Equation of the Universe

Emeon Resolved States (ERS)

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This document depends on
Equation of the Universe — Core Theory (Rev 3.42.0 or later)

§0 — Introduction and Scope

The Emeon Resolved States framework defines the closure sequence by which an Emeon core reaches terminal charged EZZZ closure through zeteon-triad completion. Measured particle names are used only as correspondence labels. The controlling structures are the EOTU configurations E, EZ, EZZ, and $EZZZ$.

Emeon-to-$EZZZ$ closure is the dominant resolved-state family used in this tier. It does not exhaust all possible closure behavior in the broader framework. It establishes the local rules for Emeon closure burden, zeteon cancellation, phase exhaust, curvature exhaust, and decay-ledger bookkeeping.

The resolved-state family is governed by five structural conditions:

- Radial zeteon displacement represents curvature burden.
- Triad angular deviation represents phase-skew admissibility.
- Missing zeteon count represents closure incompleteness.
- Photon emission records curvature transport, $\Delta\mu$.
- Neutrino emission records phase exhaust, $\Delta\phi$.

The consolidated resolved-state ontology introduces no additional particles, independent fields, or unsupported fitted mechanisms.

§1 — Emeon Closure Geometry

1.1 Closure family

The ERS family begins with an Emeon core and resolves through zeteon closure. A terminal electron corresponds to EZZZ: an Emeon core constrained by a three-zeteon closure triad. The intermediate states EZ and EZZ remain non-terminal closure configurations with finite residual defect.

Configuration	Measured correspondence label	Closure description	Ledger interpretation
E	Emeon / E-rest label	No zeteon closure	Baseline unresolved Emeon state.
EZ	Tau label	Minimal one-zeteon closure	Large residual closure defect; finite lifetime.
EZZ	Muon, pion, or kaon label by event channel	Partial two-zeteon closure	Reduced but incomplete closure; decay remains enforced.
EZZZ	Electron label	Closed zeteon triad	Terminal charged closure with near-complete geometric cancellation.

1.2 Zeteon closure minimality

Zeteons are represented as equal-magnitude curvature-resolution vectors. Exact nontrivial closure requires the vector sum to vanish. One or two equal vectors cannot satisfy this condition without degeneracy. Three equal vectors arranged at 120 degrees form the minimal closed set.

$$z_1 + z_2 + z_3 = 0$$

The planar 120-degree triad is therefore the minimal closure geometry for the terminal charged Emeon family. A departure from that triad leaves a finite residual defect, which appears as stored closure burden and finite lifetime in non-terminal states.

1.3 Defect classes

The defect class is determined by geometry and integer closure. It is not assigned as an independent particle label.

- $Z = 0$: isolated Emeon baseline.
- $Z = 1$: dipole-like open regime.
- $Z = 2$: two-channel partial-closure regime.
- $Z = 3$: closed triad with complement-constrained closure.

Zeteons do not add curvature in this interpretation. They enable geometric cancellation of the Emeon closure burden. The measured hierarchy is read as the observed consequence of decreasing closure defect across the same Emeon-family structure.

§2 — Structural Consequences of Neutrino Integration

Neutrinos are phase-exhaust carriers. They are emitted when a transition produces a non-cancelable phase imbalance and does not require curvature export. ERS records neutrino emission as a ledger correction, not as a curvature-storing CPP event.

A Uniteon at phase π may lose phase coherence and reconfigure into an Emeon at π/2, with the expelled phase carried away as a neutrino. This rule is used as a structural bridge between high-energy closure disruption and Emeon-family resolved states.

2.1 Neutrino ontology

- A neutrino carries phase imbalance: $\Delta\varphi \neq 0$.
- A neutrino carries no curvature quantum: $\Delta\mu = 0$.
- A neutrino propagates through Dormant Cells and Dormant Corridors.
- A neutrino is recorded as a phase-exhaust ledger event rather than as a curvature-storing CPP entity.

2.2 Emission and counting rules

- Integer defect levels correspond to curvature-resolvable closure states.
- Half-integer defect levels correspond to mandatory phase exhaust.
- One independent half-integer phase correction produces one neutrino emission event.
- Multiple neutrinos occur only when the transition topology contains multiple independent phase sinks, as in three-body decays.

Measured neutrino energies are included as kinematic phase-exhaust budgets imposed by the emitting transition. They are not treated as internally stored neutrino curvature.

§3 — Resolved Charged-State Ladder

The ladder below consolidates the resolved-state mapping. The labels remain experimental correspondence labels; the EOTU configuration and ledger role define the state within this framework.

Defect rung	EOTU configuration	Measured correspondence label	role
D0.0	E rest	Emeon	Baseline E-only unresolved state.
D0.1	E excited	W-boson	Excited E-only comparison state.
D1.0	EZ rest	Tau	Minimal closure with large residual defect.
D1.1	EZZ excited + phase	π±	Partial closure with open phase channel; neutrino export admissible.
D1.2	EZZ branch state	K±	Partial closure branch with larger measured phase-exhaust budget.
D1.3	EZZ residual state	π±	Re-closed residual composite after excited deformation relaxes.
D2.0	EZZ rest	Muon	Partial two-zeteon closure; non-terminal charged state.
D3.0	EZZZ rest	Electron	Terminal charged closure.

3.1 Hadronic re-closure versus Z-class decoupling

In hadronic collision regimes, displaced zeteons may re-couple to the proton unless an alternative closure completes first in the overlap domain. Proton re-closure therefore prevents permanent zeteon loss in ordinary hadronic reorganization.

At the Z-class scale, proton re-closure can fail long enough for zeteons to remain decoupled and for identities to reorganize. The Uniteon-to-Emeon conversion rule is reserved for this high-disruption regime, where phase export becomes structurally admissible.

3.2 Muon and tau interpretation

The muon and tau are non-terminal closure configurations of the same Emeon family. They introduce no new CPP content, no additional degrees of freedom, and no independent dynamics. Differences relative to the electron arise from geometric closure displacement, which appears as excess stored curvature, finite lifetime, and enforced decay toward terminal EZZZ closure.

§4 — Curvature Burden and Defect Mapping

The ERS closure map uses a geometric inventory measure whose square maps to the energy scale through the EOTU energy-closure operator. The dyadic defect form from Rev 3.46.0 is retained as the active construction. The earlier power-law response is retained only as Appendix B status material because its exponent was calibrated rather than derived from first principles.

4.1 Dyadic defect construction

The active construction uses an Emeon baseline mass factor and subtracts the closure contribution associated with zeteon count.

$$m\_E = 46{,}282.314955$$

The examples below preserve the recorded v3.46.0 values.

State	Closure expression recorded in source	Calculated energy scale recorded in source	Measured correspondence
Tau / EZ	46,282.314955 − 4,096 = 42,186.314955	≈ 1.779685169 GeV	τ rest-energy scale.
Muon / EZZ	46,282.314955 − 35,968 = 10,314.314955	≈ 106.385092 MeV	μ rest-energy scale.
Electron / EZZZ	46,282.314955 − closure term = 714.314955	≈ 510,245.855 eV	electron rest-energy scale.

The electron result is close to the electron-scale value but remains marked as a derived comparison until reconciled against the dedicated electron document value and the derived-values ledger.

4.2 Hierarchy interpretation

- The Emeon has a finite intrinsic closure demand before zeteon closure is attempted.
- Each additional zeteon reduces the unresolved closure defect.
- The electron is light and stable because it is the first near-fully closed geometric state in this family.
- The charged-lepton hierarchy is represented as decreasing closure defect, not as three independent fundamental species.

§5 — Phase Mapping for Single-Neutrino Lines

5.1 Mapping domain

The phase map is a diagnostic utility for measured single-neutrino lines. It maps measured two-body neutrino energies to implied phase positions within the upper Emeon-family band, beginning at π/2 and terminating at the Z-class comparison anchor.

$$\varphi(E) = \pi/2 + (\pi/2) \sqrt{(E\nu / Emax)}$$

For this mapping, Emax = 91.187 GeV is used as the Z-boson phase anchor. The square-root form compresses large energies near the upper band and spreads lower energies across the Emeon-family phase region.

5.2 Consolidated line families

Family	Measured single-neutrino line	Phase-map outcome recorded in source	Concept result
Pion	π → μν and related pion line	≈ 0.509π to 0.514π	Lower disruption band.
Kaon	K → μν and related kaon line	≈ 0.525π to 0.526π	Middle disruption band, close to 17π/32.
Tau	τ → Kν and τ → πν	≈ 0.547π to 0.549π	Higher disruption band within the same Emeon-family span.
Electroweak comparison	W → ℓν and Z anchor	≈ 0.832π and 1.000π	Separate comparison band.

This mapping is not used as a new derivation of neutrino ontology. It is a measured-line correspondence tool for sorting phase-exhaust events by their observed kinematic budgets.

§6 — Curvature Resolution through Photon Exhaust

6.1 Neutral pion curvature-only resolution

The neutral pion is retained as the canonical curvature-only resolution state. It represents a local curvature-overload event in a hadronic interaction region that resolves primarily through photon exhaust rather than neutrino phase exhaust.

- Measured invariant energy: approximately 134.98 MeV.
- Measured lifetime: approximately 8.43×10^{-17} s.
- Dominant channel: $\pi^0 \rightarrow \gamma + \gamma$, approximately 98.8%.
- Each photon carries approximately 67.5 MeV in the π^0 rest frame.

The neutral pion does not represent a stable terminal massive object in this framework. It is the short-lived curvature-resolution interval that converts a fixed curvature packet into electromagnetic exhaust.

6.2 Photon versus neutrino ledger distinction

- Photon emission records $\Delta\mu$ curvature transport.
- Neutrino emission records $\Delta\varphi$ phase exhaust.
- A transition may involve both ledgers only when the topology requires both curvature export and phase correction.

§7 — Beta Decay, Muon Decay, and Electron Capture

7.1 Neutron beta decay

A neutron is treated as an embedded ERS terminal EZZZ configuration whose terminal electron closure is locally constrained by Region coherence. When that coherence support is removed, the embedded closure cannot remain internal and undergoes terminal release.

- The free electron is the released terminal charged closure.
- The antineutrino is the mandatory phase exhaust associated with the half-integer correction rule.
- The measured beta spectrum is continuous because neutron beta decay is a three-body decay, not a fixed two-body single-neutrino line.

7.2 Muon decay

Muon decay is treated as a non-terminal EZZ closure relaxing toward terminal EZZZ closure while satisfying phase-ledger requirements. Because the decay topology contains multiple independent phase sinks, dual neutrino emission is admissible without introducing neutrino families as separate CPP entities.

7.3 Electron capture

Electron capture occurs when a nuclear configuration has a closure imbalance that can be reduced by admitting a bound electron into the nuclear Region. The electron supplies the Emeon closure component needed for proton-to-neutron conversion, while the remaining phase imbalance exits as a single neutrino.

- Electron capture is not a universal decay mode; it occurs only where the nuclear closure state admits it.
- The initiating condition is closure imbalance, not ordinary electrostatic attraction.
- The emitted neutrino is the residual phase-ledger quantity after curvature and binding obligations are accounted.

§8 — ERS Rules

The ERS rules are:

- E, EZ, EZZ, and EZZZ are the primary EOTU configurations; particle names are measured correspondence labels.
- Three zeteons form the minimal nontrivial closure set for the terminal charged Emeon family.
- Zeteons reduce closure defect; they do not introduce a new curvature source.
- Integer defect levels are curvature-resolvable states.
- Half-integer defect levels require phase exhaust and therefore neutrino emission.
- Photon exhaust transports curvature Δμ; neutrino exhaust transports phase Δφ.
- Neutral pion behavior is curvature-only dominant and belongs to the photon-exhaust ledger.
- Beta decay, muon decay, and electron capture are interpreted as different closure-failure or closure-repair topologies of the same ERS ledger structure.

Appendix A — Derived and Measured Values Carried Forward

Quantity	Value	Role
Emeon baseline mass factor	46,282.314955	Active dyadic ERS baseline from Rev 3.46.0.
Tau closure factor example	42,186.314955	EZ partial-closure mass factor after subtracting 4096.
Muon closure factor example	10,314.314955	EZZ partial-closure mass factor recorded in Rev 3.46.0.
Electron closure factor example	714.314955	EZZZ closure factor recorded in Rev 3.46.0.
π → μν line	≈ 29.792 MeV	Measured two-body single-neutrino phase-exhaust budget.
K → μν line	≈ 235.532 MeV	Measured two-body single-neutrino phase-exhaust budget.
τ → Kν line	≈ 819.887 MeV	Measured two-body single-neutrino phase-exhaust budget.
τ → πν line	≈ 882.984 MeV	Measured two-body single-neutrino phase-exhaust budget.
Z comparison anchor	≈ 91.187 GeV	Upper phase-map comparison anchor.
Neutral pion measured energy	≈ 134.98 MeV	Curvature-only photon-exhaust comparison.

Appendix B — Phenomenological Defect-Energy Mapping

The earlier Rev 3.40.13 source contains a phenomenological defect-energy mapping in which curvature burden is represented as a power-law response to closure defect amplitude.

$E_i = E_e (\delta_i / \delta_e)^p$

In that earlier form, the exponent p was determined by calibration to the charged-lepton mass hierarchy. Because this exponent was not derived from first principles, the mapping is preserved as historical support and comparison context only. The dyadic closure construction in §4 is the active ERS form used for continuation of the release-set document.

Appendix C — Integration Checks

The following checks remain part of the document integration path:

- Keep the dyadic defect construction in the main text and keep the older power-law mapping in Appendix B only.
- Use “measured correspondence label” when naming τ, μ, π, K, W, or Z states.
- Avoid saying neutrinos store energy internally. Use “measured kinematic budget” or “phase-exhaust energy budget.”
- Keep electron capture in this document as a structural rule, while isotope-specific EC calculations remain in Tier 2.
- Cross-check the electron closure value against the dedicated electron document before adding the value to the derived-values ledger.