Implosive Edge Hypothesis (IEH) and the Change Measure Δ — concept note (open for expert review)
A concise framework and what it claims

What this text presents (purpose)
This note proposes a compact, testable way to describe cosmic evolution without relying on the labels "past–present–future," and an alternative explanation for why the universe's "edge" is not observable. It has two coupled parts:
• Pillar A (Δ): replace "time" with an orientation-free change measure Δ that increases whether the universe expands or implodes.
• Pillar B (IEH): explain the invisibility of the "edge" not merely by superluminal metric recession, but by implosion dominating at the edge, which prevents outward signals from emerging coherently.
• Addition: near the edge, apparent expansion can persist due to observational inertia—signals still look expansion-like even while implosion is already overlaying the process.

Together, these parts give a stable "age of change" even if the global direction of cosmic evolution flips, and they account for why the edge remains unseen while still looking expansion-like for a time.

Starting axiom
"**People do not measure time; they only measure the course of their existence.**" Clocks do not measure the passage of time—they count cycles of diverse processes (e.g., Cs-133 hyperfine transition, optical Sr/Yb clocks, quartz resonators, Earth rotation UT1, Earth's orbital period, millisecond pulsars). In cosmology, the natural quantity to track is how much change has occurred, not which side of "past/present/future" we name it.

Pillar A — Change replaces "time"
Define Δ to monotonically accumulate change regardless of orientation:
$\Delta_a = \int |d \ln a|$; $\Delta_T = \int |d \ln T_{CMB}|$
Δ_a counts how many e-folds the scale changed (up or down).
Δ_T counts how much the CMB temperature changed in relative (log) terms (down in expansion, up in implosion).

CMB temperature (T_{CMB})
Cosmic Microwave Background temperature (≈ 2.725 K today). In standard expansion T_{CMB} decreases ($\propto 1/a$); under implosion the trend reverses (increases). It enters Δ_T via $\Delta_T = \int |d \ln T_{CMB}|$.

Operational age (fixed linear combination)
$Age_\Delta = w_a \cdot \Delta_a + w_T \cdot \Delta_T$
with w_a, w_T calibrated once to reference epochs (e.g., BBN). Age_Δ always increases, even if χ flips from +1 to −1. This avoids the breakdown of "age in years" when the Hubble rate changes sign.

Pillar B — Implosive Edge Hypothesis (IEH)
Claim. We do not fail to see the universe's "edge" solely because of superluminal metric recession. We fail because the edge is a region where implosion dominates and the two opposite flows—expansion and implosion—mix.

Operationally, at Σ:
• Outgoing light does not achieve net divergence (outward bundles have non-positive expansion), so energy does not propagate outward carrying coherent, far-field information.
• Wave phases decohere due to mixing of counter-propagating components; whatever nominally "exits" loses readable structure.

Apparent expansion (observational inertia near Σ)
Even after implosion becomes the true global orientation, lines of sight that traverse Σ can still look expansion-like for some time.
Effective expansion along a sightline:
$H_{eff} = \mu \cdot H_+ + (1 - \mu) \cdot H_-$; $H_+ > 0$, $H_- < 0$
For large μ, $H_{eff} > 0$ despite ongoing implosion on the same boundary—this is apparent expansion.

Orientation lag (observational inertia)
$d\chi_{obs}/d\lambda = (\chi_{true} - \chi_{obs}) / \tau_{inertia}$
χ_{obs} can remain "+" while $\chi_{true} = -1$. Observables exhibit a delayed flip.

Why the pillars must be coupled
1) If χ flips (expansion → implosion), descriptions that tie "age" to $H(z)$ or a forward arrow become ill-posed (H changes sign).
2) Δ sidesteps this: it counts how much change occurred; χ is just the sign of direction. You retain a continuous "age of change" through the flip.
3) IEH explains the data limitation: an implosion-dominated Σ cannot be "looked beyond," while μ and $\tau_{inertia}$ explain why observations can still look expansion-like in the transition.

State of the universe in practice
(Δ, χ_{true}, μ, $\tau_{inertia}$), with χ_{obs} inferred and allowed to lag.

Minimal measurement protocol
1) Zero point: pick today (a_0, T_0) and set $Age_\Delta(today) = 0$.
2) Accumulate Δ from observables:
   $\Delta_a = |\ln(a/a_0)| = |\ln((1+z_0)/(1+z))|$; $\Delta_T = |\ln(T_{CMB}/T_0)|$
3) Infer χ and inertia parameters:
   • χ_{obs} from the sign of the redshift drift $\dot{z}$ and the trend of T_{CMB} (↓ expansion, ↑ implosion).
   • μ via joint fits of $\dot{z}$, Hubble-diagram curvature, and phase-coherence metrics (EM/GW) along each sightline.
   • $\tau_{inertia}$ from the delay between the $\dot{z}$ sign flip and the T_{CMB} trend reversal.
4) Report $Age_\Delta = w_a \cdot \Delta_a + w_T \cdot \Delta_T$ (monotone), χ_{obs}, and the estimated (μ, $\tau_{inertia}$); infer χ_{true}.

Unified Symbols & Terms (Unicode)
$\chi \in \{+1, -1\}$ — global orientation of change (+1 expansion, −1 implosion).
$\mu \in [0, 1]$ — line-of-sight expansion fraction through the mixing zone Σ ($1-\mu$ samples implosion).
$\tau_{inertia} > 0$ — observational inertia timescale (lag for observables to flip after χ changes).
a — scale factor. T_{CMB} — CMB temperature (≈ 2.725 K today).
Δ — orientation-free change measure. $\Delta_a = \int |d \ln a|$; $\Delta_T = \int |d \ln T_{CMB}|$.

Age_Δ — operational age of change: $Age_\Delta = w_a \cdot \Delta_a + w_T \cdot \Delta_T$.
z — cosmological redshift ($1 + z = a_0 / a$). $\dot{z}$ — redshift drift: $\dot{z} = dz/dt_{obs}$.
Σ — mixing zone (“edge”): outward radiation fails to develop net divergence and phase information is lost; explains the lack of direct view and transient apparent expansion.
H_{eff} — effective rate along a sightline through Σ: $H_{eff} = \mu \cdot H_+ + (1 - \mu) \cdot H_-$.
H_+ — local expansion contribution ($H_+ > 0$). H_- — local implosion contribution ($H_- < 0$).
$d\chi_{obs}/d\lambda = (\chi_{true} - \chi_{obs}) / \tau_{inertia}$ — first-order relaxation of χ_{obs} toward χ_{true}.
χ_{obs} — observed orientation (appearance in data; typically in [−1, +1]). χ_{true} — true orientation.

Distinct predictions (falsifiable, concise)

- Redshift-drift sign reversal when χ_{true} flips; during inertia, mixed signs across directions due to varying μ (n-hat).
- CMB trend reversal: T_{CMB} stops decreasing and starts increasing (with possible delay set by $\tau_{inertia}$).
- Phase decoherence at Σ: no sharp boundary at the highest redshifts; increasing phase dispersion (EM/GW).
- Hysteresis between Δ_T and Δ_a: a loop appears during the transition, reflecting inertia; temporary divergence in rates inferred from scale vs. background temperature.

Contrast with the standard picture

- Standard: the edge is unseen because recession is superluminal relative to light signals.
- IEH (+ inertia): the edge is unseen because implosion at Σ prevents coherent outward transmission, and for a time apparent expansion persists (high μ, finite $\tau_{inertia}$). Metric superluminality is not a necessary cause.

Bottom line

Use Δ to quantify how much change has occurred and χ to label which way it goes. Augment IEH with μ (how much of a sightline still samples expansion) and $\tau_{inertia}$ (how fast observables catch up). Then the universe has a well-defined Age_Δ even if it later implodes, and the invisibility—and temporarily apparent continuation—of the “edge” follows from implosion-dominated mixing plus observational inertia at Σ.

***
© 2025 Mariusz Włodarczyk
mariusz.wlodarczyk@hotmail.com
www.linkedin.com/in/mariusz-włodarczyk-7bb61027
***
This work is licensed under the Creative Commons
Attribution-NonCommercial-NoDerivatives 4.0 International License.
(CC BY 4.0) Version 1.0_2025
***