

RM — Relativity of Matter

The Heresy of Absolute Time

A Theoretical Manifesto of Relativity of Matter

From Universal Time and Physical Cadence to State $\mathcal{A}$, Local Gravity, Constitutive
Length and the Exclusion Interaction

RM — Pillar III

Canonical Concordance Edition

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THE REVISED SCHWARZSCHILD RELATION

$$\mathcal{C}_{\text{RM}}(r) = \sqrt{1 - \frac{2GM}{rc^2}} = \sqrt{1 - C(r)}$$

Time does not slow down. Matter changes cadence.

The observable Schwarzschild factor is retained; RM changes its physical reading from local time dilation to local physical cadence.

Preface — The Return to the Sphere

I am a *Homo sapiens* of the year 2026.

Twenty thousand years ago, I imagine one of my distant ancestors looking up at the Moon. He probably did not see merely a silver disc fixed to the vault of the sky. The movement of light, the slow advance of shadow, and that presence suspended in the night may already have revealed depth to him. Behind the appearance of the disc, his physical intuition sensed a sphere: another material world, tangible and perhaps similar to his own.

He had neither telescope, nor equation, nor theory of gravitation. Yet he possessed the instrument that precedes every discovery: the ability to imagine that reality is deeper than the image it presents to us.

Every age nevertheless runs the same risk: mistaking its representation of reality for reality itself. Mathematics describes, orders and predicts; but a representation, however elegant, does not necessarily become a physical object. A geometry may describe the behaviour of reality without constituting its substance. An equation may permit a solution without nature being required to realise it.

This Manifesto was born from that distinction. It does not claim to provide definitive proof. It gathers an architecture of ideas, explicit postulates, derived local results, acknowledged contradictions, rejected branches and unfinished paths. Some avenues survive because they passed an internal calculation; others are retained only as research history. The status of a statement matters as much as the statement itself.

In RM, time is an open universal line T . Clocks do not measure a substance called time: they count the cadence of physical phenomena. State $\mathcal{A}$ is proposed as the physical continuum through which RM seeks a physical account of manifestations that geometry describes with extraordinary precision.

This work is therefore a return to the sphere: an invitation to look behind the apparent disc, and not to confuse the map with the territory, the measurement with the object measured, or the power of an abstraction with the physical existence of what it represents.

I do not ask the reader to believe. I ask the reader to look a second time.

The Relativity of Simplicity

Nothing is more complex than making things simple.

I write this Manifesto as the sole author and assume full scientific responsibility for its postulates, selections, calculations, interpretations and claims.

My method rests on parsimony, common sense, explicit status labels and a rule that became stricter as the programme evolved: an attractive result is not protected from its own failure. If a branch requires an undeduced fit, changes rank, violates its gauge reading, or contradicts a later constraint, it is withdrawn rather than cosmetically repaired.

Time is only a date.

Pierre Benaros

How to read Pillar III

Pillar III is the *manifesto* of RM. It is not the primary technical source for every derivation. Pillar I v5.3.0 records the epistemological genesis, the non-repair discipline, the separation of physical prerogatives, the stellar cross-method result, N-OPT-01.1 and the later bulk/thermal concordance. Pillar II v4.7.0 carries the technical gravitational corpus: the constrained local action, weak-field closure, Pure Cadence, nonlinear Dirac audits, the stellar Q -fold, the homogeneous GHC-1/GEC-1/HBR-1 closure, the thermal extension and the conditional P-CIN reception. Pillar IV fixes the constitutional norm. Pillar III states the architecture that remains after those audits and records, in one place, what RM claims, what it postulates, what it has withdrawn and what can still kill it.

DIVISION OF AUTHORITY

The four Pillars have different jobs rather than a single linear hierarchy. **Pillar IV** governs constitutional norms, laws and postulates; **Pillar II** governs technical derivations and the live calculation debt register; **Pillar I** governs the epistemological genesis, division of physical roles and non-repair discipline; **Pillar III** is the canonical synthesis. Narrow later notes may govern the branch they explicitly derive—notably the homogeneous-bulk, Exclusion-Interaction and off-center-mechanics notes—without becoming additional Pillars. Pillar III does not revive a branch retired by another competent authority and does not silently strengthen a technical status.

Four epistemic labels

- **Postulate:** an ontological or constitutive statement taken as an input of RM.
- **Derived result:** a consequence obtained from the stated action and assumptions within its declared domain.
- **Conditional closure:** a result that survives only if named debts or regularity conditions hold.
- **Open programme:** a calculation, microscopic derivation or observation not yet completed.

Epistemic contract of version v7.5.0

What is carried as derived or conditionally derived

- For the local non-homogeneous branch $k \neq 0$, CLG-1 yields the Poisson equation and the attractive pair energy from one matching $Z\sigma^2 = 8\pi G$.
- The quadratic CLG-1 constraint count is six first-class plus ten second-class constraints, leaving two local tensor polarisations when the stated rank conditions hold.
- On the selected weak branch $\sigma < 0$, the optical and static calculations conditionally give the PPN tuple $\gamma_{\text{PPN}} = 1$, $\beta_{\text{PPN}} = 1$, $\alpha_1 = 0$, $\alpha_2 = 0$ without independent PPN fitting coefficients.
- N-Æ-05 conditionally fixes the local two-derivative cadence dependence under the Pure Cadence Principle; N-Æ-06 conditionally preserves two local gravitational degrees of freedom on the regular local elliptic branch. D-Æ-04A is closed conditionally, while D-Æ-04M remains open for explicit microscopic matter sectors that may alter the canonical structure.
- The nonlinear geometric sector contains a constitutive length $\ell_\star$ before any stellar equation of state is chosen. In CNL-BI1 the response obeys $F'(X_{\mathcal{R}}) \rightarrow \infty$ as $X_{\mathcal{R}} \rightarrow 1^-$. Current RM uses **Exclusion Interaction** as the canonical physical name for this increasingly stiff constitutive response; the name introduces no new force or fitted coefficient.
- In the static spherical N-EMPR reduction, the minimal matter interface yields TOV-RM and exactly recovers standard TOV when the RM sectors are switched off. With the frozen reduced parameters and the declared toy EOS, v28 contains two converged hydrostatic solutions at the same $p_c = 0.5028$ on opposite sides of $Q_c = 0$, and a local fold reconstruction gives $X_{c,\star} = 0.9052492489$ and $\varepsilon_{c,\star} = 1.2120324954$.
- At $p_c = 0.5028$, the post-v28 $Q_c < 0$ branch is now cross-method reproducible. DOP853 shooting gives $R = 2.08849775$, $M = 0.84685706$ with a smooth internal $Q = 0$ crossing; a separately implemented two-domain collocation gives $X_c = 0.9109684074$, $Q_c = -0.0598152950$, $R = 2.0884976108$, $M = 0.8468571424$ with $\max |H| < 8 \times 10^{-14}$. This confirms branch existence and regularity at the declared test point without rewriting the frozen v28 coordinates.
- N-OPT-01.1 conditionally fixes photonic cadence as a Dynkin first-passage cost on a frozen $\{g_{ij}, D_{\text{loc}}\}$ background: $\mathcal{L}_{\text{loc}}\Theta = -1/N$, and $\Theta_N/\Theta_{N=1}$ is a positive kernel-weighted mean of $1/N$. No new optical fitting coefficient is introduced; a complete stellar transport calculation remains outside this theorem.
- On the homogeneous reduced branch with the declared matter-radiation balances, GHC-1 and GEC-1 survive the $k = 0$ rank change and their preservation yields HBR-1,

$$\boxed{H[3B'(e) + 3\rho_m + 8u_\gamma] = s.}$$

The result closes the deep bulk without importing a Friedmann equation, H_0 or a fitted homogeneous response coefficient. HCR-1 is historical: its own derivation/rejection clause was executed rather than repaired.

- Retaining the curvature density $U(X)$ requires a new preservation calculation. Under the written homogeneous balances and $\dot{X} = -4HX$, the conditional extension is

$$H[3B' + 8XU' + 16X^2U'' + 3\rho_m + 8u_\gamma] = s,$$

which returns exactly to HBR-1 when $U = 0$. This is not a microscopic conversion law.

- In the active stellar energetic reading, the constitutive stock is written $\varepsilon_{\mathcal{A}}^{\text{th}}$ rather than being defined as accumulated redshift work. Maria M-02 supplies a conditional homogeneous thermal ceiling; UC-1, $u_{\mathcal{A}}^{\text{cap}} = P/\ell_\star^2$, remains a postulate. Redshift remains a physical propagation observable and a possible secondary energetic contribution whose quantitative share is not imposed.
- P-CIN passes a local kinetic canonical audit conditionally: the velocity-momentum map is regular for finite momentum, the Hamiltonian is positive and single-branch, and the lapse remains non-kinetic. This local result does not by itself prove preservation of the complete two-polarisation field chain, hyperbolicity or strong-field activation.
- The Black-Core bulk scaling $R_S \propto M$ versus $r_c \propto M^{1/3}$ and the exact Born-Infeld spherical bulk integrals remain conditional results of a distinct strong-field candidate branch. The later reception adds a conditional net-surface treatment through a double curvature layer and a static interior cadence plateau $N(r) = N_c$; the common phase action and global stability remain open.
- For an off-center observer in a fully spherical configuration, symmetry fixes the common sky axis but not a nonzero amplitude, sign or transfer to a particular observable. The v5.1 mechanical analysis keeps matched birth on the explicitly reduced $U = 0$ branch and separates deposited density, reference work and formation cost; no observed sky amplitude or direction is used to select the solution.

What remains postulated or open

- State $\mathcal{A}$ exists as a physical continuum; universal time is an open line; the four-state ontology is $\{m, EM, \mathcal{A}, E\}$.
- The Pure Cadence Principle is a falsifiable constitutive principle, not a theorem of spatial relabelling covariance alone.
- CNL-BI1 is a nonlinear curvature candidate, not a completed uniqueness theorem; the Exclusion Interaction is the interpretation of its stiff constitutive response, not an independently observed interaction.
- The frozen v28 stellar results remain reduced-unit, toy-EOS calculations. The later cross-method reproduction at $p_c = 0.5028$ closes the branch-existence discrepancy at that test point, but it does not establish radial stability, a physical neutron-star calibration, a maximum RM mass, the complete high-compactness continuation, a physical endpoint or external human numerical reproduction. The old v28 global coordinates remain visible as dated audit history rather than being silently overwritten.

- N-OPT-01.1 is a theorem of cadence on a frozen background, not a complete stellar radiative-transfer model. N-OPT-02 remains open and must test explicit dense, dispersive, anisotropic and moving matter sectors without hiding cadence inside the material diffusion coefficient.
- OCH-1, the common Black-Core phase action, radial/global stability, P-CIN-FIELD, P-CIN-OBS, the microscopic matter audit and the physical calibration of ℓ_* remain open.
- The deep homogeneous bulk rate is closed conditionally by GHC-1/GEC-1/HBR-1 under its declared balances. Boundary production, full formation cost, microscopic transfer into $\varepsilon_{\mathcal{A}}^{\text{th}}$, the Maria-limit $\rightarrow EM \rightarrow \mathcal{A}$ bridge, perturbations, distance-redshift operators, BAO, CMB and structure growth remain separate open programmes.
- Off-center geometry fixes an axis under spherical symmetry; a unique physical cosmic profile, observable amplitude, sign and selection/transfer law are not thereby fixed.
- The Triple Identity $E_0/c_{\mathcal{A}}^2 = M_{\text{in}} = M_{\text{rel}}$ is an open target and must be independently derived from one common action without inserting observed mass as an input.

NON-REPAIR CLAUSE

A failed branch is not rescued by inserting a fitted coefficient after the failure. A change of constraint rank, an unavoidable extra gravitational mode, a required independent matter coupling, a Black-Core wall tension adjusted to recover the desired radius, or a microscopic matter action incompatible with the universal interface reopens or rejects the relevant branch. Likewise, disagreement between independent numerical implementations is reported as a disagreement: it is not removed by averaging, selective quotation or post hoc retuning.

Contents

Preface — The Return to the Sphere	i
How to read Pillar III	iii
Epistemic contract of version v7.5.0	iv
I The conceptual inversion	1
1 The framework of the scientific programme	2
1.1 What is established	2
1.2 What is re-examined	2
2 Clocks, measurement and interpretation	3
2.1 A question prior to any theory	3
2.2 What does a clock really measure?	3
2.3 Observation, measurement and interpretation	3
2.4 Why does this distinction matter?	4
3 Universal time and the notion of cadence	5
3.1 Does a hypothesis deserve to be examined?	5
3.2 The choice of time as a starting point	5
3.3 The notion of cadence	5
3.4 A thought experiment	6
3.5 A requirement of coherence	6
4 From universality to the continuum	7
4.1 In search of a physical mechanism	7
4.2 A universal property	7
4.3 The problem of the vacuum	7
4.4 A minimal hypothesis	8
4.5 Why introduce a continuum?	8
4.6 A first conceptual consequence	8
4.7 A methodological remark	8

5	The continuum: constitutional principle and empirical proposition	9
5.1	The two scientific statuses of the continuum	9
5.2	Why look for a physical support?	9
5.3	A requirement of economy	9
5.4	The principle of universality	10
5.5	A first qualitative prediction	10
5.6	An unexpected consequence	10
5.7	The next step	10
6	The Marie Test: State $\mathcal{A}$ must manifest	12
6.1	From invisible interactions to visible consequences	12
6.2	Where is State $\mathcal{A}$?	12
6.3	Start from the phenomenon, not from its interpretation	13
7	Density, gradients and local perturbations	14
7.1	Is the continuum necessary?	14
7.2	What is a physical continuum?	14
7.3	Why introduce a density?	14
7.4	Why does a gradient become inevitable?	15
7.5	A physical analogy	15
7.6	Matter as a perturbation of the continuum	15
7.7	A requirement of prudence	15
7.8	The next step	16
8	Equilibrium, inertia and the birth of dynamics	17
8.1	Does the continuum possess an equilibrium state?	17
8.2	Inertia as a property of the continuum	17
8.3	The birth of a dynamics	17
8.4	Matter as a source of disequilibrium	17
8.5	An analogy with thermodynamics	18
8.6	An inversion of the gravitational problem	18
8.7	What remains to be built	18
8.8	The true challenge	18
9	From gradient to motion and to geometric representation	20
9.1	From gradient to motion	20

9.2	The forgotten question	20
9.3	An analogy with optics	20
9.4	A working hypothesis	20
9.5	The notion of least constraint	21
9.6	A remarkable consequence	21
9.7	An experimental requirement	21
9.8	A new reading of geometry	21
9.9	The tipping point	21
9.10	Provisional conclusion	22
II	The division of physical roles	23
10	State $\mathcal{A}$, matter, radiation and maximal cohesion	24
10.1	The four-state ontology	24
10.2	The separation inherited from Pillar I	24
10.3	Gravity is fundamental; its manifestation is mediated	24
10.4	A physical continuum and a gauge reading	25
11	Universal time and physical cadence	26
11.1	One time line, many physical rates	26
11.2	Pure Cadence Principle	26
11.3	Photonic cadence as a Dynkin cost	26
III	The technical gravitational sector	28
12	Who pays for gravity? — the retained local chain	29
12.1	The gauge-invariant scalar	29
12.2	CLG-1 and the Newtonian matching	29
12.3	Constraint count	30
13	Weak-field closure without PPN fitting	31
13.1	Optical operator	31
13.2	The PPN tuple	31
14	Pure Cadence, matter and the nonlinear Dirac survival audit	32
14.1	Universal matter interface	32

14.2 Nonlinear local count	32
IV Constitutive length, the Exclusion Interaction and strong fields	33
15 A strong-field candidate, not a finished strong-field theory	34
15.1 Why the old local constitutive potential is retired	34
15.2 CNL-BI1 and the constitutive length	34
15.3 P-CIN: kinetic capacity without a completed field proof	35
16 The stellar Q-fold	36
16.1 Static spherical reduction of the same constitutive sector	36
16.2 The frozen v28 doublet and fold	36
16.3 Cross-method confirmation and CA-1	37
17 The Revised Schwarzschild Relation	38
17.1 Cumulative constitutive cadence closure	38
18 The double-scale Black Core	39
18.1 Two operators, two scales	39
18.2 Mass-independent core density scaling	39
18.3 OCH-1, the net surface and the cadence plateau	39
18.4 What is genuinely open	40
V The homogeneous universe	41
19 The zero mode closes; the boundary stays separate	42
19.1 The $k \neq 0$ / $k = 0$ separation	42
19.2 GHC-1, GEC-1 and HBR-1	42
19.3 Thermal concordance: $U(X)$, Maria and redshift	42
19.4 Boundary production and off-center observables	43
19.5 What the historical numerical checkpoint still says	44
VI The branches RM killed itself	45
20 The audit trail: attractive ideas that are no longer active laws	46

VII	Falsifiability and open work	48
21	The live debt register	49
22	The Triple Identity: the next summit is not allowed to be circular	51
23	What would count as a serious external test	52
VIII	The architecture of RM	53
24	Four Pillars, four authorities	54
24.1	Pillar I — The Missing State of the Universe: The Genesis of RM	54
24.2	Pillar II — Fundamental Energetic Symmetry	54
24.3	Pillar III — The Heresy of Absolute Time	54
24.4	Pillar IV — Foundation / TRD Constitution	54
25	Fundamental dictionary	55
26	Manifesto conclusion	57
	Version note — v7.5.0	58
	Declarations	59
	Indicative references and RM sources	60

Part I

The conceptual inversion

Chapter 1

The framework of the scientific programme

1.1 What is established

The programme presented here recognises without reservation the principal experimental results on which contemporary physics is founded. In particular: atomic clocks placed in different gravitational potentials accumulate different numbers of oscillations; the relativistic corrections applied to the GPS system are indispensable to its operation; light undergoes a gravitational frequency shift; the trajectories of bodies in the vicinity of masses are described with remarkable precision by general relativity within its domain of experimental validity. These results constitute the common ground of any further discussion. They will never be called into question in this work.

1.2 What is re-examined

While the observations are taken as established, their interpretation remains, by nature, open to scientific analysis. Thus, when an atomic clock placed at altitude accumulates more oscillations than an identical clock located at sea level, several levels of description are involved. The first level is the measurement itself: a different number of oscillations is recorded. The second level is the interpretation of that measurement. Within general relativity, this difference is interpreted as the consequence of a modification of the spacetime metric. The programme presented here explores another possibility: clocks continue to measure atomic oscillations, but these oscillations depend on the local physical properties of the medium in which the atoms evolve. The observed result remains identical. The proposed physical origin changes.

Chapter 2

Clocks, measurement and interpretation

2.1 A question prior to any theory

Every physical theory answers a prior question. Classical mechanics answers the question of the motion of bodies. Thermodynamics answers the question of energy exchanges. General relativity answers the question of gravitation. The present programme adopts a different approach. It chooses to go upstream of the observed manifestations of gravitation in order to examine a more elementary experimental object: the clock. This choice may seem unusual. It is nonetheless methodologically natural. Indeed, no theory of gravitation can be confronted with experiment without recourse to time-measuring devices. Any comparison between two events presupposes a temporal reference. Any determination of a velocity, a frequency or a duration rests on a clock. In other words, before discussing the nature of time, one should examine the nature of the instrument that claims to measure it. This inversion of perspective constitutes the starting point of the present programme.

2.2 What does a clock really measure?

In everyday language, as in much of the scientific literature, one says that a clock “measures time.” This formulation is convenient. It is not, however, a physical description. An atomic clock never observes an abstract entity called “time.” It counts a perfectly identified physical phenomenon: the hyperfine transitions of a caesium-133 atom. A mechanical clock counts the oscillations of a pendulum. A quartz clock counts the vibrations of a crystal. In every case, the instrument does not directly measure a universal coordinate. It measures the regular repetition of a material process. This distinction, often implicit, becomes essential as soon as one seeks to interpret the differences observed between several clocks. A variation in the number of recorded oscillations can receive several physical interpretations. It can be attributed: to a modification of the time coordinate itself; or to a modification of the periodic phenomenon used as a reference. The two interpretations lead to the same immediate experimental result: a different number of oscillations. They differ only in the physical mechanism proposed. The present programme explores the second possibility.

2.3 Observation, measurement and interpretation

One of the recurring difficulties in debates on the foundations of physics stems from the confusion between three levels of description. The first level is that of observation. It corresponds to experimental facts. For example, two identical atomic clocks, placed at different altitudes, do not accumulate the same number of oscillations when they are reunited after a certain duration. This result is reproducible. It belongs to the domain of observation. The second level is that of measurement. In the preceding experiment, what is actually recorded is a number of atomic periods. The measurement contains no information about the deep nature of time. It establishes

only a difference of cadence between two physical systems. The third level is that of interpretation. It is at this level that theory intervenes. Within general relativity, this difference of cadence is interpreted as the consequence of a variation of the spacetime metric. The programme presented here examines another hypothesis. It proposes that the observed difference results from a local modification of the physical properties of the medium in which the clocks operate. Thus, the observations remain identical. The measurements remain identical. Only the interpretation changes. This distinction constitutes the methodological heart of the present work. It will guide all subsequent developments.

2.4 Why does this distinction matter?

Any mature physical theory must be able to distinguish what it explains from what it assumes. To confuse an observation with its interpretation is to render the theory impossible to discuss. Conversely, to recognise that a single observation can sometimes receive several interpretations opens a legitimate space of research. The present programme does not claim that the proposed interpretation is already demonstrated. It claims only that it deserves to be examined according to the same criteria as any other scientific hypothesis: logical coherence; compatibility with observations; mathematical formulation; predictive capacity; possibility of refutation. These criteria will be applied without exception at every stage of the development. No hypothesis will be considered as established before having simultaneously satisfied all of these requirements.

Chapter 3

Universal time and the notion of cadence

3.1 Does a hypothesis deserve to be examined?

Every physical theory is born of a dissatisfaction. Not a dissatisfaction with the observations, but a dissatisfaction with their interpretation. The history of science shows that this situation is frequent. Newtonian mechanics successfully explained planetary motions. Yet it did not answer an essential question: what is the physical nature of gravitation? Thermodynamics described heat exchanges perfectly even before the existence of atoms was universally accepted. Likewise, Maxwell's equations described electromagnetic phenomena before the notion of the photon was introduced. In each of these examples, the observations were correct. The equations were effective. What evolved was the physical interpretation. The present programme belongs to that tradition. It does not claim that the equations currently in use are incorrect. It questions their physical meaning. This nuance is essential. A theory can be mathematically exact within its domain of application while leaving open the question of its microscopic interpretation. It is precisely this space that the present work explores.

3.2 The choice of time as a starting point

Most theories of gravitation begin by defining the geometry of space. The present programme adopts the inverse approach. It begins by examining time. This choice does not proceed from a philosophical preference. It answers a methodological requirement. Every experimental description of a gravitational phenomenon involves a temporal measurement. The periods of pulsars. The oscillations of atomic clocks. The corrections of the GPS system. Signal propagation times. Particle decay lifetimes. In all these examples, the first observed quantity is a frequency, a period or a cadence. Before interpreting these variations as modifications of time itself, it seems legitimate to examine a simpler question:

Which physical phenomena determine the cadence of the systems used as clocks?

This question prejudices no answer. It fixes only a logical order. Understand the instrument before interpreting what it measures.

3.3 The notion of cadence

The word “time” occupies a central place in the language of physics. Yet measuring instruments never directly manipulate this quantity. They manipulate periodic phenomena. This remark leads to a distinction that will play a fundamental role throughout the development of the model. **Universal time** T designates the parameter used to order events. **Cadence** designates the proper frequency of a physical process. These two notions are independent. A variation of

cadence does not necessarily entail a variation of the time coordinate. This distinction, which may seem purely terminological, has important consequences. It opens the possibility of interpreting certain observed differences between clocks without supposing that the very structure of time is modified. The present programme does not yet claim that this possibility is realised in nature. It claims only that it deserves rigorous examination.

3.4 A thought experiment

Consider two rigorously identical computers executing exactly the same program. The first runs on a processor clocked at 4 GHz. The second uses a processor limited to 2 GHz. The second computer will take approximately twice as long to finish the computation. Does this difference in execution entitle us to conclude that time has elapsed differently for each of the computers? The answer is obviously negative. The difference stems exclusively from the cadence of the internal processes. The example does not constitute a physical proof. It does not describe a gravitational phenomenon. It merely shows that a uniform slowing of a set of physical processes does not logically imply a slowing of time itself. Its role is therefore strictly methodological. It recalls that a single observation can sometimes receive several conceptually coherent interpretations.

3.5 A requirement of coherence

At this stage of the reasoning, no new hypothesis has yet been introduced. No continuum. No novel mechanism. A single idea has been examined. Clocks measure physical phenomena. This statement immediately leads to a requirement of coherence. If the observed cadences do change with the gravitational environment, it becomes necessary to identify a physical mechanism capable of producing this modification. Two general possibilities then appear. The first consists in attributing this variation to the properties of time itself. The second consists in seeking a physical cause acting directly on the material processes that serve as clocks. The present programme chooses to explore this second possibility. This decision does not yet constitute a demonstration. It simply defines the starting point of the research. The next chapter will have precisely the task of examining what type of physical medium could act universally on all material processes. It is only at that point of the reasoning that the hypothesis of an energetic continuum will be introduced.

Chapter 4

From universality to the continuum

4.1 In search of a physical mechanism

The previous chapter led to a provisional conclusion. Clocks measure physical phenomena. If these phenomena change cadence with their environment, a physical mechanism must be proposed to explain the variation. This requirement is a general principle of any physical theory. Describing a phenomenon is not enough. One must also identify the mechanism capable of producing it. The question then becomes remarkably simple. What physical object could act simultaneously on all clocks, all atoms and, more generally, on the totality of material processes? The answer cannot be sought in the particular properties of a caesium atom. The same phenomenon is observed with clocks of different natures. The mechanism sought must therefore be universal. This universality already constitutes a first experimental constraint.

4.2 A universal property

Atomic clocks are a remarkable example. However, they are not the only systems that display a modification of cadence in a gravitational environment. Molecular transitions. Mechanical oscillators. Pulsars used as astrophysical clocks. The characteristic lifetimes of certain nuclear processes. All display, in their own domain, a dependence on the local physical conditions. These observations suggest that the phenomenon sought does not concern one particular object. It affects the totality of physical processes. The proposed programme therefore adopts a working principle that will play a fundamental role.

Principle of universality of physical processes. *Any local modification responsible for the variations of cadence acts on the totality of physical processes and not on one particular category of clocks.*

This proposition does not yet constitute a physical law. It represents a requirement of coherence. If the proposed mechanism were not universal, it would have to explain separately the behaviour of each type of clock. Such an approach would be unsatisfactory.

4.3 The problem of the vacuum

Once the existence of a universal mechanism is admitted, a second question naturally appears. *Where does this mechanism act?* In the usual framework of contemporary physics, space is often represented as the geometric support of events. Geometry describes distances, trajectories and the relations between objects. But a geometry, in itself, possesses no material properties. It cannot slow an oscillator. It cannot modify an atomic transition. It cannot exert a thermodynamic action. These effects presuppose a physical support. This remark is not a criticism of general relativity. It merely marks the difference between a geometric description and the search for a microscopic mechanism. The present programme pursues precisely this second path.

4.4 A minimal hypothesis

At this stage of the reasoning, a single new hypothesis becomes necessary. Space would not merely be a geometric framework. It would also possess a continuous physical reality. In other words, the vacuum would not be identified with the absence of a medium. It would represent the most homogeneous state of an energetic continuum. This hypothesis is deliberately minimal. It does not yet specify the exact nature of this continuum, nor the equations that govern it. It states only that a continuous physical medium is a natural candidate to explain a universal action on material processes. The programme will henceforth adopt the name **State $\mathcal{A}$** to designate this continuum. This terminological choice must not be interpreted as a reference to the old luminiferous-aether models of the nineteenth century. It designates exclusively an energetic continuum defined by the properties that will be progressively attributed to it in the course of the development.

4.5 Why introduce a continuum?

The decision to introduce a continuum does not proceed from a philosophical preference. It results from a logical constraint. If one and the same mechanism acts: on clocks; on atoms; on material systems; on the propagation of interactions; then this mechanism must be present everywhere these phenomena exist. It must therefore possess a continuous spatial extension. This property is precisely the operational definition of a continuum. The hypothesis does not claim to demonstrate its existence. It claims only that such an object deserves study because it naturally satisfies the constraints identified in the preceding chapters.

4.6 A first conceptual consequence

The introduction of a continuum profoundly modifies the way of approaching gravitation. The fundamental law of gravity is not created by the continuum and is not downgraded to an emergent effect: within Foundation/TRD it remains prior, universal and without exception. What the programme seeks to derive is the physical manifestation of attraction — how the local state of State $\mathcal{A}$ turns that law into gradients, energetic work, modified cadences and trajectories. The inversion is therefore precise: the law remains fundamental; its operative manifestation becomes physically intelligible through the continuum.

4.7 A methodological remark

At this stage of the document, no new equation has yet been introduced. This choice is deliberate. Experience shows that debates on the foundations of physics quickly become sterile when the concepts are not stabilised before mathematical formalisation. The present programme adopts the inverse approach. Define the concepts. Establish the experimental constraints. Identify the minimal hypotheses. Only after this stage will the search for a mathematical formulation become relevant. This progression is one of the guiding principles of the whole project. For the first time, State $\mathcal{A}$ appears in the text. But it does not arrive as a belief. It arrives as the answer to a logical constraint built up from the very first pages.

Chapter 5

The continuum: constitutional principle and empirical proposition

5.1 The two scientific statuses of the continuum

The status of State $\mathcal{E}$ must be stated on two levels and never blurred. Within Foundation/TRD, its existence is an Absolute Principle: it is active in the internal construction and is not treated as an optional device. In external scientific evaluation, however, its physical existence remains an empirical proposition: it must earn public scientific recognition through mathematical closure, quantitative confrontation and discriminating predictions. These two statements are not contradictory. One fixes the internal architecture; the other fixes the burden of evidence. The continuum is therefore neither a revealed truth nor a disposable metaphor. Internally it is foundational; externally it is exposed to refutation. That double status is the exact scientific position of this Theoretical Manifesto.

5.2 Why look for a physical support?

Modern physics describes the fundamental interactions admirably. It answers, with great precision, the question: “How do physical systems evolve?” The present programme asks a slightly different question. “In what physical support do these interactions take place?” This formulation does not presuppose that the current answer is incomplete. It merely seeks to determine whether a deeper level of description may exist. This approach is familiar in all branches of physics. Macroscopic thermodynamics found its microscopic explanation in statistical mechanics. The elasticity of solids finds its origin in the atomic organisation of matter. The propagation of sound is interpreted as a wave propagating in a material medium. Each time, a macroscopic phenomenon received an interpretation founded on a more fundamental structure. The present programme explores the possibility that an analogous approach may be feasible for gravitation.

5.3 A requirement of economy

Introducing a new physical object is always a decision heavy with consequences. The principle of parsimony therefore imposes a very strict requirement. The continuum must never be invoked to explain an already understood phenomenon without bringing additional information. Its introduction will be justified only if it simultaneously allows one: to unify several independent phenomena; to simplify their interpretation; to produce new consequences amenable to testing. This requirement is one of the major validation criteria of the programme. A useless continuum would be immediately rejected. A continuum capable of explaining several observations through a single mechanism would, on the other hand, deserve thorough study.

5.4 The principle of universality

The previous chapter led to a central idea. If the continuum exists, its action cannot be selective. It cannot slow only atomic clocks. It must act on the totality of physical processes that depend on its local state. This property becomes the first general principle of the programme.

Principle of universality of the continuum. *The local properties of the continuum coherently influence all physical processes that develop within it.*

This formulation has an immediate consequence. Clocks are no longer a particular phenomenon. They become simply the most precise instruments revealing a much more general property of the medium. Thus, the apparent slowing of clocks is no longer the object of the theory. It becomes its first experimental symptom.

5.5 A first qualitative prediction

Every physical hypothesis must lead to observable consequences. The continuum is no exception to this rule. If the local properties of the medium do modify the cadence of physical processes, then several independent phenomena should display common correlations. For example: atomic frequencies; the time constants of oscillating systems; certain propagation properties of interactions; the dynamics of material systems. The programme does not yet claim to establish these relations quantitatively. It claims only that they must follow from one and the same mechanism. This requirement will be one of the main objectives of the subsequent mathematical formalisation. Chapter 9 will show that a single constitutive postulate suffices to relate the first two of these categories to the fourth.

5.6 An unexpected consequence

At this stage of the reasoning an idea appears that was not sought at the outset. If the continuum does act on all physical processes, then the traditional distinction between matter and space becomes less sharp. Matter would no longer evolve in a passive space. It would evolve in a medium possessing its own energetic properties. The energetic manifestation of gravitational attraction could then be interpreted as an interaction between matter and this medium. This perspective profoundly modifies the way of approaching the problem. The question is no longer: “How does matter curve space?” It becomes: “How does matter modify the local state of the continuum, and how does this modification then influence the dynamics of other material systems?” This reformulation is perhaps the true paradigm shift proposed by this programme.

5.7 The next step

The continuum has now been introduced as a hypothesis. It remains to understand how it can act on matter. This question can only receive a satisfactory answer by examining the notion of density. A continuous medium can produce physical effects only if its properties vary from one point to another. The research must therefore answer a new question. What is a density gradient in an energetic continuum, and how can such a gradient influence the dynamics of matter? This document began as a book about gravitation. It has become, along the way, an

exercise in scientific method applied to a hypothesis of gravitation. The difference is essential: a reader may reject the hypothesis, but the text will have stated, at every step, what is observed, what is interpreted, what is proposed and what remains to be demonstrated. It is this discipline that gives the programme its value, whatever its scientific outcome.

Chapter 6

The Marie Test: State $\mathcal{A}$ must manifest

6.1 From invisible interactions to visible consequences

A physical interaction does not have to be seen directly in order to be physically meaningful. What is observed is what it makes happen. This elementary distinction gives RM a stricter ontological requirement than the mere introduction of a new symbol.

Marie sees the apple fall, her hand exist, the Sun hold in the sky. She sees none of the interactions that make these things possible — she sees their effects.

The three images may be written without theoretical decoration:

$$\begin{array}{cc} \boxed{\text{Apple} \longrightarrow \text{Gravity}} & \boxed{\text{Hand} \longrightarrow \text{strong interaction}} \\[10pt] \boxed{\text{Sun} \longrightarrow \text{Exclusion Interaction within RM}} & \end{array}$$

The first two arrows refer to established physical descriptions: falling bodies display gravity, while stable nuclei are indispensable to the material chain from atoms to living tissue. The third arrow has a different epistemic status. It is the RM constitutive reading: in the RM stellar sector, the increasingly stiff response associated with the Exclusion Interaction is what prevents the constitutive load from being continued arbitrarily through the same channel. The Sun is therefore a concrete image of what the RM mechanism is meant to make possible, not by itself an experimental proof of State $\mathcal{A}$ or a claim that standard stellar physics lacks its own successful account of stellar equilibrium.

6.2 Where is State $\mathcal{A}$?

If the question is “I do not see State $\mathcal{A}$. Where is it?”, RM must not answer by replacing one invisible abstraction with another. State $\mathcal{A}$ is not introduced as a fourth geometrical direction and it is not a renamed spacetime. It is proposed as a physical relational continuum, and a physical continuum must be characterised by what it permits, constrains, transmits and makes measurable.

The programme therefore adopts a manifestation criterion:

$$\boxed{\text{State } \mathcal{A} \longrightarrow \text{physical state or response} \longrightarrow \text{observable consequence.}} \quad (6.1)$$

A geometrical representation may organise observations with extraordinary precision. RM asks a different question: whether the physical world possesses a deeper relational support whose state leaves a trace in those observations. The burden of proof is correspondingly stronger, not weaker.

MANIFEST PHYSICALITY

State $\mathcal{A}$ is not made more physical by being described more elaborately. It becomes physically meaningful only when a chain can be drawn from its state to a reproducible consequence. Geometry may describe; State $\mathcal{A}$ must manifest.

6.3 Start from the phenomenon, not from its interpretation

The methodological consequence is equally important. RM should begin from the simplest established law that adequately describes the phenomenon, and introduce State $\mathcal{A}$ only at the exact point where RM asserts that an additional physical property is required. Newtonian mechanics remains the zero bench wherever its domain is valid; ordinary material microphysics remains the zero bench for local transport wherever it is valid.

$$\begin{array}{l} \text{Phenomenon} \longrightarrow \text{minimal established law} \longrightarrow \text{limit or question} \\ \hspace{10em} \longrightarrow \text{State } \mathcal{A} \longrightarrow \text{prediction} \end{array} \quad (6.2)$$

This rule forbids a common circularity: if the physical status of four-dimensional spacetime is precisely what the programme wishes to examine, spacetime cannot be silently placed among the premises and then rediscovered as the conclusion. The same discipline explains the strength of the recent transport construction: the local random walk of the photon is first assigned to ordinary matter microphysics; only the conversion of its cadence to the universal line T is assigned to N .

METHOD RULE

Start from the phenomenon. Keep Newton where Newton works. Keep ordinary microphysics where ordinary microphysics works. Introduce State $\mathcal{A}$ only where the RM hypothesis makes a new physical statement, and require that statement to return to an observable consequence.

Chapter 7

Density, gradients and local perturbations

7.1 Is the continuum necessary?

The introduction of an energetic continuum is the central hypothesis of the programme. Such a hypothesis immediately calls forth a legitimate objection. Why introduce a new physical object when general relativity already describes the observations with very great precision? This question must be asked before any attempt at justification. In science, an additional hypothesis is acceptable only if it answers a clearly identified necessity. Two criteria must be satisfied. First, the new object must explain a coherent set of phenomena that appear scattered in the previous framework. Second, it must lead to new consequences amenable to experiment. Failing that, its introduction would be arbitrary. The continuum must therefore never be considered a free hypothesis. It must appear as the logical consequence of the constraints identified from the observations.

7.2 What is a physical continuum?

The word “continuum” has many meanings across disciplines. In mathematics, it designates a continuous structure. In continuum mechanics, it represents a medium whose properties can be described at every point of space. The present programme adopts a more general definition. A continuum is a continuous physical medium whose energetic state can vary locally without losing its continuity. Three properties are attributed to it.

Continuity. It occupies all the space accessible to physical phenomena.

Transmissivity. It allows the propagation of interactions.

Variability. Its local properties can evolve in space and in universal time T .

No other property is yet postulated. The continuum is introduced with the minimum of hypotheses compatible with the research programme.

7.3 Why introduce a density?

A perfectly homogeneous continuum would be physically undetectable. If it possesses everywhere exactly the same properties, no instrument could bring its existence to light. The observed phenomena therefore impose an immediate consequence. If the continuum exists, it must present local variations. These variations can be described in many ways. The present programme retains the simplest notion: a local energy density. This density must not be understood as the density of an ordinary fluid. It represents a parameter describing the energetic state of the continuum at each point. The density function thus becomes the first physical quantity capable of characterising the medium.

7.4 Why does a gradient become inevitable?

A uniform density exerts no differential influence. Two clocks placed in a perfectly homogeneous continuum would run identically. To explain the differences observed between several regions of space, it is therefore not enough to introduce a density. One must introduce its variation. In other words, a gradient. This remark has considerable scope. Physics no longer answers the question: *What is the density of the continuum?* It now answers a different question: *How does the density vary from one point to another?* The programme progressively leaves a static description and enters a dynamics.

7.5 A physical analogy

Consider a valley covered by a perfectly uniform fog. In that state, the fog exists but it orients no motion. Now introduce a progressive variation of density. The fog becomes thicker in some regions, lighter in others. An observer crossing this valley will encounter different propagation conditions depending on position. The analogy is not a model of gravitation. It merely shows that a continuous medium acquires a physical influence only when its properties cease to be uniform. Dynamics is born of the gradient. Not of the existence of the medium itself.

7.6 Matter as a perturbation of the continuum

We can now reformulate a classical question. Gravitation is usually presented as the consequence of the presence of matter. The present programme proposes a slightly different formulation. Matter does not act directly on trajectories. It first modifies the local state of the continuum. In other words, a concentration of material energy becomes a source of density variation. The continuum responds to this perturbation. Other material systems then evolve in this now inhomogeneous medium. The causal chain thus changes profoundly. In the traditional geometric formulation:

$$\text{matter} \rightarrow \text{curvature} \rightarrow \text{trajectories}$$

In the present programme:

$$\text{matter} \rightarrow \text{local modification of the continuum} \rightarrow \text{gradient} \rightarrow \text{evolution of trajectories}$$

At this stage, this chain is a working hypothesis. It will have to be mathematically formalised before any conclusion.

7.7 A requirement of prudence

The reader might be tempted to recognise here a reformulation of gravitation. That temptation must be resisted. We have not yet demonstrated any law of motion. We have only identified a possible causal architecture. The difference is fundamental. A conceptual architecture can be coherent while remaining physically false. The programme will acquire scientific value only on condition of producing quantitative equations recovering the known experimental results. This requirement will never be abandoned.

7.8 The next step

The preceding chapters have successively introduced: measurement; cadence; the continuum; density; the gradient. One question now remains open. *How does a gradient of the continuum act on a material system?* In other words: *What mechanism transforms a density variation into an observable trajectory?* This question is the true starting point of the theory of gravitation explored in this Manifesto. Up to now, we have built the language. The next chapter must begin to build the dynamics.

Chapter 8

Equilibrium, inertia and the birth of dynamics

8.1 Does the continuum possess an equilibrium state?

Every theory describing a physical medium begins by defining its reference state. In thermodynamics, a gas is characterised by an equilibrium state. In fluid mechanics, a liquid at rest is a particular configuration from which perturbations can be studied. The present programme adopts the same approach. If the State $\mathcal{E}$ continuum exists, it too must possess a reference state. This state does not correspond to the absence of the continuum. It corresponds to a homogeneous, isotropic and thermodynamically stable continuum. In this ideal state, no privileged direction exists. No gradient is present. No differential gravitational manifestation can appear. The motion of bodies there would be inertial. Thus, the equilibrium state of the continuum naturally becomes the reference state of the programme.

8.2 Inertia as a property of the continuum

In classical mechanics, uniform rectilinear motion is presented as a fundamental principle. The present programme proposes a slightly different reading. If the continuum is homogeneous, every point of space presents exactly the same physical properties. No body then has any reason to spontaneously modify its trajectory. Inertial motion is no longer merely a principle. It becomes the natural consequence of a medium devoid of gradients. This reformulation has a conceptual advantage. It directly attaches inertia to the properties of the continuum. Rest and uniform motion become two manifestations of one and the same physical state.

8.3 The birth of a dynamics

Suppose now that a region of the continuum ceases to be homogeneous. A local density variation appears. This variation introduces a dissymmetry. From that instant, two neighbouring points no longer present exactly the same energetic state. The system leaves equilibrium. A dynamics becomes possible. The programme does not yet seek to compute this dynamics. It merely identifies the condition necessary for its appearance. Without a gradient, no differential motion can emerge. With a gradient, an evolution becomes physically conceivable. The gradient is therefore the first engine of the dynamics.

8.4 Matter as a source of disequilibrium

We can now reformulate the role of matter. In this programme, a material body is not merely an object evolving in the continuum. It represents a local concentration of energy capable of modifying the equilibrium state of the medium. The presence of a mass introduces a perturbation. This perturbation propagates in the continuum in the form of a density variation. The problem

of gravitation then changes nature. It is no longer a matter of determining how one mass attracts another mass. It is a matter of understanding how a concentration of energy modifies the state of the surrounding medium. The dynamics of bodies becomes an indirect consequence of this modification.

8.5 An analogy with thermodynamics

Thermodynamics provides a useful image here. When a hot source is immersed in an initially homogeneous fluid, it creates a temperature gradient. This gradient then generates heat flows. The observed motion is not directly caused by the source. It results from the response of the medium to the perturbation. The present programme explores a conceptually analogous architecture. Matter would not directly transmit a gravitational interaction. It would first modify the local state of the continuum. The observed trajectories would then be the dynamical response of this medium. This analogy has an important limit. The proposed continuum is not identified with an ordinary fluid. The comparison concerns only the logical structure of the reasoning.

8.6 An inversion of the gravitational problem

Since Newton, the fundamental question has often been formulated thus: *Why do masses attract each other?* The present programme proposes a different formulation. *Why does a body placed in an inhomogeneous continuum adopt a particular trajectory?* This reformulation is perhaps the deepest conceptual shift of the project. Gravity itself remains fundamental. What ceases to be primitive is the unexplained local mechanism of attraction: its energetic and transmissive manifestation becomes a property of the physical state of State $\mathcal{A}$. The observed phenomenon remains identical. The explanatory starting point changes.

8.7 What remains to be built

At this stage of the Theoretical Manifesto, the programme now possesses a complete conceptual architecture. Yet the essential is missing. No quantitative law has yet been proposed. We still do not know: how to describe mathematically the density of the continuum; how this density evolves; how the gradients influence material systems; how to recover the results of general relativity. This absence is deliberate. The present document carefully distinguishes the construction of the conceptual framework from its mathematical formalisation. The former without the latter remains insufficient. The latter without the former becomes hard to interpret. Part III begins precisely this reunion.

8.8 The true challenge

The scientific value of the programme will not depend on the elegance of the concepts introduced. It will depend on a single question. Will the equations built from this architecture quantitatively recover the observations already established? If the answer is positive, the continuum will become a serious candidate for a deeper physical interpretation. If the answer is negative, the programme will have to be abandoned or profoundly revised. This requirement is the principle of falsifiability

to which the entire project agrees to submit. A universe is not first of all a set of forces. It is first of all a physical medium possessing a state, an equilibrium and a dynamics. If this intuition is right, then gravity remains the fundamental starting law, while the measurable attraction, cadence shifts and trajectories become consequences of the state of State $\mathcal{A}$. A remark is in order at the close of these seven chapters: they do not constitute a plea against general relativity. They address a more ambitious question: *What should a theory of gravitation look like if one decided today to rebuild it from scratch?*

Chapter 9

From gradient to motion and to geometric representation

9.1 From gradient to motion

The continuum now possesses a structure. Matter locally modifies its density. Gradients appear. One question, however, remains entirely open. *Why would a gradient produce a motion?* This question is the true dividing line between a descriptive hypothesis and a physical theory. Describing a medium is not enough. A theory must explain how this medium acts on material systems. The present programme must therefore take a further step. It must propose a mechanism.

9.2 The forgotten question

Since Newton, a force has generally been defined as the cause of an acceleration. This formulation is extraordinarily effective. It does not, however, answer a deeper question. *Why does an acceleration appear?* The present programme reformulates this question. Instead of asking: *Why does a force act?* it asks: *Why does a material system cease to follow its inertial motion when it crosses a medium whose properties change?* The difference seems subtle. It nonetheless completely modifies the problem.

9.3 An analogy with optics

Optics provides a particularly instructive example. When a light ray crosses a homogeneous medium, it propagates in a straight line. This trajectory ceases to be rectilinear when the optical index varies progressively in space. The ray receives no localised impulse. It continually adapts its propagation to the local properties of the medium. In other words, it is not a pointlike force that bends its trajectory. It is the continuous variation of the properties of the traversed medium. This observation is not a demonstration of the present programme. It merely shows that a progressive change in the properties of a medium can produce a curved trajectory without the need to introduce a localised interaction.

9.4 A working hypothesis

The programme then explores a possibility. Suppose that the local properties of the continuum also determine the conditions of evolution of material systems. In this hypothesis, a free body would not be attracted by a distant mass. It would spontaneously follow the trajectories compatible with the local state of the continuum. In other words, the observed trajectory would become a property of the medium itself. Gravitation would cease to be interpreted as an interaction between two bodies. It would appear as a consequence of the structure of the continuum. This hypothesis will naturally have to be submitted to mathematical verification.

9.5 The notion of least constraint

In many branches of physics, systems evolve according to variational principles. They follow the trajectories compatible with certain conditions of equilibrium or of least action. The present programme does not yet introduce a new variational principle. It suggests, however, a neighbouring idea. A material system would evolve along the trajectories imposed by the local properties of the continuum. This formulation remains deliberately qualitative. It merely prepares the ground for a later formalisation. The objective is not yet to compute a trajectory. It is to identify the type of dynamical principle that will have to be sought.

9.6 A remarkable consequence

If this hypothesis proves correct, an important consequence appears immediately. The observed trajectories would no longer depend directly on the presence of the masses. They would depend on the state of the continuum created by those masses. The difference is fundamental. In such a description, matter no longer directly communicates an interaction. It modifies a medium. It is then this medium that determines the dynamics of the other systems. This architecture recalls certain well-known mechanisms of continuum physics. It will nonetheless have to be developed independently, in order to avoid any misleading analogy.

9.7 An experimental requirement

Such a reinterpretation can be retained only if it satisfies a particularly strong constraint. It must quantitatively recover the results attributed today to general relativity. In particular: planetary orbits; the perihelion precession of Mercury; the gravitational deflection of light; the gravitational frequency shift; the relativistic corrections of the GPS system. These phenomena are the first tests against which the programme will have to be confronted. No partial success will suffice. The model must explain all of these observations simultaneously.

9.8 A new reading of geometry

We can now return to geometry. In general relativity, geometry is the fundamental object. Trajectories are determined by the metric. The present programme proposes an inversion of this hierarchy. Geometry does not disappear. It changes status. It becomes the macroscopic description of the properties of the continuum. In other words, the metric would no longer be a primary object. It would summarise the local state of a deeper physical medium. This idea will naturally have to be confronted with the existing geometric formulations. But it already offers an important change of perspective.

9.9 The tipping point

The preceding chapters built the concepts. This one introduces the first complete causal chain of the programme.

Universal time T ↓ Energetic continuum ↓ Local density variation ↓ Gradient ↓ Modification of the local conditions of evolution ↓ Observed trajectories

This chain is not yet a demonstration. It is the structuring hypothesis of this Manifesto. All the mathematical work to follow must now answer a single question: *Does this causal chain quantitatively reproduce the known laws of gravitation?*

9.10 Provisional conclusion

The present Theoretical Manifesto here reaches its first objective. It has built a coherent conceptual architecture linking the notions of time, measurement, continuum and dynamics. The remaining work is no longer mainly philosophical. It becomes mathematical. The success or failure of the programme will now depend on its capacity to transform this architecture into a set of reproducible, falsifiable equations quantitatively comparable to observations. Only on this condition will the continuum hypothesis be able to claim to move beyond the status of an idea to that of a physical theory. The first eight chapters never seek to convince the reader; they construct a language. The technical sector that follows changes register: it computes.

Part II

The division of physical roles

Chapter 10

State $\mathcal{A}$, matter, radiation and maximal cohesion

10.1 The four-state ontology

The current RM ontology distinguishes four physical states:

$$\boxed{\{m, EM, \mathcal{A}, E\}} \quad (10.1)$$

Here m denotes matter, EM electromagnetic radiation, State $\mathcal{A}$ the relational continuum, and E the state of maximal cohesion. These are not four arbitrary labels for one equation. They delimit physical roles that the programme is no longer permitted to exchange whenever a calculation becomes difficult.

10.2 The separation inherited from Pillar I

Pillar I imposed a decisive restriction after the nuclear-elastic and junction branches were audited:

DIVISION OF ROLES

State $\mathcal{A}$ does not take over the prerogatives of matter. Nuclear cohesion and the internal structure of matter belong to m . State $\mathcal{A}$ may transmit, relate, condition propagation and carry relational stress, but it does not become a replacement name for the strong interaction or for the material structure it was introduced to explain.

This separation is methodological as much as ontological. It blocks a common failure mode of speculative models: when one object is allowed to do everything, no calculation can falsify it.

10.3 Gravity is fundamental; its manifestation is mediated

RM does not say that State $\mathcal{A}$ creates the law of gravity. Gravity is treated as fundamental. What Pillar II attempts to derive is the physical local manifestation of attraction, cadence and propagation through the state of the continuum. The distinction is essential:

fundamental gravity $\neq$ local constitutive mechanism of its manifestation.

Geometry remains a successful macroscopic representation. RM asks whether the quantities represented geometrically can also be carried by a physical relational state. The post-v28 synthesis sharpens this further: the RM geometric sector already contains its own constitutive length ℓ_* . Matter supplies the loading; the constitutive geometry supplies the response. In the compact phrase adopted by Pillar I: *the matter loads; the geometry answers*.

10.4 A physical continuum and a gauge reading

A physical continuum need not make its coordinate labels physical observables. The working local calculations treat spatial relabellings as a gauge redundancy. Pillar II nevertheless keeps D–Æ–02 open because the ontology of a physical body and the gauge status of its labels must be reconciled without ambiguity. Pillar III therefore adopts the gauge reading used by the calculations while refusing to declare the conceptual debt closed by vocabulary alone.

Chapter 11

Universal time and physical cadence

11.1 One time line, many physical rates

RM keeps a single physical time line T . The local field N does not create a second time. It maps the cadence of local processes to the universal ordering parameter. The notation

$$d\tau_{\text{cad}} = N dT \quad (11.1)$$

is therefore a *proper-cadence parameter*, not a second ontological time.

11.2 Pure Cadence Principle

N-Æ-05 sharpens this reading into an explicit constitutive statement:

PURE CADENCE PRINCIPLE

At the local two-derivative level, the cadence field N is a rate converter, not an autonomous local energy reservoir. Its admissible role is exhausted by the cadence conversion and by the corresponding convected rate operator. If a physically required independent $V(N)$ or $D(N)a_i a^i$ term appears, Pure Cadence is falsified rather than repaired.

The general two-derivative family permits functions $A(N), B(N), C(N), D(N), V(N)$. Under PCP and the cadence translation already used for light, the frozen branch is

$$A(N) = \frac{P}{4Nc_{\text{Æ}}^2}, \quad B(N) = \frac{P}{12Nc_{\text{Æ}}^2}, \quad C(N) = PN, \quad D(N) = V(N) = 0. \quad (11.2)$$

This is a conditional constitutive theorem. It is stronger than a fit because the whole Taylor tower is fixed before the nonlinear constraint audit; it is weaker than a fundamental derivation because PCP itself remains an explicit physical principle.

11.3 Photonic cadence as a Dynkin cost

N-OPT-01.1 applies the same separation of roles to radiative transport. Let the local material random walk be generated by

$$\mathcal{L}_{\text{loc}} f = \nabla_i \left(D_{\text{loc}} \nabla^i f \right), \quad (11.3)$$

where D_{loc} contains the material microphysics of opacity, scattering, absorption, emission and the statistics of the local spatial step. With

$$d\tau_{\text{cad}} = N dT, \quad (11.4)$$

the same path, referred to universal time, has generator $\mathcal{L}_T = N\mathcal{L}_{\text{loc}}$. Dynkin's first-passage equation therefore gives

$$\boxed{\mathcal{L}_{\text{loc}}\Theta = -\frac{1}{N}.} \quad (11.5)$$

On a frozen background with the same g_{ij} and D_{loc} , replacing only N by unity yields the exact conditional theorem

$$\boxed{\frac{\Theta_N(0)}{\Theta_{N=1}(0)} = \left\langle \frac{1}{N} \right\rangle_{K \, dV_{\text{prop}}}, \quad K > 0.} \quad (11.6)$$

Thus the cadence contribution is a positive weighted cost. No new optical fitting coefficient is introduced and N is not hidden inside D_{loc} .

THE SENTENCE THAT SURVIVED THE AUDIT

Matter determines the statistics of the photon's step; State $\mathcal{A}$ determines the cadence of that step and the spatial structure in which it is taken.

Status. Exact within the declared frozen-background Fick assumptions. It is not yet a complete stellar escape-time calculation, an astrophysical calibration or an experimental validation of State $\mathcal{A}$. N-OPT-02 must test whether the separation survives explicit dense, dispersive, anisotropic and moving matter sectors.

Part III

The technical gravitational sector

Chapter 12

Who pays for gravity? — the retained local chain

12.1 The gauge-invariant scalar

For the symmetric relational state $q_{ij} = Q_{(ij)}$, the local scalar used by gravity is

$$\boxed{\mathcal{G}[q] = \nabla^2 \text{Tr } q - \partial_i \partial_j q_{ij}.} \quad (12.1)$$

For $k \neq 0$, define the derived scalar

$$\Phi[q] = \frac{1}{2\nabla^2} \mathcal{G}[q]. \quad (12.2)$$

No global projector is imposed. The homogeneous mode is absent from the local force because the invariant contains spatial derivatives.

12.2 CLG–1 and the Newtonian matching

The quadratic local action is organised around the trace-free kinetic term, the three-dimensional Fierz–Pauli spatial potential, the scalar multiplier and the constrained antisymmetric sector. Variation gives

$$\mathcal{G}[q] = \sigma \rho_m, \quad \Lambda = Z\Phi, \quad \Psi_{\mathcal{E}} = Z\sigma\Phi. \quad (12.3)$$

The single matching

$$\boxed{Z\sigma^2 = 8\pi G} \quad (12.4)$$

yields simultaneously

$$\boxed{\nabla^2 \Psi_{\mathcal{E}} = 4\pi G \rho_m, \quad E_{12}(r) = -\frac{Gm_1 m_2}{r}.} \quad (12.5)$$

The demonstrated local ledger is therefore

$$\boxed{\text{d}(K_1 + K_2) = -\text{d}E_{12}, \quad \text{d}(K + E_{12}) = 0.} \quad (12.6)$$

The homogeneous density u_0 is not locally depleted by a fall. The bridge from this local mechanical account to any global reservoir is a separate constitutive problem.

12.3 Constraint count

At quadratic level, the local relational configuration has thirteen variables. For $k \neq 0$, $B \neq 0$ and $\mu_A \neq 0$, the second-class determinant is

$$\det \Omega_{\text{SC}} = \frac{B^2 \mu_A^6}{16} (k^2)^{10}. \quad (12.7)$$

Six first-class plus ten second-class constraints leave

$$N_{\text{phys}} = \frac{26 - 2 \times 6 - 10}{2} = 2. \quad (12.8)$$

The two local tensor polarisations have positive quadratic energy for $Z > 0$ and front speed $c_{\mathcal{E}}$. The statement is local: $k = 0$ belongs to the homogeneous sector.

Chapter 13

Weak-field closure without PPN fitting

13.1 Optical operator

The electromagnetic principal symbol in the retained branch is

$$\mathfrak{P} = \frac{\omega^2}{N^2 c_{\mathcal{A}}^2} - g^{ij} k_i k_j, \quad (13.1)$$

with the cadence powers fixed by the Exclusion Interaction cadence rule (historical PS-0 terminology) and the spatial coupling fixed by the same relabelling structure used by the gravitational sector.

13.2 The PPN tuple

In the isotropic weak branch, the relational representative obeys $\psi = -\text{sgn}(\sigma)C$. Hence

$$\gamma_{\text{PPN}} = -\text{sgn}(\sigma). \quad (13.2)$$

The selected branch $\sigma < 0$ gives $\gamma_{\text{PPN}} = 1$. The physical areal-to-isotropic mapping and the retained static completion give $\beta_{\text{PPN}} = 1$, while the universal sourced matter interface gives $\alpha_1 = \alpha_2 = 0$ on the same conditional branch.

WEAK-FIELD TUPLE

$$(\gamma_{\text{PPN}}, \beta_{\text{PPN}}, \alpha_1, \alpha_2) = (1, 1, 0, 0)$$

No independent PPN coefficient is introduced after the calculation.

Status. Conditional. The tuple inherits the gauge-reading debt D- $\mathcal{A}$ -02, the PCP assumption, and the residual microscopic matter audit D- $\mathcal{A}$ -04M. Agreement with the standard local coefficients is not by itself evidence for RM; it is a survival requirement.

Chapter 14

Pure Cadence, matter and the nonlinear Dirac survival audit

14.1 Universal matter interface

The minimal matter interface is written in the form

$$S_m = \int dT d^3x N \sqrt{g} \mathcal{L}_m(\chi^A, D_T \chi^A, D_i \chi^A; g_{ij}), \quad D_T = \frac{1}{N}(\partial_T - \mathcal{L}_B). \quad (14.1)$$

After Legendre transformation the gravitational variables enter affinely through the lapse/cadence and shift constraints. The purpose is not to decree universal coupling by prose, but to expose the exact place where a microscopic matter sector could fail the interface.

14.2 Nonlinear local count

With the two-derivative cadence functions frozen before the audit, N-Æ-06 finds on the regular non-homogeneous elliptic branch:

- six spatial first-class constraints;
- four scalar second-class constraints;
- six antisymmetric second-class constraints, organised as three nondynamical pairs.

Thus the full local gravitational count remains two. This is the content of D-Æ-04A, closed *conditionally*. D-Æ-04M remains open because matter formulations with metric or triad velocities, notably spinorial formulations, may modify the canonical structure.

WHAT WOULD KILL THIS CLOSURE

If a microscopic matter sector necessarily introduces an independent gravitational coupling, gives N , B_i or g_{ij} an additional gravitational velocity that destroys the primary constraints, or forces an elliptic kernel on the intended branch, the local survival result is reopened or rejected. The action may not be altered afterwards merely to restore the count.

Part IV

Constitutive length, the Exclusion Interaction and strong fields

Chapter 15

A strong-field candidate, not a finished strong-field theory

15.1 Why the old local constitutive potential is retired

The earlier raw-trace constitutive function depended on quantities that transform under the spatial labelling gauge and introduced an unwanted low-order contribution. It is not an active RM law. The retained nonlinear candidate is built from intrinsic relational curvature so that its added Born–Infeld sector starts beyond the quadratic closure.

15.2 CNL–BI1 and the constitutive length

Let γ_{ij} be the nonlinear relational tensor and define

$$\boxed{X_{\mathcal{R}} = \ell_{\star}^4 \mathcal{R}_{ij} \mathcal{R}^{ij}}, \quad 0 \leq X_{\mathcal{R}} < 1. \quad (15.1)$$

Here $\ell_{\star}$ is not supplied by a stellar equation of state. It is an action-level constitutive length of the RM geometric sector. The subtracted candidate is

$$\mathcal{U}_{\text{BI}}(X_{\mathcal{R}}) = u_{\star} F(X_{\mathcal{R}}), \quad \boxed{F(X) = 1 - \sqrt{1 - X} - \frac{X}{2}}. \quad (15.2)$$

Its response is

$$F'(X) = \frac{1}{2\sqrt{1 - X}} - \frac{1}{2}, \quad \boxed{X \rightarrow 1^{-} \implies F'(X) \rightarrow \infty}. \quad (15.3)$$

The subtraction prevents the strong-field candidate from silently changing the established quadratic propagator. The increasingly stiff response as the constitutive boundary is approached is called the **Exclusion Interaction** in current RM nomenclature. The term has no connection to Pauli exclusion, introduces no fifth force and carries no new fitted coefficient.

CONSTITUTIVE READING

If a local relational curvature length $L_{\mathcal{R}}$ is defined schematically by $\mathcal{R}_{ij} \mathcal{R}^{ij} \sim L_{\mathcal{R}}^{-4}$, then $X_{\mathcal{R}} \sim (\ell_{\star}/L_{\mathcal{R}})^4$. For $L_{\mathcal{R}} \gg \ell_{\star}$ the nonlinear correction is small; when $L_{\mathcal{R}} \sim \ell_{\star}$ the constitutive response becomes order unity. This does not calibrate $\ell_{\star}$ to kilometres or to any stellar radius.

15.3 P–CIN: kinetic capacity without a completed field proof

A later candidate applies the same finite-capacity logic to the trace-free deformation rate. Its local deviatoric density is

$$\mathcal{L}_{\text{dev}} = \frac{2P}{\ell_\star^2} N \sqrt{g} \left(1 - \sqrt{1-y}\right), \quad y = \frac{\ell_\star^2}{4c_\mathbb{E}^2} \left\| \frac{K_{\text{TF}}}{N} \right\|^2 < 1. \quad (15.4)$$

The Legendre map is regular for finite momentum and the local Hamiltonian may be written

$$\mathcal{H}_{\text{dev}} = N \frac{2}{\ell_\star^2} \left(\sqrt{P^2 + c_\mathbb{E}^2 \ell_\star^2 |p|^2} - P \right). \quad (15.5)$$

It is positive and single-branch on the stated sector, while N remains a multiplier rather than acquiring an independent kinetic degree of freedom.

P–CIN STATUS

This closes only the local kinetic canonical health check. It does not prove, by itself, that the complete nonlinear field chain on a strong background preserves exactly two tensor polarisations; trace/curvature coupling, the full constraint algebra, hyperbolicity, calibration of $\ell_\star$ and observational activation remain P–CIN–FIELD / P–CIN–OBS programmes.

Chapter 16

The stellar Q -fold

16.1 Static spherical reduction of the same constitutive sector

For the static spherical N-EMPR branch, define

$$a \equiv \frac{f'}{r}, \quad b \equiv \frac{1-f}{r^2} - \frac{a}{2}, \quad X_{\mathcal{R}} = \ell_{\star}^4(a^2 + 2b^2), \quad (16.1)$$

$$G \equiv u_{\star} \ell_{\star}^4 F'(X_{\mathcal{R}}), \quad \boxed{Q \equiv PZ + G(a-b)}, \quad Z(\chi) = \chi^4. \quad (16.2)$$

The decisive v28 correction is to retain the radial Euler–Lagrange relation without dividing by Q :

$$\boxed{Q \frac{N'}{N} = Q \frac{f'}{2f} + \frac{r(\varepsilon + p)}{4f} + \frac{r\kappa_{\chi}\chi'^2}{4} - Q' - \frac{G(a+b)}{r}}. \quad (16.3)$$

The local Hamiltonian constraint satisfies

$$\boxed{\frac{\partial H}{\partial a} = -2Q}. \quad (16.4)$$

Thus $Q = 0$ is a loss of a as a convenient local algebraic coordinate; it is not, by itself, a physical termination of the solution.

16.2 The frozen v28 doublet and fold

With the declared validation EOS $p = \rho^2$, $\varepsilon = \rho + p$ and the frozen reduced parameter set $\kappa_{\chi} = 1$, $\kappa_W = 10$, $P = 0.5933438771$, $u_{\star} = 1$, $\ell_{\star} = 1$, v28 reports at the same central pressure $p_c = 0.5028$:

Branch	X_c	Q_c	M	R	$2M/R$
$Q_c > 0$	0.899396	+0.051350	0.832632	2.112721	0.788208
$Q_c < 0$	0.910971	−0.059808	0.850506	2.046754	0.831077

A local reconstruction of the converged v28 data gives

$$\boxed{X_{c,\star} = 0.9052492489, \quad \varepsilon_{c,\star} = 1.2120324954, \quad \left. \frac{d\varepsilon_c}{dX_c} \right|_{X_{c,\star}} = 0}. \quad (16.5)$$

The last accepted refined point is

$$\boxed{X_c = 0.9715, \quad M = 0.972448, \quad R = 1.949276, \quad 2M/R = 0.997753, \quad f_{\min} > 0}. \quad (16.6)$$

No horizon, $X = 1$ event or RM maximum mass is claimed from these points.

16.3 Cross-method confirmation and CA–1

The post-v28 DOP853 shooting implementation of the $Q_c < 0$ branch at $p_c = 0.5028$ gives

$$\boxed{\chi_c = 1.201356564122, \quad R = 2.08849775, \quad M = 0.84685706,} \quad (16.7)$$

with a smooth internal crossing $Q = 0$ near $r_Q = 0.5148433$ and a shallow pressure maximum $p_{\max} = 0.5028824$ near $r = 0.4982$.

A separately implemented two-domain collocation now gives

$$\boxed{X_c = 0.9109684074, \quad Q_c = -0.0598152950, \quad R = 2.0884976108, \quad M = 0.8468571424,} \quad (16.8)$$

with $\max |H| < 8 \times 10^{-14}$ in both domains. The two post-v28 radii differ by only 1.392×10^{-7} in the declared reduced units. The same regular $Q_c < 0$ solution and its smooth internal $Q = 0$ crossing are therefore cross-method reproducible at this test point.

The frozen v28 value $R = 2.046754$ is not deleted or retuned. It remains a dated audit record of the earlier collocation implementation. The historical discrepancy is therefore preserved, but it no longer represents an unresolved question of branch existence at $p_c = 0.5028$.

Pillar II v4.7.0 keeps CA–1 as a candidate solver-certification interface. Any claimed stellar solution should report: (i) $\chi(R)$ and $\chi'(R)$; (ii) global admissibility $\chi \geq 1$; (iii) surface and asymptotic masses separately; (iv) constraint, undivided-equation and enthalpy closures; and (v) interior anatomy such as $p_{\max}$ and r_Q when present. CA–1 is an audit protocol, not a physical law, and it remains necessary for surface, exterior, extension and future-continuation checks.

STATUS OF THE STELLAR BRANCH

Cross-method branch existence and regularity are confirmed at the declared test point inside the reduced toy-EOS model. This does not establish radial stability, a physical neutron-star EOS, kilometre or solar-mass calibration, the complete high-compactness continuation, a maximum RM mass, a physical endpoint, or external human numerical reproduction.

Chapter 17

The Revised Schwarzschild Relation

The central conceptual inversion of RM can be written in one measurable factor. In a static spherical exterior, define the RM cadence signature

$$\mathcal{C}_{\text{RM}}(r) = \sqrt{1 - \frac{2GM}{rc^2}} = \sqrt{1 - C(r)}. \quad (17.1)$$

RM retains the Schwarzschild factor that organises clock-rate and propagation observables, but changes its physical interpretation: the universal open time line T is not locally slowed. The factor is read as a local physical-cadence response of matter in the relational state of State $\mathcal{A}$.

PILLAR III SIGNATURE

Time does not slow down. Matter changes cadence.

This is a conceptual signature, not a claim that the nonlinear strong-field completion has already been derived. In particular, the physical branch must remain compatible with the RM prohibition against promoting an absolute zero of a physical state variable into an achieved material state. The endpoint and any phase change therefore remain questions for the nonlinear constitutive sector rather than assumptions hidden inside the slogan.

17.1 Cumulative constitutive cadence closure

The current Pillar II also records the candidate cumulative relation

$$N_{\text{RM}}(r) = \frac{P\sqrt{f(r)}}{Q(r)} \exp\left[-\int_r^\infty \mathcal{S}(s) ds\right]. \quad (17.2)$$

Here $\sqrt{f(r)}$ carries the local cadence contribution, while the exponential term is intended to encode cumulative constitutive history associated with the Exclusion Interaction. The relation is not promoted to a derived law in Pillar III: an independent definition of $\mathcal{S}$, its boundary conditions, regularity through the relevant Q -structure and the strong-field completion remain explicit calculation debts.

Chapter 18

The double-scale Black Core

18.1 Two operators, two scales

The current Black-Core branch separates the optical/transport threshold from the mechanical phase boundary:

$$R_S = \frac{2GM}{c_{\mathcal{A}E}^2} \propto M, \quad (18.1)$$

$$r_c = 6^{1/6} \left(\ell_\star^2 \frac{GM}{c_{\mathcal{A}E}^2} \right)^{1/3} \propto M^{1/3}. \quad (18.2)$$

R_S is not declared to be the mechanical conversion wall. The nonlinear relational stress grows through the intermediate region while State $\mathcal{A}E$ remains present. In the conditional DSB-1 branch the candidate mechanical phase boundary is associated with the approach to the constitutive barrier, $X_{\mathcal{R}}(r_c) = 1$. This Black-Core wall hypothesis is distinct from the stellar Q -fold above: the stellar sequence does not claim to reach $X = 1$.

18.2 Mass-independent core density scaling

Because $r_c^3 \propto M$, the ratio M/r_c^3 is independent of M . If a residual fraction $M_{\text{res}} = \varepsilon_M M$ occupies the core, its mean residual density is also independent of the macroscopic mass. Under the stated isotropic saturated-core constraint,

$$\varepsilon_M = \frac{2\sqrt{\pi G Z}}{c_{\mathcal{A}E}^2}, \quad (18.3)$$

and on the independently normalised weak branch this becomes $\varepsilon_M = \sqrt{2}/4$. The number is conditional on that normalisation and is not a fit to the core.

18.3 OCH-1, the net surface and the cadence plateau

OCH-1 separates the complete exterior mass from the local residual-matter scalar source. The cohesive and nonlinear relational sectors remain in the global mass-energy and radial-stress ledger; they are not declared massless. The historical global wall equation that added quantities of incompatible dimensions remains withdrawn.

The later strong-field reception does not restore a freely adjustable membrane. It introduces, on a declared conditional branch, a net surface treatment through a double curvature layer. In the static reduced interior the cadence may form a plateau,

$$\boxed{N(r) = N_c, \quad D_i N = 0,} \quad (18.4)$$

so the cadence-gradient contribution to the reduced interior gravitational field vanishes. This is a statement about that static interior contribution; matter retains its own interactions and motion, and equilibrium is not global stability.

BLACK-CORE STATUS

The double-layer surface and cadence plateau do not identify R_S with r_c , do not prove horizon abolition, do not establish $N_c > 0$ without the corresponding surface condition and do not replace the missing common phase action. P-CIN is a separate kinetic-capacity candidate, not the Black-Core solution itself.

18.4 What is genuinely open

The branch still owes a complete regular spherical solution from one common phase action, global/radial stability, the strong-field spectrum, the full P-CIN field continuation and an independently calibrated $\ell_\star$. A spectacular image of a nonsingular core is not a substitute for these calculations.

Part V

The homogeneous universe

Chapter 19

The zero mode closes; the boundary stays separate

19.1 The $k \neq 0$ / $k = 0$ separation

The local constrained sector and the homogeneous bulk are not the same derivation problem. At $k = 0$, the differential operator that fixes local cadence loses rank, while algebraic scalar constraints survive. The homogeneous kernel may contain

$$\mathcal{K} = 3H(T), \quad (19.1)$$

but the value of H is not obtained by extrapolating the local $k \neq 0$ Dirac calculation through the rank change.

19.2 GHC–1, GEC–1 and HBR–1

On the reduced homogeneous branch, write $e = \ln(V/V_{\text{ref}})$ and let $\epsilon(e)$ denote the declared constitutive stock. For $U = 0$, the surviving scalar constraints are

$$P^{(3)}R = \rho_m + u_\gamma + \epsilon + u_0, \quad (19.2)$$

$$\rho_m + 2u_\gamma - 2u_0 = 2\epsilon + 3\epsilon'. \quad (19.3)$$

With $B(e) = 2\epsilon + 3\epsilon'$ and the declared balances

$$\dot{\rho}_m = -3H\rho_m - s, \quad \dot{u}_\gamma = -4Hu_\gamma + s, \quad \dot{e} = 3H,$$

preservation of the second constraint yields

$$\boxed{H[3B'(e) + 3\rho_m + 8u_\gamma] = s.} \quad (\text{HBR-1})$$

No Friedmann equation, H_0 or fitted homogeneous response coefficient is imported into this closure.

HCR DEATH CLAUSE EXECUTED

The earlier HCR pressure-rate branch required the future common homogeneous action to reproduce HCR–1 or replace it. The action-level zero-mode audit did not reproduce HCR–1. The HCR branch is therefore historical; it is not recalibrated.

19.3 Thermal concordance: $U(X)$, Maria and redshift

The current stellar energetic reading does not define its support stock as a sum of observed redshifts. It writes the working constitutive energy as $\varepsilon_{\mathcal{A}}^{\text{th}}$ and keeps redshift as a propagation

observable. In the homogeneous reduction with

$$X = \frac{\ell_\star^4 \mathcal{R}^2}{3}, \quad U(X) = u_\star F(X),$$

the scalar constraints acquire the curvature terms

$$P^{(3)}R = \rho_m + u_\gamma + \epsilon + u_0 + U, \quad (19.4)$$

$$\rho_m + 2u_\gamma - 2u_0 = 2\epsilon + 3\epsilon' + 2U - 4XU'. \quad (19.5)$$

For a fixed homogeneous scale-factor geometry, $\dot{X} = -4HX$, and preservation gives the conditional extension

$$\boxed{H[3B' + 8XU' + 16X^2U'' + 3\rho_m + 8u_\gamma] = s.} \quad (19.6)$$

It reduces exactly to HBR-1 at $U = 0$. Changing the transfer ledger requires rederiving the equation; the displayed form is not a microscopic conversion law.

For equilibrium radiation,

$$u_\gamma = a_R \Theta^4, \quad a_R = \frac{\pi^2 k_B^4}{15 \hbar^3 c^3 \mathcal{A}}. \quad (19.7)$$

Maria M-02 supplies a conditional thermal ceiling. Under the separate capacity postulate UC-1,

$$u_{\mathcal{A}}^{\text{cap}} = \frac{P}{\ell_\star^2}, \quad \boxed{\Theta \leq \left[\frac{1}{a_R} \left(\frac{5P}{4\ell_\star^2} - u_0 \right) \right]^{1/4}.} \quad (19.8)$$

No number in kelvins follows until $\ell_\star$ is independently calibrated. The further bridge “approach to the Maria limit $\rightarrow$ Exclusion of the same channel $\rightarrow EM \rightarrow \mathcal{A}$ ” remains a working constitutive bridge, not a derived microscopic theorem. No thermal/redshift percentage is inserted by hand.

19.4 Boundary production and off-center observables

The total manifested-volume rate keeps the deep bulk distinct from boundary formation,

$$\boxed{H_{\mathcal{A}} = H + g_\partial, \quad g_\partial = \frac{\Gamma_\partial}{3V_{\mathcal{A}}}.} \quad (19.9)$$

Thus HBR-1 closes the reduced deep-bulk rate under its stated balances; it does not, by itself, derive the production of new manifested volume at the edge.

The same separation matters observationally. In a fully spherical configuration, an off-center observer inherits one exact sky axis from symmetry, but geometry does not determine a nonzero amplitude, its sign or the transfer into a particular observable. The v5.1 mechanical analysis therefore asks for compatible cadence, Core mechanics, boundary conditions and transfer laws. Its matched-birth result is explicitly restricted to the reduced $U = 0$ branch under the stated balances, while deposited newborn density, global reference work and complete formation cost remain distinct quantities. No measured sky amplitude or direction is used to select the profile.

GEOMETRY IS NOT ENOUGH

Spherical symmetry can fix an axis. Mechanics decides whether a compatible field exists; propagation and source physics decide how that field appears in redshift, temperature or counts.

19.5 What the historical numerical checkpoint still says

The earlier radiatively sourced homogeneous history remains useful only as a viability checkpoint. In that effective closure,

$$w_{\mathcal{E},\text{eff}} = -0.683953, \quad q_0 = -0.405656, \quad z_t = 0.834140 \quad (19.10)$$

and the Pantheon+ comparison gave approximately

$$\Delta\chi^2_{\text{Pantheon+}} \simeq +0.244 \quad (19.11)$$

relative to the optimised flat- Λ CDM comparison used in that notebook. These fitted effective coefficients no longer define the active homogeneous mechanism. They show only that one earlier effective history was not numerically excluded by that comparison.

Status. The reduced deep bulk is closed conditionally by HBR-1 and its explicitly rederived $U(X)$ extension. Still open are microscopic thermal transfer, complete boundary formation physics, perturbations, distance-redshift operators, BAO, CMB anisotropies, lensing, structure growth and the observational lift of the off-center mechanical solution.

Part VI

The branches RM killed itself

Chapter 20

The audit trail: attractive ideas that are no longer active laws

The purpose of this chapter is not embarrassment control. It is the opposite: a programme that claims falsifiability must leave a visible scar where it changed its mind.

Retired branch	Why it was attractive	Why it is not active in v7.5.0
Raw trace projector $(1 - \mathcal{P}_0) \text{Tr } Q$	Separated local gravity from a homogeneous mean mode.	Replaced by the gauge-invariant scalar $\mathcal{G}[q]$, which removes the homogeneous local force through derivatives rather than an imposed global projector.
Direct local depletion of u_0 during a fall	Offered an intuitive answer to “who pays?”	The demonstrated local identity is $d(K + E_{12}) = 0$. The bridge to a global reservoir remains open and must not be double-counted.
Viscoelastic gravitational attenuation	Supplied a mechanical medium picture and a relaxation time.	It is not part of the retained CLG–1/PCP gravitational closure. Transparency of the tensor sector is no longer used to infer a literal viscous storage law for State $\mathcal{A}$.
Autonomous vector-flow gravity	Offered a fluid-like account of frame dragging.	The preferred-frame and constraint audits do not retain an independent propagating gravitational vector sector. The current local count is two tensor modes.
Exponential metric as the strong-field law	Gave a finite-core picture and a direct cadence interpretation.	It is not the canonical strong-field completion. The active nonlinear candidate is CNL–BI1 plus the double-scale Black-Core programme, with its own explicit open debts.
Progressive $\mathcal{A} \rightarrow E$ conversion through a layer near R_S	Linked compactness to phase change.	R_S is retained as an optical/transport threshold. The candidate mechanical phase boundary is r_c , and the intermediate zone carries nonlinear relational stress while State $\mathcal{A}$ remains present.

Retired branch	Why it was attractive	Why it is not active in v7.5.0
Cosmological swelling/stretching Γ as a local constitutive mode	Produced an intuitive elastic cycle.	Local Pure Cadence excludes autonomous two-derivative N energy and gradient terms. The homogeneous zero mode is now closed conditionally by GHC-1/GEC-1/HBR-1; boundary production remains a distinct edge problem.
HCR-1 Exclusion-attractor rate branch	Offered a sub-capacity homogeneous attractor with a direct pressure-rate law.	Its own death clause required derivation from the common action. The action-level homogeneous audit did not reproduce HCR-1; the branch is historical and is not recalibrated.
Redshift-dominant stellar support ledger	Gave cosmological redshift an immediate energetic receiver inside State $\mathcal{A}$.	The active stellar interpretation is thermal-radiative. Redshift remains a real propagation observable and may enter a secondary energetic ledger only through a separately derived transfer law.
Clock-front coefficient $c_{\text{orb}} = 5$ and the associated 10^{-14} yr^{-1} signature	Offered a sharp experimental target.	It is not carried as a canonical prediction until it is rederived from the frozen universal matter interface and the current homogeneous bulk/boundary architecture. The old derivation depends on superseded matter/cosmology assumptions.
Global Core $B_{\text{BI}} + 8\pi r_c \tau_\Sigma = 0$	Black-junction Appeared to close the wall with one equation.	Withdrawn by dimensional audit. The retained statement is the local pressure jump; a finite-wall action must derive a dimensionally homogeneous global junction.

APPEND-ONLY DISCIPLINE

A retired branch may remain in the historical archive, but it may not be silently imported into a current derivation. The reason for retirement travels with the branch.

Part VII

Falsifiability and open work

Chapter 21

The live debt register

Reference	Question	Status
D-Æ-02	Can the ontology of a physical continuum and the gauge redundancy of its spatial labels be reconciled without making the labels observable?	Open conceptual debt
D-Æ-03 / N-Æ-05	Is Pure Cadence the correct constitutive rule for the local two-derivative cadence field?	Closed conditionally by PCP
D-Æ-04A	Does the frozen local gravitational chain retain two modes through the nonlinear local Dirac audit?	Closed conditionally
D-Æ-04M	Do explicit microscopic matter sectors, including formulations with metric/triad velocities, preserve the universal interface and constraint structure?	Open, narrowed
CNL-BI1 / Exclusion Interaction	Does the intrinsic-curvature constitutive barrier preserve the intended strong-field constraint structure and admit stable physical solutions?	Open strong-field programme
P-CIN-FIELD / OBS	Does the locally healthy kinetic capacity preserve the full field constraint chain, hyperbolicity and a parameter-free observable activation criterion?	Local kinetic audit closed conditionally; field/observable lift open
N-EMPR / CA-1	The regular $Q_c < 0$ solution is cross-method reproducible at the declared test pressure; can the continuation, stability and physical calibration also survive independent reproduction?	Branch existence closed at test point; continuation/stability open
A-DSB-1 / OCH-1	Can one common phase action derive the net surface, source separation, regular core and global/radial stability without a fitted membrane or hidden bridge between R_S and r_c ?	Open conditional strong-field branch
HBR-1	Does the reduced homogeneous rate follow from preservation of the surviving zero-mode constraints under the declared matter-radiation balances?	Closed conditionally on stated ledger
THERMAL MARIA	What microscopic transfer produces $\varepsilon_{\mathcal{AE}}^{\text{th}}$, and does UC-1 survive a common-action comparison of capacities across channels?	Bound derived conditionally; transfer and UC-1 test open
HBR-BOUNDARY	What law fixes g_{∂} , complete formation cost and the state carried by newly manifested volume without double counting the deep bulk?	Open

Reference	Question	Status
OFF-CENTER	Which mechanically compatible radial solution produces a nonzero observable amplitude, and what transfer/selection law maps it to redshift, temperature or counts?	Axis exact under symmetry; amplitude/transfer open
COSMO	Can the bulk-plus-boundary system be propagated through early radiation, perturbations, BAO, CMB, lensing and structure growth?	Open
ELL-CALIB	What independent physical calculation fixes ℓ_* ?	Open
MASS	Can the Triple Identity be derived independently from one common action?	Open target

Chapter 22

The Triple Identity: the next summit is not allowed to be circular

Pillar I leaves a deliberately severe target for any future theory of mass within RM:

$$\boxed{\frac{E_0}{c^2_{\mathcal{E}}} = M_{\text{in}} = M_{\text{rel}}.} \quad (22.1)$$

The equality is not a definition. Each route must be independently derived from a common action. The observed particle mass may not be inserted into one route and then celebrated when the other route reproduces it.

CLAUSE OF DEATH

Reject a proposed mass closure if it requires a separate fitted coefficient for each particle, defines one mass route from another instead of deriving both, or introduces a stabilising term whose origin lies outside the common action.

Chapter 23

What would count as a serious external test

RM does not gain credibility merely because its weak-field coefficients coincide with the standard values. Those are survival tests. Distinguishing evidence must come from sectors where the ontology produces a calculable difference.

The stellar Q -fold provides an intermediate kind of test: before asking Nature to discriminate RM, independent numerical implementations must reproduce or destroy non-trivial structures of the stated equations. At $p_c = 0.5028$, the regular $Q_c < 0$ branch has now survived one such cross-method comparison between DOP853 shooting and a separately implemented two-domain collocation. That success remains an internal/model result, not an observational validation. The next burdens are continuation, stability, physical calibration and independent external reproduction.

Beyond that internal reproduction test, the most valuable external tests are those attached to an already closed internal chain: a strong-field observable after the Black-Core wall and regular solution are derived; a microscopic matter species that stresses the universal interface; a cosmological prediction after HBR-1, boundary production and the perturbative/observable lift have been joined without fitted rescue parameters; or a new parameter-free relation emerging from the Triple Identity. Conversely, an apparent anomaly should not be adopted merely because it is suggestive. The calculation must exist first.

Part VIII

The architecture of RM

Chapter 24

Four Pillars, four authorities

24.1 Pillar I — The Missing State of the Universe: The Genesis of RM

Pillar I is the epistemological origin. Its v5.3.0 Thermal/Bulk Concordance edition records the non-repair discipline, the separation of physical prerogatives, the N-EMPR ascent, the cross-method CA-1 reproduction, N-OPT-01.1, HBR-1 reception, the thermal/Maria hierarchy and the corrected status of boundary formation cost. DOI lineage: 10.5281/zenodo.22674666.

24.2 Pillar II — Fundamental Energetic Symmetry

Pillar II is the technical gravitational corpus. Its v4.7.0 Homogeneous Bulk / Thermal Concordance edition carries CLG-1, weak-field optical closure, Pure Cadence, nonlinear local Dirac audits, the stellar Q -fold and CA-1, GHC-1/GEC-1/HBR-1, the thermal extension, P-CIN reception and the separate conditional Black-Core programme. DOI lineage: 10.5281/zenodo.22641647.

24.3 Pillar III — The Heresy of Absolute Time

This v7.5.0 Manifesto is the synthesis. It does not compete with Pillar II equation by equation. Its job is to keep the ontology, the causal story, the rejected branches, the current bulk/thermal/strong-field hierarchy, the live debts and the falsification rules visible at once. Its versioned series is represented by concept DOI 10.5281/zenodo.21341337.

24.4 Pillar IV — Foundation / TRD Constitution

Pillar IV fixes the constitutional norm: official ontology, Fundamental Laws, active postulates, structuring principles, consistency clauses and the sovereignty of testability. It cannot silently rewrite a Pillar II calculation; conversely, an older technical note cannot override a current constitutional prohibition. Current public v7.2.0 DOI: 10.5281/zenodo.22655616.

Chapter 25

Fundamental dictionary

Universal time T The single open physical ordering line of RM. It is not locally deformed into multiple physical times.

Cadence The rate of a physical process relative to T . Clocks count cadence; they do not directly observe an abstract substance called time.

State $\mathcal{A}$ The proposed physical relational continuum of the manifested Universe. It is not a fourth geometrical direction or a renamed spacetime. Its physical meaning is constrained by a manifestation criterion: its state must connect to reproducible consequences. The historical designation “Æther D” is withdrawn from current nomenclature.

Matter m Material state whose internal cohesion and microscopic interactions remain its own physical prerogative.

Electromagnetic state EM Radiation and electromagnetic field content; it propagates through the relational environment without being redefined as State $\mathcal{A}$.

State E State of maximal cohesion, distinct from ordinary matter and from State $\mathcal{A}$.

Gravity Fundamental law in the manifested Universe. RM does not say that State $\mathcal{A}$ creates gravity.

Relational tensor Q_{ij} Variable used to record the local relational state of State $\mathcal{A}$; its symmetric and antisymmetric sectors have different constraint roles.

Gauge scalar $\mathcal{G}$ Gauge-invariant scalar $\nabla^2 \text{Tr } q - \partial_i \partial_j q_{ij}$ used in the retained local gravitational closure.

Pure Cadence Principle Constitutive statement that N is a local rate converter and not an autonomous local two-derivative energy reservoir.

CLG–1 Quadratic local gravitational closure yielding the Poisson limit, pair energy and two local tensor modes under its stated rank conditions.

Constitutive length ℓ_* Action-level length entering $X_{\mathcal{R}}$ before any stellar EOS is chosen; it defines when the nonlinear geometric response becomes non-perturbative, but is not yet calibrated to an astrophysical radius.

Exclusion Interaction / EI–1 Canonical finite-capacity principle: as a specified physical channel approaches its admissible capacity, the incremental cost of continuing through that same channel increases and continuation is excluded at the boundary. It is not Pauli exclusion, not a fifth force and not a fitted coupling. CNL–BI1 is one geometric realization; the principle itself does not select a universal analytic function.

CNL–BI1 Gauge-invariant intrinsic-curvature Born–Infeld-type constitutive barrier; not a completed strong-field theory.

TOV–RM / stellar Q -fold Static spherical N–EMPR reduction with exact standard-TOV non-regression. The v28 doublet and fold are conditional reduced-unit numerical results; stability, physical calibration and independent human reproduction remain open.

CA–1 Candidate method-independent certification interface for stellar solvers; an audit protocol, not a physical law.

P–CIN Candidate trace-free kinetic-capacity closure with a Born–Infeld-type rate bound. Its local kinetic canonical audit is conditionally healthy; the full field chain and observational activation remain open.

DSB–1 Double-scale Black-Core architecture: $R_S \propto M$ for optical/transport compactness and $r_c \propto M^{1/3}$ for the candidate mechanical phase boundary. The current conditional reception adds a net double-layer surface and a static interior cadence plateau without closing the common phase action.

OCH–1 Constitutive source-selection hypothesis separating complete exterior mass from local residual-matter scalar charge in the saturated-core branch.

GHC–1 / GEC–1 Surviving homogeneous scalar constraints. They remain algebraic when the local cadence-fixing operator loses rank at $k = 0$.

HBR–1 Reduced homogeneous bulk rate $H[3B' + 3\rho_m + 8u_\gamma] = s$ obtained by preserving GEC–1 under the declared material–radiative balances. The $U(X)$ extension must be rederived rather than imported unchanged.

$\epsilon_{\mathcal{A}}^{\text{th}}$ Working constitutive thermal stock in the active stellar application. It is not defined by a measured redshift.

Maria M–02 Conditional homogeneous thermal bound. Under UC–1 it gives the scale $5P/(4\ell_\star^2)$ inside the radiative ceiling; it does not determine a Kelvin value without $\ell_\star$ and does not prove $EM \rightarrow \mathcal{A}$ microscopically.

Boundary production Inhomogeneous formation of new manifested State– $\mathcal{A}$ volume at the edge, $g_\partial = \Gamma_\partial/(3V_{\mathcal{A}})$, kept distinct from the deep-bulk rate H .

Off-center axis Under complete spherical symmetry, an off-center observer inherits one exact sky axis. Geometry alone does not fix a nonzero amplitude, sign or observable transfer law.

Triple Identity Open target $E_0/c_{\mathcal{A}}^2 = M_{\text{in}} = M_{\text{rel}}$, requiring independent derivations from one common action.

Chapter 26

Manifesto conclusion

RM began with a deceptively simple question: what does a clock actually count? That question opened a separation between universal ordering and physical cadence, then a hypothesis of a physical relational continuum. The programme became scientifically interesting only when that intuition acquired the power to fail.

The current architecture is therefore less expansive than older versions and stronger for that reason. State $\mathcal{A}$ no longer performs every task. Matter keeps its own cohesion. Local gravity is carried by a gauge-invariant constrained sector. Cadence is prevented, conditionally, from becoming a hidden two-derivative energy reservoir. The weak-field branch survives without independent PPN fitting. The geometric sector exposes its own constitutive length $\ell_\star$ and EI-1 names the finite-capacity principle without pretending that one analytic barrier is universal. The stellar N-EMPR line has reached a non-trivial Q -fold inside the frozen reduced model, and the regular $Q_c < 0$ solution at $p_c = 0.5028$ is reproduced by two post-v28 numerical methods without rewriting the frozen history. N-OPT-01.1 adds an exact conditional cadence theorem for photon first-passage on a frozen background.

The zero mode has also changed status. GHC-1 and GEC-1 survive the homogeneous rank change and HBR-1 closes the reduced deep-bulk rate under the declared balances; HCR-1 was not rescued when the common action failed to reproduce it. The stellar energetic reading is now thermal-radiative, with Maria M-02 as a conditional capacity bound and redshift retained as a propagation observable rather than imposed as the dominant support-energy source. Boundary production remains distinct from the bulk. Off-center geometry can fix an axis but not a measurable amplitude without compatible mechanics and transfer physics. P-CIN is locally healthy at the kinetic canonical level but is not yet a complete strong-field theory. The Black-Core programme has gained a conditional surface treatment and interior cadence plateau, while its common phase action and global stability remain open. Several attractive predictions have been withdrawn because the chain that produced them no longer belongs to the canonical theory.

The new ontological discipline is equally simple: State $\mathcal{A}$ cannot earn physical meaning merely by becoming more elaborate in prose. It must manifest through consequences. The apple, the hand and the Sun are deliberately ordinary images of this rule. RM must always return from its invisible architecture to something that can in principle be measured, reproduced or used to distinguish one physical account from another.

This is the meaning of the word *heresy* in the title. It is not a claim that established physics is fraudulent, nor a license to ignore successful observations. It is permission to ask whether a successful representation is the last physical layer. RM proposes one answer. Its equations and debts must decide whether that answer survives.

**A theory earns the right to be defended only after it has been
given a fair chance to destroy itself.**

Version note — v7.5.0

Version v7.5.0 is the Canonical Concordance revision of Pillar III. It preserves the v7.4.0 manifesto, Revised Schwarzschild signature, Marie Test, stellar cross-method result and N-OPT-01.1, while receiving the technical changes that occurred after 12 September without turning the Manifesto into a second Pillar II.

The revision: (i) executes the HCR death clause and receives GHC-1/GEC-1/HBR-1 as the active reduced homogeneous closure; (ii) receives the explicitly rederived $U(X)$ thermal extension and the working stock $\varepsilon_{\mathcal{A}}^{\text{th}}$; (iii) records Maria M-02 as a conditional thermal bound and UC-1 as a postulate, while leaving the Maria-limit $\rightarrow EM \rightarrow \mathcal{A}$ bridge microscopically open; (iv) keeps redshift as a physical propagation observable and possible secondary energetic contribution without inserting a percentage; (v) receives the local P-CIN canonical health check while keeping the complete field chain, hyperbolicity and activation open; (vi) updates the Black-Core synthesis with the conditional net double-layer surface and static cadence plateau, without claiming global stability or identifying R_S with r_c ; (vii) receives the off-center mechanical lesson that symmetry fixes an axis but mechanics and transfer laws determine whether a nonzero observable exists; and (viii) updates the canonical concordance to Pillar I v5.3.0, Pillar II v4.7.0 and Pillar IV v7.2.0.

No frozen v28 stellar datum, CA-1 result, N-OPT-01.1 theorem or conditional PPN coefficient is retuned by this revision. The purpose of v7.5.0 is status concordance: what survived remains visible, what died remains historical, and what is conditional keeps its conditions.

Declarations

Authorship and responsibility. Pierre Benaros is the sole author and assumes full responsibility for all postulates, calculations, interpretations and claims. AI assistants were used for algebraic cross-checking, critical review, manuscript restructuring and LaTeX preparation.

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