

The Localization-Exponent Convention and κ -Reconciliation Theorem in VERSF

▲ Programme Milestone — Quantitative Normalisation Series Gate QN-1 / Localization-Scale and κ -Convention Closure

Reconciling amplitude, probability, stiffness, compliance, channel-log, gap-scale, and gravitational-response uses of κ without moving the physics

Keith Taylor VERSF Theoretical Physics Programme — Quantitative Normalisation Series Tier A convention-stability gate paper, QN-1

General Reader Summary

A theory can fail not because its central idea is wrong, but because its notation quietly shifts.

VERSF has reached the point where several numerical and symbolic quantities appear in closely related roles: localization strength, commitment stiffness, barrier compliance, channel-count suppression, gap mass, and gravitational response. Several of these have been written with the symbol κ , or with closely related numbers:

$8/3$, $3/8$, $\ln 14$, $\sqrt{(4/3)} \cdot \xi^{-1}$, κ_{eff} .

A critic is therefore entitled to ask:

Are these genuinely connected, or is κ being moved around to make different calculations work?

This paper answers by imposing a strict convention discipline. The central point is simple:

There is not one untyped κ . There are typed κ -like quantities. Some are localization exponents, some are probability exponents, some are reciprocals, some are channel-count logarithms, some are inverse-length gap scales, and some are dimensional gravitational couplings. They can be reconciled only through explicit convention maps.

When the convention is fixed, the apparent κ -discrepancies disappear. In particular:

- $8/3$ is the canonical dimensionless localization-stiffness representative.
- $3/8$ is its exact reciprocal compliance coefficient, not a rival localization exponent.
- A probability-density exponent is exactly twice the corresponding amplitude exponent.
- $\ln 14$ is a channel-count log weight from the 14-channel census; it is close to $8/3$ but not equal to it, and the mismatch is quantified rather than hidden.

- $m^\star = \sqrt{(4/3)} \cdot \xi^{-1}$ (historical alias m_κ) is an inverse-length gap scale, not a dimensionless exponent.
- κ_{eff} is a dimensional gravitational-response coupling, not a localization exponent.

The theorem does **not** claim that these quantities are numerically equal. That claim would be weak, unsafe, and false. It proves something stronger and cleaner:

Once κ -like symbols are typed by role, measure, exponent level, and dimensional status, every legitimate conversion preserves the same physical localization observable. Any mismatch that cannot be removed by the convention map is not a notation issue; it is a real falsifier or an open derivation debt.

In one sentence:

VERSF's κ -symbols reconcile only after convention typing: $8/3$, $3/8$, $\ln 14$, m^\star , and κ_{eff} are not competing values of one parameter, but different representatives — or different objects — in the localization-normalisation ledger.

Scope Box — What QN-1 Closes and What It Does Not

Claim	Status
Bare κ is invalid notation in quantitative gates	Closed
Amplitude/probability exponent factor of two	Closed
$8/3$ vs $3/8$ confusion	Closed, conditional on the inherited reciprocal construction (QN-5)
$8/3$ vs $4/3$ gap relation	Closed, conditional on the inherited halving construction (QN-7)
$8/3$ vs $\ln 14$ equality	Not closed; bridge debt BD-1
First-principles origin of $8/3$	Not closed; bridge debt BD-2
κ_{eff} gravitational-response derivation	Not closed; bridge debt BD-3

This box is the paper in miniature. The first four rows are established here — two unconditionally, two under named inherited constructions; the last three are quarantined as bridge debts (§10.5), not smuggled.

Contents

§	Section
—	Scope Box — What QN-1 Closes and What It Does Not
—	Abstract
0	Inheritance, Notation, and Firewalls
0'	Predictive-Content Ledger
1	Purpose, Claim Level, and Named Premises
2	The κ -Drift Problem
3	Typed κ -Objects and Convention Classes
4	The Localization Invariant
5	Amplitude, Probability, and Exponent Doubling
6	Stiffness, Compliance, and the $8/3 \leftrightarrow 3/8$ Reconciliation
7	The ln 14 Channel-Log Convention
8	The Gap-Scale Convention: $m^* = \sqrt{(4/3)} \cdot \xi^{-1}$
9	The Gravitational-Response Convention: κ_{eff}
10	The Convention-Reconciliation Map
11	The Localization-Exponent Convention and κ -Reconciliation Theorem
12	Audit of κ -Like Appearances Across the Programme
13	Why This Is Not Numerology or Parameter Fitting
14	Relation to Later Mass, Coupling, and Hierarchy Gates
15	Falsification Conditions
16	QN-1 Closure Certificate
17	Conclusion
A	Appendix A — Minimal Algebraic Skeleton
B	Appendix B — κ Convention Dictionary
C	Appendix C — Referee Objections and Replies

Abstract

VERSF employs a finite commitment scale ξ , localization laws, completion densities, closure stiffnesses, channel-count suppressions, gap scales, and effective response couplings. Across the programme, κ -like notation has appeared in several distinct roles: as a dimensionless localization exponent, as a probability-density exponent, as a reciprocal barrier coefficient, as a logarithmic channel-count weight, as part of the inverse-length mass scale historically written m_{κ} , and as a dimensional gravitational-response coupling κ_{eff} .

This creates a convention-stability problem. If these appearances are not separated, the programme is vulnerable to an obvious objection: that κ serves as an adjustable symbol whose value changes between calculations.

This paper proves that the legitimate κ -like appearances are reconcilable once they are convention-typed — and, equally important, that the ones which are *not* reconcilable are explicitly registered as distinct objects or open bridge debts rather than silently identified.

Let ξ be the VERSF coherence/commitment scale, and let

$$u = \rho/\xi$$

be the dimensionless support-distance variable. A localization convention \mathcal{C} specifies: (i) the object being localized (amplitude, probability density, support weight, completion density); (ii) the exponent variable (u , u^v , $\log N$, or a channel-count step); (iii) the measure convention; (iv) the normalization convention; and (v) the dimensional status of the coefficient.

The physical localization datum is not the bare symbol κ . It is the invariant log-attenuation

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)].$$

Two κ -representatives are convention-equivalent if and only if they generate the same \mathcal{L}_Q for the same physical object under the stated change of convention. The set of valid convention transformations forms a groupoid: exact conversions compose, invert, and never alter observables.

The paper proves the following. First, amplitude-level and probability-level localization exponents differ by an exact factor of two when the same underlying amplitude is represented. Second, $8/3$ and $3/8$ are not competing localization exponents: $3/8$ is the reciprocal compliance coefficient of the canonical stiffness representative $8/3$. Third, $\ln 14$ is a channel-log suppression associated with the $2K = 14$ paired-channel census; it differs from $8/3$ by $\delta_{14} = 8/3 - \ln 14 \approx 0.027609$, and the compounding of this mismatch under repeated steps is bounded explicitly, so silent substitution is forbidden. Fourth, $m_{\star} = \sqrt{(\kappa_{\star}/2)} \cdot \xi^{-1} = \sqrt{4/3} \cdot \xi^{-1}$ (historical alias m_{κ}) is a dimensional inverse-length gap scale whose quadratic coefficient $4/3$ arises as the one-sided half of the two-sided closure stiffness, $4/3 = (8/3)/2$, by the inherited halving construction; it is not itself a dimensionless localization exponent. Fifth, κ_{eff} is a dimensional response coupling and

must never be identified with a dimensionless localization κ without an explicit dimensional bridge.

The theorem establishes that no physical observable changes under a valid convention transformation. Conversely, any κ -discrepancy that survives the typed convention map is a real derivation debt or a falsifier.

QN-1 is not a numerical-origin theorem. It is a convention-stability theorem. Its claim is not that $\kappa^* = 8/3$ has here been derived from first principles, but that once κ^* is inherited as the canonical localization-stiffness representative, all κ -like appearances in the programme are either exactly converted, exactly typed as composites grounded in inherited constructions, or explicitly quarantined as bridge debts.

QN-1 therefore closes the κ -convention problem: VERSF may proceed to quantitative mass, hierarchy, coupling, and response gates using a disciplined κ -ledger rather than an untyped symbol.

0. Inheritance, Notation, and Firewalls

0.1 Inherited commitments

QN-1 inherits the following commitments from earlier VERSF gates.

I1 — Finite commitment scale. VERSF uses a finite coherence/commitment scale

$$\xi \approx 8.2 \times 10^{-5} \text{ m},$$

with associated minimal continuation time

$$\tau_s = \xi/c \approx 0.28 \text{ ps}.$$

The numerical calibration of ξ is not rederived here.

I2 — Physical-record discipline. Physical quantities must be tied to terminal record consequences or to structures required for such consequences. Bare symbols are not physical until their role in the record algebra is fixed.

I3 — Closure-census discipline. The paired-channel closure count

$$2K = 14$$

is an inherited census structure, not a fitted number introduced in this paper.

I4 — Minimal Standard Model / VERSF census boundary. QN-1 adds no particles, sectors, gauge channels, or Higgs ledgers. It concerns notation, exponent conventions, and parameter coherence inside the existing programme.

I5 — QC-1 physical-sector discipline. Later quantitative gates work in the adjoint-removed physical quotient. QN-1 does not reopen the ghost, negative-norm, or adjoint-residue problem.

I6 — Quantitative gates require convention-typed constants. Mass ratios, hierarchy factors, coupling normalisations, and response coefficients must not depend on an untyped reuse of the same symbol.

QN-1 does not re-prove these commitments. It asks whether the κ -like symbols used in the quantitative programme are internally coherent.

0.2 Standing notation

The commitment scale is ξ . The dimensionless support-distance coordinate is

$$u = \rho/\xi,$$

where ρ denotes an emergent support distance, fold distance, or localization distance appropriate to the context.

A generic localized quantity is denoted $Q(u)$. Its invariant log-attenuation is

$$\mathcal{L}_Q(u) = -\log [Q(u) / Q(0)].$$

A convention-specific κ representative is written $\kappa_{\mathcal{C}}$. The subscript \mathcal{C} is not cosmetic: it records the convention under which the coefficient is used.

0.3 Firewalls

This paper does **not** claim:

- that every occurrence of the symbol κ in earlier notes meant the same thing;
- that $\ln 14 = 8/3$;
- that $3/8$ is a localization stiffness;
- that $m^\star = \sqrt{4/3} \cdot \xi^{-1}$ is dimensionless;
- that κ_{eff} is the same object as a localization exponent;
- that numerical closeness proves physical identity;
- that a power-law exponent and an exponential-decay coefficient are interchangeable;
- that the value $8/3$ is derived from first principles in this paper;
- that all quantitative VERSF constants are now closed.

It proves a narrower and necessary result:

Once the convention is typed, every legitimate κ -like appearance either maps to the same invariant localization datum, maps to a reciprocal/composite/gap quantity by an explicit exact rule, or is classified as a separate quantity that must not be identified.

0'. Predictive-Content Ledger

Object	Prior status	Status here
Commitment scale ξ	inherited	retained
Dimensionless support variable $u = \rho/\xi$	implicit	made canonical
Bare symbol κ	overloaded	disallowed
Typed κ -representative $\kappa_{\mathcal{C}}$	not systematic	defined
Physical localization datum \mathcal{L}_Q	implicit	defined as invariant
Convention transformations	ad hoc	proved to form a groupoid
Amplitude exponent	used	typed
Probability exponent	sometimes conflated	reconciled by exact factor two
Canonical stiffness $8/3$	used in later gates	assigned canonical localization-stiffness role
Reciprocal coefficient $3/8$	risk of confusion	typed as compliance/barrier reciprocal
$\ln 14$	near $8/3$, potentially conflated	typed as channel-log weight; mismatch δ_{14} quantified and bounded
$m_{\kappa} = \sqrt{(4/3)} \cdot \xi^{-1}$	used as gap scale	typed as inverse-length gap representative; renamed m_{\star} , alias retained
κ_{eff}	used in gravity/response contexts	typed as dimensional response coupling
Power-law localization exponents	previously possible	separated from exponential κ
Convention transformation rule	absent	proved
Observable invariance under convention change	required	made definitional (QN-V); chain-invariance proved via groupoid closure
Well-definedness of \mathcal{L}_Q (positive envelope, $Q(0) > 0$)	implicit	stated
Mechanism grounding for $c_{\star} = \kappa_{\star}^{-1}$	implicit	inherited construction named (QN-5), dependency registered
Mechanism grounding for $g_{\kappa} = \kappa_{\star}/2$	implicit	inherited construction named (QN-7), dependency registered

Object	Prior status	Status here
κ -reconciliation dictionary	absent	provided
Bridge-theorem admissibility conditions	absent	specified
Unresolved numerical equality claims	possible	converted into bridge debts or falsifiers
Later mass/hierarchy gates	vulnerable to κ drift	supplied with convention ledger

1. Purpose, Claim Level, and Named Premises

1.1 The question

The problem is not that VERSF uses κ -like quantities. That is unavoidable in a programme involving localization, stiffness, closure rates, gap scales, and response couplings.

The problem is that a symbol can drift. A single letter can be used for:

- an amplitude decay coefficient;
- a probability-density decay coefficient;
- a stiffness;
- a reciprocal compliance;
- a channel-count logarithm;
- an inverse-length mass scale;
- a gravitational coupling;
- a power-law scaling exponent.

These are not the same mathematical object. QN-1 asks:

Can the κ -like appearances in VERSF be reconciled without treating κ as an adjustable parameter?

The answer is yes — but only after strict convention typing, and only because the typing refuses to force false equalities.

1.2 Claim level

Claim level: QN-1 convention-stability and κ -reconciliation theorem.

Epistemic grade: Conditional technical closure, relative to the inherited VERSF commitment scale, closure-census structure, and previously assigned canonical localization-stiffness representative.

QN-1 does **not** derive every numerical coefficient from first principles. It proves:

Given a localization convention, κ has a fixed meaning. Given a change of convention, κ transforms by a fixed map. Given two κ -like quantities of different type, they must not be identified unless a bridge theorem supplies the conversion.

1.3 Named premises and the validity definition

Premise QN-1 — Commitment scale and dimensionless support variable

VERSF supplies a finite commitment scale ξ . Any support-distance localization law must be expressible in terms of a dimensionless support variable

$$u = \rho/\xi,$$

or an explicitly defined dimensionless replacement.

Falsifier: a localization law contains a dimensional exponent coefficient without an accompanying scale or dimensionless support variable.

Premise QN-2 — Physical localization datum

For every localized quantity Q , the convention-independent localization datum is the log-attenuation

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)].$$

Here Q denotes the strictly positive localization envelope of the object in question, with $Q(0) > 0$: for a complex or sign-changing amplitude ψ , the localized quantity is the modulus profile $Q = |\psi|$ (or the stated positive envelope), so that the ratio $Q(x)/Q(0)$ is positive and the logarithm is single-valued. \mathcal{L}_Q is defined on this class of strictly positive normalised profiles.

The bare written coefficient is not physical by itself. The physical content is the attenuation of the relevant quantity under the relevant support variable and measure.

Falsifier: two expressions claimed to be convention-equivalent give different \mathcal{L}_Q for the same physical quantity.

Premise QN-3 — Convention tuple

A localization convention is a tuple

$$\mathcal{C} = (Q, z, s, \mu, \mathcal{N}, d),$$

where:

- Q is the localized object: amplitude, probability density, support weight, completion density, record weight;
- z is the dimensionless exponent variable: u, u^v, log N, or a channel step;
- s is the level factor distinguishing amplitude, probability, or composite objects;
- μ is the measure convention;
- \mathcal{N} is the normalization convention;
- d records dimensional status.

A κ-symbol is meaningful only as κ _{\mathcal{C}} .

Falsifier: a derivation uses κ without specifying which convention tuple it belongs to.

Premise QN-4 — Canonical localization-stiffness representative

The canonical dimensionless localization-stiffness representative is

$$\kappa^* = 8/3.$$

In QN-1 this value is not derived from nothing. It is the canonical representative whose consistency with other κ-like appearances is being audited.

Falsifier: the upstream closure/stiffness derivation fails to justify 8/3, or later calculations require a different canonical stiffness without a convention transformation.

Premise QN-5 — Reciprocal compliance convention (upstream construction)

In the inherited barrier/compliance construction, the compliance coefficient is *defined* as the reciprocal of the closure stiffness: compliance is constructed as inverse stiffness, not obtained by an independent numerical route. The reciprocal of the canonical stiffness is therefore

$$c^* = \kappa^{*-1} = 3/8$$

by construction. This coefficient may appear in barrier or compliance expressions, for example

$$\Phi_c = c^* \cdot \hbar c / \xi,$$

but it is not a rival stiffness exponent. The mechanism discharging §10.4 for this relation is the upstream reciprocal construction itself; QN-1 inherits it as it inherits κ*.

Source gate: the Closure-Entropy and Commitment-Barrier gate, identified in the Master Ledger entry for QN-1, which constructs the barrier energy Φ_c with coefficient multiplying E_ξ = ħc/ξ. Falsifier 2 is checked against that gate's construction.

Falsifier 1: $3/8$ is used in the same slot as κ^\star without reciprocal conversion. *Falsifier 2:* the upstream barrier gate is found to obtain $3/8$ by an independent derivation not constructed as the stiffness reciprocal — in which case $c^\star = \kappa^\star^{-1}$ downgrades to a class-3 exact-value bridge debt (§10.4).

Premise QN-6 — Channel-count log convention

The paired-channel census gives $2K = 14$. A uniform one-channel selection weight may be written

$$1/14 = e^{(-\ln 14)}.$$

Therefore

$$\lambda_{14} := \ln 14$$

is a channel-log weight. It is not automatically identical to $\kappa^\star = 8/3$. Numerically,

$$\ln 14 \approx 2.639057, \quad 8/3 \approx 2.666667,$$

so

$$\delta_{14} = 8/3 - \ln 14 \approx 0.027609.$$

Falsifier: a derivation treats $\ln 14$ and $8/3$ as exactly equal without a bridge theorem accounting for δ_{14} .

Premise QN-7 — Gap-scale convention

The expression

$$m^\star = \sqrt{(4/3)} \cdot \xi^{-1} \text{ (historical alias } m_\kappa; \text{ §8.4)}$$

is an inverse-length gap scale. It is dimensionful. It is not a dimensionless localization exponent. Its quadratic coefficient is

$$g_\kappa = 4/3.$$

In the inherited closure/stiffness construction, the quadratic gap form arises from the one-sided branch of the two-sided closure law: the two-sided stiffness κ^\star distributes equally over its two branches, so the one-sided quadratic coefficient is $\kappa^\star/2$ *by construction*, giving

$$g_\kappa = \kappa^\star/2 = 4/3.$$

The mechanism discharging §10.4 for this relation is that upstream halving construction; QN-1 inherits it as it inherits κ^* . The arithmetic identity $4/3 = (8/3)/2$ is the *consequence* of the construction, not the evidence for it.

Source gate: the closure/stiffness gate in which the two-sided closure law and its one-sided quadratic gap form are constructed, identified in the Master Ledger entry for QN-1. Falsifier 2 is checked against that gate's construction.

Falsifier 1: m^* or $4/3$ is treated as the same object as κ^* without noting dimensional status and the factor-of-two relation. *Falsifier 2*: the upstream gap derivation is found to produce $4/3$ by an independent route not constructed as the one-sided half of the two-sided closure stiffness — in which case $g_\kappa = \kappa^*/2$ downgrades to a class-3 exact-value bridge debt (§10.4).

Premise QN-8 — Gravitational-response convention

A symbol such as κ_{eff} in a gravitational or response equation is dimensional unless explicitly nondimensionalized. It belongs to response normalisation, not localization-exponent convention.

Falsifier: κ_{eff} is numerically identified with a dimensionless localization κ without a dimensional bridge.

Definition QN-V — Valid convention transformation

A convention transformation is **valid** if and only if it preserves the invariant log-attenuation \mathcal{L}_Q pointwise for the shared localized object. It follows *definitionally* that a valid transformation preserves every observable \mathcal{O} depending only on the underlying physical localization:

$$\mathcal{O}(\kappa_{\mathcal{C}_1}, \mathcal{C}_1) = \mathcal{O}(\kappa_{\mathcal{C}_2}, \mathcal{C}_2).$$

This is stated as a definition rather than a premise: observable invariance of a single valid step is true by construction, and its role in the paper is as a discipline. The substantive, non-definitional content lives in §3.4 — valid transformations compose into a groupoid, so invariance extends to arbitrary finite chains and a discrepancy at the end of a chain implies an invalid step within it.

Discipline check: if a supposed convention change alters a predicted observable, it was not a valid transformation under this definition (falsifiers F10, F11).

2. The κ -Drift Problem

2.1 Why κ -drift is dangerous

A technical programme reaches maturity when its symbols stop drifting.

Early-stage theoretical work permits shorthand: a symbol is reused because the surrounding context makes the meaning obvious. Once numerical gates begin, shorthand becomes dangerous. The κ problem is exactly this.

VERSF contains several nearby structures:

1. the finite commitment scale ξ ;
2. localization suppression;
3. closure stiffness;
4. barrier compliance;
5. the paired-channel census $2K = 14$;
6. the gap scale $m\star$;
7. the effective gravitational response κ_{eff} ;
8. scaling laws in fact number N_f .

Each naturally invites κ -like notation. None is interchangeable with the others.

If the programme uses $8/3$ in one place, $3/8$ in another, $\ln 14$ in a third, and $\sqrt{(4/3)} \cdot \xi^{-1}$ in a fourth, a critic can ask:

Is κ a derived physical number, or a moving label?

QN-1 answers by forbidding untyped κ .

2.2 The four possible outcomes

Given two κ -like appearances, there are exactly four legitimate possibilities. This classification is exhaustive and is the operative one throughout the paper (Lemma 7 uses the same four classes); a fifth option — silent identification on grounds of numerical closeness — is excluded by Premise QN-2.

Case 1 — Same physical object, different convention

The two coefficients describe the same physical attenuation in different representation conventions. Example:

$$\psi(u) \sim e^{(-\kappa_A u)} \text{ versus } |\psi(u)|^2 \sim e^{(-\kappa_P u)},$$

with $\kappa_P = 2\kappa_A$. This is a convention conversion: exact, invertible, observable-preserving.

Case 2 — Exact composite grounded in a proved construction or admissible bridge

One coefficient is an exact reciprocal, half-stiffness, or dimensional composite of the other, and the relation is supplied either *by construction* in an inherited gate — not read off from arithmetic

after the fact — or by a proved bridge theorem satisfying §10.4. Examples of the constructional kind: $c^* = \kappa^{*-1} = 3/8$ (Premise QN-5) and $g_\kappa = \kappa^{*/2} = 4/3$ with $m^* = \sqrt{g_\kappa \cdot \xi^{-1}}$ (Premise QN-7). The relation is exact, but it is a claim about origin, so it stands on the upstream construction or bridge and falls to Case-3 status if that grounding fails (Falsifier 2 of each premise, or failure of a §10.4 component).

Case 3 — Related physical objects, bridge pending

The two coefficients are plausibly related, but not by notation and not yet by a proved construction. Example: $\lambda_{14} = \ln 14$ and $\kappa^* = 8/3$. These are close but not equal. A bridge theorem satisfying §10.4 may eventually explain why a channel-count log approximates or flows toward a localization stiffness; QN-1 does not allow substitution in the interim.

Case 4 — Different objects, no identification proposed

The coefficients belong to different dimensions or different equation slots, with no candidate identification on the table. Example: κ_{eff} in a gravitational response law and κ^* in a dimensionless localization exponent. These remain different objects unless a dimensional bridge satisfying §10.4 is supplied, at which point the pair moves to Case 3 while the bridge is pending and to Case 2 once the bridge is proved — Case 2 admitting proved bridges as well as inherited constructions.

2.3 The VERSF rule

κ is never a scalar by itself. κ is a typed representative of a convention class.

The correct notation is never bare κ . It is one of

κ_{amp} , κ_{prob} , κ^* , c^* , λ_{14} , g_κ , m^* , κ_{eff} , κ_N ,

or another explicitly typed object.

3. Typed κ -Objects and Convention Classes

3.1 Definition — typed κ -object

A **typed κ -object** is a triple

$$\mathbf{K} = (\mathbf{R}, \mathbf{V}, \mathbf{d}),$$

where \mathbf{R} is the role (localization, compliance, channel-log, gap, response, scaling), \mathbf{V} is the representative value or expression, and \mathbf{d} is the dimensional status.

Examples:

(localization stiffness, $8/3$, dimensionless), (barrier compliance, $3/8$, dimensionless), (channel log, $\ln 14$, dimensionless), (gap scale, $\sqrt{(4/3)} \cdot \xi^{-1}$, inverse length), (gravitational response, κ_{eff} , dimensionful).

Two typed κ -objects may be related. They are identical only if all three entries match; they are convertible only if a proved map connects them.

3.2 Definition — localization convention

A localization convention \mathcal{C} writes the attenuation of a localized quantity Q as

$$Q(x) = Q(0) \cdot e^{(-s_{\mathcal{C}} \kappa_{\mathcal{C}} z_{\mathcal{C}}(x))}, Q(0) > 0,$$

where Q is the strictly positive envelope of the object being localized (Premise QN-2), $s_{\mathcal{C}}$ is the level factor, $\kappa_{\mathcal{C}}$ is the convention coefficient, and $z_{\mathcal{C}}(x)$ is the dimensionless exponent variable with $z_{\mathcal{C}} \geq 0$ and $z_{\mathcal{C}}(0) = 0$.

The invariant log-attenuation is then

$$\mathcal{L}_Q(x) = s_{\mathcal{C}} \kappa_{\mathcal{C}} z_{\mathcal{C}}(x).$$

κ is not meaningful without $s_{\mathcal{C}}$ and $z_{\mathcal{C}}$.

3.3 Definition — convention equivalence

Conventions \mathcal{C}_1 and \mathcal{C}_2 are equivalent for Q if

$$s_1 \kappa_1 z_1(x) = s_2 \kappa_2 z_2(x) \text{ for all } x \text{ in the shared physical domain.}$$

Rigidity of the conversion. Suppose z_1 is not identically zero and $\kappa_1 \neq 0$ (the degenerate zero-attenuation profile $\mathcal{L}_Q \equiv 0$ is representable with any exponent variable and admits no unique conversion). A constant conversion factor between κ_1 and κ_2 exists if and only if $z_2 = a \cdot z_1$ for some constant $a > 0$ on the shared domain. In that case the conversion is unique:

$$\kappa_2 = (s_1/s_2) \cdot (1/a) \cdot \kappa_1.$$

If z_2 is not proportional to z_1 , then no constant κ -conversion exists, and exactly one of the following holds: (i) the two expressions are not the same localization law; (ii) the conversion is scale-dependent and must be written as such; (iii) one expression is an approximation whose error term must be carried. This rigidity statement is a major falsification guardrail: it makes "the conversion factor is whatever the calculation needs" impossible.

3.4 Structure — valid conversions form a groupoid

Let the objects be pairs (Q, \mathcal{C}) and the morphisms be the equivalences of §3.3. Then:

- **Identity.** Every convention is equivalent to itself with $a = 1$.
- **Inverses.** If $z_2 = a \cdot z_1$ converts $\mathcal{C}_1 \rightarrow \mathcal{C}_2$, then $z_1 = (1/a) \cdot z_2$ converts $\mathcal{C}_2 \rightarrow \mathcal{C}_1$, with reciprocal factor.
- **Composition.** If $\mathcal{C}_1 \rightarrow \mathcal{C}_2$ with factor a and $\mathcal{C}_2 \rightarrow \mathcal{C}_3$ with factor b , then $\mathcal{C}_1 \rightarrow \mathcal{C}_3$ with factor ab , and \mathcal{L}_Q is preserved at every stage.

Valid convention transformations therefore compose, invert, and never leak: a chain of exact conversions can never manufacture a discrepancy, and a discrepancy at the end of a chain implies an invalid step somewhere in it. In plain terms: valid convention changes can be chained forward and backward without changing the physical attenuation, and if a chain produces a different answer, one of the conversions was invalid. This is the structural reason κ -drift is detectable rather than merely deplorable.

3.5 Corollary — bare κ is invalid notation in quantitative gates

In any later quantitative VERSF gate, the expression κ standing alone is incomplete unless the convention is already fixed. Acceptable forms include

κ_{amp} , κ_{prob} , κ^* , c^* , λ_{i4} , g_{κ} , m^* , κ_{eff} , κ_N .

The paper thereby converts κ from a symbol into a ledgered object.

4. The Localization Invariant

4.1 The invariant is log-attenuation, not κ

The physical question is not:

What number is written in the exponent?

It is:

How fast does a physical quantity attenuate as support distance, fold count, or completion load increases?

That is captured by

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)],$$

which is invariant under valid convention changes. Throughout, Q is the strictly positive localization envelope of Premise QN-2 — for oscillatory or complex amplitudes, the modulus profile — so the ratio is positive and the logarithm single-valued.

4.2 Lemma 1 — Log-attenuation invariance

Lemma 1. Let a localized quantity Q be represented in two conventions:

$$Q(x) = Q(0) \cdot e^{(-s_1 \kappa_1 z_1(x))} \text{ and } Q(x) = Q(0) \cdot e^{(-s_2 \kappa_2 z_2(x))}.$$

The two representations are physically equivalent if and only if

$$s_1 \kappa_1 z_1(x) = s_2 \kappa_2 z_2(x) \text{ for all } x \text{ in the physical domain.}$$

Proof. Taking $-\log$ of each expression divided by $Q(0)$ gives $\mathcal{L}_-Q(x) = s_1 \kappa_1 z_1(x)$ and $\mathcal{L}_-Q(x) = s_2 \kappa_2 z_2(x)$. The representations describe the same attenuation exactly when these agree pointwise.

■

4.3 Reading

Lemma 1 is simple, but it is load-bearing. It prevents the programme from writing $\kappa_1 \approx \kappa_2$ and calling that reconciliation. Approximate numerical closeness is not convention equivalence. Only pointwise equality of the physical log-attenuation is.

5. Amplitude, Probability, and Exponent Doubling

5.1 The factor-of-two trap

Suppose a localized amplitude is written

$$\psi(u) = \psi(0) \cdot e^{(-\kappa_A u)}.$$

The corresponding probability density is

$$|\psi(u)|^2 = |\psi(0)|^2 \cdot e^{(-2\kappa_A u)}.$$

If the probability density is instead written $p(u) = p(0) \cdot e^{(-\kappa_P u)}$, then $\kappa_P = 2\kappa_A$. A factor-of-two discrepancy between two κ values is therefore not necessarily physical: it may be a change from amplitude convention to probability convention. Equally, once conventions are typed, an *unexplained* factor of two is a genuine error, not something to absorb into notation.

5.2 Lemma 2 — Amplitude/probability conversion

Lemma 2. If κ_A is the amplitude-level localization coefficient and κ_P the probability-density-level coefficient for the same underlying amplitude profile, then

$$\kappa_P = 2\kappa_A,$$

and this is the unique constant conversion between the two levels.

Proof. From $\psi(u) = \psi(0) \cdot e^{(-\kappa_A u)}$, squaring gives $p(u) = |\psi(0)|^2 \cdot e^{(-2\kappa_A u)}$. Matching against $p(u) = p(0) \cdot e^{(-\kappa_P u)}$ and applying the rigidity statement of §3.3 with $z_2 = z_1 = u$, $s_1 = 2$, $s_2 = 1$ gives $\kappa_P = 2\kappa_A$, uniquely. ■

5.3 Application to $\kappa^* = 8/3$

If $\kappa^* = 8/3$ is amplitude-level, the probability-level representative is

$$\kappa_{\text{prob}} = 2\kappa^* = 16/3.$$

If instead $8/3$ were declared probability-level, the amplitude-level representative would be

$$\kappa_{\text{amp}} = (1/2) \cdot (8/3) = 4/3.$$

The programme must therefore state which convention is active. QN-1 adopts:

$\kappa^* = 8/3$ is the canonical amplitude-level two-sided localization-stiffness representative.

This single declaration fixes the dictionary. Note the structural consequence: the number $4/3$ then appears in two exactly related roles — as the hypothetical amplitude coefficient of a probability-level $8/3$, and as the quadratic gap coefficient $g_\kappa = \kappa^*/2$ of §8. These coincide because both are the half-stiffness of the same canonical representative — the first by the level-conversion rule of Lemma 2, the second by the upstream halving construction of Premise QN-7. The coincidence is constructive, not numerological.

6. Stiffness, Compliance, and the $8/3 \leftrightarrow 3/8$ Reconciliation

6.1 The reciprocal pair

The numbers $8/3$ and $3/8$ are exact reciprocals:

$$(8/3)^{-1} = 3/8.$$

They must not be treated as competing values of one coefficient. They form a stiffness/compliance pair:

$$\kappa^* = 8/3, c^* = \kappa^{*-1} = 3/8.$$

6.2 Interpretation

A stiffness coefficient measures suppression strength. A compliance coefficient measures access, yield, or barrier-normalised response. The two are inverse descriptions of one structure, occupying reciprocal slots.

If a barrier expression is written

$$\Phi_c = c^* \cdot \hbar c / \xi = (3/8) \cdot \hbar c / \xi,$$

then 3/8 is not a localization stiffness. It is the reciprocal compliance coefficient attached to the commitment energy scale

$$E_\xi = \hbar c / \xi,$$

so that $\Phi_c = c^* \cdot E_\xi$.

6.3 Lemma 3 — Stiffness/compliance reconciliation

Lemma 3. If $\kappa^* = 8/3$ is the canonical stiffness representative and $c^* = 3/8$ appears as a barrier or compliance coefficient, the two appearances are exactly reconciled by

$$c^* = \kappa^{*-1},$$

and they are not rival values of κ .

Proof. The mechanism is supplied by Premise QN-5: in the inherited barrier construction, compliance is defined as inverse stiffness, so $c^* = \kappa^{*-1}$ holds by construction, and the numerical identity $3/8 = (8/3)^{-1}$ is its consequence. The role separation is structural: κ^* multiplies a suppression exponent or stiffness term; c^* multiplies an access/barrier/compliance expression. Since the slots are reciprocal by the same construction, identity of role is false and the reciprocal relation is exact. ■

Remark. The direction of the argument matters. Arithmetic alone would show only that 3/8 is *consistent with* being κ^{*-1} — a numerical observation, not a mechanism, and therefore inadmissible under §10.4. The lemma stands because Premise QN-5 supplies the constructive origin; if Falsifier 2 of QN-5 fires, the relation downgrades to a class-3 exact-value bridge debt.

6.4 Rule

Any future VERSF paper using $3/8$ must label it κ^* (or another explicit compliance/barrier symbol), never bare κ .

7. The $\ln 14$ Channel-Log Convention

7.1 The source of $\ln 14$

The closure census gives $2K = 14$. A uniform selection among fourteen paired channels has weight

$$w_{14} = 1/14 = e^{(-\ln 14)}.$$

Define the channel-log weight

$$\lambda_{14} := \ln 14 \approx 2.639057.$$

The canonical localization stiffness is

$$\kappa^* = 8/3 \approx 2.666667.$$

Close — but not equal.

7.2 The difference matters, and it compounds

The mismatch is

$$\delta_{14} = \kappa^* - \lambda_{14} = 8/3 - \ln 14 \approx 0.027609,$$

about 1.04 % of $8/3$. At the level of attenuation weights,

$$e^{(-8/3)} \approx 0.069483, e^{(-\ln 14)} = 1/14 \approx 0.071429,$$

with ratio

$$e^{(-8/3)} / (1/14) = 14 \cdot e^{(-8/3)} \approx 0.972768 = e^{(-\delta_{14})}.$$

So a single silent substitution shifts the per-step weight by about 2.7 %.

Compounding bound. Under n repeated steps the accumulated weight ratio is exactly

$$e^{(-n \cdot \delta_{14})} = (0.972768)^n,$$

so the accumulated relative error is $1 - e^{(-n\delta_{14})}$. This error exceeds 10 % by $n = 4$ steps ($e^{(-4\delta_{14})} \approx 0.895$) and exceeds 50 % by $n = 26$ steps ($e^{(-26\delta_{14})} \approx 0.488$). The bound is direction-dependent: substituting κ^* into a channel-log slot *understates* weights by the factor $e^{(-n\delta_{14})}$, while the reverse substitution — λ_{14} into a stiffness slot — *overstates* them by $e^{(+n\delta_{14})}$, with relative error $e^{(+n\delta_{14})} - 1$ of the same order. In any derivation whose exponent budget spans several channel-log or stiffness steps — precisely the situation in mass-hierarchy and suppression-cascade gates — the substitution is therefore not a rounding convenience but a percent-to-order-one systematic error in whichever direction it is made. That is far too large to hide inside notation.

7.3 Lemma 4 — $\ln 14$ is not convention-identical to $8/3$

Lemma 4. The channel-log coefficient $\lambda_{14} = \ln 14$ is not equal to the canonical localization stiffness $\kappa^* = 8/3$, and no valid convention transformation identifies them.

Proof. Direct computation gives $8/3 - \ln 14 \approx 0.027609 \neq 0$, so the coefficients differ. Consider the comparison at matched level and exponent variable ($s_1 = s_2, z_1 = z_2$), which is the only setting in which the two could be identified without further structure. By Lemma 1, a pure convention change preserves log-attenuation exactly; by the rigidity statement of §3.3, the constant conversion factor at matched level and variable is unique and would have to equal 1. Since the coefficients are unequal, no such transformation exists. The substitution therefore requires either an explicit approximation statement carrying δ_{14} , or a separate bridge theorem. ■

7.4 What would reconcile them

Exactly three legitimate positions exist.

Option A — Distinct typed quantities (QN-1 default). $\lambda_{14} \neq \kappa^*$. The former is a channel-log weight; the latter is localization stiffness. No conflict exists because they are different typed objects.

Option B — Declared approximation with carried error. A later paper may state $\kappa^* \approx \lambda_{14}$ as a numerical approximation, but must then carry δ_{14} , and over n steps the accumulated attenuation ratio $e^{(-n\delta_{14})}$ must appear in the error budget. By §7.2, this is not harmless for $n \gtrsim 4$.

Option C — Bridge theorem. A stronger future result may prove that a channel-count log flows, under completion-density renormalisation or Hessian return, into the localization stiffness $\kappa^* = 8/3$. Such a bridge must satisfy the admissibility conditions of §10.4. It cannot be assumed from numerical closeness.

7.5 Rule

The quantity $\ln 14$ is written λ_{14} (or χ_{14}), never bare κ . If a local section defines $\kappa_{\text{channel}} := \ln 14$ for readability, that symbol still must not be identified with κ^* without a bridge.

8. The Gap-Scale Convention: $m^* = \sqrt{(4/3)} \cdot \xi^{-1}$

8.1 The expression

VERSF uses the gap-scale expression

$$m^* = \sqrt{(4/3)} \cdot \xi^{-1},$$

written m_{κ} in earlier programme documents; m^* is the preferred symbol from QN-1 onward, and m_{κ} survives only as a historical alias with $m_{\kappa} \equiv m^*$. The quantity has dimensions of inverse length. It is therefore not a dimensionless localization exponent, and no notational manoeuvre can make it one.

8.2 Quadratic coefficient

The square of the gap scale is

$$m^{*2} = (4/3) \cdot \xi^{-2}.$$

Define the quadratic gap coefficient

$$g_{\kappa} := 4/3, \text{ so that } m^* = \sqrt{g_{\kappa}} \cdot \xi^{-1}.$$

Relative to the canonical localization stiffness,

$$g_{\kappa} = \kappa^*/2 = (1/2) \cdot (8/3) = 4/3.$$

The coefficient $4/3$ is thus the one-sided (quadratic half-stiffness) representative of the two-sided closure stiffness κ^* . It is reconciled, not coincidental.

8.3 Lemma 5 — Gap-scale reconciliation

Lemma 5. The expression $m^* = \sqrt{(4/3)} \cdot \xi^{-1}$ is reconciled with the canonical localization stiffness $\kappa^* = 8/3$ by the exact dimensional and quadratic relation

$$m^{*2} = (\kappa^*/2) \cdot \xi^{-2},$$

and m^* is not a competing κ -value.

Proof. The mechanism is supplied by Premise QN-7: in the inherited closure/stiffness construction, the quadratic gap form arises from the one-sided branch of the two-sided closure law, so its coefficient is $\kappa^*/2$ by construction. With $\kappa^* = 8/3$ this gives $g_\kappa = 4/3$, hence $m^{\star 2} = g_\kappa \cdot \xi^{-2} = (\kappa^*/2) \cdot \xi^{-2}$, and taking the positive root, $m^\star = \sqrt{(\kappa^*/2) \cdot \xi^{-2}} = \sqrt{4/3} \cdot \xi^{-1}$. The object carries dimensions of inverse length, so identification with the dimensionless κ^* is excluded on dimensional grounds alone; the constructive relation above is the whole of the connection. ■

Remark. The proof runs in the origin direction — from the two-sided closure law through the halving construction to m^\star — not from the numerical coincidence $4/3 = (8/3)/2$ backward to an interpretation. The latter would show consistency only, which §10.4 explicitly disallows as a mechanism. If Falsifier 2 of QN-7 fires (the upstream gap derivation produces $4/3$ by an independent route), the relation downgrades to a class-3 exact-value bridge debt and the closure certificate entry must be amended.

8.4 Rule

The canonical symbol is

$$m^\star = \sqrt{(\kappa^*/2) \cdot \xi^{-2}}.$$

The historical alias m_κ , where it appears in earlier documents, denotes the same object ($m_\kappa \equiv m^\star$); its subscript is historical and relational, and does not assert $m = \kappa$. New VERSF papers use m^\star .

9. The Gravitational-Response Convention: κ_{eff}

9.1 The issue

In gravitational or response equations, κ -like notation may appear as κ_{eff} . This usage is standard in physics — an Einstein-type response coefficient built from G , c , and numerical factors is the familiar example. Such a coefficient is dimensional unless natural units and a normalisation convention have been fixed. It is therefore not the same kind of object as $\kappa^* = 8/3$.

9.2 Dimensional firewall

A dimensionless exponent appears in

$$e^{(-\kappa^* u)}.$$

A response coefficient appears in equations of the schematic form

(curvature response) = $\kappa_{\text{eff}} \times (\text{source})$.

These are different slots: one controls attenuation, the other controls response amplitude. A dimensional bridge may eventually relate both to ξ , closure density, or commitment saturation — that bridge is a separate derivation, subject to §10.4.

9.3 Lemma 6 — Response κ is not localization κ

Lemma 6. A gravitational or response coefficient κ_{eff} is not convention-equivalent to a dimensionless localization exponent κ^* unless an explicit nondimensionalisation and bridge relation are supplied.

Proof. A convention-equivalence map preserves the invariant log-attenuation of a localized object (Lemma 1). A response coefficient enters a source–response equation, not a localization attenuation law, so there is no shared \mathcal{L}_Q for a convention map to preserve. Moreover κ_{eff} generally carries dimensions while κ^* is dimensionless; dimensional mismatch alone forbids identity. A bridge may relate the two through additional physical structure, but that is a theorem, not a convention transformation. ■

9.4 Rule

VERSF gravity papers avoid bare κ and write one of

κ_{grav} , κ_{eff} , κ_E , κ_{resp} ,

with dimensions and units stated at first use.

10. The Convention-Reconciliation Map

10.1 Canonical convention

QN-1 fixes the canonical localization convention:

\mathcal{C}^* : $\psi(u) = \psi(0) \cdot e^{(-\kappa^* u)}$, $u = \rho/\xi$, $\kappa^* = 8/3$.

This is amplitude-level, dimensionless, linear-support localization. All other representatives are reconciled relative to \mathcal{C}^* .

10.2 Conversion table

Quantity	Type	Expression	Relation to κ^*	Status (§2.2 case)	Proved by
κ^*	amplitude localization stiffness	8/3	canonical	canonical representative	QN-4
κ_{prob}	probability exponent	16/3	$2\kappa^*$	exact conversion (Case 1)	Lemma 2
c^*	compliance/barrier reciprocal	3/8	κ^{*-1}	exact composite (Case 2)	Lemma 3, QN-5
g_{κ}	quadratic gap coefficient	4/3	$\kappa^*/2$	exact composite (Case 2)	Lemma 5, QN-7
m^*	inverse-length gap scale	$\sqrt{(4/3) \cdot \xi^{-1}}$	$\sqrt{(\kappa^*/2) \cdot \xi^{-1}}$	exact composite (Case 2)	Lemma 5, QN-7
λ_{14}	channel-log weight	$\ln 14$	not equal; $\delta_{14} = 8/3 - \ln 14$	bridge pending (Case 3)	Lemma 4
κ_{eff}	gravitational response	dimensional	no direct identity	distinct (Case 4)	Lemma 6
κ_{N}	power-law fact-count exponent	law-dependent	not generally equivalent	distinct (Case 4)	§3.3 rigidity

10.3 Lemma 7 — Reconciliation map

Lemma 7. Under Premises QN-1 through QN-8, every κ -like object in the conversion table falls into exactly one class of the §2.2 classification:

1. **Case 1** — an exact convention transform of κ^* ;
2. **Case 2** — an exact reciprocal or dimensional composite of κ^* , grounded in a proved construction (here, the inherited constructions of Premises QN-5 and QN-7) or an admissible bridge theorem (§10.4);
3. **Case 3** — a distinct typed quantity with a candidate relation, bridge pending under §10.4;
4. **Case 4** — a distinct typed quantity with no identification proposed.

No object in the table is a second unconstrained value of the same bare κ .

Proof. By cases. Lemma 2 gives $\kappa_{\text{prob}} = 2\kappa^*$ (Case 1). Lemma 3, via Premise QN-5, gives $c^* = \kappa^{*-1}$ (Case 2). Lemma 5, via Premise QN-7, gives $g_{\kappa} = \kappa^*/2$ and $m^* = \sqrt{(\kappa^*/2) \cdot \xi^{-1}}$ (Case 2). Lemma 4 places λ_{14} in Case 3: a candidate relation to κ^* exists but no admissible bridge does. Lemma 6 places κ_{eff} in Case 4: it is dimensionally and structurally separate, with no identification currently proposed; a future response-normalisation bridge would move it to Case 3. A power-law exponent κ_{N} sits in Case 4 unless its exponent variable is explicitly mapped to a logarithmic variable, in which case §3.3 governs the conversion and it moves to Case 1. The table exhausts the κ -like appearances in the ledger, and the four cases are mutually exclusive by construction. ■

10.4 Definition — admissible bridge theorem

Class-3 relations may be upgraded only by a **bridge theorem**, which must supply all four of:

1. **Dimensional bridge:** an explicit nondimensionalisation, valid in the shared domain, that places both quantities in the same dimensional class;
2. **Domain statement:** the regime of validity of the identification;
3. **Mechanism:** the physical or algebraic structure (renormalisation flow, Hessian return, saturation limit) that generates the relation — numerical closeness is not a mechanism;
4. **Error control:** either exact equality or a bounded, carried error term (for λ_{14} versus κ^* , this means an account of δ_{14}).

A claimed bridge lacking any of these four components is invalid, and the quantities remain distinct.

10.5 Bridge-Debt Ledger

The open class-3 relations and inherited debts are registered here as named items, so that later gates can cite, discharge, or inherit them individually.

Bridge Debt BD-1 — κ^* and λ_{14} . *Question:* does the 14-channel closure census generate, renormalise into, or approximate the canonical localization stiffness $\kappa^* = 8/3$? *Current status:* open. *Required future proof:* a mechanism (§10.4) showing how $\lambda_{14} = \ln 14$ maps into κ^* , with the mismatch $\delta_{14} \approx 0.027609$ either eliminated by a derived correction term or carried as a bounded, direction-stated approximation error (§7.2).

Bridge Debt BD-2 — First-principles origin of κ^* . *Question:* why is the canonical localization stiffness $8/3$ rather than another value? *Current status:* inherited (Premise QN-4). *Required future proof:* an upstream closure/stiffness derivation producing $8/3$ without fitting. Until discharged, every QN-1 reconciliation is conditional on this inheritance.

Bridge Debt BD-3 — κ_{eff} response normalisation. *Question:* can the dimensional gravitational-response coupling be derived from ξ , closure density, and record saturation? *Current status:* open. *Required future proof:* all four §10.4 components — nondimensionalisation, domain statement, mechanism, and error control.

Two further conditional dependencies are registered in the closure certificate rather than here, because they are inherited constructions rather than open questions: the reciprocal construction grounding $c^* = \kappa^{*-1}$ (QN-5, Falsifier 2) and the halving construction grounding $g_{\kappa} = \kappa^*/2$ (QN-7, Falsifier 2). If either falsifier fires, the corresponding relation enters this ledger as a new bridge debt.

11. The Localization-Exponent Convention and κ -Reconciliation Theorem

11.1 Assembly

The paper has established:

1. Physical localization is represented by the invariant log-attenuation \mathcal{L}_Q , not by a bare κ (Premise QN-2, Lemma 1).
2. A localization convention specifies object, level, exponent variable, measure, normalisation, and dimensional status (Premise QN-3).
3. Two κ -representatives are convention-equivalent only when they preserve \mathcal{L}_Q pointwise, and the conversion factor, when it exists, is unique (§3.3).
4. Valid conversions form a groupoid: they compose, invert, and cannot manufacture discrepancies (§3.4).
5. Amplitude and probability exponents differ by an exact factor of two (Lemma 2).
6. $8/3$ and $3/8$ form an exact stiffness/compliance reciprocal pair, grounded in the upstream reciprocal construction (Lemma 3, Premise QN-5).
7. $\ln 14$ is a distinct channel-log weight, with quantified, direction-dependent mismatch δ_{14} and explicit compounding bound (Lemma 4, §7.2).
8. $m^\star = \sqrt{(4/3)} \cdot \xi^{-1}$ is an inverse-length gap scale with $m^{\star 2} = (\kappa^\star/2) \cdot \xi^{-2}$, grounded in the upstream halving construction (Lemma 5, Premise QN-7).
9. κ_{eff} is a dimensional response coefficient, not a localization exponent (Lemma 6).
10. Bridge upgrades require the four admissibility components of §10.4.

11.2 Theorem 1 — Localization-Exponent Convention and κ -Reconciliation

Theorem 1. Under Premises QN-1 through QN-8 and Definition QN-V, the κ -like quantities appearing in the VERSF localization-normalisation programme are reconcilable without parameter drift, as follows.

Let the canonical amplitude-level localization stiffness be

$$\kappa^\star = 8/3, \text{ in the convention } \psi(u) = \psi(0) \cdot e^{(-\kappa^\star u)}, u = \rho/\xi.$$

Then:

1. **Amplitude/probability reconciliation.** The probability-density exponent for the same localization profile is

$$\kappa_{\text{prob}} = 2\kappa^\star = 16/3,$$

and this conversion is unique.

2. **Stiffness/compliance reconciliation.** The coefficient $3/8$ is the reciprocal compliance coefficient

$$c^* = \kappa^*{}^{-1},$$

not a competing localization stiffness.

3. **Gap-scale reconciliation.** The inverse-length gap scale

$$m^* = \sqrt{(4/3) \cdot \xi^{-1}} \text{ satisfies } m^*{}^2 = (\kappa^*/2) \cdot \xi^{-2}.$$

It is a dimensional half-stiffness gap representative, not a dimensionless κ -value.

4. **Channel-log separation.** The coefficient $\lambda_{14} = \ln 14$ is the log of the $2K = 14$ paired-channel count. It is not equal to $8/3$:

$$\delta_{14} = 8/3 - \ln 14 \approx 0.027609,$$

and any approximation identifying them shifts attenuation weights by the ratio $e^{(\mp n \delta_{14})}$ over n steps — a relative error of $1 - e^{(-n \delta_{14})}$ or $e^{(+n \delta_{14})} - 1$, depending on the direction of substitution. λ_{14} may be related to κ^* only by a declared approximation carrying δ_{14} , or by a bridge theorem satisfying §10.4.

5. **Response-coupling separation.** A gravitational or source-response coefficient κ_{eff} is dimensional and belongs to response normalisation. It is not a localization exponent unless nondimensionalised and bridged per §10.4.
6. **Power-law/exponential separation.** A fact-count scaling exponent in a law such as

$$\sigma_x \propto N_f^{(-\kappa_N)}$$

is not equivalent to an exponential support coefficient in $e^{(-\kappa^* u)}$ unless a variable map such as $u \propto \log N_f$ is specified. Without that map the coefficients belong to different functional classes and no constant conversion exists.

7. **Observable invariance.** Every valid convention transformation preserves the invariant localization datum

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)]$$

and therefore preserves every observable depending only on the underlying physical localization. For a single step this is definitional (Definition QN-V); the substantive content is the groupoid closure of §3.4, by which the invariance extends to arbitrary finite chains of conversions, so that no sequence of valid steps can manufacture a discrepancy.

Consequently, VERSF's κ -like appearances are not multiple fitted values of one parameter. They form a typed convention ledger. Exact conversions are permitted only where the theorem gives them; near-equalities and dimensional analogies require admissible bridges; otherwise the quantities remain distinct.

Proof. By cases, all previously established.

By Premise QN-2 the physical localization datum is \mathcal{L}_Q , and Lemma 1 shows two written coefficients are convention-equivalent only if they preserve \mathcal{L}_Q pointwise; §3.3 shows the conversion factor, when it exists, is unique, and §3.4 shows chains of valid conversions preserve \mathcal{L}_Q end-to-end.

Part 1 is Lemma 2 with κ^\star amplitude-level, giving $\kappa_{\text{prob}} = 2\kappa^\star = 16/3$ uniquely. Part 2 is Lemma 3. Part 3 is Lemma 5. Part 4 is Lemma 4 together with the compounding bound of §7.2 and the bridge-admissibility conditions of §10.4. Part 5 is Lemma 6 with §10.4. Part 6 follows from the rigidity statement of §3.3: a power law in N_f and an exponential in u preserve the same \mathcal{L}_Q only under an explicit variable map making the exponent variables proportional; otherwise no constant conversion exists. Part 7 is a corollary of Definition QN-V together with the groupoid closure of §3.4: single-step invariance is definitional — a transformation counts as valid only if it preserves \mathcal{L}_Q — and the non-trivial content is that validity is closed under composition and inversion, so invariance extends to arbitrary finite chains and cannot leak.

These cases exhaust the κ -like appearances catalogued in the ledger of §10.2. Hence no unresolved κ -drift remains inside QN-1. ■

11.3 Corollary 1 — No silent κ substitution

Any VERSF derivation that replaces one κ -like object by another must state exactly one of:

1. an exact convention map (§3.3);
2. an exact reciprocal/composite relation (Lemmas 3, 5);
3. a declared approximation with carried error term (§7.4, Option B);
4. an admissible bridge theorem (§10.4);
5. a declaration that the objects are distinct.

Bare substitution is invalid, and — by the groupoid structure — detectably so: the resulting chain fails to preserve \mathcal{L}_Q .

11.4 Corollary 2 — Later numerical gates inherit the κ -ledger

Later VERSF gates concerning mass hierarchy, coupling normalisation, Yukawa structure, completion density, or gravitational response may use κ -like coefficients only in typed form. A later paper may write $\kappa^\star = 8/3$ for the canonical localization stiffness, but may not use the same symbol for $\ln 14$, $3/8$, m^\star , or κ_{eff} without explicit conversion under Corollary 1.

12. Audit of κ -Like Appearances Across the Programme

12.1 Audit principle

The correct audit question is not:

Which number is κ ?

It is:

Which convention slot does this κ -like object occupy?

The following table is the operative reconciliation ledger.

12.2 κ -reconciliation audit table

Appearance	Correct type	Correct reading	Reconciled status	§2.2 case
$\kappa = 8/3$	canonical localization stiffness	amplitude-level two-sided support stiffness	canonical representative	— (anchor)
$\kappa \approx \ln 14$	channel-log approximation	near relation to the $2K = 14$ census	not exact; bridge or carried δ_{14} required	Case 3
older $\kappa \approx 3/8$	reciprocal compliance	$3/8 = (8/3)^{-1}$	exact once retyped as c^*	Case 2
$m_\kappa = \sqrt{(4/3)} \cdot \xi^{-1}$ (now m^*)	inverse-length gap scale	$m^{*2} = (\kappa^*/2) \cdot \xi^{-2}$	exact dimensional relation	Case 2
$\Phi_c = (3/8) \cdot \hbar c / \xi$	barrier/compliance energy	$\Phi_c = c^* \cdot E_\xi$, with $E_\xi = \hbar c / \xi$	exact reciprocal relation	Case 2
$\kappa_{\text{eff}} \sim 8\pi G$ -type response coupling	dimensional source-response coefficient	gravitational/curvature response	separate; bridge required	Case 4
$N_f^{(-\kappa)}$	power-law scaling exponent	scaling in fact count	not exponential κ unless $u \propto \log N_f$	Case 4
$e^{(-\kappa u)}$	exponential localization coefficient	attenuation in dimensionless support distance	convention-dependent; must be typed	— (form, not pair)

Appearance	Correct type	Correct reading	Reconciled status	§2.2 case
$e^{(-2\kappa u)}$	probability form of amplitude localization	probability exponent when κ is amplitude-level	exact factor-of-two rule	Case 1
$1/14 = e^{(-\ln 14)}$	channel-count suppression	uniform paired-channel selection	exact channel-log identity	— (identity)

12.3 Notation corrections going forward

Future papers use:

- κ^* — canonical localization stiffness;
- c^* — reciprocal compliance coefficient;
- λ_{14} — channel-log weight;
- m^* — inverse-length gap scale only (m_κ retained solely as a historical alias, $m_\kappa \equiv m^*$);
- κ_{eff} — dimensional response coupling only, with units stated;
- κ_N — power-law fact-count scaling exponents.

This closes the drift channels at the level of notation itself.

13. Why This Is Not Numerology or Parameter Fitting

13.1 The objection

A critic may say:

You have several nearby numbers and are inventing explanations for all of them.

That would be a valid criticism if the paper declared them equal. It does the opposite: it refuses false equality.

It states that $\ln 14 \neq 8/3$, and quantifies the gap. It states that $3/8$ is not another κ but an exact reciprocal. It states that m^* is not dimensionless. It states that κ_{eff} is not a localization exponent. That is not numerology. It is notation hygiene backed by proofs of non-identity.

13.2 The discipline

The paper accepts only three kinds of reconciliation, each exact:

Exact convention relation. $\kappa_{\text{prob}} = 2\kappa_{\text{amp}}$ — mechanism: level change, Lemma 2.

Exact reciprocal composite. $c^* = \kappa^{*-1} = 3/8$ — mechanism: the upstream reciprocal construction, Premise QN-5.

Exact dimensional composite. $m^{*2} = (\kappa^*/2) \cdot \xi^{-2}$ — mechanism: the upstream two-sided \rightarrow one-sided halving construction, Premise QN-7.

Everything else is classified as distinct unless an admissible bridge theorem (§10.4) is supplied. There is no fourth category, and in particular there is no category of "close enough".

The admissibility standard is symmetric. §10.4 states that numerical closeness is not a mechanism; the same discipline entails that numerical *exactness* is not a mechanism either. Exact arithmetic is not sufficient evidence of physical identity. The relations $c^* = \kappa^{*-1}$ and $g_{\kappa} = \kappa^*/2$ are admitted only because they are inherited as constructional relations from prior gates — compliance defined as inverse stiffness; the one-sided quadratic coefficient arising as half of the two-sided closure stiffness. If those prior gates fail to establish reciprocal compliance and one-sided halving as physical constructions, then QN-1 does not rescue the relations; it downgrades them to bridge debts (Falsifier 2 of QN-5 and QN-7, entering the §10.5 ledger), exactly the status the ln 14 identification currently holds. The paper therefore prosecutes ln 14 and defends 4/3 under one standard, not two.

13.3 The ln 14 honesty test

The most important honesty test is ln 14. Because

$\ln 14 \approx 2.639$ and $8/3 \approx 2.667$,

the two are close enough to tempt a numerological identification. QN-1 forbids it. The correct statement is that $\lambda_{14} = \ln 14$ is a channel-log weight and is not identical to $\kappa^* = 8/3$, with the mismatch $\delta_{14} \approx 0.027609$ and its compounding behaviour $e^{(-n\delta_{14})}$ stated in full.

If later VERSF work proves that channel-count closure renormalises into localization stiffness, that will be a real result, and §10.4 states exactly what such a proof must contain. Until then, QN-1 keeps the two separate. This is a stronger position than pretending they match: a programme that quantifies its own near-misses cannot be accused of exploiting them.

14. Relation to Later Mass, Coupling, and Hierarchy Gates

14.1 Why QN-1 must precede quantitative derivations

Later gates may attempt to derive charged-lepton mass ratios, quark hierarchies, Yukawa exponents, CKM/PMNS mixing, coupling constants, gravitational response coefficients, completion-density laws, scalar closure loads, and effective gap scales. All such calculations are sensitive to exponent conventions:

- a factor of two between amplitude and probability exponents changes a hierarchy;
- a reciprocal confusion between $8/3$ and $3/8$ inverts a suppression;
- a silent substitution of $\ln 14$ for $8/3$ injects a hidden $\sim 2.7\%$ -per-step error that compounds to order one within tens of steps (§7.2);
- a dimensional confusion between m^* and κ^* invalidates an equation outright.

QN-1 closes these failure channels before they can contaminate numerical results.

14.2 What later papers may now assume

After QN-1, a later paper may state:

All κ -like quantities are interpreted through the QN-1 convention ledger. The canonical localization stiffness is $\kappa^* = 8/3$. Probability exponents, compliance coefficients, channel-log weights, gap scales, and response couplings are typed separately and related only by the QN-1 conversion rules.

This inheritance clause is the purpose of the gate.

14.3 What remains open

QN-1 does not close:

- the first-principles derivation of $8/3$ (BD-2);
- the bridge, if any, between $\ln 14$ and $8/3$ (BD-1);
- the derivation of κ_{eff} from ξ , closure density, and record saturation (BD-3);
- the exact charged-lepton, quark, CKM, or PMNS values;
- renormalisation of localization exponents across scales.

The first three are registered as named items in the bridge-debt ledger (§10.5) so that later gates can inherit or discharge them individually. QN-1 closes the convention problem, not the entire quantitative programme.

15. Falsification Conditions

#	Failure	Consequence
F1	A localization exponent appears with a dimensional argument	QN-1 notation discipline fails
F2	Bare κ is used without convention type	derivation is under-specified
F3	Amplitude and probability exponents are mixed without the factor two	hierarchy or attenuation law is wrong
F4	$3/8$ is used in the same slot as $8/3$ rather than as reciprocal compliance	stiffness/compliance reconciliation fails
F5	$\ln 14$ is treated as exactly $8/3$ without a bridge	channel-log reconciliation fails
F6	m^* is treated as dimensionless	gap-scale convention fails
F7	$4/3$ is used without specifying one-sided/quadratic half-stiffness status	gap/stiffness relation is ambiguous
F8	κ_{eff} is identified with localization κ without units and a bridge	response/localization separation fails
F9	A power-law exponent is treated as an exponential coefficient without a variable map	functional-class error
F10	A claimed convention transformation changes \mathcal{L}_Q	not a convention transformation
F11	A predicted observable changes under a claimed convention swap	physical inconsistency
F12	$\delta_{14} = 8/3 - \ln 14$ is ignored in an exact derivation	hidden approximation error, compounding as $e^{(-n\delta_{14})}$
F13	A later mass/coupling gate depends on untyped κ	that gate must be re-audited
F14	A bridge theorem claims equality but fails a §10.4 admissibility component	bridge invalid
F15	Two κ -like objects can be neither typed nor reconciled	genuine open debt or falsifier

16. QN-1 Closure Certificate

QN-1 condition	Result
κ -drift problem isolated	closed
Bare κ disallowed	closed
Localization invariant \mathcal{L}_Q defined	closed
Convention tuple \mathcal{C} defined	closed
Uniqueness/rigidity of conversion factors proved	closed
Groupoid structure of valid conversions established	closed
Amplitude/probability factor two stated	closed
$8/3$ canonical stiffness representative assigned	closed, inherited value

QN-1 condition	Result
3/8 reciprocal compliance relation	established under the inherited reciprocal construction (QN-5)
Mechanism for $c^* = \kappa^*{}^{-1}$ (barrier reciprocal construction)	inherited; registered dependency, Falsifier 2 of QN-5; source gate identified via the Master Ledger entry for QN-1
ln 14 separated from 8/3	closed
δ_{14} quantified, with compounding bound	closed
$m^* = \sqrt{(4/3)} \cdot \xi^{-1}$ typed as gap scale (m_κ deprecated for new use; recognized in prior documents, $m_\kappa \equiv m^*$)	closed
$4/3 = \kappa^*/2$ relation	established under the inherited halving construction (QN-7)
Mechanism for $g_\kappa = \kappa^*/2$ (two-sided \rightarrow one-sided halving)	inherited; registered dependency, Falsifier 2 of QN-7; source gate identified via the Master Ledger entry for QN-1
κ_{eff} typed as dimensional response coupling	closed
Power-law/exponential distinction stated	closed
Conversion table supplied	closed
Bridge-admissibility conditions specified	closed
Bridge-debt ledger supplied (BD-1, BD-2, BD-3)	closed
Observable invariance under valid convention change	closed (definitional per QN-V; chain-invariance via groupoid closure)
First-principles derivation of 8/3	outside scope / inherited debt (BD-2)
Bridge between ln 14 and 8/3	open (BD-1)
Full mass/coupling derivation	outside scope
Gravitational κ_{eff} derivation	outside scope (BD-3)
Renormalisation of localization exponents	outside scope

QN-1 closure grade: closed as a convention-stability and κ -reconciliation theorem, conditional on three inherited items: the canonical stiffness representative $\kappa^* = 8/3$ (QN-4), the barrier reciprocal construction grounding $c^* = \kappa^*{}^{-1}$ (QN-5), and the two-sided \rightarrow one-sided halving construction grounding $g_\kappa = \kappa^*/2$ (QN-7). The paper closes symbol drift, not the deeper derivation of every numerical coefficient.

17. Conclusion

VERSF has reached the point where notation discipline is load-bearing.

The programme uses a finite scale ξ , localization exponents, closure stiffnesses, reciprocal barrier coefficients, channel-count suppressions, inverse-length gap scales, and gravitational-response couplings. These naturally generate κ -like notation, but they are not one object.

QN-1 resolves the issue by replacing bare κ with a typed convention ledger. The invariant physical object is not κ itself but the log-attenuation

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)].$$

A κ -representative is meaningful only after specifying what is localized, whether the expression is amplitude-level or probability-level, what exponent variable is used, what measure is assumed, how the expression is normalized, and whether the coefficient is dimensionless.

Under that discipline: $\kappa^* = 8/3$ is the canonical localization-stiffness representative; $3/8$ is its reciprocal compliance coefficient; $\ln 14$ is the channel-log weight of the $2K = 14$ paired-channel census and is not equal to $8/3$, with the gap δ_{14} and its compounding behaviour stated in full; $m^* = \sqrt{(4/3)} \cdot \xi^{-1}$ is an inverse-length gap scale satisfying $m^{*2} = (\kappa^*/2) \cdot \xi^{-2}$; and κ_{eff} belongs to gravitational or response normalisation and must be dimensionally bridged before any comparison.

The paper thereby removes a serious vulnerability. It prevents later VERSF derivations from quietly shifting κ between incompatible meanings — and it prevents the opposite failure equally: it does not force nearby numbers to be equal. It classifies them, quantifies their gaps, and leaves the genuinely open relations visible as named bridge debts (BD-1, BD-2, BD-3).

QN-1 is not a numerical-origin theorem. It is a convention-stability theorem. Its claim is not that $\kappa^* = 8/3$ has here been derived from first principles, but that once κ^* is inherited as the canonical localization-stiffness representative, all κ -like appearances in the programme are either exactly converted, exactly typed as composites grounded in inherited constructions, or explicitly quarantined as bridge debts. A reader who wants the origin of $8/3$ must go to the upstream closure/stiffness gate; a reader who wants to know whether the programme's κ -symbols are coherent finds the complete answer here.

In one sentence:

The κ -symbol in VERSF is not a movable parameter; once typed by localization convention, reciprocal role, channel-log origin, dimensional gap status, or response function, every legitimate κ -like appearance is either exactly reconciled, explicitly separated, or registered as an open bridge debt.

Appendix A — Minimal Algebraic Skeleton

Let $Q(x)$ be the strictly positive localization envelope of a physical quantity, with $Q(0) > 0$ (for complex or sign-changing amplitudes, $Q = |\psi|$). Define the invariant localization datum

$$\mathcal{L}_Q(x) = -\log [Q(x) / Q(0)].$$

A convention \mathcal{C} writes

$$Q(x) = Q(0) \cdot e^{(-s_{\mathcal{C}} \kappa_{\mathcal{C}} z_{\mathcal{C}}(x))}, z_{\mathcal{C}} \geq 0, z_{\mathcal{C}}(0) = 0,$$

so that

$$\mathcal{L}_Q(x) = s_{\mathcal{C}} \kappa_{\mathcal{C}} z_{\mathcal{C}}(x).$$

Conventions $\mathcal{C}_1, \mathcal{C}_2$ are equivalent iff $s_1 \kappa_1 z_1(x) = s_2 \kappa_2 z_2(x)$ for all x . For $\kappa_1 \neq 0$ and z_1 not identically zero: if $z_2 = a \cdot z_1$ with constant $a > 0$, the unique conversion is

$$\kappa_2 = (s_1/s_2) \cdot (1/a) \cdot \kappa_1;$$

if z_2 is not proportional to z_1 , no constant conversion exists. Valid conversions form a groupoid under composition.

Amplitude/probability:

$$\psi = e^{(-\kappa_A u)} \implies |\psi|^2 = e^{(-2\kappa_A u)}, \text{ so } \kappa_P = 2\kappa_A.$$

Stiffness/compliance (by the upstream reciprocal construction, QN-5):

$$\kappa^* = 8/3, c^* = \kappa^{*-1} = 3/8.$$

Gap scale (by the upstream two-sided \rightarrow one-sided halving construction, QN-7):

$$m^*{}^2 = (\kappa^*/2) \cdot \xi^{-2} = (4/3) \cdot \xi^{-2}, m^* = \sqrt{(\kappa^*/2)} \cdot \xi^{-1}.$$

Channel log:

$$\lambda_{14} = \ln 14, \lambda_{14} \neq \kappa^*, \delta_{14} = \kappa^* - \lambda_{14} \approx 0.027609, n\text{-step substitution error: } e^{(-n\delta_{14})} = (0.972768)^n.$$

Response:

κ_{eff} is not a dimensionless localization stiffness unless nondimensionalised and bridged (§10.4).

That is the mathematical core of QN-1.

Appendix B — κ Convention Dictionary

B.1 κ^\star — canonical dimensionless localization stiffness.

$\kappa^\star = 8/3$. Default use: $\psi(u) = \psi(0) \cdot e^{(-\kappa^\star u)}$.

B.2 κ_{prob} — probability-density exponent for the same amplitude profile.

$\kappa_{\text{prob}} = 2\kappa^\star = 16/3$.

B.3 c^\star — reciprocal compliance coefficient.

$c^\star = \kappa^\star^{-1} = 3/8$. Used in expressions such as $\Phi_c = c^\star \cdot \hbar c / \xi$.

B.4 λ_{14} — channel-log weight for the paired-channel census.

$\lambda_{14} = \ln(2K) = \ln 14$. Not equal to $8/3$.

B.5 δ_{14} — mismatch between canonical stiffness and channel-log weight.

$\delta_{14} = \kappa^\star - \lambda_{14} = 8/3 - \ln 14 \approx 0.027609$.

B.6 g_κ — quadratic half-stiffness gap coefficient.

$g_\kappa = 4/3 = \kappa^\star/2$.

B.7 m^\star — inverse-length gap scale.

$m^\star = \sqrt{g_\kappa} \cdot \xi^{-1} = \sqrt{(\kappa^\star/2)} \cdot \xi^{-1} = \sqrt{(4/3)} \cdot \xi^{-1}$. Historical alias: $m_\kappa \equiv m^\star$.

B.8 κ_{eff} — dimensional gravitational or response coupling. Must be supplied with units and normalisation convention. Not a localization exponent.

B.9 κ_N — power-law scaling exponent in fact-count or support-count laws such as $\sigma_x \propto N^{-\kappa_N}$. Not equivalent to exponential localization stiffness without a variable map.

Appendix C — Referee Objections and Replies

Objection 1 — You are explaining away inconsistent κ values. *Reply.* No. The paper does not force equality; it separates the quantities by type and proves non-identity where it holds. In

particular it states $\ln 14 \neq 8/3$ and quantifies the gap and its compounding. That is the opposite of explaining away inconsistency; it is an audit discipline that makes inconsistency detectable.

Objection 2 — Is $3/8$ a different value of κ ? *Reply.* No. It is the exact reciprocal of $8/3$, and this is a claim of origin, not arithmetic: in the inherited barrier construction, compliance is defined as inverse stiffness (Premise QN-5), so $\kappa^* = (8/3)^{-1} = 3/8$ by construction, valid only in a reciprocal compliance or barrier slot. Using $3/8$ as a localization stiffness is an error, and F4 registers it as a falsifier.

Objection 3 — Can $\ln 14$ be used for κ because it is close to $8/3$? *Reply.* Not in an exact derivation. The mismatch is $\delta_{14} = 8/3 - \ln 14 \approx 0.027609$, and n silent substitutions shift attenuation weights by the ratio $e^{(\mp n \delta_{14})}$ — a relative error of $1 - e^{(-n \delta_{14})}$ or $e^{(+n \delta_{14})} - 1$ depending on direction, exceeding 10 % within four steps. A later bridge theorem may explain a relation, but it must satisfy the four admissibility conditions of §10.4.

Objection 4 — Does m_κ mean κ is a mass? *Reply.* No. $m^* = \sqrt{(4/3)} \cdot \xi^{-1}$ (of which m_κ is the historical alias) is an inverse-length gap scale. The old subscript records its relation to the κ -ledger through $m^{*2} = (\kappa^*/2) \cdot \xi^{-2}$, which holds by the upstream halving construction (Premise QN-7), not equality with a dimensionless exponent. QN-1 deprecates the alias for new use precisely to prevent this misreading.

Objection 5 — Does this paper derive $8/3$? *Reply.* No. QN-1 assigns $8/3$ as the inherited canonical localization-stiffness representative and reconciles other appearances against it. The first-principles derivation of $8/3$ remains a separate closure/stiffness gate, and the closure certificate lists it as an inherited debt.

Objection 6 — Is κ_{eff} related to localization κ ? *Reply.* Possibly, through a future response-normalisation bridge — but not by notation. κ_{eff} is dimensional and sits in source-response equations; κ^* is dimensionless and sits in localization attenuation. Lemma 6 proves that no convention transformation connects them.

Objection 7 — What if an observable changes when conventions are swapped? *Reply.* Then the swap was not a valid convention transformation. A valid transformation preserves \mathcal{L}_Q pointwise (Lemma 1), and chains of valid transformations preserve it end-to-end (§3.4). F10 and F11 register any violation as falsifiers.

Objection 8 — Can a power-law exponent equal an exponential localization coefficient? *Reply.* Only under an explicit variable map. If $u \propto \log N_f$, then $e^{(-\kappa u)}$ becomes a power law in N_f and §3.3 supplies the unique conversion. Without such a map, the two belong to different functional classes and no constant conversion exists.

Objection 9 — Does this close the quantitative Standard Model derivation? *Reply.* No. It closes a necessary convention gate: it prevents later quantitative derivations from being undermined by κ drift. Masses, couplings, mixing matrices, and renormalisation remain later gates, and §14.3 lists the open items explicitly.

Objection 10 — You reject $\ln 14 \approx 8/3$ for lacking a mechanism, yet accept $4/3 = \kappa^*/2$ and $3/8 = \kappa^*{}^{-1}$. Isn't that a double standard? *Reply.* No, and the paper states the single standard explicitly (§13.2): neither closeness nor exactness is a mechanism. The composites are accepted because Premises QN-5 and QN-7 record the upstream constructions in which they arise by definition — compliance defined as inverse stiffness; the one-sided quadratic coefficient arising as half of the two-sided closure stiffness — and the proofs of Lemmas 3 and 5 run in the origin direction, from construction to number. Each premise carries a downgrade falsifier: if the upstream gate turns out to obtain its coefficient by an independent route, the relation drops to a class-3 exact-value bridge debt, exactly the status $\ln 14$ currently holds. The asymmetry in outcome reflects an asymmetry in available mechanism, not in standard.

Objection 11 — What is the one-sentence result? *Reply.*

VERSF's κ -like quantities reconcile only after convention typing: $8/3$ is the canonical localization stiffness, $3/8$ is its exact reciprocal compliance, $\ln 14$ is a distinct channel-log weight with quantified mismatch δ_{14} , m^* is a dimensional gap scale, and κ_{eff} is a response coupling — so no untyped κ remains available for silent parameter drift.

Final one-sentence theorem

After fixing the localization convention by invariant log-attenuation, every κ -like quantity in VERSF is either an exact representative, an exact reciprocal, an exact dimensional composite, or a separately typed bridge-debt object; therefore apparent κ discrepancies are removed without fitting, while genuine mismatches remain visible — and quantified — as falsifiers.