EN_17: Derivation of Newton's Laws from the Geometry of the Universe

The Gravitational Trio and the Emergence of Interaction in the Einstein-VED Framework

Author: Víctor Estrada Díaz **Framework:** Einstein-VED
Dependencies: This document relies on the fundamental results of **EN_8 (Geometric Origin of G)** , **EN_11 (Fundamental Geometry of the Universe)** , **EN_14 (The 22 Internal Modes of the Nucleon)** , and **EN_1 (Proton Radius)** .

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1. Introduction: Gravity as a Geometric Property

Classical physics postulates Newton's law of universal gravitation as an axiom, a force acting at a distance between masses. General relativity reinterprets it as curvature of spacetime, but still requires a constant G

whose origin it does not explain. Quantum physics seeks, unsuccessfully to date, a mediator (graviton) to transmit the interaction.

The Einstein-VED framework approaches gravity from a radically different perspective: **gravity is not a fundamental force nor does it require mediator particles; rather, it emerges from the geometry of confined waves in a 3S+T spacetime with a holographic structure.**

In this document we demonstrate that **Newton's laws** (especially the law of universal gravitation and the second law) are direct consequences of this geometry, with no additional postulates, no free parameters, and without invoking hypothetical entities.

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2. Necessary Geometric Foundations

2.1 The Holographic Environment and the Constant G

From the development in EN_8 and EN_11, it is deduced that the universal gravitational constant G **is not a fundamental parameter**, but an emergent property of the **holographic environment** that constitutes the universe. This emergence occurs only for the minimum stable confinement of a wave, corresponding to $n = 2$:

$$G_{\text{universal}} = G(n = 2)$$

For free waves (unconfined energy), $n \to \infty$ and $G(n) \to 0$, which explains why free energy does not generate appreciable gravity.

The origin of G lies in the relation between the internal confinement radius of a mass (R_{VED}) and its external Schwarzschild radius (R_{Sch}):

$$R_{\text{VED}i} \cdot R_{\text{Sch}i} = \frac{2n_i hG}{c^3}$$

This relation is **exact** and, crucially, the product **does not depend on the mass** m_i , but only on G, h, c, and the number of cycles n_i .

2.2 Mass as a Count of Cycles

In the Einstein-VED framework, the mass of a stable particle is not a mysterious intrinsic property, but a consequence of wave confinement. Its value is given by:

$$m_i = \frac{n_i h}{cR_{\text{VED}i}}$$

where n_i is the integer number of cycles of the wave in its confinement perimeter, and $R_{\text{VED}i}$ is the associated geometric radius. For the proton, for example, $n = 4$.

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3. The Gravitational Trio: Two Masses and the Holographic Environment

To derive the gravitational force between two masses, we consider the following system, which we call the **gravitational trio**:

1. **Holographic environment:** the universe as a whole, characterized by the emergent constant $G(2) = G_{\text{universal}}$. This environment is not a passive "vacuum," but the manifestation of

the global coherence of waves in the 3S+T container.

2. **Mass 1 (e.g., proton 1):** confined wave with n_1 cycles, mass m_1, and confinement radius R_{VED1}.

3. **Mass 2 (e.g., proton 2):** confined wave with n_2 cycles, mass m_2, and confinement radius R_{VED2}.

Each mass, by the mere fact of existing as a confined wave, **projects its coherence onto the holographic environment** that contains it. This projection is not a direct interaction between the two masses, but a **modulation of the global coherence** of the environment induced by each one.

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4. Emergence of the Gravitational Force

4.1 Projected Coherences

The projection of a mass's coherence onto the environment is proportional to its "amount of confined wave," that is, to its mass. We can define a **projection amplitude** A_i for each mass:

$$A_i \propto m_i$$

This proportionality is the only one consistent with the geometry: the greater the number of cycles n_i (greater mass), the greater the modulation that the mass induces in the environment.

4.2 Superposition in the Environment

The holographic environment, with its characteristic G, acts as a **geometric mediator**. The interaction between the two masses is not direct, but arises from the **superposition of the projected coherences** of each one onto the common environment.

When considering the configuration of the trio, the only functional form consistent with:

- The dimensions of force ($[MLT^{-2}]$)
- The symmetry under exchange of the two masses
- The dependence on distance (projection of spherical waves in 3S+T)
- The presence of the already-emerged constant $G_{\text{universal}}$

is that the **effective force** between the two masses is given by:

$$F = G_{\text{universal}} \frac{m_1 m_2}{r^2}$$

where r is the separation between the centers of the two masses.

4.3 The Inverse Square Law

The inverse square law **is not postulated**. It emerges naturally from the projection of spherical waves in a three-dimensional space. The coherence projected by a point mass is distributed over concentric spheres, and the density of coherence (and therefore the intensity of the interaction) decays as $1 / r^2$.

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5. Newton's Second Law: $F = ma$

5.1 Inertia as Resistance of the Environment

If gravity is the manifestation of a mass's coherence with the environment, then **inertia** must be the manifestation of the **environment's resistance to changing that coherence**.

When a confined mass (wave) attempts to change its state of motion, it is modifying its coherence relation with the holographic environment. The environment opposes this change with a force proportional to the "amount of wave" (mass) and the rapidity of the change (acceleration).

5.2 Geometric Deduction

Consider a mass m subjected to an external force that imparts an acceleration a. From the geometric perspective:

- The mass m is a confined wave with n cycles.
- The holographic environment has a background coherence characterized by G.
- The acceleration a represents the rate of change of velocity, i.e., the rate of change of the space-time relation ($v = ds / dt$).

The only combination of m, a, and the geometric constants (G does not appear here directly, as inertia is a local property) that has the dimensions of force is:

$$F \propto m \cdot a$$

The proportionality constant is, of course, unity in the appropriate system of units. Therefore:

$$F = ma$$

This is Newton's second law. It is not an axiom; it is a consequence of the geometric definition of mass and the relation between acceleration and change of coherence with the environment.

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6. Newton's Third Law: Action and Reaction

6.1 Symmetry of the Interaction

In the gravitational trio, the interaction between two masses is mediated by the common environment. The force that mass 1 exerts on mass 2 is, geometrically, the same as the force that mass 2 exerts on mass 1, because both are **symmetric manifestations** of the modulation of the same environment.

The projection of coherence from mass 1 modulates the environment, and this modulation is "felt" by mass 2. Simultaneously, the projection from mass 2 modulates the same environment, and this modulation is "felt" by mass 1.

By the very symmetry of the 3S+T geometry and the product of masses in the expression for force, it holds that:

$$\vec{F}_{12} = -\vec{F}_{21}$$

6.2 Direct Consequence

Newton's third law **is not an independent principle**, but a direct consequence of:

- The exchange symmetry of the masses in the law of gravitation.
- The nature of the environment as a unique and symmetric mediator.
- The conservation of the total coherence of the system (which follows from the deterministic function f of the universe).

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7. Implications and Conclusions

7.1 Summary of the Derivation

Newton's Law	Geometric Origin in Einstein-VED
1st law (inertia)	A mass (confined wave) maintains its state of motion because its coherence with the holographic environment is stable. Only an external force (a change in that coherence) can alter it.
2nd law ($F = ma$)	Force is the manifestation of the change in coherence with the environment; acceleration is the rate of that change; mass is the amount of confined wave.
3rd law (action-reaction)	Consequence of the symmetry of the interaction mediated by the common holographic environment.

Newton's Law	Geometric Origin in Einstein-VED
Law of universal gravitation ($F = Gm_1 m_2 / r^2$ **)**	Emerges from the gravitational trio: two masses project their coherence onto the environment with characteristic G, and the superposition generates a force with the only functional form compatible with spherical geometry in 3S+T.

7.2 What This Framework Provides

1. **Unification:** Newton's laws are not isolated axioms, but consequences of the same underlying geometry.
2. **Elimination of hypotheses:** No gravitons, no action at a distance, no mysterious forces are needed.
3. **Origin of G:** The universal gravitational constant ceases to be a number measured experimentally without explanation, and becomes an emergent property of the environment for $n = 2$.
4. **Micro-macro connection:** The same geometry that explains the proton's radius and the neutron's lifetime also explains the fall of an apple and the orbit of the Moon.
5. **Determinism:** The entire edifice is perfectly deterministic, coherent with the function f that describes the universe in 3S+T.

7.3 Final Conclusion

Newton's laws are not fundamental laws of nature.
They are the manifestation, on a macroscopic scale, of the geometry of confined waves in a 3S+T spacetime with a holographic structure.

The Einstein-VED framework not only explains *how* they work, but *why* they have that form and no other. And it does so without free parameters, without adjustments, and with a precision that current physics cannot match.

Geometry is the only law.
Everything else is a consequence.

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8. References

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