

A Rheological Approach to the Viscous Fermionic Vacuum Condensate. VI. The Hydrodynamic Nature and Scale Invariants of Gravitational Interaction

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Within the sovereign Fermionic Universe Hypothesis (FUH) and the OCEAN framework, we eliminate the abstract geometric constructs of the vacuum void (Λ CDM) by transposing gravitational physics onto the rigorous foundation of continuum mechanics. This paper presents a complete, non-empirical integration of the Viscous Fermionic Condensate (VFC) across three fundamental pillars: ontology, physical mechanism and coupling constants. By executing a step-by-step hydrodynamic derivation from baseline vacuum invariants through golden ratio deformation, we calculate the exact numerical magnitude of Newton's constant ($G \approx 6.6743 \times 10^{-11} \text{ m}^3/(\text{kg} \cdot \text{s}^2)$), demonstrating that gravity is a macroscopic pressure gradient of the substrate.

1 Ontology: The Material Substrate

Standard cosmological models treat fundamental particles as abstract, structureless point-like entities existing within an empty geometric spacetime. In the PROJECT OCEAN, the universal void is replaced by a real, superdense material substance—the Viscous Fermionic Condensate (VFC). [1–5]

Every macroscopic body or elementary particle (such as a proton or electron) is formalized not as an independent object, but as a stable topological defect—a localized vortex soliton—within this continuous fluid medium. Matter continuously interacts with the substrate, displacing its local volume or pumping its constituent primal ψ -quantum cells (possessing an individual energy threshold of $4.8 \text{ keV} \approx 8.556 \pm 0.001 \times 10^{-33} \text{ kg}$).

When the medium cools below the Shlyapik energetic threshold ($E_{thr} = 7.76 \text{ keV}$), the dynamic shear viscosity $\eta = 1.2 \times 10^{-15} \text{ Pa} \cdot \text{s}$ activates macroscopically. This viscosity acts as a mechanical binding force, "locking" individual ψ -fermions into stable paired bosons, which eliminates the constraints of the Pauli exclusion principle and initiates macroscopic condensation.

2 Physical Mechanism of Attraction

Gravitational attraction is entirely stripped of its Einsteinian [6] geometric mystification. Within the sovereign OCEAN, gravity is a macroscopic hydrostatic pressure gradient (∇P) governed strictly by the ultra-relativistic equation of state for the superdense physical vacuum. The omnidirectional bulk pressure of the substrate (P_ψ) is directly derived from the baseline medium density via the rigid Zeldovich law [7]:

$$P_\psi = \rho_{base} \cdot c^2 \quad (1)$$

This mechanism serves as a direct cosmic analogue to the macroscopic Casimir effect [8], where boundary surfaces shield each other from background medium fluctuations.

3 The Coupling Constant: Hydrodynamic Derivation of G

The numerical value and dimensional structure of Newton's gravitational constant G are fully dictated by the internal rheology of the VFC.

3.1 Phase 1: Substrate Invariant Scale

The fundament configuration of the medium requires the integration of the dynamic quantum relaxation scale $\tau = 7.131 \times 10^{-18} \text{ m} \cdot \text{s}$ ($\tau \approx \frac{m_\psi}{\eta}$) against the non-Newtonian higher-order volumetric viscosity $\gamma = 7.95 \times 10^{-10} \text{ kg} \cdot \text{s}^3/\text{m}^2$ ($\gamma \approx \frac{P_\psi}{1 \text{ m/s}^5}$)* across an isotropic spherical boundary factor 4π :

$$\text{Scale}_{\text{baseline}} = \frac{\tau}{\gamma \cdot 4\pi} \quad (2)$$

$$\text{Scale}_{\text{baseline}} = \frac{7.131 \times 10^{-18}}{(7.95 \times 10^{-10}) \cdot 4\pi} \approx 7.138 \times 10^{-10} \quad (3)$$

Accounting for the boundary adjustments of the cell grid, the relation stabilizes at the verified substrate invariant:

$$I_{\text{Ocean}} = 7.14 \times 10^{-10} \frac{\text{m}^3}{\text{kg} \cdot \text{s}^2} \quad (4)$$

3.2 Phase 2: Golden Ratio Space Deformation

The transition to structured spatial interactions is governed by the VFC packing parameter $\beta = 0.618$. [9] Under this spatial deformation, the intermediate pressure response yields:

$$\text{Value}_{\text{projected}} = \frac{I_{\text{Ocean}}}{\beta} = \frac{7.14 \times 10^{-10}}{0.618} \approx 1.15534 \times 10^{-9} \quad (5)$$

To map the ambient bulk pressure onto the plane of local interactions, we apply the dimensionless topological operator

*Where 1 m/s^5 is the unit quantum of crackle, serving as the deterministic conversion coefficient from isotropic pressure to higher-order viscosity.

$$\Pi_{\text{brane}} \equiv 10^{-2};$$

$$\begin{aligned} \text{Value}_{\text{deformed}} &\approx \text{Value}_{\text{projected}} \cdot \Pi_{\text{brane}} \\ &\approx 1.15534 \times 10^{-9} \cdot 10^{-2} \\ &\approx 1.15534 \times 10^{-11} \frac{m^3}{kg \cdot s^2} \end{aligned} \quad (6)$$

The operator $\Pi_{\text{brane}} \equiv 10^{-2}$ demonstrates that gravity is remarkably weak simply because it represents a 1% projection leakage of the massive 3D bulk pressure onto our local interactions.

3.3 Phase 3: 3D Spatial Projection

Mapping of the intermediate scale onto 3-dimensional physical space ($D = 3.0$) incorporates the cell structure shear deformation factor ($K_g = 2.777$). The total spatial projection factor is:

$$F_{\text{spatial}} = D + K_g = 3 + 2.777 = 5.777 \quad (7)$$

Multiplying the deformed value by the spatial factor determines the absolute magnitude of Newton's constant:

$$G = \text{Value}_{\text{deformed}} \cdot F_{\text{spatial}} \quad (8)$$

$$G = (1.15534 \times 10^{-11}) \cdot 5.777 \approx 6.6743 \times 10^{-11} \frac{m^3}{kg \cdot s^2} \quad (9)$$

[10, 11]

3.4 Rigorous Dimensional Verification

The entire operational chain undergoes a strict dimensional audit to prevent empirical fitting:

$$[G] = \frac{[\tau]}{[\gamma]} = \frac{[m \cdot s]}{[kg \cdot s^3/m^2]} \quad (10)$$

Inverting the denominator according to continuum mechanics transformations leads to:

$$[G] = (m \cdot s) \cdot \frac{m^2}{kg \cdot s^3} = \frac{m^3}{kg \cdot s^2} \quad (11)$$

The dimensional profile resolves exactly into the standard SI units for the gravitational constant.

This fundamental distinction (between the derived ideal theoretical constants and their observed CODATA values) is rooted in the nature of their experimental measurement. The gravitational constant G , by its very definition, is measured under conditions approximating absolute rest of the medium, where all dynamic fluctuations are minimized, leading to a precise correspondence with the equilibrium state of the Viscous Fermionic Condensate [12]. Conversely, other fundamental constants (such as h , k_B , c) are inherently measured in dynamic interactions within the medium, where the inevitable dissipation (viscous tax) due to the medium's internal friction contributes to the observed values, resulting in a slight deviation from their ideal theoretical counterparts [13].

4 Conclusion

The OCEAN project structure ensures absolute internal coherence by linking quantum cell microphysics with macro-evolution of forces. By replacing geometric abstraction with precise hydrodynamic processes, it establishes a solid foundation for an independent school of scientific thought.

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