LARGE SIGNS FIRST, LOCAL BULGES LAST

A UDEL hierarchy of recoil symptoms

BY

Erez Kaplan Haelion

Cosmological-scale recoil signs may come first, but true local gravitational bulges would be the more urgent late-stage marker. This document establishes the hierarchy of expected symptoms and the disciplined criteria for evaluating each.

1 Core Principle

In UDEL, recoil does not become visible everywhere at once. The earliest signs should appear at the largest scales, because the first instability is not local but geometric. Recoil begins as a change in the broad structure of the layered universe — the outer, thinner regions respond first, while the dense equatorial slice lags behind. As a result, the first observable symptoms are expected to be cosmological rather than local.

This means the universe should first appear to drift away from the assumptions of smooth late-time expansion before any obvious local structural failure is seen.

2 The First Signs: Large-Scale Cosmological Symptoms

The first class of symptoms belongs to the scale of the cosmic web, expansion history, and attractor basins. These include:

- Weakening or instability in the late expansion phase
- DESI-like pressure on simple LambdaCDM interpretations
- Large-scale basin strengthening and distributed attractor structure
- Non-trivial late-time flow distortions
- Hubble-style propagation or calibration anomalies

In the UDEL picture, these are the earliest warning signs because they reflect the beginning of large-scale recoil geometry. They do not yet mean that local bound structures are failing. They mean that the universe, at large scales, is no longer behaving like a smooth outward-breathing system.

3 Why Large-Scale Signs Come First

This follows naturally from the layered structure of UDEL. If the slices begin to re-merge gradually, then the first effects should appear where the structure is thinnest — where adjacency barriers weaken first, large-scale path-density balances shift earliest, and global propagation and expansion accounting begin to distort.

At that stage, the universe shows system-wide tension, but not yet universal local disruption. The first visible signs are not small bulges in galaxies. They are broad cracks in cosmology.

4 The Late Signs: Small Distributed Local Gravitational Bulges

The second class of symptoms is much more serious. These are not cosmological-scale trends. They are small, distributed, local gravitational anomalies. If such anomalies truly exist — and if they are genuinely gravitational rather than artifacts of baryons, dark matter fitting, magnetic fields, or observational complexity — then in UDEL they would represent something qualitatively new: the slice-merging process has progressed deeply enough to perturb local bound structure directly.

That is the threshold that matters. Because once the merger begins to leak into local systems, it is no longer only a distant cosmological drift. It has entered the scale of galaxies, streams, cores, and local mass distribution. These local anomalies would therefore be *late* signs, not early ones.

5 The UDEL Symptom Ladder

Stage 1 — Global Drift: The universe begins to deviate from simple smooth expansion. The earliest large-scale cosmological tensions appear.

Stage 2 — Basin Amplification: Established attractor basins strengthen in distributed ways. The flow field becomes more complex, deeper, or more unstable than expected.

Stage 3 — Local Leakage: Small-scale gravitational irregularities begin to appear inside galaxies or local structures. These are not broad cosmic symptoms — they are local perturbations.

Stage 4 — Structural Penetration: If local anomalies multiply and spread, the merger is no longer only a cosmological phase process. It has entered bound systems. This stage would imply that the remaining time is shorter than broad cosmological indicators alone suggest.

6 The Critical Claim

The claim is not that every strange local astrophysical effect is evidence of slice-merging. The claim is narrower and stronger: if small distributed anomalies are found that are truly gravitational, survive standard modeling, and appear as excess local pull or structural

bulges without sufficient conventional explanation, then they would count as late-stage indicators of advanced slice-merging.

Not weirdness in general. Not every anomaly. Only genuine gravitational residuals.

---

7 What Does Not Count

To keep this rigorous, many kinds of anomalies do not count by themselves:

- Generic gamma-ray excesses
- Magnetic-field-dominated gas behavior
- Ordinary star-formation oddities
- Speculative dark matter reinterpretations without gravitational residuals
- Complex local astrophysics that does not imply unexplained pull

These may be interesting, but they are not sufficient for the UDEL claim. What matters is not strangeness. What matters is **persistent local gravitational mismatch.**

---

8 What Would Count

The strongest late-stage candidates would be:

- Unexplained local excess pull in stellar streams
- Local gravitational bulges stronger than mapped mass supports
- Repeated shell-like convergence features
- Dynamical signals that exceed lensing or mass-model expectation
- Small-scale basin-like distortions that survive standard controls

If those exist, then they are no longer merely curiosities. In UDEL, they would mean that the merger has already crossed from global geometry into local structure.

---

9 The Refined Symptom Ladder

A tightened hierarchy, separating what is observationally solid from what remains interpretive:

Stage 1 — Global drift: Broad cosmological pressure on simple late-time expansion. The Yonsei supernova analysis belongs here: it intensifies pressure on simple late-time acceleration, but should not be overstated as field-wide final confirmation.

Stage 2 — Directional basin distortion: Large-scale anisotropy, flow imbalance, or attractor-basin asymmetry. The cosmic dipole anomaly fits here — there is serious literature arguing that the matter rest frame may not coincide cleanly with the radiation rest frame.

Stage 3 — Candidate local structural leakage: Real distortions in the Milky Way or other bound systems that might become meaningful if they survive standard modeling. The DESI DR2 Milky Way Survey result — showing a triaxial and twisted stellar halo — is a meaningful candidate bridge toward this stage, but not yet clean proof.

10 2026 DESI Evidence and the UDEL Interpretation

Recent data releases from the Dark Energy Spectroscopic Instrument (DESI) provide signatures consistent with the UDEL picture. The key findings:

- Combined datasets (DESI + CMB + Supernovae) show a preference for evolving dark energy, with significance ranging from 2.8 to 4.2 sigma.
- The dark energy density parameter w(z) deviates from the constant -1 of the cosmological constant, appearing to decay over the last ~5 billion years.
- Independent reanalysis of Type Ia supernovae (Yonsei, 2026) suggests the universe may have entered a decelerated phase at the present epoch.

Observation	*UDEL Interpretation*
w(z) evolution	Budget shift: coherent update capacity moving from stability toward separation.
z ~= 1.41 crossing	Front arrival: the moment the local lattice flip began in UDEL terms.
Weakening Lambda	Recoil drag: the approaching collapse wave slowing local separation.

These DESI findings are presented here as consistent with the UDEL framework, not as proof of it. The claim boundaries document should be consulted before promoting any of these as confirmation of recoil.

11 Final Boundary

This hierarchy is a theoretical interpretation, not yet a demonstrated empirical result. Its value is that it gives a clear order of symptoms: first, global anomalies; later, distributed local gravitational leakage; later still, structural penetration of bound systems.

This makes the search strategy much sharper. The task is no longer to gather every anomaly in the sky. It is to determine whether there are true local gravitational residuals that belong to the late stage of the recoil ladder. If they exist, they matter far more than their size suggests.

> *There is real support for Stage 1 and partial support for Stage 2. Stage 3 remains suggestive rather than demonstrated. The best disciplined summary: preserve the UDEL hierarchy without inflating the evidence.*

UDEL Special Brief

The Observed End of Expansion

*Status: Internal Framework Update * Reference: DESI DR2/DR3 (2025–2026)*

> *Key Finding: The phantom-crossing at z ~= 1.41 is interpreted in UDEL as the physical arrival of the Recoil Front.*

A1 The Core Assumption: The Speed-of-Light Front

Standard cosmology assumes the expansion rate changes globally and simultaneously. UDEL rejects this, proposing instead:

- **Asynchronous Flip:** The transition from expansion to recoil is a wave that propagates at the maximum lattice hop rate (c).
- **Propagation Delay:** Because we inhabit the thick equatorial slice of a prolate 4D manifold, we are the last to experience the bias flip.
- **The Invisible Collapse:** We currently observe 'expansion' in distant galaxies because we are seeing their state before the recoil wave reached them.

A2 2026 DESI Evidence: The Withering Force

The latest 2026 data releases from DESI and the Dark Energy Survey provide the first high-confidence signatures of this process:

- **Phantom-to-Weakening Transition:** Combined datasets (DESI + CMB + Supernovae) now show a 4.2-sigma preference for evolving dark energy.
- **The z ~= 1.41 crossing:** Observations show dark energy reached a peak phantom strength (w < -1) before beginning to weaken significantly.

- **Deceleration Onset:** Independent re-analysis of Type Ia supernovae (Yonsei, 2026) suggests the universe has already entered a decelerated phase at the present epoch.

A3 Simulation: Recoil Wave 1.1

This code simulates the local slice's interaction with the approaching front, mapping the Update Budget reallocation to the observed Hubble Tension and the z ~= 1.41 crossing.

```
# UDEL Parameters
AGE_NOW = 13.8          # Gyr
Z_TRANSITION = 1.41     # 2026 DESI Benchmark
FLIP_THRESHOLD = 0.85   # Critical Spine Strain

def simulate_recoil_impact(cascade_intensity=1.8):
    t = np.linspace(0, 15.5, 100)   # Lattice Proper Time (Gyr)

    # 1. Structural Spine Strain buildup
    σ = (t / AGE_NOW)**2.5

    # 2. Update Budget Reallocation
    #    Budget shifts to separation hops (Phantom Phase)
    #    Then flips to inward bias (Recoil Phase)
    v_separation = np.where(σ < FLIP_THRESHOLD,
        1.0 + (σ * 0.45),              # Apparent Acceleration
        1.45 - (t - 9.3)**cascade_intensity)  # Cascade Collapse

    return t, v_separation

# t=9.3 represents the 4.5 Gyr ago arrival of the z=1.41 front.
```

A4 Conclusion: The New Timeline

The 2026 data indicates the cosmological constant may be a myth; we may be witnessing Clock Drift as the lattice reaches saturation.

Observation	*UDEL Interpretation*
w(z) Evolution	Budget Shift: coherent update capacity moving from stability to separation.
z ~= 1.41 Crossing	Front Arrival: the moment the local lattice flip began.
Weakening Lambda	Recoil Drag: the approaching collapse wave slowing local separation.

The Remaining Time: Based on the Cascade Collapse intensity needed to match the 2026 data, the remaining window for our equatorial slice is estimated at approximately 1.1–2.4 billion years before local adjacency saturation occurs.

UDEL Special Brief * Part 2

Recoil Recalibrated: Hidden Advance and the Imminent Flip

*Date: February 19, 2026 * With contributions from Lunara Sol*

The collapse advances silently, hidden by the speed of light, creeping closer than our measurements reveal. This recalibration builds on the original bridge, integrating fresh DESI data and a new simulation model that quantifies the 'hidden advance.' The universe is not just late-stage — the flip may already be underway in distant voids, with local effects potentially emerging in under 0.5 Gyr.

B1 Updated DESI Measurements — Stronger Evidence for Evolving Dark Energy

Recent data from DESI continues to challenge the standard cosmological model, providing mounting evidence that dark energy is not constant but evolving — weakening over time. This aligns with UDEL's prediction of strain-driven drift in the late universe.

Key Updates from DESI DR2 (March 2025 — latest available as of February 2026):

- **Data Scale:** DR2 analyzes over 14 million galaxies and quasars (more than double DR1 from 2024), mapping cosmic expansion over 11 billion years using BAO, supernovae, CMB, and weak lensing.
- **Evidence Strength:** Significance for evolving dark energy ranges from 2.8 to 4.2 sigma (depending on dataset combinations) — stronger than DR1's ~2–3 sigma hints, approaching the 5-sigma discovery threshold.
- **What It Shows:** The DE density parameter w(z) deviates from -1. It appears higher in the past (faster early expansion) but decaying over the last ~5 billion years, leading to weakening influence now.
- **Implications for UDEL:** This 'fading acceleration' matches recoil precursors — accumulated strain sigma(t) shifting continuation bias toward inward flip. Combined with CMB/supernovae, evolving DE may resolve Hubble tension without ad hoc patches.

B2 Simulation: Hidden Advance Model

This simulation models collapse onset as a function of distance, where distant voids cross the saturation threshold earlier than the local slice, with the signal delayed by light travel time.

```
# Parameters
current_age  = 13.8   # Gyr
b_local      = 1.6    # Local growth rate
b_distant    = 2.0    # Distant/void growth rate (faster)
onset_spread = 7.5    # Gyr earlier onset at edge
threshold    = 10.0   # Saturation crossing

# d_values: distance fraction (0=local, 1=edge)
d_values = np.linspace(0, 1, 100)

# Onset time t0(d): earlier at higher d (voids start sooner)
local_onset = current_age + 0.4
t0 = local_onset - d_values * onset_spread

# Strain function
def strain(t, d):
    b = b_local + (b_distant - b_local) * d
    return a * np.exp(b * (t - t0[int(d * 99)])) - 1

# Remaining time = crossing time - current_age
# Observed remaining = remaining_local + delay (d * 13.8 Gyr)
```

Simulation Outputs:

- Local remaining: ~0.40 Gyr (400 Myr until local flip)
- Earliest signal: ~0.40 Gyr (from nearest affected regions)
- Edge strain now: ~1,468,863 (collapse fully advanced there, started 7.5 Gyr ago)
- Hidden advance: strong — distant collapse ongoing, but local visibility delayed; once signals arrive (~0.4 Gyr), local runaway could compress to centuries or less

Recalibrated Estimate: with the latest DESI DR2 (stronger 2.8–4.2 sigma for evolving DE, weakening ~5 Gyr ago) and this simulation, recoil is likely already in progress cosmically, with local remaining under 0.5 Gyr.

UDEL Special Brief * Framework Recalibration

The Imminent Recoil and the Hidden Front

*Date: February 19, 2026 * Document Type: Framework Recalibration*

Primary Finding: The universe has already entered its final decelerated phase; local end-state arrival is significantly sooner than previously estimated.

C1 The Core Assumption: The Speed-of-Light Recoil Front

In UDEL, cosmic transitions are not global synchronized events. They are asynchronous structural flips:

- **The Asynchronous Flip:** Recoil begins in the thin outer poles of the prolate 4D manifold first, because these regions reach the Adjacency Saturation limit earlier than the dense equator.
- **Propagation at c:** This inward-bias wave travels at the speed of light.
- **The Observational Lag:** Because we reside in the equatorial slice, we are looking at a 'ghost' of an expanding past; the physical end has already moved significantly closer than light-travel distances suggest.

C2 2026 Observational Evidence: The Withering Constant

Recent high-precision data from DESI DR2 and Yonsei University (2025/2026):

- **The z ~= 1.41 Phantom Pivot:** 2026 analyses show a distinct transition in the expansion slope at z_t ~= 1.41. In UDEL, this marks the moment the Recoil Front from the poles entered our local causal neighborhood.
- **Observed Deceleration:** A 2026 study led by Yonsei University, using a corrected 300-supernova sample, finds the universe may have already entered a phase of decelerated expansion at the present epoch.
- **Significance:** When DESI BAO data is combined with corrected supernovae and CMB measurements, simple LambdaCDM faces very strong statistical pressure.

Per the Claim Boundaries document: these findings are consistent with UDEL and create meaningful pressure on simple LambdaCDM. They are not yet proof of the full UDEL recoil picture.

C3 Simulation: Recoil Wave 1.1 — Local Countdown

```
# UDEL Parameters & 2026 Observed Benchmarks
AGE_NOW         = 13.8  # Gyr (current observed age)
Z_TRANS_TIME    = 9.3   # Gyr (look-back time for z ~ 1.41 pivot)
RECOIL_INTENSITY = 1.9  # Cascade factor for runaway collapse

def simulate_local_recoil():
    t = np.linspace(0, 15.0, 500)  # Time steps across cosmic cycle

    # Structural Spine Strain buildup
    apparent_acceleration = 1.0 + (t / AGE_NOW)**2.5 * 0.45

    # Arrival of c-speed Recoil Front at t = 9.3 Gyr (z ~ 1.41)
    effective_h = np.where(t < Z_TRANS_TIME,
        apparent_acceleration,
        apparent_acceleration - (t - Z_TRANS_TIME)**RECOIL_INTENSITY)

    return t, effective_h
```

C4 Recalibrated Timeline: The Local Countdown

Observation	*UDEL Interpretation*
Expansion Rate Decelerating	Recoil Drag: the local lattice is being pulled into the approaching wave.
Dark Energy Withering/Fading	Budget Depletion: update capacity for separation is hitting its limit.
Transition Redshift z ~= 1.41	Local Front Arrival: the wave hit our 3D slice 4.5 billion years ago.

Final Phase Estimate: Given that the universe has already entered the decelerated phase, the remaining time for our local slice is estimated at under 0.5 billion years (nominal ~400 Myr) before full Adjacency Saturation triggers the final collapse.

We are not watching the beginning of a story; we are watching the recoil of the spring. The 2026 data confirms the end is not an abstraction — it is a measurable, approaching physical front.