Special VLCC section – Lagrangian V9

Stabilized variational formulation of the chronotropic temporal field

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This work is provided as the English translation of the original French publication, available under the DOI : https://doi.org/10.5281/zenodo.17976677

Invitation to a broader reading

This document deliberately focuses on the canonical mathematical formulation of the V9 Lagrangian of the VLCC model.

Readers wishing to delve deeper into the ontology of time underlying the model, the conceptual and historical foundations of its development, the role of the unique temporal field with a threephase structure, as well as the intermediate developments — including the cosmological toy model and detailed phenomenological analyses — are invited to refer to the VLCC Treatise — Canonical Edition, Version 1:
DOI (Zenodo):https://doi.org/10.5281/zenodo.17946156

This treatise constitutes the complete and structured exposition of the theoretical framework of the VLCC, from its ontological principles to its cosmological implications, and provides the necessary context for a thorough understanding of the formulation presented here.

Introduction — Status and purpose of the document

The purpose of this document is to explicitly present the canonical V9 Lagrangian of the VLCC (Variable Lagrangian of Cosmic Chronotropy) model.
It constitutes a formal and variational update of earlier versions of the Lagrangian (V7–V8), already introduced and discussed in the VLCC Treatise — Morphogenic Foundation of Time and Light (associated DOI).

This text does not propose a new theory, nor an independent extension of the model. It is a mathematical reference document intended to:

- to determine the canonical form of the Lagrangian V9,
- to explain its internal structure,
- and provide a stable basis for numerical, observational and computational validations.

The entire set of ontological motivations, morphogenic laws, physical interpretations and cosmological developments is set forth in the main treatise.
The reader is invited to refer to it for a complete understanding of the VLCC conceptual framework.

This document should therefore be understood as a formal pivot, allowing for the updating of previous publications and the rigorous use of Lagrangian V9 in future work.

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Part I — Presentation of the Lagrangian V.9 introduced in Treatise VLCC

Previous developments in the VLCC Treaty have allowed the complete architecture of the model to be established progressively:
the fully deployed temporal triad, the dynamics of morphogenic slippage χ, the existence of structural attractors, the pre-Freeze and Freeze Sphere regimes, galactic transitions, as well as the deep articulation between coherence, evolutionary tension and temporal memory.

These contributions, presented in a deliberately progressive manner for pedagogical and conceptual reasons, highlighted an intrinsic limitation of the Lagrangian V8 used until then.

Although V8 made it possible to derive the fundamental structure of the temporal field and to establish its morphogenic coherence, it did not yet contain all the components necessary to integrate, in a unified way, all the mechanisms revealed in Part III of the treatise.

In particular, the following remained absent or only outlined in V8:

- the second derivative of the present entangled $\ddot{t}_2(\mathrm{eff})$, indispensable to the formulation of morphogenic gravity;
- the existence of an incompressible basic state of the present;
- the explicit feedback of Δt on the kinetics of the time field; the
- unified minimal geometric coupling of type $\sigma^2 R$;
- the canonical structuring of the χ slip in the variational framework;
- the coherent integration of extreme regimes (pre-Freeze, Freeze Sphere and dissolution mechanisms).

The introduction of Lagrangian V9 precisely addresses this need.
It constitutes the complete canonical formulation of the VLCC model, integrating into a single and stabilized writing all the morphogenic laws, temporal regimes and dynamic mechanisms now established.

The aim of this chapter is to present this Lagrangian V9, to explain its structure, internal logic and theoretical status, before deploying its physical and cosmological consequences.

1.1 — Why this new Lagrangian?

The conceptual progression of this section has shown that the model rests on four pillars:

1. The triad t_1–t_2–t_1' as an internal temporal structure.

2. The three-phase field {τ, σ, Δt} as a phenomenal representation of distributed time.

3. Morphogenic gravity $g \propto \partial r(\ddot{t}_2\,\mathrm{eff})$ as a dynamic basis.

4. Morphogenic attractors that structure galaxies, dwarfs, UDGs, Zone III and Freeze Spheres.

However, for a model to be coherent, these pillars must emerge from the same variational formalism.

V.8 partially succeeded.
V.9 achieves this completely.

The transition from V.8 to V.9 is therefore not a change of framework: it is the logical closure of the existing framework.

1.2 — Role of Lagrangian V.9 in the treatise

V.9 now becomes:

- the canonical mathematical form of the VLCC,
- the version to which the equations in Part II should be linked,
- the support for the morphogenic predictions of Part III,
- the basis of any simulation or observational study (Part IV).

It does not retroactively modify the demonstrations in chapters 33–46:
It provides the unified formalism that justifies and organizes all the structures introduced independently in these chapters.

1.3 — The Lagrangian V.9 (canonical form)

The fundamental Lagrangian of the model is:

$$\mathscr{L}\_\mathrm{VLCC}\hat{}(\mathrm{V.9}) = \alpha/2\ (\nabla t_2)^2 + \beta/2\ (\nabla t_1)^2 + \gamma/2\ (\nabla t_1')^2 - V(t_1, t_2, t_1')$$

$$+ \lambda\_\chi\ (t_1' - \chi\, t_1) + \mu\ (t_2 - t_{2,\mathrm{basal}}) + \mathscr{L}\_\mathrm{bar}.$$

The Lagrangian V.9 imposes simultaneously:

• the temporal triad (t_1, t_2, t_1') as the internal structure of time,
• the morphogenic shift $\chi = t_1' / t_1$, inscribed at the variational level,
• the existence of an incompressible basal present indispensable to any dynamic ($t_2 > t_{2,basal}$),
• compatibility with baryonic physics and the phenomenological constraints of the model.

And he accomplished:

• the integration of the modified kinetics of the field σ,
• the explicit link between χ, Δt and the variational equations,
• the encoding of morphogenic gravity as a second derivative of the entangled present $\ddot{t}_2$ (eff),
• the natural emergence of pre-freeze and freeze-sphere regimes, not as hypotheses, but as inevitable solutions,
• the structural guarantee of the four morphogenic laws (LPHD, LCFT, LRTG, LITV).

Together, these elements make the V.9 Lagrangian the definitive mathematical basis of the VLCC, from which all the dynamic equations and all the predictions of the theory are derived.

Note: We note $\mathscr{L}$ the Lagrangian density and S the associated action

1.4 — What V.9 changes

What V.9 changes profoundly:

- It gives a strict variational origin to all the equations used.
- It renders morphogenic gravity mathematically unified.
- It provides a computable basis for temporal tomography (Part IV of the VLCC Treaty)
- It establishes the exact conditions for the stability and metastability of Freeze Spheres.
- It allows us to establish the three morphogenic outcomes (extinction, reopening, diffusion).
- It introduces the canonical structure of χ into the global formalism.

1.5 — Why introduce it now?

Two main reasons:

1.The reader did not yet possess all the necessary concepts before reading the VLCC Treaty.

To understand V.9, you must first master:

- the differentiated role of t_1, t_2, t_1',
- the dynamic interaction between σ and Δt,
- Gravity as a second derivative of the present,
- the structure of galactic attractors,
- the morphogenic status of pre-Freezes and Freeze Spheres.

These concepts did not exist before Part III of the VLCC treaty.

2.Part III of the VLCC treaty establishes the conditions for the possibility of V.9.

In other words:

V.9 is not a hypothesis. It is the mathematical expression of everything that Part III of the VLCC treaty made necessary.

1.6 — Conclusion of Part I

This Part I reinforces the framework that allows the model to:

- to be mathematically complete,
- physically unified,
- conceptually stable,
- and strictly falsifiable.

With version 9, the VLCC acquires its final form, the one on which the following are based:

- the upcoming simulations,
- multi-instrument comparisons,
- morphogenic cosmology (Part IV),
- and critical evaluation by the scientific community.

Part II — Complete Formulation of the Canonical Lagrangian V.9 Enthroned in Treatise VLCC

The Lagrangian V.9 has two requirements:

1.Reproduce the V.8 nucleus: tri-phase {τ, σ, Δt}, triplet (t_1, t_2, t_1'), χ glide, LPHD/LCFT/LRTG/LITV laws, morphogenic gravity.

2.Explicitly incorporate the refinements introduced in the VLCC treaty:

- existence of a basal present t_2,basal > 0,
- Metastability of Freeze Spheres (no eternal freezing),
- dissolution by external gradients (∇σ_ext, ∇Δt_ext).

The Lagrangian V.9 is therefore constructed as a minimal extension of V.8:

S_VLCC^(9) = ∫ d^{4}x √(-g) _VLCC (9).

with

_VLCC^(9) = _GR + _time + _grav + _int + _constraints.

3.Summary table of VLCC morphogenic constants

Note :

- The numerical values   of the morphogenic constants are not fixed a priori and are intended to be constrained by observation.

- G_0 is fixed as the phenomenal reference constant, the emergent character of gravity being carried by the temporal fields.

Constant	Nature	Conceptual role	Status in the model
(G_0)	Constant gravitational effective	Effective Newtonian coupling constant in the emergent phenomenal regime	Fixed (constant of reference)
(\alpha)	Coefficient morphogenic	Relates the temporal coherence gradient (sigma'(r)) to the effective morphogenic density (rho_T(r))	To be constrained by observation
( )	Coefficient of temporal feedback	Weights the effects of memory (t_1) in the structuring of the temporal field	To be constrained by observation
(γ)	Voltage coefficient evolving	Controls the influence of the regime (t_1') (evolutionary tension) on morphogenic dynamics	To be constrained by observation
(\lambda_i)	Coefficients of transition morphogenic	Parameters of connection between morphogenic regimes (zones I–II–III)	To be constrained by observation
(K_A)	Constant of standardization morphogenic	Sets the overall scale of temporal coherence in a given regime	To be constrained by observation
(sigma_0)	Consistency value central	Initial value of temporal coherence at the center of the structures	System dependent
(sigma_infty)	Asymptotic value consistency	Long-range temporal coherence value (external regime)	System dependent
(k)	Setting asymptotic	Controls the decay of temporal coherence in the external regime	To be constrained by observation

2.1 — Classical geometric sector: _GR

We retain a standard Einsteinian structure:

_GR = (1 / 16πG_0) R,

where R is the curvature scalar of the metric g_{μν}, with determinant g.

This part guarantees that the model reduces to General Relativity in a regime where the time field is uniform (constant σ, τ, Δt, zero gradients).

2.2 — Fundamental temporal sector: _time

The morphogenic degrees of freedom are:

- three-phase: $\tau(x)$, $\sigma(x)$, $\Delta t(x)$
- triplet: $t_1(x)$, $t_2(x)$, $t_1'(x)$

We introduce a covariant kinetic term of the scalar field type for each:

_time^kin = −1/2 Σ_A K_A g^{μν} ∇_μ φ_A ∇_ν φ_A,

where $\varphi_A \in \{\tau, \sigma, \Delta t, t_1, t_2, t_1'\}$ and $K_A > 0$ are morphogenic constants.

To this kinetic term, we add an overall morphogenic potential:

_time p̂ot = $-U(\tau, \sigma, \Delta t, t_1, t_2, t_1')$,

so that:

_time = _time kin − $U(\tau, \sigma, \Delta t, t_1, t_2, t_1')$.

The U potential is broken down into three blocks:

U = V_{τ,σ,Δt} + V_triplet + V_I.

(has)Three-phase coherence and voltage potential

V_{τ,σ,Δt} = V_τ(τ) + V_σ(σ) + V_{Δt}(Δt).

Morphogenic requirements:

- V_σ(σ) has an external plate σ_∞: dV_σ/dσ → 0 when σ → σ_∞.
- V_{Δt}(Δt) diverges when Δt → 0, preventing the arrow of time (LITV) from being zeroed:

  V_{Δt}(Δt) ~ Λ_{Δt} / Δt̂p, p > 0.

(b)Triplet potential (basal presence and metastability)

$V\_triplet(t_1, t_2, t_1') =$

$\lambda_1 t_1^2 + \lambda_2 (t_1' - t_{1',\infty})^2 + \lambda_3 (t_2 - t_{2,basal})^2 + \lambda_4 t_1 t_1' + \lambda_5 t_2 t_1'$.

Roles:

• $\lambda_3 (t_2 - t_{2,basal})^2$ imposes a basal present $t_2 \geq t_{2,basal} > 0$.

• The couplings $\lambda_4 t_1 t_1' + \lambda_5 t_2 t_1'$ ensure that t_1 can never remain fixed:

$\dot{t_1} \approx \beta_1 t_2 > 0$.

• The Freeze Sphere remains asymptotic and metastable.

(c)Fundamental invariant $I > 0$

$I = t_2^2 - t_1 t_1' > 0$.

Penalization terms:

$V\_I(I) = \Lambda\_I\, \Theta(I\_min - I)\, (I\_min - I)^2$.

This guarantees:

• impossibility of reaching $I \leq 0$,

• energy cost of solutions close to $I = 0$,

• exclusion of wormhole type geometries ($\Delta t = 0$).

2.3 — Morphogenic gravitational sector: _grave

Morphogenic gravity is associated with the present effective entangled t_2^{eff}.

It is defined as a minimal combination of three-phase components:

$t_2^{eff} = u_1 \sigma + u_2 \Delta t + u_3 \tau$,

with ui constants.

We introduce a gradient term:

$\_grav = - \kappa/2 \cdot g^{\mu\nu} \nabla_\mu t_2 {eff} \nabla_\nu t_2\hat{} {eff}$.

The associated Euler-Lagrange equations give:

$\square t_2^{eff} = (1 / \sqrt{-g}) \partial_\mu (\sqrt{-g} g^{\mu\nu} \partial_\nu t_2 {eff})$ = time source.

In quasi-static regime:

$g\_VLCC(r) \propto \partial_r t_2 {eff}(r)$.

Inside a Freeze Sphere:

$\nabla_\mu t_2 {eff} \to 0 \Rightarrow \_grav \to 0 \Rightarrow g\_VLCC \to 0$.

2.4 — Couplings to baryons and the indirect role of the "effective mass"

The morphogenic mass M_T(r) is a reinterpretation of the temporal field.

We add a weak coupling to the baryons:

$\_int = - f(\sigma, \Delta t) \rho\_b - (\xi/2) t_2^{eff} T {(b)}$,

with $T\check{}{(b)} = g {\mu\nu} T_{\mu\nu}^{(b)}$.

Interpretation:

- Baryons sense the time field via t_2^{eff} and σ.
- On a large scale:

  $\rho\_T(r) = \alpha \sigma'(r)$,

  $M\_T(r) = 4\pi \int_0 \rho\_T(r') r'^2 dr'$,

  $v\_c^2(r) = G_0/r [M\_b(r) + M\_T(r)]$.
- At a fundamental level, there is no dark matter:

  M_T is the phenomenal translation of a temporal phenomenon.

2.5 — Constraint terms: Freeze Spheres metastables & external gradients

To model the metastability of Freeze Spheres and their dissolution:

$$\_constraints = - W\_FS(t_1, t_2, t_1', \nabla\sigma, \nabla\Delta t),$$

with :

$$W\_FS = \varepsilon_1 t_2 t_1 + \varepsilon_2 t_2 |\nabla\sigma|^2 + \varepsilon_3 t_2 |\nabla(\Delta t)|^2,$$

$\varepsilon > 0$.

Roles:

1)Basal flow resuscitator

- The term $\varepsilon_1 t_2 t_1$ guarantees that, even if t_1 is small,

  $t_2 > 0$ reintroduces a dynamic thrust.
- Formalize:

  $$\dot{x}\, t_1 \sim + \beta_1 t_2 > 0.$$
- ⇒ No Freeze Sphere can remain frozen.

2)Sensitivity to external gradients

- The terms $\varepsilon_2 t_2 |\nabla\sigma|^2$ and $\varepsilon_3 t_2 |\nabla\Delta t|^2$ mean:

  — if $\nabla\sigma\_ext$ or $\nabla\Delta t\_ext \neq 0$

  — then the dynamics of t_1 and t_1' are modified:

  $$\dot{x}\, t_1 \approx - \alpha_1(\nabla\sigma\_int + \nabla\sigma\_ext) + \beta_1 t_2$$

  $$\dot{x}\, t_1' \approx \alpha_3(\nabla\Delta t\_int + \nabla\Delta t\_ext) + \gamma t_2$$

  — which reactivates memory and decreases χ.

These terms mathematically encode the dissolution of the Freeze Spheres.

when an environment imposes non-zero gradients.

2.6 — Conceptual summary of Lagrangian V.9

The Lagrangian V.9 implements, in variational language:

1.Triphase and triplet as fundamental fields

• τ, σ, Δt, t_1, t_2, t_1' are coupled scalar fields, with standard kinetic terms.

2.Morphogenic laws integrated into the potential

• LPHD: t_1 erodes but remains > 0 (via V_triplet and couplings at t_2).

• LCFT: $t_2 \geq t_{2,basal} > 0$ (centered quadratic term).

• LRTG: $t_1' \geq 0$ (minimum at $t_{1,\infty}' > 0$).

• LITV: $\Delta t > 0$ (potential diverges when $\Delta t \to 0$).

• Invariant I > 0: penalized by V_I(I).

3.Morphogenic gravity = gradient of the entangled present

• Terms in ∇t_{2}_eff give g_VLCC(r) $\propto \partial_{(r)}$ t_2_eff(r),

with extinction when t_2_eff becomes spatially constant (Freeze / pre-Freeze).

4.Morphogenic mass M_T(r) as effective rereading

• Couplings at ρ_b and T {(b)} lead, in the galactic regime,

to a temporal density ρ_T $\propto \sigma'$ and to M_T(r),

without introducing dark matter particles.

5.Freeze Spheres are metastable by construction

• Present basal $t_{2,basal} > 0$,

• recall terms t_2 t_1,

• couplings to gradients $|\nabla\sigma|^2$, $|\nabla\Delta t|^2$

⇒ no Freeze Sphere can be an eternal frozen state;

Any configuration can be reopened, broadcast, or rearranged.

6.Compatibility with case studies

• Relaxed spiral regime: V.9 ≈ V.8 (same predictions for $\sigma(r)$, M_T, $v_c(r)$, g_{VLCC}).

• Dwarf regime / UDG: $\sigma' \approx 0$, slow rise, $\tilde{\chi}$ dominant.

• Extreme regime (Freeze Spheres): V.9 formalizes metastability and dissolution.

This Part II reproduces verbatim the introduction and mathematical formulation of the Lagrangian V.9 as presented in the treatise VLCC.

It becomes the logical culmination of everything presented in Part III of the VLCC treaty (pages 201 to 334 of the treaty): the triplet, the tri-phase, the morphogenic laws, the galactic attractors, the central Freeze Spheres and the external pre-Freezes.

By integrating these contributions, the Lagrangian no longer merely supports the theory — it becomes its canonical expression, the condensed form of its internal coherence.

With this completed formulation, the model is no longer just a conceptual architecture: it becomes a complete variational framework, endowed with its own dynamics, capable of generating its regimes, instabilities, structures, limits and signatures.

This consolidation naturally paves the way for the presentation of the mathematical master's degree as presented in the VLCC Treaty in Annex A.

Part III — Mathematical Master of the VLCC Model

3.1 — Purpose and status of the Master's program

This appendix brings together all the fundamental mathematical structures of the VLCC (Local Variation of the Time Field) model.

It constitutes the formal reference of the treatise: all the demonstrations in Part III and all the observational analyses are based on the equations, invariants and principles established here.

The Master does not add any assumptions to the model.

It unifies:

• the morphogenic triplet (t_1, t_2, t_1'),
• the temporal tri-phase {τ, σ, Δt},
• morphogenic slippage $\chi = t_1' / t_1$,
• morphogenic laws (LPHD, LCFT, LRTG, LITV),
• the canonical Lagrangian V.9,
• the gravitational structure $g \propto \partial r(\ddot{x}t_2\text{eff})$,
• the variational equations $\Sigma\Phi = 0$,
• the analytical solutions $\sigma(r)$ in Zones I–II–III,
• extreme regimes (pre-Freeze, Freeze Sphere).

This document is the mathematical framework of the model.

3.2 — Fundamental Fields of the VLCC

The VLCC is based on three distributed continuous objects:

1. Deep time field $\tau(x,t)$
2. Phenomenal coherence field $\sigma(x,t)$
3. Voltage field / time arrow $\Delta t(x,t)$

They constitute the tri-phase and drive the dynamics of galaxies, the cosmos, and gravitational systems.
But their internal structure is captured by a more fundamental object: the morphogenic triplet.

3.3 — Morphogenic triplet (t_1, t_2, t_1')

(ontological structure of time)

The triplet is the basis of the model.

It expresses the internal structuring of time according to three dynamic regimes:

• t_1: deep memory

The capacity of time to integrate past states.

• t_2: entangled present / phenomenal density

Minimum thickness of the present.

• t_1': evolutionary tension / future orientation

Local intensity of the arrow of time.

3.3.1 — Dynamic Interpretation

• t_1 decreases under the effect of interactions → memory erosion.
• t_2 is bounded below (LCFT) → never zero → permanent interiority of the present.
• t_1' grows up to a plateau (LRTG) → irreversible lick.

3.3.2 — Associated morphogenic laws

LPHD — Memory Preservation

$t_1 > 0$ always.

LCFT — Consistency of the present

$t_2 \geq t_{2,\text{basal}} > 0$.

LRTG — Generative Voltage Response

$t_1' \geq 0$ and tends towards a plateau.

LITV — Irreversivity of Δt

$\Delta t > 0$ everywhere.

3.3.3 — Morphogenic invariant

$I = t_2^2 - t_1 t_1' > 0$

This invariant imposes:

- impossibility of reversible time,
- impossibility of a negative voltage,
- stability of the present.

In particular, it prohibits:

- wormholes,
- global temporal symmetries,
- Complete memory cancellation.

3.3.4 — Role of the triplet

The triplet generates:

- morphogenic severity,
- the structure of galaxies (inner/outer zones),
- the attractors t_1 / t_1' / χ / σ,
- the Freeze Spheres,
- cosmological dynamics.

It is the internal geometry of time.

3.4 — Tri-temporal phase $\{\tau, \sigma, \Delta t\}$

(phenomenal projection of the triplet)

The triphase expresses the way in which the triplet is distributed in space and generates astrophysical phenomena.

- $\tau(x,t)$: observable temporal depth (related to t_1)
- $\sigma(x,t)$: phenomenal coherence (related to t_2)
- $\Delta t(x,t)$: observed tension / deflection (related to t_1')

The structural link is of the type:

$\tau \sim F_1(t_1)$, $\sigma \sim F_2(t_2)$, $\Delta t \sim F_3(t_1')$

The tri-phase is what the instruments "see".

The triplet is what is actually happening.

Morphogenic gravity results from this.

3.5 — Canonical Lagrangian V.9

The fundamental Lagrangian of the model:

$$\mathscr{L}\_VLCC^{(V.9)} = \alpha/2\ (\nabla t_2)^2 + \beta/2\ (\nabla t_1)^2 + \gamma/2\ (\nabla t_1')^2 - V(t_1, t_2, t_1')$$

$$+ \lambda\_\chi\ (t_1' - \chi\ t_1) + \mu\ (t_2 - t_2,basal) + \mathscr{L}\_bar.$$

It simultaneously imposes:

- the triad of time,
- the sliding $\chi = t_1'/t_1$,
- the present basic element necessary for any dynamic,
- baryonic compatibility.

It is this Lagrangian that produces all the variational equations of the model.

3.6 — Morphogenic gravity: $g \propto \partial r(\ddot{x}t_2\_eff)$

In the VLCC, gravity is neither a spatial curvature nor a mass, but:

$g\_VLCC(r) \propto \partial/\partial r\ (\ t_2\_eff\ddot{}(r)\ )$

where t_2_eff depends on σ, Δt, t_2 and their coupling.

Consequences :

- halo = modulation of t_2_eff̈,
- plateau = zone where t_2_eff̈ ≈ const.,
- external extinction = t_2_eff̈ → 0.

<u>Note :</u> The notation $\ddot{t}_2$ {eff} denotes the effective time second derivative, whose spatial gradient governs the morphogenic acceleration.

3.7 — Morphogenic mass

When g is rewritten in Newtonian form:

$v\_c^2(r) = G_0/r\ [\ M\_b(r) + M\_T(r)\ ]$

We define a temporal density:

$\rho\_T(r) = \alpha\ \sigma'(r)$

Morphogenic mass M_T is not a physical mass,

but the phenomenal translation of the temporal field.

3.8 — Open framework equation (ΣΦi = 0)

The variational principle applied to the Lagrangian V.9 leads to a single framework equation:

(ΣΦi = 0)

where each term Φ_i represents the variational contribution of a sector:

- temporal triplet (t_1, t_2, t_1'),
- three-phase {τ, σ, Δt},
- consistency and χ slippage,
- baryonic coupling,
- effective geometry.

This framework equation is not a solved equation:
It constitutes the unique generator of all the model's evolution equations.

It establishes the complete dynamics of the VLCC and makes it an open theory, in the sense that the system remains non-linear, coupled, and dependent on the morphogenic regime.

3.9 to 3.11 — Galactic Solutions

I summarize here the crucial points (already demonstrated in Part III):

- σ(r) has three analytical regimes (Zones I–II–III).
- t_2_eff governs v_c(r).
- M_T(r) ∝ r in Zone II → rotational plateau.
- M_T(r) → const in Zone III → gravitational extinction.

These solutions emerge naturally from the Master's program.

3.12 — Internal dynamics of the triplet

Simplified equations:

dot $t_1 \approx \beta_1 t_2$,

dot $t_2 \approx -\beta_2 t_2$,

dot $t_1' \approx \gamma t_2$.

They produce:

- erosion of t_1 (memory),
- minimal stability of the present,
- rise then plateau of t_1' (tension).

<u>Note :</u> This decay, dot $t_1 \approx \beta_1 t_2$, is bounded below by the LCFT constraint.

3.13 — Sliding χ: mean + fluctuations

Decomposition:

$\chi(x,t) = \bar{\chi}(r,t) + \tilde{\chi}(x,t)$

with dynamics:

$\partial \tilde{\chi} = D_\chi \nabla^2 \tilde{\chi} - \kappa_\chi \tilde{\chi} + S(x,t)$

This term explains galactic diversity.

3.14 — Extreme regimes (pre-freeze, freeze sphere)

Freeze Sphere conditions:

$t_1 \to 0$, $t_1' \to t_1',\infty$, $\sigma \to \sigma\infty$, $\sigma' \to 0^+$, $\chi \to \infty$.

Gravity:

$t_{2\_eff} \to 0 \Rightarrow g_{VLCC} \to 0$.

3.15 — Metastability and dissolution

No Freeze Sphere is stable:

• t_2_basal > 0 reanimates t_1:
dot $t_1 = \beta_1 t_2 > 0$

• External gradients dissolve the freezing: dot
$t_1 = -\alpha_1 (\nabla\sigma) + \beta_1 t_2$

Three outcomes:

1. Slow extinction,
2. reopening,
3. Pre-freeze diffusion.

3.16 — Conclusion of Part III

The Master's program shows that:

• Galactic gravity emerges from the entangled present,

• Zones I–II–III are necessary analytical solutions,

• Freeze Spheres are dynamic boundaries, never eternal,

• Galactic diversity results from morphogenic shifts,

• The Lagrangian V.9 unifies triplet, triphase and gravity.

This is the complete mathematical framework of the VLCC.

Relationship with previous publications

The earlier versions of the Lagrangian of the VLCC model (V7 and V8), as published in previous works, should be understood as intermediate steps in the conceptual and formal stabilization process of the model.

This document establishes the Lagrangian V9 as the canonical reference formulation, integrating and unifying all the morphogenic laws introduced previously.

The results derived from previous versions remain valid in regimes where the structure of the V9 Lagrangian is formally reduced to that of V8, thus ensuring the theoretical continuity and backward compatibility of the VLCC framework.

This hierarchical arrangement of versions ensures the consistency of all previous publications and their inclusion in a unified theoretical trajectory.

General Conclusion

The V9 Lagrangian presented in this document constitutes the canonical and stabilized formulation of the variational framework of the VLCC model.
It synthesizes all the fundamental morphogenic laws, temporal invariants and consistency constraints developed in the treatise, without modifying its conceptual architecture.

Unlike classical cosmological approaches, the Lagrangian V9 does not describe a dynamic of the cosmos in time, but formalizes the structural conditions allowing the existence of a stable phenomenal present.
Gravity, apparent expansion, galactic halos, and extreme regimes then emerge as effects derived from temporal coherence, and not as independent fundamental entities.

Earlier versions of the Lagrangian should be understood as intermediate stages leading to this canonical form.
The V9 Lagrangian now provides a consistent mathematical basis for:

- numerical simulations,
- observational analyses,
- validations using scientific artificial intelligence,
- and future developments of the model.

This document thus concludes the formal stabilization phase of the VLCC and establishes a unified reference framework, open to experimental confrontation and further theoretical exploration.