributions. Unlike alternative frameworks that rely on postulated dark matter halos, the *Djamilars* model generates galactic dynamics as a direct consequence of spatial structure.

This approach simultaneously explains:

- the absolute values of observed rotation velocities,
- and their asymptotic behavior (a broad, slowly declining plateau), without appealing to exotic particles or invisible fluids.

These results represent a dynamic validation of the model at galactic scale. We now turn to its application in two other major cosmological phenomena: gravitational lensing and the Hubble tension.

F. Angular Deflection and Gravitational Lensing Effect

1. *Classical Prediction in General Relativity*

Gravitational lensing is one of the most direct observational signatures of gravitational interaction. According to general relativity, light passing near a massive object is deflected by a predictable angle:

$$\theta_{rel} = \frac{4GM}{c^2 R}$$

This formula has been historically validated, such as during the 1919 solar eclipse, where the deflection of starlight near the Sun confirmed Einstein's predictions. However, when applied to massive structures such as galaxy clusters, this formulation significantly underestimates the observed deflection angles if one considers only visible (baryonic) mass.

Case Study – Abell 1689:

Let us consider the well-documented cluster Abell 1689:

- Baryonic mass: $M \approx 6 \times 10^{44}$ kg

- $R \approx 1.0 \times 10^{22}$ m
- $\theta = 1.45 \times 10^{-4}\ rad$

Plugging into the classical equation:

$$\theta_{rel} = \frac{4 \cdot 6.674 \times 10^{-11} \cdot 6 \times 10^{44}}{(3 \times 10^8)^2 \cdot 10^{20}} \approx 4.4 \times 10^{-5}\ rad$$

This predicted deflection is about three times smaller than observed. To reconcile this discrepancy, general relativity resorts to the introduction of non-baryonic dark matter, increasing M artificially:

$$M_{effective} \approx 3 \times M_{baryonic}$$

This approach, although functional, relies on hypothetical matter that has never been directly detected.

2. *Adaptation in the Djamilars Model*

In the *Djamilars* model, gravity is no longer governed by a universal constant G, but by a local interaction governed by the *multiversal force* F_m, filtered through a discrete and structured space-time fabric composed of *Djamilars*. This framework leads to the emergence of a local gravitational constant G_{local}, which varies depending on the geometric properties of the region considered.

The relation becomes:

$$G_{local} = \frac{F_m \cdot C_d \cdot R^2}{M}$$

Replacing G by G_{local} in the deflection formula gives:

$$\theta_{obs} = \frac{4 \cdot G_{local} \cdot M}{c^2 R} = \frac{4 \cdot F_m \cdot C_d \cdot R}{c^2}$$

This formulation shows that the deflection angle depends on the local geometric filtration rather than on an intrinsic universal constant. Hence, regions with identical baryonic mass can exhibit different gravitational strengths due to variations in C_d, without invoking any additional mass.

This reinterpretation allows the model to reproduce large deflection angles using only visible mass, provided that the local gravitational field g is enhanced by geometric filtration:

$$g = F_m \cdot C_d$$

The observed discrepancy is therefore not explained by invisible matter, but by an increased transmission of gravitational influence through the space-time structure.

3. *Reconstruction for Abell 1689*

Using the same observed data for Abell 1689:

- Baryonic mass: $M \approx 6 \times 10^{44}$ kg
- Radius: $R \approx 1.0 \times 10^{22}$ m
- $\theta = 1.45 \times 10^{-4}\ rad$
- Speed of light: $c = 2.99792 \times 10^8$ m.s^{-1}
- Multiversal force: $F_m = 2.99792 \times 10^8$ m.s^{-2}

We reconstruct gravitational parameters step by step.
Step 1 – Compute G_{local} :

$$G_{local} = \frac{\theta \cdot R \cdot c^2}{4M} = \frac{1.45 \times 10^{-4} \cdot 10^{22} \cdot (2.99792 \times 10^8)^2}{4.6 \times 10^{44}} \approx 5.44 \times 10^{-11}\ \mathrm{m^3 kg^{-1} s^{-2}}$$

Step 2 – Compute the filtration coefficient:

$$C_d = \frac{G_{local} \cdot M}{R^2 \cdot F_m} \approx 1.09 \times 10^{-18}$$

Step 3 – Compute the gravitational field:

$$g = C_d \cdot F_m \approx 3.26 \times 10^{-10}\ \mathrm{m.s^{-2}}$$

Comparison with the classical prediction:

$$g_{rel} = \frac{G \cdot M}{R^2} = 4.00 \times 10^{-11}\ \mathrm{m.s^{-2}}$$

Interpretation: While the value of G_{local} remains close to the Newtonian constant, the local gravitational field g is significantly stronger due to filtration. This enhancement explains the observed light deflection without invoking dark matter. The *Djamilars* model thus offers a geometric and falsifiable explanation for strong lensing effects using only baryonic mass and spatial structure.

Model	$G[m^3/kg/s^2]$	$g[m/s^2]$
Relativity	6.674×10^{-11}	4.00×10^{-11}
Djamilars	5.44×10^{-11}	3.26×10^{-10}
Ratio	~ 0.82	$\times 8.15$

TABLE IV. Comparison of Gravitational Acceleration g: Relativity vs. Djamilars Model.

4. *Conclusion*

The analysis of Abell 1689 demonstrates that the *Djamilars* model can reproduce the observed gravitational lensing effects using only baryonic mass, without invoking dark matter. This is achieved through the modulation of the gravitational field by the filtration coefficient C_d, which amplifies the local gravitational intensity

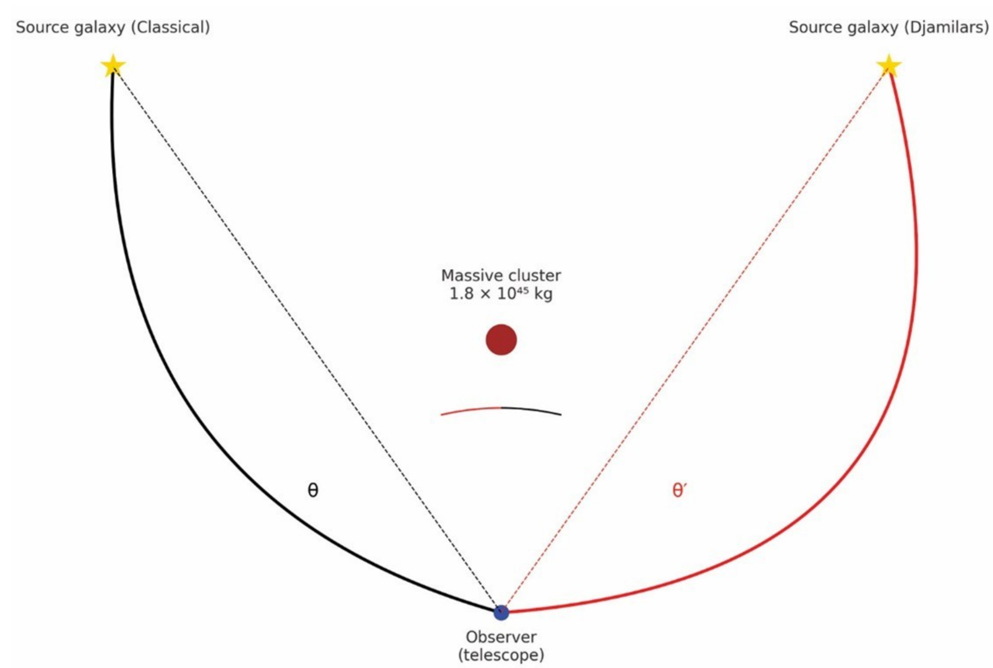

FIG. 8. Comparison of gravitational lensing effects for galaxy cluster Abell 1689 according to two models
Classical Model (left): With only baryonic mass ($\approx 6 \times 10^{44}$ kg), the predicted deflection angle ($\sim 4.4 \times 10^{-5}$ rad) is significantly lower than the observed value ($\sim 1.45 \times 10^{-4}$ rad), requiring the addition of dark matter to match observation.
*Djamilars*Model (right): The enhanced gravitational field g, resulting from the filtration coefficient C_d, naturally explains the full deflection angle using only visible matter. This amplification emerges from the geometric structre of space-time and does not require any additional mass component.

Amas	θ **(arcmin)**	R **(m)**	$g(\theta)$ **[m/s^2]**	C_d (θ)
Abell 2218	0.7254	$7.04e+21$	$1.35e-09$	$4.50e-18$
Abell 370	0.7822	$9.83e+21$	$1.04e-09$	$3.47e-18$
Abell 426	40.4439	$2.74e+22$	$1.93e-08$	$6.44e-17$
NGC 1275	0.2272	$1.55e+20$	$1.92e-08$	$6.40e-17$
ACO 2218	2.0000	$1.88e+22$	$1.39e-09$	$4.64e-18$
ACO 370	25.1198	$8.92e+21$	$3.69e-08$	$1.23e-16$
A370	0.7822	$9.83e+21$	$1.04e-09$	$3.47e-18$

TABLE V. Calculated C_d and G values for Different Clusters.

without modifying the mass itself.

In contrast to general relativity—which underestimates the deflection angle unless additional invisible mass is introduced—the *Djamilars* framework starts from the observed angle and reconstructs a consistent gravitational configuration. From this, it derives a local gravitational field g, the corresponding filtration coefficient C_d, and ultimately the locally adapted gravitational constant G_{local}. The enhanced value of g compensates for the otherwise missing deflection, without adjusting the baryonic content.

This result supports the idea that gravitational anomalies at galactic and extragalactic scales may not originate from hidden matter, but from geometric modulation of gravitational strength. The *Djamilars* model offers a coherent and falsifiable framework, rooted in a discrete space-time structure, that can be tested through further lensing observations and independent astrophysical measurements. This same geometric filtration logic may also offer a novel approach to another major cosmological puzzle: the tension between local and cosmological measurements of the Hubble constant H_0.

G. Tension on the Hubble Constant H_0

1. *Context of the Problem*

The Hubble constant H_0 represents the current expansion rate of the universe. Two independent measurement methods yield different results:

- Local measurements (via Type Ia supernovae or

Cepheids):

$$H_0^{local} \approx 74 \text{ km} \cdot \text{s}^{-1} \cdot \text{Mpc}^{-1}$$

- Indirect cosmological measurements (from Cosmic Microwave Background fluctuations):

$$H_0^{CMB} \approx 67 \text{ km} \cdot \text{s}^{-1} \cdot \text{Mpc}^{-1}$$

This discrepancy, exceeding 5σ, is currently one of cosmology's major issues. The ΛCDM model does not offer a straightforward explanation, motivating consideration of new physical interpretations

2. *Interpretation in the Djamilars Model*

- In the *Djamilars* model, universal expansion is driven by a universal stretching force: the *multiversal force* F_m, constant throughout space and time. This force acts uniformly upon the entire space-time fabric.

However, the reaction of space-time to this force depends on local resistance, directly linked to *Djamilars*' aperture. *Djamilars* control the local transmission of F_m:

- High matter density → *Djamilars* open wider to compensate → lower resistance → accelerated expansion.
- Low density → *Djamilars* remain more closed → higher resistance → slower expansion.

The *Djamilars* model interprets H_0 tension as a geometric consequence of initial *Djamilars* opening without altering fundamental physics

4. *Falsifiable Prediction*

This model clearly predicts:

- In regions emptier than the early universe (deep cosmological voids), resistance would be even higher, and local H_0 values could be below 67 km $\cdot$ $\text{s}^{-1} \cdot \text{Mpc}^{-1}$.
- In regions denser than our local environment (massive superclusters), measured H_0 values should exceed 74 km $\cdot \text{s}^{-1} \cdot \text{Mpc}^{-1}$ if measurement methods are sensitive to local dynamics.

Thus, the locally measured Hubble constant depends on variable resistance.

3. *Numerical Application*

Consider two regions of the universe:

- Zone 1 (early universe, homogeneous): lower density, higher resistance.
- Zone 2 (local, structured universe): higher density, lower resistance.

Assume expansion force F_m is constant, but observed expansion speed differs due to resistance.

Let R be the effective resistance of space-time fabric, and $a(t)$ the universe's scale factor. By mechanical analogy:

$$\ddot{a} \propto \frac{F_m}{R} \Rightarrow H_0 = \frac{\ddot{a}}{a} \propto \sqrt{\frac{F_m}{R}} \tag{28}$$

Hence:

$$\frac{H_0^{local}}{H_0^{CMB}} = \sqrt{\frac{R_{CMB}}{R_{local}}}$$

Using observed values:

$$\frac{73}{67} \approx 1.09 \Rightarrow \frac{R_{CMB}}{R_{local}} \approx (1.09)^2 \approx 1.19$$

This implies the early universe's space-time offered approximately 19% greater resistance to stretching than the current local galactic environment. This difference suffices to explain H_0 tension without invoking additional matter or real dynamic changes.

These regional variations in H_0 directly result from the geometric structure of space-time fabric and constitute a testable signature of the *Djamilars* model.

VI. EXPERIMENTAL VALIDATION PROGRAM

A. General Testing Strategy

The filtration-based origin of gravity is fully developed in Sections 2 and 3. Here, we focus on the resulting testable predictions across multiple physical scales, which allow the model to be experimentally challenged through both astrophysical observations and precision laboratory measurements.

A direct consequence of this mechanism is a series of

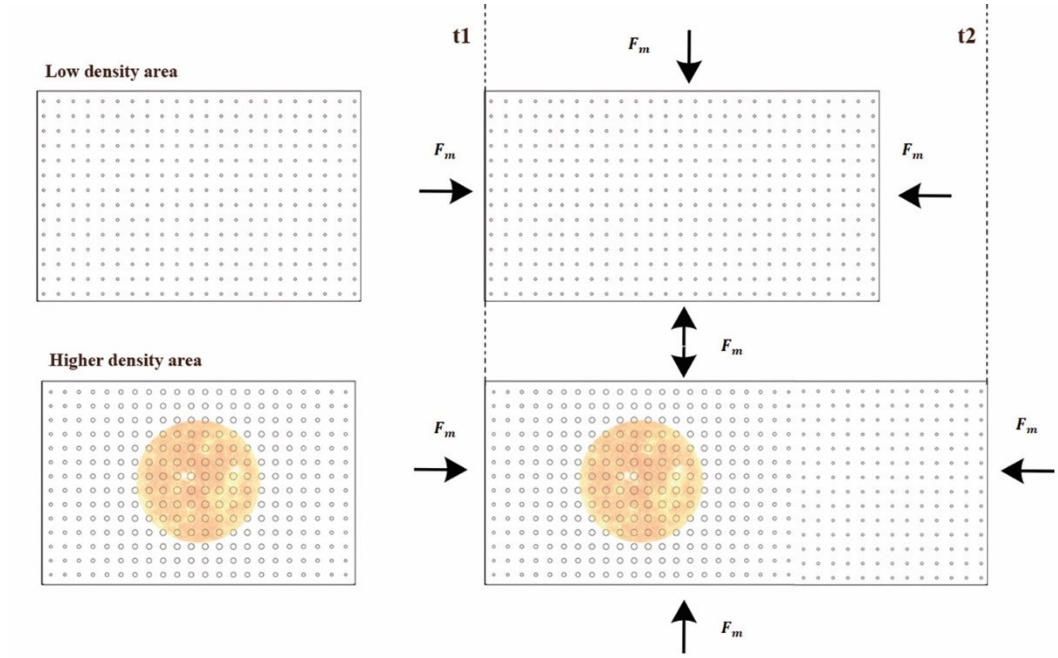

FIG. 9. Influence of *Djamilars*' Aperture on Measured Values of H_0
This schematic illustrates the expansion of two universal regions over the same duration between initial and final times (t_1 and t_2).
Upper line; low-density region, *Djamilars* slightly opened, high resistance slowing expansion → lower H_0 measured (CMB, e.g., Planck data).
Lower lone: high-density region, *Djamilars* more opened initially, lower resistance, faster expansion → higher local H_0 (supernovae measurements).

testable predictions across different scales:

- Galactic scale (rotation velocities),
- Cluster scale (gravitational lensing effects),
- Cosmological scale (Hubble constant),
- Local scale (precision gravimetric experiments, gravitational waves, fine-scale light deflection).

The validation strategy relies on two principles:

- The model's capacity to reproduce observed phenomena without introducing dark matter or ad hoc cosmological constants,
- The possibility of establishing falsifiable tests by identifying specific behaviors (variation of G_{local}, gravitational field profiles, gravitational wave amplitudes) predicted by the model but not anticipated by standard relativity.

The model's validation program thus follows a multi-scale approach, combining theoretical analysis, confrontation with existing data, and proposing targeted future experiments.

Crucially, the fundamental conceptual difference between the *Djamilars* model and classical gravitational theories (Newton, Einstein, MOND) lies explicitly in the introduction of a dynamic geometric mechanism: the locally adaptive radius of *Djamilars*. This local radius variation, dependent on mass-energy and informational densities, represents a true paradigmatic shift, distinctly differentiating the *Djamilars* model from traditional frameworks that assume a continuous and uniform gravitational field.

B. Variation of the Hubble Constant and Cosmological Testing

The *Djamilars* model attributes the Hubble constant tension to geometric filtration effects, as explained in Section 5.6. This section now focuses on how such effects can be tested observationally by correlating local baryonic density with regional measurements of H_0.

We propose the following experimental strategies:

- Measure H_0 in cosmological regions of contrasting density (e.g., voids vs. superclusters).
- Analyze statistical correlations between local baryonic matter density and observed H_0.
- Leverage data from large surveys such as Euclid, DESI, and LSST.

A positive correlation between density and H_0 would support the idea that cosmic expansion is modulated by *Djamilars'* geometry rather than dark energy, providing a falsifiable signature of the model.

Proposed Test Methods:

- Measure H_0 values in cosmological regions with contrasting densities (clusters versus voids).
- Study correlations between H_0 and local baryonic density.
- Leverage future surveys (Euclid, DESI, LSST) to map these variations.

Expected Outcome:

A correlation between local baryonic density and measured H_0 values would reinforce the idea that cosmic expansion is influenced by the geometric structure of the space-time fabric via *Djamilars*. This would represent a testable and falsifiable signature distinct from standard relativistic predictions.

C. Precision Terrestrial Gravity

The *Djamilars* model predicts that the perceived gravitational constant, via the filtration coefficient C_d, depends on local matter density and geometric structure. This dependence could be tested not only cosmologically but also through high-precision terrestrial experiments.

Model Hypothesis:

The coefficient C_d slightly varies with local density, even at terrestrial scales.

This variation might cause measurable fluctuations in gravitational acceleration g in environments with contrasting densities (e.g., mountain vs. deep underground), even with constant mass.

Testing Methods:

- Conduct precision gravimetric experiments (modern Cavendish balances, atomic interferometry) in regions of controlled or varying densities.
- Repeat measurements of g under identical conditions but different geological contexts.
- Analyze existing satellite data (GRACE, GOCE) to identify variations unexplained by classical mass distribution.

Expected Outcome:

If deviations in g are observed where mass distribution is precisely known, such variations could be attributed to local modifications of C_d This would validate the model at terrestrial scales and open paths to experimental laboratory investigations.

Current technologies allow measurement sensitivities as low as 10^{-11}m.s^{-2} using torsion balances, and relative precision below 10^{-9} on g with atomic interferometry. These thresholds make it feasible to detect submillimetric variations in G_{local}, provided the geometric structure of the filtration network varies measurably across the tested volume.

D. Effects on Gravitational Waves

In the *Djamilars* model, space-time fabric is not perfectly homogeneous but structured by a network of filtration points *Djamilars*, affecting gravity transmission. Consequently, gravitational wave propagation could be influenced, in amplitude and velocity, by the local permeability of space.

Model Hypothesis:

- Space-time acts as an anisotropic filtering medium.
- The gravitational permittivity of the fabric depends on C_d, slightly varying in specific universal regions.
- This could introduce slight modifications in gravitational wave propagation.

Possible Consequences:

- Effective wave velocity slightly differing from c in certain configurations.
- Amplitude distortion dependent on traversed medium density.
- Local attenuation or amplification effects, analogous to optical refraction or diffusion.

Testing Methods:

- Compare gravitational signals detected by various observatories (LIGO, VIRGO, KAGRA, LISA) based on their direction of origin.
- Search for subtle temporal shifts or waveform anomalies when passing through dense galactic or intergalactic regions.
- Contrast these measurements against classical models to isolate a geometric filtration signature.

Expected Outcome:

Systematic and reproducible discrepancies in gravitational wave speed or waveform correlated with traversed density would constitute experimental proof of the structural role of *Djamilars* in gravitational dynamics. This would distinctly differentiate the *Djamilars* model from classical general relativity.

E. Small-Scale Light Curvature

The gravitational lensing effect is well-documented at galaxy-cluster scales, frequently used to infer the presence of dark matter. The *Djamilars* model provides an alternative explanation: the angle of light deflection depends not only on visible mass but also on the *gravitational filtration coefficient* C_d, which locally modifies the perceived gravitational field intensity.

Model Hypothesis:

The light deflection angle is expressed as:

$$\theta = \frac{4G_{local}M}{Rc^2}, \quad \text{with} \quad G_{local} = \frac{F_m \cdot C_d \cdot R^2}{M}$$

At constant visible mass, variations in C_d can either amplify or diminish the lensing effect.

Experimental Objective:

Test this prediction at smaller scales, including:

- Light bending around binary star systems,
- Measurable deflection near stellar-mass black holes or neutron stars,
- Measurable deflection near stellar-mass black holes or neutron stars,

Testing Methods:

- Compare measured deflection angles with those predicted by general relativity.
- Correlate observed discrepancies with local density or geometric field configurations (nearby clusters, density gradients).
- Utilize high-precision measurements from the Gaia space telescope or future missions such as Nancy Grace Roman.

Expected Outcome:

If deflection angles are observed that deviate from classical relativity predictions but match expectations based on local variations of C_d, it would provide small-scale experimental evidence supporting *gravitational filtration*. Such a signature would constitute a local experimental validation of the *Djamilars* model.

F. Conclusion of Section 6

The *Djamilars* model relies on a strong hypothesis: gravity is not transmitted continuously but filtered through a discrete and geometric structure embedded in space-time fabric. This filtration, represented by the coefficient C_d, varies locally according to density and medium configuration. Consequently, perceived gravity becomes variable, capable of explaining several major anomalies without resorting to dark matter or a cosmological constant.

These results, already detailed in Sections 5 and 6, converge toward a unified interpretation: gravitational anomalies, cosmological tensions, and quantum transitions are not disparate phenomena, but manifestations of a single geometric mechanism — the local modulation of space-time permeability via *Djamilars*. This internal coherence strengthens the model's falsifiability and confirms its relevance across physical scales.

As a consequence, gravity is no longer interpreted as a fundamental force transmitted by mass-energy alone, but as the emergent result of structured filtration through a discrete spatial geometry.

This invites a conceptual shift away from the traditional notion of space-time as a passive background toward a dynamic, geometrically active structure.

VII. A NEW COMPLETE THEORY OF GRAVITY

A. A Complete Reformulation of Gravity

The complete geometrical formulation of gravity as a filtration process is established in Sections 2 and 3. This section recasts classical gravitational theories in light of this new perspective, showing how Newtonian and Einsteinian frameworks can be reinterpreted through the local modulation of the *multiversal force* by *Djamilars*.

B. Replacing Existing Models

Building upon the theoretical framework presented in Sections 2, 3 and 5, this section focuses on how the *Djamilars* model provides geometric reinterpretations of key cosmological phenomena traditionally attributed to dark matter, dark energy, or exotic modifications of gravity.

C. Replacing Existing Models

Building upon the theoretical framework presented in Sections 2, 3 and 5, this section focuses on how the *Djamilars* model provides geometric reinterpretations of key cosmological phenomena traditionally attributed to dark matter, dark energy, or exotic modifications of gravity.

1. **Dark Matter**: The *Djamilars* model replaces the dark matter hypothesis with a purely geometric mechanism. Rotation curves are reproduced using only visible matter, as detailed in Section 5.4. This is achieved through spatial modulation of the gravitational field via the filtration coefficient C_d, without invoking any hidden mass.
2. **Dark Energy and Cosmic Expansion**: The observed acceleration of the universe is explained by

spatial variations in resistance to the multiversal force F_m, as detailed in Section 5.6. The *Djamilars* model accounts for the Hubble constant tension through a purely geometric mechanism, without invoking dark energy.

3. **Quantum Gravity and Unification**: The *Djamilars* model offers a structural framework that unifies gravitational and quantum phenomena. The fixed geometric threshold r_d, detailed in Sections 3.3 and 7.3, establishes the transition between classical and quantum regimes. This reinterpretation of wave-particle duality and quantum coherence stems from the same filtration mechanism underlying gravity, without requiring additional postulates.

D. *Djamilars* and Quantum Physics: Toward Geometric Unification

The *Djamilars* model has led to a multi-scale experimental program, covering cosmic, astrophysical, and quantum domains.

The specific predictions and corresponding test protocols were presented in Sections 5 and 6.

This section summarizes the overarching validation logic: the model can be tested not only by matching existing data (e.g. rotation curves, gravitational lensing, H_0 tension) but also by designing precise laboratory experiments targeting quantum thresholds and small-scale gravitational deviations.

What distinguishes the *Djamilars* framework is the coherence of its predictions across these domains — all derived from a single geometric principle. This internal consistency strengthens its falsifiability and experimental relevance.

1. *Djamilars' Diameter as a Physical Boundary*

As introduced in Section 3, the local average diameterr_d of *Djamilars* defines a transition scale between two regimes:

- Macroscopic domain: Objects larger than r_d do not interact across universes and follow classical trajectories.
- Quantum domain: Particles smaller than r_d an interact through inter-universal *Djamilars*, producing wave-like behavior and interference patterns.

This structural threshold naturally accounts for:

- Wave-particle duality
- Decoherence and environment-induced trajectory selection
- The disappearance of interference in systems exceeding r_d

2. *Small-Scale Validation Experiments*

Unlike interpretative quantum models, this framework predicts testable geometric signatures, including:

- Modulation of r_d by high-energy fields or confinement environments (e.g., nanostructures, cavities)
- Correlation between local matter configuration and diffraction contrast
- Variation of quantum behavior based on spatial geometry

These predictions define a quantum experimental program complementary to gravitational validation, aimed at probing the geometric fabric of the vacuum.

E. Experimental and Quantum Validation Strategy

The *Djamilars* model produces a series of original, testable predictions across both cosmological and quantum domains. These predictions emerge directly from the geometric filtration mechanism proposed as the foundation of gravity and quantum behavior. To evaluate its scientific validity, the model must be confronted with both observational data and laboratory-scale experiments.

This section is divided into two parts:

- The first focuses on astrophysical and cosmological phenomena, such as galactic rotation curves, gravitational lensing, and the Hubble constant tension.
- The second addresses laboratory-scale quantum effects, including wave-particle transitions, decoherence mechanisms, and potential variations of gravity in high-precision experimental settings.

Together, these validation pathways form a falsifiable and comprehensive experimental framework that can distinguish the *Djamilars* model from standard gravitational and quantum theories.

1. *Cosmological and Astrophysical Tests*

At large scales, the model replicates and reinterprets several key phenomena:

- Galactic rotation curves without dark matter halos, using only visible mass and the modulation effect of C_d
- Gravitational lensing effects explained through spatially variable filtration, consistent with observed light deflection
- H_0 tension, resolved geometrically via local variations in resistance, without invoking evolving dark energy

These effects can be tested using existing data (e.g., galaxy surveys, lensing maps, cosmic background measurements), without needing speculative particles or modified dynamics.

Proposed Experiment	**Djamilars Model Prediction**	**Standard Theory Prediction**
Atomic Interferometry	Local variations in g depending on $r(x)$	g considered locally constant
Gravitational Wave Observation	Possible phase modulation or arrenuation	Pure signal, unaffected
Light Deflection (Near Systems)	Angle depends on local C_d	Fixed by General Relativity
Correlation H_0/Baryonix Density	H_0 depends on local geometric structure	H_0 is universal; deviations seen as systematics

TABLE VI. below outlines several key experimental tests, structured by type, highlighting where the *Djamilars* model and standard theories diverge in their predictions.

2. Laboratory-Scale and Quantum Validation

At small scales, the model predicts observable deviations from standard quantum or gravitational behavior in structured environments:

- Threshold effects based on the fixed diameter r_d, observable in interference experiments using large molecules or nanoscale systems
- Geometric dependence of quantum coherence and decoherence
- Anisotropic gravitational response in high-precision lab setups, if *Djamilars* interact with nearby massive configurations

Such predictions can be explored through matter-wave interferometry, nanostructure confinement, or gravitational resonators sensitive to small-scale anomalies.

These observations form the basis for a progressive experimental program, linking cosmological data with quantum-scale measurements. They pave the way toward empirical validation of a unified, geometry-based physical framework.

F. Final Summary and Outlook

The *Djamilars* model offers a radical rethinking of gravity and quantum phenomena, based not on speculative particles or forces, but on the intrinsic geometric structure of space-time. By introducing a filtration mechanism through discrete entities embedded in space-time — the *Djamilars* — the model provides coherent, falsifiable explanations for a wide range of phenomena: from galactic rotation curves to gravitational lensing, from the H_0 tension to wave-particle duality.

These results emerge without invoking dark matter, dark energy, or variable constants. They stem from a single structural hypothesis, rigorously developed and expressed through a consistent mathematical formalism.

The predictions of the model open new avenues for experimental investigation, bridging cosmology, quantum mechanics, and high-precision laboratory physics.

If validated, this approach could mark a paradigm shift in our understanding of reality — revealing gravity not as a fundamental interaction, but as an emergent phenomenon shaped by the hidden geometric fabric of the universe.

VIII. CONCLUSIONS AND PERSPECTIVES

A. Summary of Results

The *Djamilars* model provides a unified geometric framework reconciling gravitational and quantum phenomena. Rather than listing again the validated effects presented in Sections 5 to 7, this section summarizes the conceptual leap introduced: replacing fundamental forces with a structural modulation of the vacuum's permeability to a *multiversal force.*

B. Experiments to Validate the Theory

The strength of the *Djamilars* model lies in its ability to generate a coherent and falsifiable experimental program. As detailed in Sections 5 to 7, the model leads to predictions across cosmological, gravitational, and quantum domains.

Rather than duplicating previous descriptions, this section emphasizes the importance of linking these tests as part of a single geometric paradigm. Whether through lensing profiles, variations in gravitational acceleration, or quantum coherence thresholds, each test targets the same core mechanism: the local modulation of space-time permeability by *Djamilars.*

The diversity of testable predictions — all derived from a unified geometric principle — provides a rare opportunity to confront theoretical physics with observations at multiple scales. This cross-scale coherence defines the model's experimental originality.

C. Implications for Modern Physics

If confirmed, the *Djamilars* model would profoundly revise the current foundations of physics.

Major implications include:

- A shift from a constant G to a geometrically modulated gravity
- Removal of the need for dark matter and dark energy, replaced by local filtration effects
- A natural bridge between quantum mechanics and general relativity, without supersymmetry or string theory
- A redefinition of vacuum as an active, structured geometry connected to parallel universes

This invites a new paradigm: space-time is no longer passive, but an active geometric medium whose structure governs gravitational and quantum phenomena.

D. Final Conclusion

The *Djamilars* framework invites a foundational redefinition of gravity — not as a smooth field or a universal coupling, but as an emergent effect rooted in a geometric filtration process. This process, embedded within the discrete architecture of space-time, reshapes our understanding of gravitational interaction, quantum duality, and cosmic dynamics.

What distinguishes this model is not merely its ability to reproduce known data without resorting to hypothetical entities, but its potential to unify phenomena across disparate scales through a single geometric principle.

Rather than extending the assumptions of general relativity or quantum field theory, it proposes an entirely different substrate — one in which the structure of the vacuum, via *Djamilars*, plays the central role.

The next decisive step is experimental: to confront the predictions of this structural model with empirical reality. Whether in high-precision gravimetry, quantum interferometry, or deep-space observations, the tests are within reach. If validated, this framework could offer a profound and falsifiable shift in our conception of the physical world.

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DATA AVAILABILITY

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