APEIRON / FOUNDATIONS V2

The universal carrier hypothesis

One fundamental dynamical carrier, whose differently organized states may underlie matter, dark-sector phenomena and effective causal geometry.

A hypothesis → controlled realizations → physical tests

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What the hypothesis asks us to explain

Matter and dark sectors	Recover physical structures and restrictive relations; retain known Standard Model and QCD content.
A common causal geometry	Derive one effective geometry and universal physical couplings in the claimed observable phase.
Extreme and quantum regimes	Close reconversion and entropy accounting. The quantum branch is conditional on a quantum carrier.

These are programme targets. The microscopic carrier and the bridges are not yet derived.

One concrete effective sector

σ, θ, χ

Effective variables for a local regime. Their number does not count fundamental substances.

$$P = K(z)X + a(z)X^2 - U$$

A fixed action and parameter benchmark
Explicit field equations and domain
Corrected phase kinetic normalization
A previously checked local spectrum

The retained mathematical core is unchanged from v1. A carrier-to-sector derivation remains open.

A result and a constraint from the same action

LOCAL CHARACTERISTIC

$$c\theta^2 = (K + 2aX) / (K + 6aX)$$

$$0 < c\theta^2 \leq 1$$

For a timelike phase gradient with positive kinetic and gradient coefficients. At zero gradient and $K > 0$, the metric cone is recovered.

FLAT-FRW BOUNCE OBSTRUCTION

The healthy matter sector obeys the null energy condition.

With minimal Einstein coupling in spatially flat FRW, H cannot increase. A nonsingular bounce requiring $dH/dt > 0$ at $H = 0$ is excluded in that domain.

A research programme that can fail

1 Specify	Freeze states, dynamics, domain and allowed freedom.
2 Derive	Build controlled bridges to effective and physical sectors.
3 Test	Use independent calibration and predeclared decision criteria.
4 Record	Retain failed versions; test repairs beyond their tuning information.

Established within scope / Failed / Unresolved

The next decisive step is a physical bridge

The current conditional test needs:

Background	Independently calibrated fields and parameters
Detection	A coupling that isolates the phase perturbation
Control	A nonempty frequency window and justified error budget

Then a failed characteristic relation can reject the fixed model in its declared regime.