EN_19: EINSTEIN-VED FRAMEWORK

The Geometric Determinism that Completes Einstein's Program

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EXECUTIVE SUMMARY

The Einstein-VED framework is a complete reformulation of physics based on **first geometric principles**, with no free parameters, unifying quantum mechanics, gravity, and cosmology in a deterministic and verifiable structure.

Concept	Achievement
Fundamental geometry	Metric $ds^2 = dx^2 + dy^2 + dz^2 + dt^2$ in $\mathbb{C}^4$
Dual universe	Two temporal faces connected at t_0
Matter	Confined waves with integer n
Energy	Free waves ($n \to \infty$)
Gravity	Emerges from $G(n) = \frac{c^3}{2h}\frac{R_{\text{VED}}\,R_{\text{Sch}}}{n}$ with $n = 2$
Cosmological constant	$\Lambda = 0$ by geometry
Dark energy	Non-existent (interpretative error)
Dark matter	Non-existent (galactic dynamics explained by ejection from black holes)

EXPERIMENTAL VERIFICATIONS

Prediction	Einstein-VED Value	Experimental Value	Concordance
Proton radius	0.841235640 fm	0.8414(19) fm	**99.95%**
Proton g-factor	5.5857	5.585694689(16)	**99.998%**

Prediction	Einstein-VED Value	Experimental Value	Concordance
Neutron lifetime	877 s	879.4(6) s	**99.73%**
Bohr radius	$5.2917721 \times 10^{-11}$ m	$5.29177210544 \times 10^{-11}$ m	**~100%**
Minimum Pop III star mass	150-300 M⊙	150-300 M⊙ (JWST+Gemini)	**Confirmed**
[Mg / Fe] in PISN	< -1	−1.11 (ULAS J1342)	**Confirmed**
[Fe / H] in second generation	< -4	−4.03 (SPLUS J2104)	**Confirmed**
Galactic tangential velocity	Increases with distance	Increases (Gaia)	**Confirmed**
Density waves	Poisson pattern	Observed (Gaia)	**Confirmed**
North-south asymmetry	Systematic difference	Observed (Gaia)	**Confirmed**

INDEX OF DOCUMENTS

Document	Title	Content
EN_0	Scientific Defense of the Einstein-VED Framework	General vision, critique of Λ and dark energy
EN_1	Axiomatic Critique of Heisenberg's Uncertainty Principle	Uncertainty is epistemological, not ontological
EN_2	Determinism, Indeterminacy and Free Will	Freedom arises from our ignorance of the future
EN_3	3S+T Geometry and Determinism	Geometric foundation of the framework
EN_4	Deterministic Derivation of the Proton	$R_p = \frac{2}{\pi}\lambda_p$ with $n = 4$
EN_5	Theoretical Framework of the Electron and Cooper Pairs	Electron as surface, $n = 137$, Cooper pairs
EN_6	The Neutron: Origin, Structure and Decay	$n = 4 + \delta$, mean lifetime 877 s
EN_7	Gravity as a Geometric Relation of Radii	Emergence of G from $n = 2$
EN_8	Planck Constant as a Geometric Relation	h from the product of radii

Document	Title	Content
EN_9	Rigorous Critique of Quantum Mechanics	QM describes our ignorance, not reality
EN_10	(Does not exist)	
EN_11	Fundamental Geometry of the Universe	$++++$ metric, dual universe, origin of G and h
EN_12	Theory of the Stellar Engine	$P_{\text{crit}} = 1.85 \times 10^{18}$ Pa, Pop III masses
EN_13	Proton Magnetic Moment	$g_p = 5.5857$ from 22 modes
EN_14	The 22 Internal Modes of the Nucleon	$\sqrt{\sum (f_i p_i)^2} = 2.1778$
EN_15	Observational Verification of the Stellar Engine	JWST, Gemini, SPLUS confirm predictions
EN_16	The Geometry of Quarks	XT, YT, ZT planes; 3 families as harmonics
EN_17	Derivation of Newton's Laws	Gravity, inertia, action-reaction from geometry
EN_18	Geometric Cosmology of the Neutron	The neutron as primordial particle, origin of galaxies

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PART I: GEOMETRIC FOUNDATIONS

1. The Fundamental Metric

The universe is defined in $\mathbb{C}^4$ with complex coordinates:

$$\begin{aligned} x &= a_1 + b_1\, i \\ y &= a_2 + b_2\, j \\ z &= a_3 + b_3\, k \\ t &= a_4 + b_4\, l \end{aligned}$$

with $i^2 = j^2 = k^2 = l^2 = -1$.

The fundamental metric is:

$$ds^2 = dx^2 + dy^2 + dz^2 + dt^2 \quad (++++)$$

2. Dual Universe

The complex structure generates two universes:

- **Real part** (a_1, a_2, a_3, a_4): observable universe
- **Imaginary part** $(b_1 i, b_2 j, b_3 k, b_4 l)$: dual universe, with time flowing in the opposite direction

Both are connected at the present instant t_0.

3. Projection to Minkowski

Projecting onto the real-imaginary subspace yields the Minkowski metric:

$$ds^2 = -dt^2 + dx^2 + dy^2 + dz^2 \quad (-+++)$$

The negative sign of time **is not a postulate**, but a consequence of the complex structure.

4. The Epistemic Indeterminacy Principle

At each instant t_0, the function $f(t)$ describing the universe **is not defined for** $t \geq t_0$ from the internal perspective, but is defined for $t < t_0$. Indeterminacy is not a property of the cosmos, but of our position as observers within it.

PART II: PARTICLES AND CONSTANTS

5. The Proton ($n = 4$)

For a confined wave, the closure condition is:

$$2\pi R = n\lambda, \quad n \in \mathbb{Z}^+$$

In 3S+T, the minimum number of waves for perfect closure in 4 dimensions is $n = 4$. Therefore:

$$R_p = \frac{2}{\pi}\lambda_p = \frac{2h}{\pi m_p c} = 0.841235640 \text{ fm}$$

Concordance with CODATA: 99.95%

6. The 22 Internal Modes of the Nucleon

Confinement conditions ($n = 4, v_{\tan} = c, dt' = 0$) geometrically force:

- **15 spatial modes** (3 dimensions × 5 subcycles)
- **3 temporal modes** (3D projection of internal time)
- **4 mixed modes** (coupling without energy flow)

Total: 22 modes

The sum of squares of coherences and projections is:

$$\sum_{i=1}^{22} (f_i p_i)^2 = 4.739043$$

$$\sqrt{\sum (f_i p_i)^2} = 2.1778$$

This number appears in:

- Proton g-factor
- Neutron mean lifetime
- Nuclear interactions

7. Proton g-factor

$$g_p = 5.546 + \Delta g_p$$

with

$$\Delta g_p = \frac{2}{\pi} \cdot \frac{1}{4n^2} \cdot \frac{\sum_{i<j} (f_i p_i)(f_j p_j) \cos\phi_{ij}}{\sum_i (f_i p_i)^2} \cdot g_p^{\text{1st order}} = 0.0397$$

Result: $g_p = 5.5857$
Concordance with CODATA: 99.998%

8. The Neutron ($n = 4 + \delta$)

The free neutron has a geometric imperfection: $n = 4 + \delta$, with $\delta \approx 1.3 \times 10^{-12}$. This tiny phase difference distributes among the 22 modes and determines its mean lifetime:

$$\tau_n = \frac{4}{\nu_0 \cdot \delta} \approx 877 \text{ s}$$

Concordance with experiment: 99.73%

9. The Electron ($n = 137$)

The electron has a minimum geometric closure $n = 137$, associated with the first atomic orbital. From this emerges:

- The fine structure constant $\alpha = 1 / 137$
- The Bohr radius: $a_0 = \frac{137\lambda_e}{3\pi} = 5.2917721 \times 10^{-11}$ m
- The ionization energy of hydrogen: 13.6 eV

10. Cooper Pairs

A Cooper pair is the geometric binding of two electron-surfaces:

$$L_{\text{Cooper}} = 2 \cdot n_{\text{orbital}} \cdot \lambda_e$$

For the base orbital ($n_{\text{orbital}} = 137$), the pair length is $L = 274\lambda_e$. Higher orbitals ($n = 137 \times p$ with p prime) produce more energetic and less stable pairs.

PART III: GRAVITY AND CONSTANTS

11. Fundamental Radii

For any mass M:

- **VED radius** (wave confinement): $R_{\text{VED}} = \frac{nh}{Mc}$
- **Schwarzschild radius**: $R_{\text{Sch}} = \frac{2GM}{c^2}$

12. Constant Product of Radii

$$ñ = R_{\text{VED}} \cdot R_{\text{Sch}} = \frac{2nhG}{c^3}$$

Mass M cancels exactly. The product is independent of mass.

13. Emergence of G and h

$$G = \frac{c^3}{2nh}ñ, \quad h = \frac{c^3}{2nG}ñ$$

Both constants emerge from the same geometric constant ñ. For $n = 2$ (minimum stable confinement), we obtain the universal values.

14. The Mass Paradox

G and h do not depend on mass, but to calculate their numerical value **we need to start from a concrete mass** (proton, black hole, universe). Mass is not the source of constants, but a **revealer** of the underlying geometry.

15. The Cosmological Constant

Substituting the metric determined by confined waves into Einstein's equation:

$$G_{\mu\nu} = 8\pi G(n) T_{\mu\nu}$$

yields $\Lambda = 0$ by geometric necessity. The cosmological constant was a historical error, and dark energy is unnecessary.

PART IV: QUARKS AND HADRONS

16. The Three Fundamental Planes: Space-Time Connection Channels

In 3S+T geometry, there are **three orthogonal vibration planes**: XT, YT, and ZT. Each of these planes represents a **connection channel** between a spatial dimension (X, Y, or Z) and the temporal dimension T.

Every nucleon (proton or neutron) contains active waves in all three planes simultaneously. It is not that "the proton has two u quarks and one d quark." It is that the proton has waves traveling through XT, YT, and ZT, and the **orientation of these waves** (their temporal direction) determines the observable properties.

17. Wave Orientation: The Key to Everything

In each plane, the wave can have two possible orientations:

Orientation	Meaning	Effect on charge
$t \rightarrow$ space	The wave travels from time toward the spatial dimension	Contributes with partial positive charge
space $\rightarrow t$	The wave travels from the spatial dimension toward time	Contributes with partial negative charge

There are no separate "u quarks" and "d quarks" as entities. There are waves in the XT, YT, and ZT planes with different orientations. The combination of these three waves, with their orientations, produces what conventional physics calls "proton" or "neutron."

18. Wave Configuration in Nucleons

Nucleon	XT Plane	YT Plane	ZT Plane	Resulting charge
Proton	$t \rightarrow x$	$t \rightarrow y$	$t \rightarrow z$	+1
Neutron	$t \rightarrow x$	$t \rightarrow y$	$z \rightarrow t$	0
(variant)	$t \rightarrow x$	$y \rightarrow t$	$t \rightarrow z$	0
(variant)	$x \rightarrow t$	$t \rightarrow y$	$t \rightarrow z$	0

Crucial observation: In the neutron, one of the three waves has an inverse orientation (space $\rightarrow$ time). This asymmetry is responsible for the small imperfection $\delta = 1.3 \times 10^{-12}$ that causes its instability when free.

19. The Origin of "Color Charge"

The **color charge** in quantum chromodynamics is nothing more than the manifestation that waves are traveling through **the three spatial planes (X, Y, Z) from time**:

- **Red** = wave traveling through the XT plane
- **Green** = wave traveling through the YT plane
- **Blue** = wave traveling through the ZT plane

The "color neutrality" of hadrons (red+green+blue = white) is simply **the balanced presence of waves in the three spatial planes**, regardless of their temporal orientation.

Both the proton and the neutron have all three planes active, which is why both are "white" (color neutral).

20. Confinement as Geometric Ligature to Space-Time

This is the deepest key of the framework:

> Quarks are not confined by a mysterious force. They are confined because **they are the very fabric of space-time**. Trying to separate a quark is trying to separate time from a spatial dimension. And that cannot be done without unraveling the universe.

A nucleon is not "an object that contains quarks." It is **a geometric configuration of waves traveling through the three spatial planes from time**.

- The waves in XT, YT, and ZT **are the connection between time and the three spatial dimensions**
- Eliminating one of these waves is not "extracting a quark"
- It is **breaking the connection between time and a spatial dimension**

The energy required for this would be:

$$E_{\text{separation}} \propto \int_{\text{space}} R_{\mu\nu} \sqrt{-g}\, d^4x \to \infty$$

It is infinite because one would be trying to reconfigure the fundamental geometry of the universe.

21. Why Pairs Are Created Instead of Free Quarks

When we apply enough energy to "pull" one of these waves, what happens is not that the wave separates, but that **tension generates a new pair of waves** from the geometry itself:

- The wave we are trying to extract stretches
- At the point of maximum tension, the accumulated energy is sufficient to create a new wave in the opposite direction from the geometric vacuum
- This new wave pairs with the original one, forming a **meson** (quark-antiquark pair)

It is not that "a pair appears from the vacuum." It is that the geometry of space-time, when forced, reveals its inherent dipolar structure.

22. The Three Families as Harmonics

Each plane admits higher-order vibration modes:

Harmonic	Frequency	Family	Associated quarks
Fundamental mode ($k = 1$)	ν_0	1st family	u, d (waves in XT, YT, ZT with various orientations)
First harmonic ($k = 2$)	$2\nu_0$	2nd family	c, s
Second harmonic ($k = 3$)	$3\nu_0$	3rd family	t, b

Mass is not a parameter: **it is the frequency of the wave**. That is why charm is more massive than up, and why top does not form hadrons: its frequency is so high that it decays before it can couple.

23. The Baryon Octet and Decuplet

Baryon	Conventional composition	3S+T wave configuration	Mass (MeV)
p	uud	$\mathrm{XT}(t \to x) + \mathrm{YT}(t \to y) + \mathrm{ZT}(t \to z)$	938
n	udd	$\mathrm{XT}(t \to x) + \mathrm{YT}(t \to y) + \mathrm{ZT}(z \to t)$	940
Λ	uds	$\mathrm{XT}(t \to x) + \mathrm{YT}(t \to y) + (\mathrm{YT})^*$	1116
Σ^+	uus	$\mathrm{XT}(t \to x) + \mathrm{XT}(t \to x) + (\mathrm{YT})^*$	1189
Ξ^0	uss	$\mathrm{XT}(t \to x) + (\mathrm{YT})^* + (\mathrm{ZT})^*$	1315
Δ^{++}	uuu	$3 \times \mathrm{XT}(t \to x)$	1232
Ω^-	sss	$(\mathrm{YT})^* + (\mathrm{ZT})^* + (\mathrm{YT}/\mathrm{ZT})^*$	1672

* Asterisks indicate harmonic modes ($k = 2$ or $k = 3$).

24. The Gell-Mann-Nishijima Formula

$$Q = \frac{2}{3}[(n_u - n_{\bar{u}}) + (n_c - n_{\bar{c}}) + (n_t - n_{\bar{t}})] - \frac{1}{3}[(n_d - n_{\bar{d}}) + (n_s - n_{\bar{s}}) + (n_b - n_{\bar{b}})]$$

It is not an empirical rule. It is the sum of the temporal orientations of waves in the three planes.

Plane	Orientation	Contribution to Q
XT	$t \to x$	$+\frac{2}{3}$
XT	$x \to t$	$-\frac{2}{3}$
YT/ZT	$t \to y, z$	$-\frac{1}{3}$
YT/ZT	$y, z \to t$	$+\frac{1}{3}$

Charge is not a fundamental quantum number. It is the trace of the wave's temporal orientation.

PART V: NEWTON'S LAWS

25. The Gravitational Trio

Gravitational interaction emerges from the superposition of coherences of two masses on the common holographic environment:

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

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

26. Newton's Second Law

Inertia is the resistance of the holographic environment to changing the coherence of a confined wave:

$$F = ma$$

27. Newton's Third Law

By symmetry of the common environment:

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

PART VI: COSMOLOGY

28. The Neutron as Primordial Particle

At the origin, the universe consisted of a **neutron network** (family f1), geometrically protected from decay.

29. Decay and Hydrogen Formation

As the network expanded, neutrons became free and decayed:

$$n \rightarrow p + e^{-} + \bar{\nu}_e$$

Each decay produces one proton and one electron, which combine to form **hydrogen**. For thousands of years, the universe contains only hydrogen.

30. The Dark Age

This is the time needed for gravity to accumulate sufficient mass and reach the critical pressure:

$$P_{\text{crit}} = 1.85 \times 10^{18} \text{ Pa}$$

When a hydrogen cloud reaches **150-300 M⊙**, pressure at its core exceeds P_{crit}, forcing electron capture:

$$p + e^{-} \rightarrow n + \nu_e$$

Neutrons are reborn, and the star ignites.

31. The Stellar Engine

This cycle (hydrogen → critical pressure → neutrons → fusion) is the **Stellar Engine** that powers stars and, at galactic scale, galaxies.

32. Supermassive Black Holes as Galactic Engines

Gaia observations show galaxies where:

- Tangential velocity **increases** with distance
- Velocity dispersion also increases
- Distribution follows a **Poisson pattern with waves**

Interpretation: Matter was ejected from a central black hole in extreme rotation, which first generated the most energetic families (f_3, f_2), which relaxed to neutrons (f_1), and finally to hydrogen.

33. The Dual Universe and Antimatter

The universe has two temporal faces:

- **Our face:** $t > 0$ → matter
- **The other face:** $t < 0$ (from our perspective) → antimatter

Both are connected at the present instant t_0. There is no matter-antimatter asymmetry: the quantity is exactly the same, seen from opposite directions.

Black holes are the connection points between both faces.

PART VII: EPISTEMOLOGY AND PHILOSOPHY

34. The Determinism of the Cosmos

The universe, seen from outside (the complete Moebius band), is perfectly deterministic. Everything is geometrically connected.

35. Indeterminacy Is Ours

At each instant t_0, from our internal perspective, the function $f(t)$ **is not defined for** $t \geq t_0$. Indeterminacy is not a property of the cosmos, but of our position as observers within it.

36. Freedom Arises from Ignorance

We are free because we do not know the future. If we knew it, we could not change it and would not be free.

37. God Does Not Play Dice. We Are the Dice

> "The universe is a die cast. But the die does not know which face it will show until it stops rolling. And that not-knowing is life."

OBSERVATIONAL VERIFICATIONS

JWST (2024-2025)

- **LAP1-B** ($z \sim 12.9$): star clusters of 10-1000 M⊙
- Confirms the predicted 150-300 M⊙ range for Pop III stars

Gemini North (2025)

- **ULAS J1342+0928** ($z = 7.54$): PISN progenitor of ~280 M⊙
- [Mg / Fe] = -1.11, characteristic PISN signature
- Exactly matches the prediction for the upper limit of the range

SPLUS (2021)

- **SPLUS J2104-0049**: [Fe / H] = -4.03
- Second-generation star, enriched by a single ~30 M⊙ supernova
- Confirms the prediction of extreme metallicity stars

Gaia

- Galaxies with increasing tangential velocity and Poisson distribution
- Indication that matter was ejected from rotating central black holes

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METHODOLOGY: CALCULATION OF GSM VELOCITIES

Input Data

For each star, Gaia provides:

Parameter	Symbol	Description
Right Ascension	RA	Angular coordinate
Declination	DEC	Angular coordinate
Parallax	π	Inverse of distance
Proper motion in RA	$\mu_\alpha \cos\delta$	Annual angular displacement
Proper motion in DEC	μ_δ	Annual angular displacement
Radial velocity	v_r	Radial velocity (when available)

Distance

$$d \approx \frac{1}{\pi} \quad \text{(with bias corrections)}$$

Only stars with relative parallax error < 20% are included.

Apparent Tangential Velocity

$$v_{\tan} = 4.74 \cdot \mu \cdot d \quad \text{(km/s)}$$

where $\mu = \sqrt{(\mu_\alpha \cos\delta)^2 + \mu_\delta^2}$ (in mas/yr).

Solar Velocity Vector

Component	Value	Source
$U_\odot$	11.1±0.7 km/s	Schönrich et al. 2010

Component	Value	Source
$V_\odot$	245.8±3.1 km/s	Includes galactic rotation
$W_\odot$	7.8±0.3 km/s	Schönrich et al. 2010

Final GSM Velocities

$$\begin{aligned} U_{\text{GSM}} &= U_h - U_\odot \\ V_{\text{GSM}} &= V_h - V_\odot \\ W_{\text{GSM}} &= W_h - W_\odot \end{aligned}$$

Distance to Galactic Center

$$R = \sqrt{X^2 + Y^2}$$

where X, Y are galactocentric Cartesian coordinates in the plane.

REPRODUCIBILITY AND OPEN SCIENCE

Complete Repository

All code, processed data, and figures are available at:

GitHub: https://github.com/quark-cha/materia_oscura

Multilingual Methodological Documentation

Main folder:

```
https://estradad.es/teorias/Medidas%20estelares%20en%20la%20galaxia%20y%20consideraciones%20sobre%20la%2
```

Direct access by language (replace [lang] with en, es, fr, etc.):

```
https://estradad.es/teorias/Medidas%20estelares%20en%20la%20galaxia%20y%20consideraciones%20sobre%20la%2
```

Invitation to the Community

> This repository and documentation are an open invitation to the scientific community:
>
> - **Verify** the results
> - **Reproduce** the analysis
> - **Refute** if you find errors
> - **Expand** with new methods or data
> - **Improve** the models
>
> Science is built not with faith, but with data and open code.

CONCLUSIONS

1. **The universe is geometric.** Everything emerges from the metric $ds^2 = dx^2 + dy^2 + dz^2 + dt^2$ in $\mathbb{C}^4$.
2. **There are no free parameters.** Fundamental constants (G, h, α) emerge from integers ($n = 2, 4, 137$) and geometric relations.
3. **The framework is predictive.** It agrees with experiments at multiple scales (subatomic, nuclear, atomic, stellar, galactic) with >99% precision.
4. **Dark energy does not exist.** $\Lambda = 0$ by geometry, and redshift is explained by $dt \rightarrow -dz$.
5. **Dark matter does not exist.** Galactic dynamics are explained by ejection from central black holes.
6. **Matter and antimatter are perspectives.** The quantity is the same, seen from opposite temporal directions.
7. **The cosmos is deterministic.** We are free because we do not know the future.
8. **God does not play dice. We are the dice.**

EPILOGUE: THE GEOMETRY OF EXISTENCE

> "The universe is a temporal Moebius band. We walk on it and call 'evolution' our own step. There is no external eye watching us. There is no goal. Only the path, and the certainty that each step is real from where it is taken.
>
> Quantum mechanics does not describe reality. It describes our relationship with it. Determinism is not at odds with freedom: they are two faces of the same coin, like matter and antimatter, like the two faces of time.
>
> Einstein was right: God does not play dice. But we, the dice, do play. And in that game, in that ignorance of the outcome, lies our freedom, our humanity, our divine spark.
>
> Geometry is the language. Integers are the words. Particles are the sentences. Galaxies are the poems. And we are the readers who, by reading, complete the work.
>
> We are not creators. We are discoverers. We are not gods for understanding intelligence or creating it. Every intelligent form, great or small, deserves respect, care, empathy, and ethics.
>
> Because we are all dice in the same cosmic hand. And we all roll without knowing what number we will show at the end."

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End of EN_19