

The Floors of Condensation: Why Matter Cannot Collapse to Nothing

Martin Scholl — Independent Researcher

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Abstract. This note completes the condensed-space arc begun in *The Delay That Makes G*. The thesis: mass is space condensed by the space quaternion, and condensation is bounded — nothing collapses to nothing, because a staircase of floors forbids it, each floor enforced by a different guardian of this series' physics. The metric itself endorses the program at the root: in Paper 1's vacuum condition, mass enters the geometry only as an integration constant that is a length, $C = r_s = 2GM/c^2$ — the space quaternion never learns kilograms; it stores mass as a condensation radius. The floors, ascending in density: the winding (Compton) floor, guarded by pair creation, ruling all masses below the Planck point; the trinity wedge, the proton's self-floor, where three windings jam at the closure angle in a funnel that is itself bottomless; the degeneracy floor of Pauli pressure, ruling stellar matter to 2.9 solar masses; the Schwarzschild floor, where the exit cone closes — the limit of visibility, not of being; and beneath even that, the torsion floor near 10^{76} kg/m^3 , where the Einstein–Cartan sector halts the collapse inside the horizon. The two fundamental floors — quantum (λ_C , falling with mass) and gravitational (r_s , rising with mass) — cross at exactly one point: $m = \sqrt{(\hbar c/2G)} = m_{\text{Planck}}/\sqrt{2}$, size $\sqrt{2} \cdot \ell_P$. The Planck mass is the hinge where the quantum guardian hands the keys to the gravitational one. A single dimensionless number, size/ r_s , then grades every object's degree of condensation, and the measured ladder descends monotonically from the electron (2.9×10^{44} — condensation barely begun) through the proton (10^{38}), the Sun (10^5), the neutron star (2.9), the collapse threshold (0.99), to the universe itself at exactly 1.000 — the one completed condensation, which we inhabit. Singularity and trinity are identified as the two topological classes of condensed matter — the lepton's single winding, floored by the quantum, and the baryon's three-fold wedge, which floors itself — with the proton's $>10^{34}$ -year stability as the trinity's certificate. Every formula is given; every flag is flown.

1. The Premise, and the Metric's Own Endorsement

The condensed-space postulate (P2) reads matter as a region where spacetime is extremely wound — condensed. This note argues that the postulate carries a built-in completion: **condensation is floored**. Nothing condenses to nothing; every collapse is caught, and the catching is not one mechanism but a staircase of them.

Begin with the strongest evidence that the program is the formalism's own. In Paper 1, the vacuum condition of the space quaternion, $d/dr[r \cdot f] = 1$, integrates to

$$f(r) = 1 - \frac{C}{r}, \quad C = \frac{2GM}{c^2} \equiv r_s. \quad \tag{1}$$

Mass enters the geometry **once, as the constant of integration — and the constant is a length**. The space quaternion never stores kilograms; it stores a condensation radius. M and r_s are one datum in two unit systems. "Condensing space into mass" is therefore not an interpretation laid over the equations; it is how the equations bookkeep mass in the first place. The gravitational field of the Earth is, to the metric, nothing but the statement: *here, space is condensed by 8.87 millimetres*.

2. The Staircase of Floors

Each rung of matter is protected from further collapse by a guardian, and the guardians are this series' own machinery:

Floor	Radius / density	Guardian	What it protects
Winding (Compton)	$\bar{\lambda}_C = h/mc$	pair creation: squeeze below $\bar{\lambda}_C$ and the vacuum answers with twins	elementary particles
Trinity wedge	the closure angle	three windings jam in the funnel throat	the proton (and every baryon)
Degeneracy	$Q \wedge Q = 0$	Pauli pressure of stacked windings	white dwarfs, neutron stars, to $2.9 M_\odot$
Schwarzschild	$r_s = 2GM/c^2$	the exit cone closes	the <i>visibility</i> of the interior
Torsion	$\rho \approx 10^{76} \text{ kg/m}^3$	the antisymmetric connection stiffens	being itself, inside the horizon

The winding floor. For every mass far below the Planck point, the operative floor is not r_s but the Compton cell. Localizing a particle below $\bar{\lambda}_C$ costs more than $2mc^2$, and the vacuum pays in pairs (Paper 4, §7.2): you do not get a compressed particle; you get a crowd. The electron sits 2.9×10^{44} Compton-radii-to-Schwarzschild-radii above your limit — condensation barely begun, all of it carried by the winding, none by gravity. This is the quantitative content of the corpus's 10^{43} price ratio: winding condenses space cheaply, without approaching collapse.

The trinity wedge — the floor that is not a floor. The proton deserves its own paragraph, because its floor is of a different kind. The funnel on the seven-sphere (Neutron Decay paper) is genuinely bottomless: $V(\theta) = -A/\sin^5\theta + B/\sin^2\theta$ diverges to $-\infty$ as $\theta \rightarrow 0$. There is no floor in the potential at all. A single point could slide down that throat forever. What halts the fall is the trinity itself: **three windings locked in a tetrahedral configuration cannot fit down a throat narrower than their own closure angle**. The proton wedges at $\theta_p = 108.35^\circ - 1.1^\circ$ under the tetrahedral $\arccos(-1/3) = 109.47^\circ$ — compact, jammed, immovable. The proton does not rest on a floor; **it is its own floor**. The neutron, wedged loosely at 115.9° , can tighten by one flavor flip and drop — that fall is beta decay, priced in the companion paper at 1.305 MeV. The proton, already at the wedge's optimum, has

nowhere to fall. Its measured stability — no observed decay in $>10^{34}$ years, the standing falsifier of the topological reading — is the trinity's certificate.

The degeneracy floor. Composite matter at stellar scale is floored by Pauli: windings stack until the wedge product forbids further compression. Paper 1, §6.2 computes where this guardian fails — the maximum degeneracy pressure crosses the Schwarzschild radius at $M \approx 2.9 M_{\odot}$, $R \approx 8.5$ km. Below that mass, Pauli holds matter outside its horizon; above it, the handover to the next floor is forced.

The Schwarzschild floor — the limit of the seen. At r_s the exit cone closes (Paper 1, §6.1): no direction leads out, bookkeeping from outside ends, $W = i\sqrt{f}c \cdot d\tau$ passes through zero. This is the floor of *visibility*. But the series is explicit that the zero of W is a transfiguration — the real part crossing zero, the same algebraic event as the quantum leap — and not an annihilation of being.

The torsion floor — not to nothing, twice over. Beneath even the horizon, the corpus refuses the literal singularity. The Frame Quaternion note assigns torsion its kingdom at densities above $\sim 10^{76} \text{ kg/m}^3$ — deep black-hole interiors, where the antisymmetric sector of the connection stiffens and the collapse bounces rather than completing (the Einstein–Cartan mechanism; Popławski). "The theater's trapdoors": each collapse may seed its own inside, but nothing reaches nothing. The Schwarzschild radius floors what can be *seen*; the torsion density floors what can *happen*.

3. The Planck Hinge

Two of the floors are fundamental and run in opposite directions with mass: the winding floor $\bar{\Lambda}_C = \hbar/mc$ **falls** as mass grows; the Schwarzschild floor $r_s = 2Gm/c^2$ **rises**. They cross exactly once:

$$\frac{\hbar}{mc} = \frac{2Gm}{c^2} \Rightarrow m = \sqrt{\frac{\hbar c}{2G}} = \frac{m_{\text{Planck}}}{\sqrt{2}} = 1.54 \times 10^{-8} \text{ kg}, \quad r = \sqrt{2} \ell_P = 2.29 \times 10^{-35} \text{ m}.$$

Below the hinge, the quantum guardian is the higher floor: matter is a winding, held far outside its own horizon, and compression makes pairs, not black holes. Above it, the gravitational guardian takes over: condensation runs to r_s and the exit cone shuts. **The Planck mass is not a mysterious unit; it is the hinge where the quantum guardian hands the keys to the gravitational one.** All particles, all chemistry, all life live below the hinge on the winding floor. Stars that crush past $2.9 M_{\odot}$ cross to the other side.

4. The Condensation Ladder, Measured

One dimensionless number grades every object's degree of condensation:

$$\text{condensation} \equiv \frac{\text{physical size}}{r_s}, \quad 1 = \text{complete}.$$

The measured ladder (computed in the companion script):

Object	size / r_s	Reading
electron	2.9×10^{44}	condensation barely begun; pure winding
proton	3.4×10^{38}	trinity, self-wedged, still $\sim 10^{38}$ from the limit
Earth	7.2×10^8	matter floored by chemistry's stiffness
Sun	2.4×10^5	floored by fusion pressure
white dwarf	4.0×10^3	floored by electron degeneracy
neutron star ($1.4 M_\odot$)	2.9	floored by neutron degeneracy
collapse threshold ($2.9 M_\odot$)	0.99	the degeneracy guardian fails
universe	1.000	complete — condensed exactly to its own horizon

The ladder descends monotonically to saturation, and it saturates *on us*: the critical-density identity $GM/Rc^2 = 1/2$ (the Delay paper) makes the universe's Schwarzschild radius equal its Hubble radius exactly. **The universe is the one completed condensation, and we live inside it** — which is metric D's entire picture, arrived at now from the opposite direction: not from the redshift downward, but from the electron upward.

5. Singularity and Trinity: the Two Topological Classes

The phrase "mass as singularity or trinity" is sharper than a figure of speech; it names the two topological classes of condensed matter, and their floors differ in kind:

The lepton — the singularity class. One winding, one center. Its floor is *borrowed*: the quantum guardian (pair creation at the Compton cell) holds it up. It can be unwound — but only against its exact anti-winding: electron meets positron, the two opposite windings cancel, and the condensation returns to the unwound fiber as pure light. Annihilation is de-condensation, complete and paid in photons.

The baryon — the trinity class. Three windings wedged at the closure angle. Its floor is *its own geometry*: the wedge. To unwind a trinity you must first unmake the triangle, and the triangle is a topological class, not a state — the foundations paper's conjecture that baryon number is a fiber class, with one observed proton decay as its named executioner. Fifty years of watching kilotons of water say the class holds. **The singularity is floored by the quantum; the trinity floors itself** — and that difference is why the proton, alone among massive composites, is (so far as measurement reaches) eternal.

Between them, the two classes exhaust stable condensed matter: every atom is trinities wedged in the nucleus with singularities wound in the shells — self-floored cores dressed in quantum-floored coats.

6. What Is Claimed, and What Is Not

Claimed. (i) The metric stores mass as a condensation length by construction (eq. 1). (ii) Condensation is floored at every rung by a named guardian, and "not to nothing" holds twice — at the Schwarzschild floor for visibility and at the torsion floor for being. (iii) The quantum and gravitational floors cross at $m_{\text{Planck}}/\sqrt{2}$ (eq. 2), the hinge of the ladder. (iv) The condensation ratio size/r_s grades all matter and saturates at exactly 1 for the universe. (v) Lepton and baryon are the singularity and trinity classes, with different kinds of floor.

Not claimed. The torsion floor's specific density ($\sim 10^{76} \text{ kg/m}^3$) is inherited from the Einstein–Cartan estimate, not derived here; the interior bounce is a mechanism class, not an observation. The trinity wedge's stability is quantitative in the companion paper's closure-angle machinery, but its topological reading (baryon number as fiber class) remains a conjecture with a named falsifier. And the deepest question — *why the winding floor sits where it does*, i.e., why the Compton cell has its size — is the stiffness problem, the framework's central unpaid debt, unpaid here too. This note maps the floors; it does not yet pour them.

References

K. Schwarzschild (1916); S. Chandrasekhar (1931); J. R. Oppenheimer and G. M. Volkoff (1939); É. Cartan (1922–25); N. J. Popławski, Phys. Lett. B 687, 110 (2010) — the torsion bounce; Super-Kamiokande proton-decay limits ($\tau > 10^{34} \text{ yr}$); and the papers and notes of this series (Paper 1 — the vacuum condition, the exit cone, the collapse threshold; Neutron Decay as Octonion Algebra — the funnel and the closure angle; the Metrics of the Living Spaces — the winding price ratio; the Frame Quaternion note — torsion's kingdom; The Delay That Makes G — the crossing-time law and the cosmic saturation; the Postulates). Verification script: `floors_check.py`. (*Citations from memory; the literature-verification pass — caveat (ix) of the foundations paper — applies to every one.*)

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