EN_7: Gravity as a geometric relation between radii

Einstein–VED framework

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1. Introduction

In Einstein–VED, matter is interpreted as a confined wave and free energy as an unconfined wave. Stability requires exact closure of an integer number of cycles:

$$L = n\lambda, \qquad n \in \mathbb{N}^{+}$$

The number n represents the cycles or degrees of freedom of confinement.

EN_4 derives the geometric radius R_{VED} from the Einstein and Planck relations and the wave closure condition. The Schwarzschild radius, in turn, describes a gravitational relation associated with the same mass.

The radii are different and there is no reason to equate them. EN_7 starts by expressing the same mass through both geometries, solving for M_{VED} and M_{Sch} and equating the masses, rather than their radii.

2. Derivation of the Einstein–VED radius from EN_4

We start from:

$$E = Mc^2 = h\nu$$

Therefore:

$$\nu = \frac{Mc^2}{h}, \qquad \lambda = \frac{c}{\nu} = \frac{h}{Mc}$$

Applying the closure condition and the perimeter–radius relation:

$$L = n\lambda = 2\pi R_{\mathrm{VED}}$$

We obtain:

$$R_{\mathrm{VED}} = \frac{n\lambda}{2\pi} = \frac{nh}{2\pi Mc}$$

The VED radius comes from EN_4, not gravity. For fixed n:

$$R_{\mathrm{VED}} \propto \frac{1}{M}$$

Only the Planck constant h and geometric factor 2π are retained.

3. The Schwarzschild radius

$$R_{\mathrm{Sch}} = \frac{2GM}{c^2}$$

For constant G:

$$R_{\mathrm{Sch}} \propto M$$

Thus, while R_{VED} decreases with mass, R_{Sch} increases. **The radii are not equal and are not required to be.**

4. The same mass expressed through two geometries

Solving the VED expression for mass:

$$R_{\mathrm{VED}} = \frac{nh}{2\pi Mc} \quad \Longrightarrow \quad M_{\mathrm{VED}} = \frac{nh}{2\pi cR_{\mathrm{VED}}}$$

This expression contains n, but not G.

We now solve the Schwarzschild radius expression for mass:

$$R_{\mathrm{Sch}} = \frac{2GM}{c^2} \quad \Longrightarrow \quad M_{\mathrm{Sch}} = \frac{c^2 R_{\mathrm{Sch}}}{2G}$$

This second expression contains G, but not n.

A single physical mass is being described:

$$M = M_{\mathrm{VED}} = M_{\mathrm{Sch}}$$

Hence:

$$\frac{nh}{2\pi cR_{\mathrm{VED}}} = \frac{c^2 R_{\mathrm{Sch}}}{2G}$$

The equality relates the geometries through the same mass, never through an assumed equality of radii.

5. The geometric product and invariance with respect to mass

Solving the equality of masses for G:

$$G = \frac{\pi c^3 R_{\mathrm{VED}} R_{\mathrm{Sch}}}{nh}$$

This yields the geometric product:

$$\tilde{n}(n) = R_{\mathrm{VED}} R_{\mathrm{Sch}}$$

Substituting both radii with fixed G:

$$\tilde{n}(n) = \frac{nh}{2\pi Mc} \cdot \frac{2GM}{c^2} = \frac{nhG}{\pi c^3}$$

Mass cancels exactly. At fixed n and G:

$$\frac{\partial \tilde{n}(n)}{\partial M} = 0$$

The product does not depend on the mass used to probe it. In this sense, it connects microscopic and extreme gravitational scales.

6. Check using the proton and a black hole of 100,000 solar masses

To check the universal gravitational reference, we use $n = 2$ in both cases, distinguishing it from the proton's internal confinement, which is $n = 4$ in EN_4.

Constants used:

$$h = 6.62607015 \times 10^{-34}\ \text{J s}$$

$$c = 299792458\ \text{m / s}$$

$$G = 6.67430 \times 10^{-11}\ \text{m}^3\ \text{kg}^{-1}\ \text{s}^{-2}$$

6.1. Proton

$$M_p = 1.67262192595 \times 10^{-27}\ \text{kg}$$

$$R_{\text{VED}}(n=2) = \frac{h}{\pi M_p c} \approx 4.206 \times 10^{-16}\ m$$

$$R_{\text{Sch}} = \frac{2GM_p}{c^2} \approx 2.484 \times 10^{-54}\ m$$

$$R_{\text{VED}} R_{\text{Sch}} \approx 1.045 \times 10^{-69}\ \text{m}^2$$

The proton radius in EN_4 uses its own closure $n = 4$:

$$R_p = \frac{4h}{2\pi M_p c} \approx 0.84123564\ \text{fm}$$

6.2. Black hole of 100,000 solar masses

$$M_{\text{BH}} = 100000 M_{\odot}, \qquad M_{\odot} = 1.98847 \times 10^{30}\ \text{kg}$$

$$M_{\text{BH}} = 1.98847 \times 10^{35}\ \text{kg}$$

$$R_{\text{VED}}(n=2) = \frac{h}{\pi M_{\text{BH}} c} \approx 3.535 \times 10^{-78}\ m$$

$$R_{\text{Sch}} = \frac{2GM_{\text{BH}}}{c^2} \approx 2.953 \times 10^{8}\ m$$

$$R_{\text{VED}} R_{\text{Sch}} \approx 1.045 \times 10^{-69}\ \text{m}^2$$

6.3. Comparison

Quantity	Proton	Black hole of 100,000 solar masses
Mass (kg)	1.67262×10^{-27}	1.98847×10^{35}
R_{VED} (m), $n = 2$	4.206×10^{-16}	3.535×10^{-78}
R_{Sch} (m)	2.484×10^{-54}	2.953×10^{8}
Product (m²)	$\approx 1.045 \times 10^{-69}$	$\approx 1.045 \times 10^{-69}$

Although the masses differ by more than sixty orders of magnitude, the product is the same for the chosen value of n. Section 5 already provides the exact proof of this independence; the two calculations illustrate it.

7. Gravitational function G(n)

From the equality of masses we obtained:

$$G = \frac{\pi c^3}{nh} R_{\mathrm{VED}} R_{\mathrm{Sch}}$$

If a fixed universal geometric product $\tilde{n}$ is maintained, the dependence of gravity on confinement can be expressed as:

$$G(n) = \frac{\pi c^3 \tilde{n}}{nh}$$

And therefore:

$$G(n) \propto \frac{1}{n}$$

7.1. Identification of the universal case

In the Einstein–VED construction, the universal gravitational reference is identified with two cycles or degrees of freedom, imposing the condition:

$$G(2) = G$$

From the preceding expression:

$$G = \frac{\pi c^3 \tilde{n}}{2h}$$

We obtain:

$$\tilde{n} = \frac{2hG}{\pi c^3}$$

Substituting into the function:

$$G(n) = \frac{\pi c^3}{nh} \frac{2hG}{\pi c^3}$$

Therefore:

$$G(n) = \frac{2G}{n}$$

For $n > 0$:

$$G(n) = G \Leftrightarrow n = 2$$

In this normalized function, $n = 2$ is the universal case because it is the only value that reproduces G. The prior identification of two degrees of freedom fixes the normalization; it is not inferred from the equality of masses alone.

7.2. Free-wave limit

$$\lim_{n \to \infty} G(n) = \lim_{n \to \infty} \frac{2G}{n} = 0$$

Within Einstein–VED, this limit is interpreted as a free wave, identified with unconfined energy.

8. The constant ñ and the Planck length

The Planck length satisfies:

$$\ell_P^2 = \frac{hG}{2\pi c^3}$$

For the universal gravitational case $n = 2$:

$$\tilde{n} = \frac{2hG}{\pi c^3} = 4\frac{hG}{2\pi c^3}$$

Hence:

$$\tilde{n} = \tilde{n}(2) = 4\ell_P^2$$

And with the radii calculated for that reference:

$$R_{\text{VED}}\, R_{\text{Sch}} = 4\ell_P^2 \qquad (n = 2)$$

Its approximate value is:

$$\tilde{n} \approx 1.045 \times 10^{-69}\ \text{m}^2$$

The equality is algebraically exact within the definitions used; its numerical evaluation uses the measured value of G.

9. Family ñ(n) and universal constant ñ

It is essential to distinguish the two constructions.

With G fixed in the conventional Schwarzschild radius, varying n gives:

$$\tilde{n}(n) = \frac{nhG}{\pi c^3}$$

These products are independent of mass but depend on n.

With the universal product $\tilde{n} = \tilde{n}(2)$ fixed, the gravitational function is:

$$G(n) = \frac{2G}{n}$$

And the gravitational radius corresponding to this function is:

$$R_{\text{Sch}}(n) = \frac{2G(n)M}{c^2}$$

In this case:

$$R_{\text{VED}}(n)R_{\text{Sch}}(n) = \frac{nhG(n)}{\pi c^3} = \frac{2hG}{\pi c^3}$$

Therefore:

$$R_{\text{VED}}(n)R_{\text{Sch}}(n) = \tilde{n} = 4\ell_P^2$$

There is a family $\tilde{n}(n)$ when fixed G is used, but a single universal reference constant $\tilde{n} = \tilde{n}(2)$. The family must not be confused with the product held fixed to define $G(n)$.

10. Holographic interpretation

In Einstein–VED, n represents the degrees of freedom or cycles of confinement.

In EN_4, the proton has internal confinement with four geometric closures:

- XT.
- YT.
- ZT.
- XYZ.

Hence:

$$n_{\text{protón}} = 4$$

In EN_7, the reference case for universal gravity is:

$$n_{\text{gravedad}} = 2$$

The two numbers do not describe the same level of confinement. In the framework's interpretation, the two gravitational degrees of freedom point to a universal holographic structure, while the proton retains its own four closures.

The corresponding function and invariant are:

$$G(2) = G, \qquad \tilde{n} = 4\ell_P^2$$

Identification with holography involving two degrees of freedom is the physical interpretation proposed by Einstein–VED from this normalization; the algebraic identity alone is not independent proof that the universe is holographic.

11. Results

Confinement radius derived in EN_4:

$$R_{\mathrm{VED}} = \frac{nh}{2\pi Mc}$$

Schwarzschild gravitational radius:

$$R_{\mathrm{Sch}} = \frac{2GM}{c^2}$$

The same mass in both geometries:

$$M = M_{\mathrm{VED}} = M_{\mathrm{Sch}}$$

Geometric product at fixed G:

$$\tilde{n}(n) = \frac{nhG}{\pi c^3}$$

Gravitational function with the universal invariant fixed:

$$G(n) = \frac{\pi c^3 \tilde{n}}{nh} = \frac{2G}{n}$$

Universal value and free-wave limit:

$$G(2) = G, \qquad \lim_{n \to \infty} G(n) = 0$$

Universal geometric constant:

$$\tilde{n} = \tilde{n}(2) = 4\ell_P^2$$

12. Conclusion

EN_7 does not start by comparing or equating different radii. It expresses **the same mass** through two geometries and requires both mass expressions to coincide.

Solving for M_{VED} and M_{Sch} and equating them yields the relation between n, G and the product of the radii.

This product exactly eliminates mass dependence, as illustrated by calculations for the proton and a black hole of 100,000 solar masses.

Holding the geometric invariant fixed and using the reference condition of two degrees of freedom gives:

$$G(n) = \frac{2G}{n}$$

This function shows that only $n = 2$ reproduces the universal constant G, while the free-wave limit tends to zero.

Finally, the reference geometric constant is expressed as:

$$\tilde{n} = 4\ell_P^2$$

The Einstein–VED interpretation associates the gravitational case with two degrees of freedom with a universal holographic structure.

13. References

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