The Three Metronomes: Criteria for the Apparently Eternal Skeleton [F] (2026) Robert Galida – June 2026

Abstract

The attractor framework distinguishes conservative attractors (eternal skeleton) from dissipative attractors (transient dance). The most fundamental conservative attractors are the **electron, proton, and neutrino class** – collectively the **three metronomes**. This paper defines explicit criteria for a "metronome": (1) apparent immortality (no observed decay), (2) effective indivisibility under ordinary perturbations, (3) conservation-law protection, and (4) possession of a rest frame (non-zero rest mass). It shows that electrons, protons, and neutrinos (the three mass eigenstates treated as a single class) are the best-supported examples under current physics. The number three is empirical, not derived; the framework is corrigible. The three metronomes form the apparently eternal skeleton – a pragmatic substrate for measuring the transient dance of dissipative systems.

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1. Introduction

The attractor framework divides persistent structures into two classes:

- **Conservative attractors** (eternal skeleton) – persist without energy input, without observed decay, without internal change. They are mindless, time-symmetric, and

invariant.
- **Dissipative attractors** (transient dance) — persist only by consuming energy, export entropy, and eventually decay.

(The conservative/dissipative dichotomy is a framework stipulation, not a physical law; it is defended in the broader attractor framework literature, e.g., *Persistence Under Perturbation* and *Basin Defense and Stable Addition*.)

The most fundamental conservative attractors are the **three metronomes**: the **electron, proton, and the class of neutrino mass eigenstates** (ν_1, ν_2, ν_3). Their name evokes their role as invariant reference entities — they provide a stable substrate against which all change can be measured. This paper defines explicit criteria for a metronome and applies them to each candidate.

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2. Criteria for a Metronome

A metronome in the attractor framework must satisfy four criteria:

Criterion	Meaning	Operational check
1. Apparent immortality	No observed decay; no lighter state exists for it to decay into under known laws	Lifetime lower bounds >> age of universe; no allowed decay channel

Criterion	Meaning	Operational check
2. Effective indivisibility under ordinary perturbations	Behaves as a stable, indivisible unit under all perturbations relevant to the framework (scattering, binding, chemical reactions)	Remains the same particle after typical disturbances; does not spontaneously change identity
3. Conservation-law protection	Protected by an exact conservation law or an accidental symmetry that is effectively exact in the Standard Model	Lightest carrier of a conserved quantum number (electric charge, baryon number, lepton number)
4. Possession of a rest frame	Has non-zero rest mass, hence a proper time and the ability to serve as a reference clock *in its own rest frame*	Invariant mass > 0

Rationale for Criterion 4: Measurement requires a local frame. A massless particle has no rest frame, no proper time, and cannot be used as a persistent local reference. While photons are extremely long-lived, they serve as signal carriers, not as the invariant substrate. The framework prioritises rest-frame existence because the “eternal skeleton” is meant to be the background against which change is measured — a background must have a local perspective to anchor measurements. This is a **definitional choice**, not a consequence of particle physics, and it is consistently applied.

Note on Criterion 3: Baryon number and lepton number are accidental symmetries, not gauge symmetries. The paper treats them on equal footing because both provide effective stability for the proton and neutrinos under Standard Model physics. If future experiments reveal baryon or lepton number violation, the framework will adjust accordingly.

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3. Why the Electron Is a Metronome

- **Apparent immortality:** Lightest negatively charged particle; no decay channel.
- **Effective indivisibility:** Remains an electron after scattering, binding, etc.
- **Conservation protection:** Electric charge and lepton number conservation.
- **Rest frame:** Non-zero rest mass.

→ **The electron is a metronome.**

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4. Why the Proton Is a Metronome (Despite Being Composite)

- **Apparent immortality:** No observed decay; experimental lower limit on half-life > 10^{34} years (Super-Kamiokande, 2020).
- **Effective indivisibility:** For all practical purposes (chemistry, nuclear physics, stellar processes), the proton behaves as a stable, indivisible unit.
- **Conservation protection:** Baryon number is an accidental symmetry; it protects the proton from decay in the Standard Model.
- **Rest frame:** Non-zero rest mass.

→ **The proton is a metronome.** The framework does not require elementary particles; it requires maximal persistence under relevant perturbations.

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5. Why the Neutrino Class (ν_1, ν_2, ν_3) Is a Metronome

The three neutrino mass eigenstates are treated as a **single metronome class** because they share the same stability argument, differ only in mass, and are grouped for the framework's hierarchical classification.

- **Apparent immortality:** No observed decay; cosmological and astrophysical lower bounds on neutrino lifetimes are orders of magnitude longer than the age of the universe. Neutrino oscillation is flavour mixing, not decay — the mass eigenstates are stable.
- **Effective indivisibility:** Once a neutrino is in a mass eigenstate, it propagates without changing identity. (Weak interactions produce **flavour eigenstates** — superpositions of mass eigenstates — but the mass eigenstates themselves are stable and travel freely.)
- **Conservation protection:** Lepton number is an accidental symmetry; in the Standard Model it protects neutrinos from decay. (If future experiments confirm that neutrinos are Majorana particles — violating lepton number — the framework will adjust; this is part of its corrigibility.)
- **Rest frame:** Neutrinos have non-zero rest mass (confirmed by oscillation experiments), albeit very small.

→ **The neutrino class is a metronome.** The three mass eigenstates count as one metronome *type* for the framework's hierarchical classification.

6. Why Not Other Candidates?

Candidate	Fails criterion	Explanation
Free neutron	1 (apparent immortality)	Decays in ~15 minutes.
Neutron in a nucleus	2 (effective indivisibility)	Stability is environment-dependent; not an irreducible attractor.
Photon	4 (rest frame)	Massless; no proper time. Excluded by definition (see rationale for Criterion 4).
Muon, tau	1	Decay rapidly.
Dark matter candidates	Not yet identified	If discovered and shown to be stable, massive, and effectively indivisible, they could become additional metronomes.
Composite stable structures (nuclei, atoms)	2	Not effectively indivisible; they are built from metronomes and are dissipative or emergent attractors, not part of the invariant skeleton.

7. The Number Three: Empirical, Not Derived

The paper’s title uses “three metronomes” as a convenient label for the electron, proton, and the neutrino class (the three mass eigenstates grouped together). The number three is not derived from first principles; it reflects current best empirical knowledge. If new stable particles are discovered (e.g., dark matter), the list will expand. The framework is corrigible by design.

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8. The Apparently Eternal Skeleton

The term “apparently eternal” is strictly empirical: these particles have never been observed to decay or be transient, and for all practical purposes they behave as if they have no end. The three metronomes form the **eternal skeleton** – a pragmatic substrate against which the transient dance of dissipative systems (life, mind, society) is measured. This is a **framework-internal** construct, not a metaphysical claim.

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9. Stable Resonances and the Grounding of Dissipative Time Metrics

Each of the three metronomes possesses an **invariant quantum frequency** – its Compton frequency, given by f=mc2/h$f=mc2/h$. For the electron, this is ~1.24 × 10^{20} Hz; for the proton, ~2.27 × 10^{23} Hz; for neutrinos, the frequencies are very small but non-zero. These frequencies are invariant, universal, and identical for every identical particle in the universe. They are **stable resonances** of the eternal skeleton.

Why this matters for dissipative systems:

Every dissipative system (a living cell, a brain, a society) is composed of or continuously interacts with electrons, protons, and neutrinos. The **time constant τ** that appears in corrective permeability (κ = 1/τ) can, in principle, be expressed as a multiple of these fundamental resonance periods. For example, a neuron’s recovery time after a perturbation – determined by ion channel kinetics, membrane capacitance, and metabolic rate — is measurable against the same invariant clock as any other physical process. The metronome provides the **unit** of time, not the mechanism.

Thus, κ is a genuine physical variable, not a mere metaphor. It refers to a ratio of measurable durations, anchored in the invariant frequencies of the metronomes.

Cross-domain comparability:

The framework's ability to compare κ values across vastly different domains (e.g., a thermostat's seconds-scale τ and a political movement's months-scale τ) does **not** follow from shared Compton-frequency units alone. It follows from the framework's **definitional choice** to treat κ as a domain-general variable — a diagnostic that measures the same functional property (speed of return to baseline) in every system, regardless of scale or substrate. The metronomes ensure that such measurements are, in principle, commensurable; they do not guarantee that the comparison is meaningful in every case. That is a framework commitment, not a physics claim.

Caveat: The expression of τ as a multiple of Compton periods is a conceptual grounding, not a practical measurement protocol. No one will measure a society's reaction time in electron oscillations. The importance is that κ is not an arbitrary label; it is a dimensionless ratio of durations, and durations are defined by the invariant resonances of the three metronomes.

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10. κ and Basin Depth as Heuristics

The attractor framework introduces corrective permeability ($\kappa = 1/\tau$) and basin depth (B) as conceptual heuristics. For the metronomes:

- **κ** for decay is vanishingly small (effectively zero) on all observable timescales.
- **Basin depth** is the energy barrier required to change the particle's identity — effectively infinite for all practical purposes.

These are **qualitative descriptors**; they are not operational quantities in particle physics. They are included here for completeness of the framework's vocabulary. For the application of κ and B to dissipative systems (e.g., belief updating, neural recovery), see the papers *Basin Defense and Stable Addition* and *Why Clockwork Interventions Fail*.

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11. Corrigibility and Falsifiability

The framework explicitly invites revision:

- If proton decay is observed, the proton will be downgraded to "very long-lived" (or removed).
- If neutrino decay or Majorana nature is confirmed, the neutrino class's status will be revised.
- If new stable particles are discovered, they will be added.

The attractor framework is a **philosophical taxonomy and diagnostic tool**, not a predictive physical theory. Its value lies in providing a unified language for persistence across domains.

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12. Conclusion

The electron, proton, and neutrino class satisfy the attractor framework’s four criteria for metronomes: apparent immortality, effective indivisibility under ordinary perturbations, conservation-law protection, and possession of a rest frame. They are the **best-supported examples** of the apparently eternal skeleton under current physics. The framework is corrigible, the number three is empirical, and the language of “eternal skeleton” is pragmatic. The three metronomes anchor the distinction between conservative and dissipative persistence.

Suggested citation: Galida, R. S. (2026). The Three Metronomes: Criteria for the Apparently Eternal Skeleton. *Fantasy Attractor.*