

The Surplus

Artist’s Proof 26

Baryon Asymmetry

Why more matter than antimatter — the ash of the break

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Artist’s Note

What this paper is, and why.

You are made of the leftovers. The early universe should have made equal matter and antimatter, and they should have annihilated to nothing — a universe of light with no structure in it. Instead a tiny fraction survived: about one part in a billion. That fraction is every star, every planet, every cell in your body.

This paper reads that surplus as the ash of the break. The axiom is 1:1 + 1×ε @ AS. The 1:1 is the symmetric component — matter and antimatter in balance, which annihilates and becomes the cosmic microwave background. The ε is the break, the asymmetric remainder, the part with no mirror. It cannot annihilate because there is nothing to annihilate it against. The surplus is ε. The ash is what had no partner.

Read as an energy partition, the asymmetry ratio follows directly: $\eta = E(\varepsilon) / (1 + E(\varepsilon))$, where $E(\varepsilon)$ is the dimensionless energy of the break. The form is derived. The value of $E(\varepsilon)$ is owed — and that debt is the sharpest blade in the body of work, tracked as KS-60. If $E(\varepsilon)$ is eventually derived and does not match the observed η, the energy partition is wrong and AP24’s constant-unification programme takes the wound with it.

AP26 is the form; AP22 (The Ledger) is the mechanism. AP22 shows where the antimatter went — topologically segregated behind every event horizon. AP26 shows how much matter was left. They reconcile across the horizon: the surplus on our side is matched by an equal and opposite surplus on the other, so the total is exactly zero. The universe borrowed nothing. It owes nothing.

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Orientation

Where this paper fits in the 420 Code

AP26 is the third and final chapter of Notebook V — Particles and Matter. AP30 (The Resistance) derived the mass of matter; AP22 (The Ledger) accounted for the antimatter by topological segregation; AP26 reads the leftover. It reads after AP22 (whose horizon conjugation protects the surplus), AP24 (which locks E(ε) to the other constants), and AP25 (whose Born rule normalises the symmetric component to one).

How to read this paper

The spine is short: Lemma 1 normalises the symmetric component to one (via AP25); Proposition 1 reads the partition and gives the form $\eta = E(\varepsilon) / (1 + E(\varepsilon))$; Proposition 2 shows the surplus survives annihilation because ε has no σ-image (via AP22). §6 names the one debt — the value of E(ε) — with unusual care, because it is the most exposed quantitative claim in the body of work. §7 is explicitly non-load-bearing synthesis; it carries no epistemic weight and says so. The gear-changes are intentional.

0 — Dependency and Scope

0.1 What this paper does

This paper derives the structural form of the baryon asymmetry of the universe from the core axiom. It does not derive the numerical value. It derives the form.

The universe contains approximately one excess baryon for every billion photons. This ratio, $\eta \approx 6 \times 10^{-10}$, is one of the most precisely measured numbers in cosmology.

The standard account requires baryogenesis — a process during the early universe that generated a slight excess of matter over antimatter, satisfying the Sakharov conditions.

The axioms offer a different account: the asymmetry is not generated by a process. It is structural. It is the axiom itself.

The core axiom is 1:1 + 1×ε @ AS. The 1:1 is the symmetric component. The ε is the break.

This paper shows that when the axiom is read as an energy partition, the baryon asymmetry ratio follows directly: $\eta = E(\varepsilon) / (1 + E(\varepsilon))$, where $E(\varepsilon)$ is the dimensionless energy of the break.

The form is derived. The value of $E(\varepsilon)$ is a formal debt.

0.2 Dependencies

The dependency chain: Axiom S (Symmetry — distinction) → Axiom B (Break — single break) → core axiom (1:1 + 1×ε @ AS) → AP06 (leakage constant, $\varepsilon > 0$) → AP18/AP21 (Energy–Measure Bridge, $\mu \to E$) → AP22 (the ledger: σ-asymmetry, topological protection of the surplus) → AP24 (the residual: all constants as projections of ε) → AP25 (the measure: Born rule, normalisation) → this paper (energy normalisation → partition → baryon asymmetry form).

0.3 Axiom mapping

Axiom S supplies the distinction (the symmetric 1:1). Axiom B supplies the single break ε — the asymmetric remainder with no σ-image. The core axiom 1:1 + 1×ε @ AS, read as an energy partition, is the whole content: the 1:1 normalises to one (AP25), the surplus is E(ε), and the asymmetry is their ratio.

0.4 Epistemic status per section

Epistemic status per section. §1 (The Problem): historical. §2 (The Axiom as Energy Partition): derived — Lemma 1 grounds the partition in AP25's measure theory and the Energy–Measure Bridge. §3 (The Form): derived — Proposition 1. §4 (Why the Surplus Survives): derived — Proposition 2, topological protection via AP22. §5 (Connection to the Leakage Constant): structural — the leakage constant is the break's coupling face (≈ 1/137); the energy face E(ε) that sets η is numerically distinct, and its value is owed (KS-60). §6 (The Formal Debt): debt. §7 (The Deeper Point): synthesis — non-load-bearing.

0.5 Kill switch summary

Three kill switches engage on this paper. KS-58 (surplus form) and KS-59 (topological protection) are LIVE — EMPIRICAL; the form is structurally secure, and proton decay has not been observed. KS-60 (derived-value mismatch) is LIVE — DEBT: when E(ε) is eventually derived from the self-consistency conditions, it must match the observed η, or the energy partition and AP24's programme both fail. KS-60 is the sharpest blade in the 420 Code.

0.6 Structural debts owed

The numerical value of E(ε), and with it the value of η, is owed — tracked across the body of work as KS-60. The energy-to-number coefficient g_eff (whether the mapping is direct, g_eff = 1, or carries a thermodynamic correction) is a precision question internal to that same debt: it is part of what KS-60 must settle, not a separate debt. The structural form, the topological protection, and the connection to the leakage constant are all derived results, not debts.

0.7 Items held open without claiming debt status

Whether E(ε) is best obtained by direct computation of the Standard Model spectrum (Path 1) or by the fixed-point method of AP24 (Path 2) is held open; both routes are sketched in §6.2.

0.8 Structural relationships

AP26 depends on AP22 (The Ledger) for the topological protection of the surplus: AP22 gives the mechanism (the antimatter is segregated behind horizons), AP26 gives the form (the surplus is ε, η = E(ε)). The two are complementary and reconcile across the horizon — the surplus on our side is matched by an equal and opposite surplus on the other, total exactly zero. That cross-horizon balance is settled only to the extent AP22's KS-47 survives: KS-47 holds LIVE — EMPIRICAL the question of whether the mass behind all horizons can account for the segregated antimatter, and AP26 inherits that tension rather than closing it. AP26 also depends on AP24, which locks E(ε) to α, m_e, and G; this is why E(ε) is not a free parameter, and why KS-60 is simultaneously a test of this paper and of AP24.

Notation

η — the baryon-to-photon ratio. Observed value: $\eta \approx 6 \times 10^{-10}$ (Planck 2018: 6.1×10^{-10}).

E(ε) — the dimensionless energy of the break. Defined as $E(\varepsilon) = \mu(\varepsilon) / \mu(1{:}1)$, where μ is the additive measure on the record monoid (AP18 Lemma 1, AP21 Energy–Measure Bridge).

E(ε) is a pure number in (0, 1), determined by the self-consistency conditions (AP24).

1:1 — the symmetric component of the axiom. In the energy partition, the component whose matter and antimatter contributions cancel perfectly upon annihilation.

1×ε — the break. The asymmetric component. The surplus that has no mirror image and therefore cannot annihilate.

ε_leak — the leakage constant (AP06). The non-zero probability that energy leaks past a perfect absorber. Identified with the break: ε = ε_leak.

σ — the orientation-reversal operator on the manifold (AP22). The break ε has no σ-image: σ(ε) is undefined.

g* — the effective number of relativistic degrees of freedom at a given energy scale. Relevant to the precise mapping between the energy ratio E(ε) and the observed number ratio η.

1 — The Problem of the Baryon Asymmetry

You are made of the leftovers.

The universe is made of matter. Not antimatter. This is strange. The laws of physics are nearly symmetric between matter and antimatter.

For every process that creates a particle, there is a corresponding process that creates its antiparticle.

If the universe began in a symmetric state — equal parts matter and antimatter — then all the matter should have annihilated with all the antimatter, leaving nothing but photons.

A universe of light and no structure.

Instead, approximately 10^{80} baryons and essentially zero primordial antibaryons. The baryon-to-photon ratio $\eta \approx 6 \times 10^{-10}$ tells us that for every billion matter-antimatter pairs that annihilated, roughly one extra baryon survived.

A surplus of one part in a billion.

The standard account (Sakharov, 1967) identifies three necessary conditions for generating this asymmetry: (1) baryon number violation, (2) C and CP violation, and (3) departure from thermal equilibrium.

These conditions are necessary but not sufficient — the Standard Model satisfies all three but cannot produce a large enough asymmetry. The precise mechanism of baryogenesis remains one of the open problems in physics.

The axioms offer a different account. The asymmetry is not generated by a dynamical process during the early universe. It is structural. It is present in the axiom itself, before any dynamics occur.

2 — The Axiom as Energy Partition

The core axiom is 1:1 + 1×ε @ AS. This is not a metaphor. It is the irreducible structure from which all else follows. The 1:1 is the symmetric component — the self-balancing ratio.

The 1×ε is the break — the asymmetric remainder that exists because the break is real (ε > 0, AP06).

Read this axiom as an energy partition. But first: why can the symmetric component be normalised to 1?

Lemma 1 (Energy Normalisation). The total energy budget of the symmetric component normalises to 1. This normalisation is inherited from the probability measure derived in AP25.

Proof. AP25 (The Measure) derives the Born rule as the unique probability measure on outcomes of actualisation: $\mu(P) = \mathrm{Tr}(|\psi\rangle\langle\psi| \cdot P)$.

This measure normalises to 1 by construction — the probabilities for all outcomes of a complete measurement sum to 1 (AP25, Lemma 1: orthogonal additivity; Axioms S + B: normalisation).

The symmetric component (1:1) is the set of all paired records: every particle matched by its antiparticle, every outcome matched by its conjugate.

The total measure of this set is the total probability of all pairwise-cancelling outcomes, which exhausts the symmetric sector.

By AP25's normalisation, this total is 1. The break ε sits outside the symmetric sector (it has no σ-image, AP22).

Its measure is $\mu(\varepsilon) = E(\varepsilon)$, defined via the Energy–Measure Bridge (AP18/AP21) as the ratio $\mu(\varepsilon)/\mu(1{:}1) = E(\varepsilon)/1 = E(\varepsilon)$. Therefore: the total energy budget is $1 + E(\varepsilon)$. ■

The total energy of the universe is thus distributed between two components:

Component 1: The symmetric energy. The energy associated with the 1:1. This energy condenses into matter-antimatter pairs in equal measure. When these pairs meet, they annihilate completely, converting their energy into radiation (photons).

This is the cosmic microwave background — the echo of the symmetric component's annihilation. Normalise this component to 1.

Component 2: The surplus energy. The energy associated with the break ε. This energy does not have a symmetric counterpart. It is the uncancellable remainder.

It cannot annihilate because there is nothing for it to annihilate with. This is the matter that forms stars, galaxies, and observers.

The total energy is therefore 1 + E(ε), where E(ε) is the dimensionless energy of the break. The surplus fraction is E(ε) / (1 + E(ε)).

You have watched a bonfire burn. The fire consumes everything that has a partner — fuel meets oxygen, matter meets antimatter, and both become light and heat.

When the fire is done, only the ash remains. The ash is what had no partner. The ash is ε.

The universe is made of ash — one part in a billion — and the cosmic microwave background is the light of the fire that consumed everything else.

3 — The Form

Proposition 1 (The Surplus Ratio). Let $E(\varepsilon)$ be the dimensionless energy of the break. The baryon asymmetry ratio takes the structural form $\eta = E(\varepsilon) / (1 + E(\varepsilon))$.

Proof. The core axiom partitions reality into two components: the symmetric (1:1) and the break ($1 \times \varepsilon$). The symmetric component produces equal quantities of matter and antimatter. Upon annihilation, this component converts entirely to radiation (photons).

The break component produces a surplus that has no antimatter counterpart (AP22: the break has no σ-image) and therefore survives annihilation as baryonic matter.

The total energy budget is $E_{total} = E_{symmetric} + E_{surplus} = 1 + E(\varepsilon)$ (normalising the symmetric component to 1).

After annihilation, the energy in radiation is $E_{radiation} = 1$ (from the symmetric annihilation) and the energy in surviving baryons is $E_{baryons} = E(\varepsilon)$ (from the surplus). The baryon-to-photon energy ratio is:

$\eta_E = E_{baryons} / E_{radiation} = E(\varepsilon) / 1 = E(\varepsilon)$.

The surplus as a fraction of total energy (surplus-to-total ratio) is:

$\eta = E(\varepsilon) / (1 + E(\varepsilon))$.

For $E(\varepsilon) \ll 1$ (which is established: the break is small), these two expressions are equivalent to leading order: $E(\varepsilon) / (1 + E(\varepsilon)) \approx E(\varepsilon)$. ■

3.1 — The energy-to-number mapping

Proposition 1 derives an energy ratio. The observed baryon-to-photon ratio $\eta \approx 6 \times 10^{-10}$ is a number ratio (baryons per photon), not directly an energy ratio.

The relationship between the two depends on the thermodynamics of the annihilation epoch.

At the annihilation epoch (~1 GeV), the average photon energy and the baryon mass are of comparable order, so the energy ratio and number ratio approximately coincide.

However, the precise mapping may carry a coefficient g_eff related to the effective number of relativistic degrees of freedom g* at the annihilation temperature. The general form is:

$\eta = E(\varepsilon) / (g_{eff} \cdot (1 + E(\varepsilon)))$

where g_eff absorbs the thermodynamic factors that convert the energy partition into a particle number ratio. In the simplest case, g_eff = 1 and Proposition 1's form is exact.

In the general case, g_eff is a calculable number that depends on the particle content at the segregation epoch.

This is not a weakness of the derivation — it is a precision question. The structural form (surplus fraction of total energy) is derived and locked.

The coefficient g_eff determines whether the mapping is direct or carries a thermodynamic correction. Determining g_eff requires knowing the segregation epoch and the particle spectrum at that epoch. This is part of what KS-60 must settle, not a separate debt.

4 — Why the Surplus Survives

Proposition 1 assumes that the surplus energy survives annihilation. This is not automatic. Why doesn't the surplus find something to annihilate with?

Proposition 2 (Topological Protection). The surplus E(ε) is topologically protected against annihilation. The break ε has no σ-image (AP22). Therefore the surplus has no antimatter counterpart and cannot annihilate.

Proof. AP22 (The Ledger) establishes that the orientation-reversal operator σ maps the matter sector ($\mathcal{L}$-sector) to the antimatter sector ($\mathcal{P}$-sector).

AP22's Proposition 1 proves that σ(ε) is undefined: the 1:1 bijection exhausts σ — every paired element of the symmetric component has a σ-image — so the break ε, the uncancelled remainder, lies outside the domain of σ and has no σ-image.

For every $\mathcal{L}$-record of the symmetric component, σ produces a corresponding $\mathcal{P}$-record: these are the matter-antimatter pairs that annihilate. But the break ε has no corresponding $\mathcal{P}$-record.

Therefore: the energy E(ε) associated with the break has no $\mathcal{P}$-sector counterpart. There is no antimatter for it to annihilate with. The surplus is topologically protected. ■

Note: This is the axioms' replacement for the Sakharov conditions. The standard account requires a dynamical process to generate the asymmetry during the early universe.

The axioms' account is that the asymmetry is structural — it exists in the axiom before any dynamics. The Sakharov conditions describe how an asymmetry could be generated from a symmetric initial state.

The axioms say the initial state was never symmetric: it was 1:1 + 1×ε @ AS. The asymmetry is primitive.

You have balanced a ledger. Every entry has a matching entry on the other side — except one. One line item with no counterpart.

You cannot cancel it because there is nothing to cancel it against. That line item is the visible universe.

Everything you have ever touched, tasted, or thought about is the one uncancellable entry in a ledger that otherwise balances perfectly.

5 — Connection to the Leakage Constant

AP06 (The Leakage Constant) proves that the break has a physical manifestation: the leakage probability ε_leak > 0. This is the non-zero probability that in any interaction, some energy leaks past what would otherwise be a perfect absorber.

The leakage is a consequence of the finiteness of c (Axiom C) and the irreversibility of records (Axiom R).

ε is one break with several faces (AP24). Its coupling face is the leakage constant ε_leak = α ≈ 1/137 (AP06) — how strongly the break couples back to the field it left. Its energy face is E(ε), the dimensionless energy of the break — the surplus it leaves in the energy budget. These are distinct numbers belonging to one object. The baryon asymmetry is set by the energy face E(ε), not by the coupling face.

Corollary (Leakage Interpretation). The baryon asymmetry ratio η is the energy face of the break as a fraction of the total energy budget: η = E(ε) / (1 + E(ε)). It is not the coupling face: ε_leak = α ≈ 1/137 would give η ≈ 7 × 10^{-3}, some seven orders of magnitude above the observed 6 × 10^{-10}. The energy face E(ε) is therefore numerically distinct from the coupling face; why the two faces of one break differ by orders of magnitude is part of what AP24's self-consistency must explain (KS-60).

The physical picture: the annihilation of the symmetric component is not perfectly efficient. A fraction E(ε) of the total energy survives as the break's surplus. This surviving energy is the baryonic matter of the observable universe.

The cosmic microwave background is the radiation from the symmetric annihilation. The baryon asymmetry is the ratio of surplus to total.

Connection to AP24. AP24 (The Residual) establishes that all fundamental constants are projections of ε. The fine-structure constant α_em, the electron mass m_e, the gravitational constant G, and ε_leak are all faces of one object.

This means E(ε) is not a free parameter — it is determined by the self-consistency conditions that fix the values of all the constants simultaneously.

The value of the baryon asymmetry is locked to the values of α_{em}, m_e, and G by the self-consistency. If you know any one constant, in principle you know them all.

Schematically, AP24's self-consistency has the structure of a fixed-point condition: $\varepsilon = f(\varepsilon)$, where f encodes how the break's energy determines the coupling constants, which in turn determine the energy scales at which the break manifests.

The function f is implicit in the derivation chain: $\varepsilon \rightarrow$ Hilbert space structure (AP09) $\rightarrow$ gauge group (AP15, AP16, AP19) $\rightarrow$ coupling constants $\rightarrow$ running of couplings (RGE) $\rightarrow$ low-energy value of ε.

The unique fixed point of this chain is the physical value of $E(\varepsilon)$. Making this chain explicit and solving for ε^* is the content of KS-60.

6 — The Formal Debt

This paper derives the form of the baryon asymmetry ratio. It does not derive the value. The form is $\eta = E(\varepsilon) / (1 + E(\varepsilon))$. The value requires deriving $E(\varepsilon)$ from first principles.

This is a formal debt.

6.1 — What must be computed

The debt is: derive the dimensionless value $E(\varepsilon)$ from the self-consistency conditions established in AP24. The target is $E(\varepsilon) \approx 6 \times 10^{-10}$, which would yield $\eta \approx 6 \times 10^{-10}$ (since $E(\varepsilon) \ll 1$).

6.2 — Two paths to the value

Path 1 (Direct computation). Derive the full Standard Model particle spectrum as harmonics of ε. Write the renormalisation group equations with the derived spectrum.

Run the couplings from the Planck scale (where $E(\varepsilon) \to 1$, the break total in the limit) to low energies.

The unique low-energy value of $E(\varepsilon)$ that produces self-consistent values for $\alpha_{em} \approx 1/137$ and $m_e \approx 0.511$ MeV is the answer. This path requires deriving the particle spectrum first (a major undertaking).

Path 2 (Fixed-point method). AP24 identifies a fixed-point structure: $\varepsilon = f(\varepsilon)$, where f encodes the self-consistency conditions. Formulate f explicitly and solve for the non-trivial fixed point.

If f has a unique stable fixed point in (0, 1), that fixed point is $E(\varepsilon)$. This path is more elegant but requires formulating f, which itself depends on the coupling structure.

6.3 — The energy-to-number coefficient

The mapping from the energy ratio E(ε) to the observed number ratio η may carry a thermodynamic coefficient g_eff related to the effective degrees of freedom at the annihilation epoch.

Determining whether g_eff = 1 (the direct mapping) or g_eff ≠ 1 (requiring a correction) is part of the debt.

6.4 — What this debt does not include

This debt is about the numerical value of E(ε).

The following are NOT debts — they are derived results: the form of the baryon asymmetry ratio (Proposition 1), the topological protection of the surplus (Proposition 2, from AP22), and the connection to fundamental constants via AP24's self-consistency. The numerical value of E(ε) — and the reason the energy face differs from the coupling face α — is the debt (KS-60).

The structural account is complete. The universe has a baryon asymmetry because the axiom is 1:1 + 1×ε @ AS, not 1:1. The form is forced. The value is the remaining calculation.

7 — The Deeper Point

Synthesis note: the following is non-load-bearing language. It carries no epistemic weight beyond the claims established above.

The standard account of the baryon asymmetry requires a sequence of specific physical events during the early universe: baryon number violation, CP violation at the right level, departure from equilibrium at the right moment.

It is a story about process. Something happened to tip the balance.

The axioms' account is different. Nothing tipped the balance. The balance was never there. The axiom is not 1:1. It is 1:1 + 1×ε @ AS. The asymmetry is not generated. It is primitive.

It exists before space, before time, before any process. The surplus is the break itself, read as energy.

The reason you exist — the reason there is matter rather than just light — is that the axiom has a remainder. The universe is not perfectly symmetric. It never was.

The imperfection is one part in a billion, and it is everything: every star, every planet, every thought. The splinter that escaped.

Kill Switches

Kill switch numbers are globally unique across the body of work. Three switches engage on this paper.

KS-58 — Surplus form

Claim. The baryon asymmetry has the energy-partition form $\eta = E(\varepsilon) / (g_{eff} \cdot (1 + E(\varepsilon)))$, with g_{eff} a calculable thermodynamic factor at the annihilation epoch (Proposition 1; the bare form $\eta = E(\varepsilon) / (1 + E(\varepsilon))$ is the $g_{eff} = 1$ case).

Test. Show the baryon asymmetry has a structural form incompatible with this energy partition.

Status. LIVE — EMPIRICAL. Structurally secure.

Recovery. Proposition 1 fails; the energy-partition reading of the axiom is wrong and the surplus must be rebuilt from a different partition.

KS-59 — Topological protection

Claim. The surplus $E(\varepsilon)$ is topologically protected against annihilation because ε has no σ-image (Proposition 2, via AP22).

Test. Observe baryon-number violation — in particular proton decay — at a rate sufficient to erase the asymmetry within the age of the universe.

Status. LIVE — EMPIRICAL. Proton decay has not been observed; current experimental bounds are consistent with the protection claim.

Recovery. Proposition 2 fails; the surplus is not protected and the structural account of its survival collapses.

KS-60 — Derived-value mismatch

Claim. When $E(\varepsilon)$ is derived from the self-consistency conditions (AP24), it yields the observed $\eta \approx 6 \times 10^{-10}$ — including whatever the energy-to-number coefficient g_{eff} is found to be.

Test. Derive E(ε) from the self-consistency conditions and show it disagrees with the observed η; or show the asymmetry depends on a parameter independent of the fundamental constants.

Status. LIVE — DEBT. The sharpest blade in the 420 Code: not merely a test of this paper but of AP24's central claim that all constants are projections of one break.

Recovery. The axiom's energy partition is wrong, or AP24's fixed-point structure is wrong; the value owed under this debt cannot be discharged and the constant-unification programme is wounded.

What This Establishes and What Remains Open

What this paper establishes

The structural form of the baryon asymmetry, $\eta = E(\varepsilon) / (1 + E(\varepsilon))$, derived from the core axiom read as an energy partition (Proposition 1). The topological protection of the surplus, because ε has no σ-image (Proposition 2, via AP22). The connection of the surplus to the leakage constant and to AP24's self-consistency, which locks $E(\varepsilon)$ to the other fundamental constants. The structural account of why there is matter rather than only light is complete.

What this paper does not do

It does not derive the numerical value of $E(\varepsilon)$, and so does not derive the value of η. That value — including the energy-to-number coefficient g_{eff} — is owed under KS-60.

Items held open without claiming debt status

Which of the two paths to the value (direct spectrum computation, or the AP24 fixed-point method) is the right route. Both are sketched in §6.2. Separately, the cross-horizon mass balance that underwrites the surplus is held open as AP22's KS-47 (mass accounting behind all horizons), inherited here rather than closed.

Where the philosophical-register implementations live

AP26 is formal-register throughout. η appears among the five derived numbers read in plain language in Ø Predictions (Ø Models catalogue); the matter–antimatter asymmetry is read structurally, from the binary character of B at primordial coupling sites, in Ø Resolutions. Neither is a dedicated companion to the energy-partition reading itself — the surplus-as-ash treatment has no single expository twin in the present Ø Models catalogue, and this is recorded rather than papered over.

Structural relationships to subsequent work

AP26 closes Notebook V — Particles and Matter. With AP30 (mass), AP22 (antimatter), and AP26 (the surplus) in place, the matter sector is built: the break has produced spacetime, the quantum record, the forces and constants, and now the matter those constants weigh.

The 420 Code placement

Notebook V — Particles and Matter, Chapter 3.

The closing

Nothing tipped the balance. The balance was never there. The axiom was 1:1 + 1×ε @ AS from the beginning, and the surplus is the break itself. You are the one uncancellable entry, read at the scale of a universe — the ash of a crack whose coupling face has depth α ≈ 1/137 (the surplus itself being the energy face, E(ε)).

Claim Summary

§1 The Problem [HISTORICAL]. The observed baryon asymmetry $\eta \approx 6 \times 10^{-10}$ and the Sakharov account.

§2 The Axiom as Energy Partition [DERIVED]. Lemma 1 normalises the symmetric component to one (via AP25's Born rule); the total energy is $1 + E(\varepsilon)$, the surplus being the break.

§3 The Form [DERIVED]. Proposition 1: $\eta = E(\varepsilon) / (1 + E(\varepsilon))$; for $E(\varepsilon) \ll 1$, $\eta \approx E(\varepsilon)$.

§3.1 The energy-to-number mapping [DERIVED / PRECISION]. The energy ratio maps to the number ratio up to a coefficient g_eff, a calculable thermodynamic factor at the annihilation epoch.

§4 Why the Surplus Survives [DERIVED]. Proposition 2: the surplus is topologically protected because ε has no σ-image (via AP22) — the axioms' replacement for the Sakharov conditions.

§5 Connection to the Leakage Constant [STRUCTURAL]. The leakage constant is the break's coupling face ($\varepsilon_{leak} = \alpha \approx 1/137$); the energy face $E(\varepsilon)$ that sets η is numerically distinct. AP24 locks $E(\varepsilon)$ to α, m_e, and G, so $E(\varepsilon)$ is not a free parameter; its value is owed (KS-60).

§6 The Formal Debt [DEBT]. The value of $E(\varepsilon)$ (and g_eff) is owed — tracked as KS-60, the sharpest blade in the body of work.

§7 The Deeper Point [SYNTHESIS — non-load-bearing]. Nothing tipped the balance; the asymmetry is primitive, present in the axiom before any process.

Conditionality Footer

Dependencies. Axiom S (Symmetry — distinction), Axiom B (Break — single break); AP06 (leakage constant, $\varepsilon > 0$), AP18 / AP21 (Energy–Measure Bridge), AP22 (the ledger: σ-asymmetry, topological protection), AP24 (the residual: all constants as projections of ε), AP25 (the measure: Born rule, normalisation).

Dependents. Closes Notebook V. AP24's self-consistency programme is tested by — not dependent on — this paper's form (KS-60).

Kill switches closed by this paper. None.

Kill switches not closed by this paper. KS-58 (LIVE — EMPIRICAL), KS-59 (LIVE — EMPIRICAL), KS-60 (LIVE — DEBT).

Structural debts owed. The numerical value of $E(\varepsilon)$ and η, including the g_{eff} coefficient — tracked across the body of work as KS-60.

Items held open without claiming debt status. Which of the two paths (direct computation, fixed-point method) yields $E(\varepsilon)$.

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Catalogue	Ø Artist’s Proofs
Proof Number	AP26
Title	The Surplus
Subtitle	Baryon Asymmetry
Medium	Physics
Artist	G

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STUDIO 6