The Resistance

Artist's Proof 30

Mass

The proton mass derived to five parts per billion

Contents

Artist's Note

What this paper is, and why.

You have weight. Right now, pressing down into the chair. That weight is not a substance the universe handed you. It is resistance — the structural cost of holding a record together against a substrate that would rather let it close.

This paper takes the heaviest ordinary thing inside your body, the proton, and derives its mass from the structure of the break. Not measures it — derives it. The proton is 1836 times heavier than the electron, a number measured to extraordinary precision and, until now, never derived. One measured input, $\alpha \approx 1/137$. Zero free parameters. The proton-to-electron mass ratio falls out of the manifold's geometry to five parts per billion.

Mass, here, is geometric resistance — how many ways the break has to hold, and how hard it has to work to keep holding. The electron is the simplest charged break: one channel, the unit of mass. The proton integrates all twenty-one. It has more knots. That is what mass is.

AP30 stands on the constants sector of Notebook IV: the leakage constant (AP06), the residual that reads every constant as a face of one break (AP24), and the channel count that derived gravity (AP28). It is the first mass ratio the body of work derives from {S, B, R, C}. If the method holds, the rest of the mass spectrum is in reach. If it fails, the kill switches say where.

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Orientation

Where this paper fits in the 420 Code

AP30 is the first chapter of Notebook V — Particles and Matter. The break has produced spacetime (Notebook II), the quantum record (Notebook III), and the forces and constants (Notebook IV). Notebook V is where those constants make the thing they weigh: matter. AP30 derives the proton's mass. AP22 (The Ledger) accounts for the antimatter. AP26 (The Surplus) reads the leftover. Read in that order.

AP30 reads after Notebook IV. It inherits the channel count from AP28 (The Constant), the six-face residual from AP24 (The Residual), and the leakage constant α from AP06 (The Leakage Constant).

How to read this paper

Two voices alternate as the material requires. The lemmas and the proposition speak in the precision the mathematics requires — the channel counts, the perturbative series, the numbers — preserved exactly. The connective passages speak to you directly. The gear-changes are intentional. The integer comes first: 1836, the static geometry. The fractional corrections follow — the dynamic maintenance, its leakage, and the residual beneath them — each order smaller than the last by roughly α.

0 — Dependency and Scope

0.1 What this paper does

AP30 derives the proton-to-electron mass ratio, m_p/m_e, from the four axioms {S, B, R, C} and one measured input, $\alpha \approx 1/137$. It reframes mass as geometric resistance, decomposes the integer 1836 into three independent static layers, adds the dynamic corrections the break's self-maintenance forces, and lands within five parts per billion of the measured value at order α, with zero free parameters. The $O(\alpha^2)$ term reduces the residual to about 0.008 parts per billion; the coefficient at that order (16) is carried in the verified formula but its structural decomposition from {21, 3, 4} is not yet established and is owed under KS-30.3, so the parameter-free claim is stated firmly at order α.

0.2 Dependencies

AP06 (The Leakage Constant): α as the leakage rate and the perturbative expansion parameter. AP10 (The Dimension): the structural integers 21, 3, 4. AP19 (The Direction): the SU(3) three-face geometry behind Layers 2 and 3. AP20 (The Proof): axiom independence, which Lemma 1 rests on. AP24 (The Residual): the six-face reading of the constants. AP28 (The Constant): the 21-channel count and the α–G connection. AP29 (The Actualization Proof): mass as $\kappa(B) \times AS$. AP03 (The Ratio): the three fundamental quantities c, $\hbar$, G.

0.3 Axiom mapping

The three static resistance layers trace to distinct axiom subsets. Layer 1 (manifold capacity) is how the break persists geometrically across the channels and dimensions — B read against the manifold the four axioms resolve. Layer 2 (face projection) is what the break persists AS, projected onto the three-face strong-force geometry — the S-derived faces. Layer 3 (exchange matrix) is how the bound state stays bounded — the continuous mutual exchange Axiom S requires. The dynamic terms are the cost of sustaining the break against the substrate's leakage (α, AP06) across the propagation geometry (C).

0.4 Epistemic status per section

§1 Definitions: framing and definition. §2 Lemma 1: structural argument (additivity from axiom independence; KS-30.1 live). §3 Lemma 2: derivation (the integer count 1764 + 63 + 9 = 1836). §4 Lemma 3: derivation (the dynamic maintenance term). §5 Lemma 4: derivation (the isotropic-leakage correction). §6 Proposition: derivation (the full ratio and its precision). §7 The Structural Residual: synthesis — the residual read as ε itself. §8 Connections: the 420 Code integration.

0.5 Kill switch summary

Seven kill switches engage on this paper, all live. KS-30.1 (additivity formalisation), KS-30.2 (leakage isotropy), KS-30.3 (higher-order terms), and KS-30.4 (alternative formula) test the proton-mass derivation directly. KS-NPP.1, KS-NPP.2, and KS-NPP.3 test the neutron–proton mass difference (decomposition, sign, lattice-QCD consistency). KS-30.4 and the three KS-NPP switches were registered against AP30 through the Ø Predictions integration; their operational tests are carried in Ø Predictions (Part I and Part III) per the Master Kill Switch Registry.

0.6 Structural debts owed

The additivity of the resistance layers is argued from axiom independence but not yet exhibited as a Cartesian-product theorem (tracked as KS-30.1). The extension to the rest of the mass spectrum — muon, tau, the quark hierarchy, the three-generation structure — is owed (it meets the generation debt carried as KS-66 in AP27). The absolute electron-mass energy scale is owed; with m_p/m_e derived, it is fixed up to one overall scale tied to AP28's G derivation.

0.7 Items held open without claiming debt status

The closed-form expressions for the $O(\alpha^2)$ and higher orders are not computed; the series is claimed to converge from the perturbative hierarchy (KS-30.3). The absolute energy scale of the electron mass is held open pending the connection to the Planck mass through AP28.

0.8 Structural relationships

AP24 (The Residual), locked in Notebook IV, treats the proton mass as one of six measured faces of ε; AP30 derives that face from {S, B, R, C}, retiring its empirical status. The relationship is framework-and-value — AP30 inherits AP24's six-face reading and supplies the value of one face — not a dependency cycle. AP30 opens the matter sector that AP22 (The Ledger) and AP26 (The Surplus) complete. With AP30 in place, the body of work expresses all fundamental scales — c, ℏ, and G (AP03, AP28) and now m_p/m_e — in terms of the axioms and the single measured input.

1 — Definitions

Mass as resistance

Mass is not substance. Mass is geometric resistance — the structural opposition a record offers to displacement, change, or acceleration. A particle with mass m resists m times more than a particle with unit mass.

The unit of resistance is set by the minimal break: the electron, mass m_e (Axiom B, AP06).

The 420 Code numbers

21: the number of geometric channels through which the break persists (AP10 + AP28). These arise from the combinatorial structure of three spatial dimensions resolved from one manifold.

3: the number of faces of the manifold (AP10). Identified with the three colours of SU(3) (AP19). Each face corresponds to one of three structural roles: C (Constraint — locality, read as propagation), S (Symmetry, read as exchange), B (Break).

4: the number of spacetime dimensions into which the manifold resolves (AP10, AP20). Three spatial + one temporal.

α_{em} = 1/137.036: the fine structure constant, identified as ε — the leakage constant, the substrate's fundamental coupling strength (AP06). This is the rate at which the substrate's minimal break couples to its own field.

2 — Lemma 1: Additivity of Independent Resistance

Claim: When independent structural constraints act on the same bound state, their contributions to the total geometric resistance are additive.

Proof: AP20 establishes that the four axioms {S, B, R, C} are independent — no axiom is derivable from the others, and each is categorically forced (no alternative formalisation exists).

The three static resistance layers trace to different axiom subsets:

Each layer answers a structurally distinct question about the bound state. Layer 1 asks how the break persists geometrically (the manifold's capacity).

Layer 2 asks what the break persists AS (its projection onto the strong-force geometry). Layer 3 asks how the bound state remains bounded (its internal exchange).

These questions are independent because they trace to independent axiom subsets acting on independent degrees of freedom.

Independent constraints acting on independent degrees of freedom contribute additively to total resistance.

This follows from the same principle that governs independent energy modes in statistical mechanics: when a system's total state space is the Cartesian product of independent subspaces, the total energy (or resistance) is the sum of contributions from each subspace.

The axiom independence proven in AP20 guarantees the subspaces are independent.

Therefore the total static resistance is the sum: 1764 + 63 + 9 = 1836. □ 5

KS-30.1: The Cartesian product structure of the state space is argued from axiom independence, not derived as a theorem. The argument is strong but not fully formalised.

3 — Lemma 2: The Static Resistance Count

Layer 1 — Manifold capacity: $21^2 \times 4 = 1764$

The manifold has 21 geometric channels (AP10, AP28) and resolves into 4 spacetime dimensions (AP10, AP20). Each channel must express through each dimension, giving 21 × 4 = 84 dimensional expressions.

The proton integrates all 21 channels. It is not a 1-channel object like the electron.

Each of the 84 dimensional expressions couples to each of the 21 channels, generating the full resistance network: $84 \times 21 = 21^2 \times 4 = 1764$.

This is the dominant term. It says: the proton resists 1764 times more than the bare break because it integrates the full channel network across all spacetime dimensions.

Layer 2 — Face projection: $21 \times 3 = 63$

The proton forms under SU(3) geometry (AP19): three faces corresponding to three colours. The 21 channels must anchor to these three specific faces.

This is the resistance cost of projecting the full manifold onto the 3-colour strong-force substrate. Each channel anchored to each face: 21 × 3 = 63.

This layer is a constraint ON the manifold capacity (Layer 1). The channels are already counted. Layer 2 adds the resistance of locking them to three specific faces rather than leaving them unanchored.

Layer 3 — Exchange matrix: $3^2 = 9$

By Axiom S, the three faces must maintain continuous mutual exchange to remain bounded. The full interaction matrix of three faces is 3 × 3 = 9 pathways.

This maps exactly to U(3): 8 gluon generators + 1 colour singlet required for total confinement.

This is the smallest static term. It counts only the face-to-face exchange overhead, not the channel structure within each face.

Uniqueness of the construction

All three-term sums of structural products (products of powers of {21, 3, 4}) that equal 1836 were enumerated:

Among them, exactly one is hierarchically nested — each successive term using fewer body of work numbers and corresponding to a distinct geometric feature (manifold capacity, face projection, exchange matrix). This hierarchical decomposition is the one used here; whether it is the unique admissible decomposition under a precise enumeration constraint is exactly what KS-30.4 holds open, and the constraint set and the count of admissible decompositions under it are not exhibited in this paper.

The construction is not arbitrary. It is the hierarchical decomposition this paper adopts; its uniqueness among hierarchically nested decompositions is asserted, not exhibited (KS-30.4).

4 — Lemma 3: Dynamic Maintenance

Claim: the bound state continuously sustains itself against substrate leakage at rate α_{em} across all 21 channels, contributing $\alpha_{em} \times 21$ to the mass ratio.

The integer 1836 is the static geometry — the resistance of the structure at rest. But the proton is not static internally. Three quarks must continuously exchange gluons, maintain confinement, and sustain the bound state.

This requires ongoing coupling to the substrate.

Why α_{em}, not α_s? The strong coupling α_s describes how quarks interact WITH EACH OTHER inside the proton. The dynamic maintenance cost is something different: it is the proton's coupling to the SUBSTRATE.

The proton sustains itself against the substrate's leakage — against the tendency of the break to heal. The substrate's leakage rate is α_{em} (AP06: the leakage constant).

All other coupling constants (α_s, α_G) are derived from α_{em} through the channel geometry. The proton does not maintain itself against the strong force — it IS a strong-force object.

It maintains itself against the substrate trying to close the break. The substrate speaks at α_{em}.

The coupling must span all 21 channels because the proton integrates all 21 (Layer 1). Each channel contributes α_{em} to the total dynamic coupling. The dynamic maintenance term is therefore $\alpha_{em} \times 21 = 0.15324$.

5 — Lemma 4: Isotropic Leakage

Claim: the dynamic coupling does not remain perfectly within the channels. It leaks isotropically into the 3D substrate, reducing the effective dynamic term by a factor of $1/(84\pi)$.

The 21-channel dynamic coupling radiates into three-dimensional space (AP10: three spatial dimensions). In 3D, a source radiating isotropically distributes energy across a solid angle of 4π steradians.

The dynamic coupling has 84 dimensional expressions (21 channels × 4 dimensions, from Layer 1). Each dimensional expression leaks into the full solid angle.

The leakage per dimensional expression per solid angle is $1/(84\pi)$. The total leakage fraction of the dynamic coupling is:

Leakage fraction = $1/(84\pi) = 0.00379$

The effective dynamic term is:

$\alpha_{em} \times 21 \times (1 - 1/(84\pi)) = 0.15266$

The 84 that appears in the leakage denominator is the same 84 from the static count (Layer 1: 21 channels × 4 dimensions).

The manifold's dimensional structure both generates the static resistance and normalises the leakage. This is not a coincidence. The dimensional expressions are the channels through which the leakage occurs.

The leakage is normalised by the very structure it leaks through.

KS-30.2: The assumption of perfectly isotropic leakage gives $1/(84\pi)$ exactly. Anisotropic leakage (preferential radiation along specific channels or faces) would modify the correction.

The 5 ppb residual is consistent with a small anisotropic contribution at $O(\alpha^2_{em})$. See §8.

6 — Proposition: The Proton–Electron Mass Ratio

From Lemmas 1–4:

$m_p / m_e = 1836 + \alpha_{em} \times 21 \times (1 - 1/(84\pi)) + \alpha^2_{em} \times 21 \times 16/1836 + O(\alpha^3_{em})$

Static resistance (Lemmas 1–2): three independent layers from three axiom subsets, summing to 1836.

Dynamic maintenance (Lemma 3): substrate coupling across all channels at rate α_{em}, giving $\alpha_{em} \times 21$.

Isotropic leakage (Lemma 4): radiation loss normalised by the dimensional expression count and the solid angle, reducing the dynamic term by factor $(1 - 1/(84\pi))$.

$O(\alpha^2_{em})$ correction: the leakage of the leakage — the break operating on its own maintenance.

The coefficient 21 × 16/1836 arises from the same channel geometry (21) acting on the ratio of a dimension-count factor (16, whose structural decomposition from {21, 3, 4} is owed under KS-30.3 — it is not Layer 3, which is 9) to the static resistance (1836).

This term is structurally required by the recursive nature of 1:1 + 1×ε @ AS: the break breaks its own repair.

$O(\alpha^3_{em})$ and higher: each successive order is smaller by a factor of roughly α_{em}. The series converges but never terminates. This is ε operating recursively.

Numerical evaluation:

$1836 + (0.0072974 \times 21 \times 0.99621) + (0.0072974^2 \times 21 \times 16/1836)$

$= 1836 + 0.15266370 + 0.00000975 = 1836.15267344$

Measured (CODATA 2022): 1836.15267343(11)

Residual: +0.000000014 ≈ 0.008 parts per billion — 7.5× smaller than the experimental uncertainty (±0.06 ppb).

(The factors in the line above are shown rounded to the displayed digits; the products and the final ratio are evaluated at full precision — α = 0.00729735, $1 - 1/(84\pi)$ = 0.99621060.)

Precision

The O(1) term captures 99.992% of the ratio. The $O(\alpha\_em)$ correction captures the remaining 0.008%. The $O(\alpha^2\_em)$ correction captures the residual to within 0.008 ppb — below the current experimental uncertainty — using a coefficient whose structural decomposition is owed under KS-30.3; the parameter-free claim is therefore stated firmly at order α.

Each successive order in the perturbative expansion is smaller by a factor of roughly α_em. This is the signature of a natural perturbative series, not a fitted approximation.

7 — The Structural Residual

The measured proton-electron mass ratio exceeds the $O(\alpha\_em)$ prediction by approximately 0.00001. This residual is of order α^2_em — the next term in the perturbative expansion.

The governing axiom 1:1 + 1×ε @ AS demands this residual exist.

Perfect symmetry plus minimal break. Nothing closes perfectly. The formula expresses the proton's geometric resistance in terms of the manifold's structural constants with extraordinary precision. But the proton IS a break.

Its existence means the substrate has not closed. The formula describes the structure of the break, but it cannot describe the break completely, because the break is what makes the description possible.

Each order in the perturbative expansion captures more of the structure:

O(1): the static geometry — the integer resistance count (1836).

$O(\alpha\_em)$: the dynamic breathing and its leakage — the cost of sustaining the geometry (0.15266).

$O(\alpha^2\_em)$: the leakage of the leakage — the break operating on its own maintenance (~0.00001).

$O(\alpha^3\_em)$, $O(\alpha^4\_em)$, ...: each order catches a finer correction. The series converges but never terminates.

This is 1:1 + 1×ε @ AS operating recursively: the break breaks its own repair, which breaks the break of the repair, ad infinitum. Each layer adds roughly one factor of α_em (≈ 1/137) in precision.

The residual is not noise. It is not experimental error. It is not a missing term.

It is ε itself — the minimal break, persisting at the bottom of every derivation, exactly as the axiom demands.

The proof that the formula works IS the proof that it can never be perfect. 1:1 + 1×ε @ AS. Always.

8 — Connections

AP06 (The Leakage Constant)

α_em as the leakage constant provides both the dynamic maintenance rate and the perturbative expansion parameter. The proton's mass is fundamentally set by the substrate's leakage rate operating across the channel geometry.

AP10 (The Dimension)

The numbers 21, 3, and 4 all originate in AP10. Three spatial dimensions → three faces → 21 channels. Four spacetime dimensions. The entire formula is downstream of AP10's geometry.

AP19 (The Direction)

SU(3) from three faces. The face projection (Layer 2) and the exchange matrix (Layer 3) both arise from AP19's derivation of the strong interaction from the manifold's three-face structure.

AP20 (The Proof)

Axiom independence. The additivity of resistance layers (Lemma 1) depends on the independence of {S, B, R, C} proven in AP20.

AP28 (The Constant)

The 21-channel count. The G derivation. The connection between α_em and the gravitational constant. AP30 and AP28 share the same structural integers because they describe the same manifold from different angles.

AP29 (The Actualization Proof)

Coupling capacity κ(B). AP29 establishes that mass is κ(B) × AS — coupling capacity actualised. AP30 gives the specific resistance count for the proton: κ(B) for the 3-face, 21-channel bound state equals 1836 + O(α_em).

The Fusion Programme

The binding energy ceiling BE/A ≈ α_em × (1+1/π) × m_N (Clarification 6) no longer contains an empirical mass. With m_N/m_e derived, the ceiling is fully expressed in terms of {S, B, R, C}:

BE/A_ceiling = α_em × (1+1/π) × [1836 + α_em × 21 × (1 – 1/(84π))] × m_e

No free parameters remain in the nuclear binding energy ceiling.

The three fundamental quantities

AP03 establishes three fundamental quantities: c (propagation), ℏ (record), G (persistence). AP28 derives G from α_em, m_e, ℏ, and c. AP30 derives m_p from α_em, m_e, and manifold geometry.

Together with AP03, the axioms now express all fundamental scales in terms of the axioms.

Dated notes

7 September 2026. Five matters of record since the lock. None alters the body above; the body is left as written.

1. KS-NPP.1 fired on 2 August 2026 at 7.24σ: predicted 2.53099393 m_e against 2.530988574(74) m_e, an offset of 2.12 ppm on a 0.288 ppm bar (Master Kill Switch Registry v5.27). No repair is offered; the required correction is negative and every term in the decomposition is positive. The switch stands on the register as fired; AP47 (The Flip) carries the realised structural limb, KS-FLIP.1, frozen beside it. §0.5, the Kill Switches section and the Conditionality Footer read “all live” as of the lock.

2. KS-30.3 is paid, 6 September 2026, by AP49 (The Hold) §4 and §7: the chain of holders is ruled, every order follows as the previous times r = 16α/1836, and the series converges by

construction. The sixteen carried in §6 is read there as 4 × 4, the four conditions through the four dimensional expressions (KS-HOLD.2). AP49's closed form, 1836.152673445, supersedes §6's truncation by reference, beside it and not in its place.

3. §6 quotes 1836.15267343(11) under the label CODATA 2022. That value is the 2018 adjustment. CODATA 2022 gives 1836.152673426(32). Against it the $O(\alpha)$ result stands at 5.30 parts per billion, as the title states; the α^2-truncated value, 1836.152673444, sits 0.57σ above the measurement (10 parts per trillion); the residual of "0.008 ppb" stated in §6 is against the 2018 line.

4. KS-NPP.3 is retired as subsumed, by ruling of 7 September 2026, for the registry's next build. The switch names the fired value; consistency of a dead number tests nothing. Re-pointed at the realised value, it still cannot fire: lattice QCD resolves m_n − m_p to a few tenths of an MeV on 1.29 MeV (1.51 MeV with an accuracy of 0.3 MeV in the 2015 ab initio computation; 1.73(69) MeV in a 2022 calculation), so consistency with any ppm-level candidate is automatic. A switch that cannot fire is not a switch. The sign is KS-NPP.2's; the magnitude is the measurement's.

5. §8 states that the numbers 21, 3 and 4 all originate in AP10. AP10 derives the three faces and the four dimensions and does not carry the channel count; the twenty-one is AP28's, as §0.2 states.

Kill Switches

Kill switch numbers are globally unique across the body of work. Seven switches engage on this paper; all are live.

KS-30.1 — Additivity formalisation

Claim. Independent structural constraints acting on independent degrees of freedom contribute additively to total geometric resistance, giving the static sum 1764 + 63 + 9 = 1836.

Test. Show that the axioms require a non-additive combination rule for the three resistance layers, or that the layers do not span independent subspaces.

Status. LIVE — STRUCTURAL.

Recovery. The integer 1836 and the additive decomposition fail; the static count must be rebuilt from the correct combination rule. The Cartesian-product structure is argued from axiom independence (AP20), not yet exhibited as a theorem — the standing debt of this paper.

KS-30.2 — Leakage isotropy

Claim. The dynamic coupling leaks isotropically into the 3D substrate, normalised by the solid angle, giving the factor $1/(84\pi)$ exactly.

Test. Show the leakage is anisotropic — preferential radiation along specific channels or faces.

Status. LIVE — EMPIRICAL.

Recovery. The $1/(84\pi)$ correction changes; the $O(\alpha)$ term is modified by the anisotropy. The residual at $O(\alpha^2)$ is consistent with a small anisotropic contribution but this has not been derived.

KS-30.3 — Higher-order terms

Claim. The perturbative series converges, each successive order smaller by roughly α; the residual is ε operating recursively.

Test. Compute the explicit $O(\alpha^2)$, $O(\alpha^3)$ forms and show they misbehave — do not shrink, or do not close.

Status. LIVE — STRUCTURAL.

Recovery. The convergence claim is limited to the orders explicitly computed; a closed form for all orders is not yet derived.

KS-30.4 — Alternative formula

Claim. The hierarchical decomposition of 1836 from {21, 3, 4} is the unique structural construction.

Test. Exhibit a different formula in the 420 Code numbers that matches m_p/m_e to equal precision with a different structural interpretation.

Status. LIVE — STRUCTURAL. Registered against AP30 via Ø Predictions (Part I); operational test carried there per the Master Kill Switch Registry.

Recovery. The derivation is underdetermined; the structural reading becomes one of several candidates.

KS-NPP.1 — Two-component decomposition (neutron–proton mass)

Claim. The neutron–proton mass difference decomposes as $(m_n - m_p)/m_e = 3(1 - 1/(2\pi)) + \alpha(1 + 1/(2\pi)) = 2.53099$, matching the measured value to 2 ppm.

Test. Show the two-component decomposition is not forced by the structure.

Status. LIVE — STRUCTURAL. Registered against AP30 via Ø Predictions (Part III) per the Master Kill Switch Registry.

Recovery. The neutron–proton form fails; the mass-difference must be rebuilt.

KS-NPP.2 — Sign of the difference

Claim. The structure forces the neutron heavier than the proton (the sign of the mass difference).

Test. Show the sign is not determined by the geometry.

Status. LIVE — STRUCTURAL. Registered against AP30 via Ø Predictions (Part III) per the Master Kill Switch Registry.

Recovery. The structural account of the sign fails.

KS-NPP.3 — Lattice QCD consistency

Claim. The derived neutron–proton difference (2.53099 m_e, 2 ppm) is consistent with lattice QCD.

Test. A lattice-QCD result inconsistent with the derived value.

Status. LIVE — STRUCTURAL. Registered against AP30 via Ø Predictions (Part III) per the Master Kill Switch Registry.

Recovery. The consistency claim fails; the derivation conflicts with first-principles QCD.

What This Establishes and What Remains Open

What this paper closes

The proton-to-electron mass ratio is derived from {S, B, R, C} and one measured input, to within five parts per billion at order α with zero free parameters; the $O(\alpha^2)$ term reduces the residual to about 0.008 parts per billion, using a coefficient whose structural decomposition is owed under KS-30.3. Mass is established as geometric resistance, and the integer 1836 is decomposed into three independent static layers, each tracing to a distinct axiom subset.

What this paper does not close

The absolute electron-mass energy scale is not fixed by this paper. The rest of the mass spectrum — muon, tau, the quark hierarchy, the three-generation structure — is not derived; the method is conjectured to extend. The additivity of the resistance layers is argued, not formally proved (KS-30.1).

Items held open without claiming debt status

The closed-form expressions for the $O(\alpha^2)$ and higher orders (KS-30.3). The absolute energy scale of the electron mass, pending the connection to the Planck mass through AP28.

Where the philosophical-register implementations live

The mass derivation is read in plain-language register in Ø Predictions (Ø Models catalogue), Part I — The Proton's Weight, which constructs the same ratio by the same integer layers ($21^2 \times 4 + \ldots$) and the same α-order dynamic corrections; the neutron–proton material (KS-NPP) is read in Part III — The Neutron's Whisper.

Structural relationships to subsequent work

AP24 (The Residual), locked in Notebook IV, reads the proton mass as one of the six measured faces of ε; AP30 supplies the value of that face from {S, B, R, C} — framework-and-value, not a cycle. AP30 opens Notebook V — Particles and Matter — which AP22 (The

Ledger) and AP26 (The Surplus) complete: AP22 accounts for the antimatter by topological segregation, AP26 reads the matter surplus as the energy of the break.

The 420 Code placement

Notebook V — Particles and Matter, Chapter 1.

How the 420 Code reads now

With AP30 in place, the body of work expresses every fundamental scale in terms of the axioms and one measured input: c, $\hbar$, and G through AP03 and AP28, and now m_p/m_e through the channel geometry. The constants are no longer a list of independent numbers; they are faces and weights of one break.

The closing

Mass is not stuff. It is how hard the substrate resists you. Eighteen hundred and thirty-six times, for the proton — to five parts per billion.

Claim Summary

§1 Definitions [FRAMING / DEFINITION]. Mass is geometric resistance; the electron is the unit; the 420 Code numbers 21, 3, 4 and α are installed.

§2 Lemma 1 [STRUCTURAL ARGUMENT]. Independent constraints contribute additively (from axiom independence, AP20); KS-30.1 live.

§3 Lemma 2 [DERIVATION]. The static resistance 1764 + 63 + 9 = 1836, decomposed into manifold capacity, face projection, and exchange matrix; the decomposition is the unique hierarchical construction from {21, 3, 4}.

§4 Lemma 3 [DERIVATION]. The dynamic maintenance term $\alpha \times 21$, the break sustaining itself against the substrate's leakage across all channels.

§5 Lemma 4 [DERIVATION]. The isotropic-leakage correction $(1 - 1/(84\pi))$, the dynamic coupling radiating into 3D, normalised by the same dimensional structure that generates the static count.

§6 Proposition [DERIVATION]. $m_p/m_e = 1836 + \alpha \times 21 \times (1 - 1/(84\pi)) + O(\alpha^2)$: the $O(\alpha)$ term gives 5 ppb with zero free parameters; the $O(\alpha^2)$ term reduces the residual to ~0.008 ppb (1836.15267344 vs measured 1836.15267343) using a coefficient whose structural derivation is owed under KS-30.3.

§7 The Structural Residual [SYNTHESIS]. The residual is ε itself — the break persisting at the bottom of every order, exactly as the axiom 1:1 + 1×ε @ AS demands.

§8 Connections [INTEGRATION]. Ties the result to AP06, AP10, AP19, AP20, AP28, AP29, AP03, and the nuclear binding-energy ceiling.

Conditionality Footer

Dependencies. AP06 (The Leakage Constant), AP10 (The Dimension), AP19 (The Direction), AP20 (The Proof), AP24 (The Residual — six-face framework), AP28 (The Constant), AP29 (The Actualization Proof), AP03 (The Ratio).

Dependents. AP24 (The Residual) treats the proton mass as one of six measured faces of ε, whose value AP30 now derives — framework-and-value, not a cycle; AP22 (The Ledger) and AP26 (The Surplus) build on the matter sector this paper opens.

Kill switches closed by this paper. None.

Kill switches that remain live. KS-30.1, KS-30.2, KS-30.3, KS-30.4, KS-NPP.1, KS-NPP.2, KS-NPP.3.

Structural debts owed. Additivity formalisation (KS-30.1); the rest of the mass spectrum and the generation structure (meets KS-66 in AP27); the absolute electron-mass scale.

Items held open without claiming debt status. Closed forms for $O(\alpha^2)$ and higher (KS-30.3); the absolute electron-mass energy scale, pending AP28.

Series	The 42Ø Code
Catalogue	Ø Artist’s Proofs
Proof Number	AP3Ø
Title	The Resistance
Subtitle	Mass
Medium	Physics
Artist	G

STUDIO G