

PUBLIC SCIENTIFIC FALSIFICATION PROTOCOL

RM – *Relativity of Matter* – Version-5 Homogeneous Bulk Closure

Proposed 50,000 EUR Scientific Challenge

Protocol v2.0 EN – frozen scientific target: RM Technical Note, Version 5

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THE CHALLENGE IN ONE SENTENCE

Eight pages. Seven frozen propositions. One fatal mathematical error is enough.

The task is not to dislike RM, replace it with another ontology, or cite a consensus. The task is to demonstrate, publicly and reproducibly, that one of the Version-5 claims below does not follow from the equations and assumptions that Version 5 itself declares.

STATUS BEFORE THE CHALLENGE OPENS

This document establishes the proposed *scientific protocol*. By itself, it is not a contractual offer, a promise of reward, or the final competition rules. The 50,000 EUR prize opens only after separate, dated and signed legal rules specify, in particular, the organiser, proof of funds, opening and closing dates, eligibility, official submission channel, jury, adversarial procedure, taxation, personal-data processing, applicable law and payment mechanism.

This separation follows the precaution already used in the earlier RM protocol. Under French law, an offer addressed even to unspecified persons may bind its author when it contains the essential terms and expresses an intention to be bound; the separate legal instrument is therefore mandatory before activation.

1 Scientific purpose

Version 4 of the Conicus3D technical note deliberately ended with a kill condition: derive the provisional homogeneous relation HCR–1 from the common RM action or reject it. Version 5 performs that test, retires HCR–1, and claims a different result: a derived homogeneous bulk closure based on the surviving Hamiltonian and conformal constraints of the frozen RM branch.

This protocol freezes that new claim and converts it into a calculation contract. The prize is not for an opinion hostile to RM. It is for a reproducible demonstration that the Version-5 homogeneous bulk closure is mathematically false within its declared domain.

2 Frozen target document

FALSIFIABLE TARGET – EXACT ARTEFACT

Title: *Constitutive Exclusion and Homogeneous Bulk Closure in RM.*

Subtitle: *From the Conicus3D consistency test to a derived zero-mode constraint system.*

Author: Pierre Benaros.

Version: Version 5, dated 15 September 2026.

Extent: 8 pages, A4.

Filename of the frozen artefact: RM_Conicus3D_V5.pdf.

SHA-256 of the frozen PDF:

9531ed5dda246d113bd5d95b87336f92340ce1f6fe149884ea5187c52eb27a2b

DOI: not required for target identity. If the identical PDF is later deposited in an archival repository, the SHA-256 above remains controlling.

The fingerprint takes precedence over filename, repository metadata, website copy or any later revision. A later erratum or Version 6 may correct RM, but it cannot retroactively change the target of this protocol. Recompiling the same L^AT_EX source may change the PDF bytes; the challenge therefore freezes the PDF itself, not a future rebuild.

WHAT IS NOT THE TARGET

The challenge does **not** freeze the older HCR–1 attractor of Version 4, the complete RM corpus, the Conicus3D codebase, a website summary, a popular explanation, or the still-open boundary-production calculation. A submission aimed only at one of those objects does not falsify the frozen target unless it proves that one of the seven Version-5 propositions below fails.

3 Declared domain and fixed assumptions

The target claims a *homogeneous bulk* theorem, not a complete cosmology. For purposes of this challenge, a participant must evaluate the theorem under the assumptions the target actually declares, including:

- the frozen two-derivative RM gravitational action and universal matter interface stated in Version 5;
- the homogeneous Fourier mode $k_F = 0$, where k_F denotes wave number and *not* spatial flatness;
- cold matter, $p_m = 0$, and isotropic radiation, $p_\gamma = u_\gamma/3$;
- an invariant homogeneous State-AE background u_0 with $\dot{u}_0 = 0$ and $p_0 = -u_0$ in the declared Pillar-II architecture;
- the constitutive reservoir

$$\varepsilon_z(e) = \kappa \frac{e}{e_{\text{cap}} - e}, \quad \kappa > 0, \quad 0 \leq e < e_{\text{cap}};$$

- $\dot{e} = 3H$ for the already manifested homogeneous bulk;
- a local matter-to-radiation conversion rate per unit volume s ;
- boundary production g_∂ as a separate inhomogeneous $k_F \neq 0$ problem, not as an input to the zero-mode bulk derivation.

A successful falsification may prove that these assumptions are mutually inconsistent, that a claimed equation does not follow from them, or that an undisclosed additional assumption is necessary. It may not simply replace them with a different theory and announce disagreement.

4 Admissible routes to falsification

4.1 F1 – Formal derivation failure

A submission is admissible if it demonstrates an incorrect variation, sign, coefficient, constraint reduction, rank statement, derivative, algebraic identity, pressure law, or degree-of-freedom statement that invalidates one of propositions V5-R1–V5-R7.

4.2 F2 – Hidden dependence

A submission is admissible if it proves that a result advertised in Version 5 as derived without an imported Friedmann law, external energy reservoir, or fitted dynamical coefficient actually requires such an undisclosed ingredient.

4.3 F3 – Incompatibility of the frozen assumptions

A submission is admissible if it proves that no configuration can satisfy simultaneously the frozen bulk assumptions and the proposition under attack. Merely observing that the target explicitly leaves the boundary layer, constitutive calibration, or perturbative lift open is not enough.

4.4 F4 – Boundary impossibility that destroys the bulk theorem

The boundary layer itself is an acknowledged debt. It becomes falsifying only if a theorem proves that every admissible $k_F \neq 0$ boundary completion necessarily modifies, contradicts, or adds an unavoidable homogeneous term to the Version-5 bulk system, so that the claimed separation between bulk closure and boundary production cannot exist.

4.5 F5 – Empirical contradiction

Empirical falsification is admissible only if the target itself supplies a non-adjustable quantitative prediction in the tested domain and that prediction is shown incompatible with robust data after treatment of uncertainties and auxiliary assumptions. Version 5 explicitly does *not* claim observational validation; therefore generic disagreement with a standard cosmological fit is not, by itself, a winning route.

5 Central propositions under challenge

Falsification of **any one** proposition below is sufficient if the corresponding break condition is met and the materiality and reproducibility rules are satisfied.

V5-R1 – SURVIVAL OF THE ZERO-MODE SCALAR CONSTRAINTS

On the homogeneous isotropic Fourier mode, $\pi_{\text{TF}}^{ij} = 0$ and $D^2 N_0 = 0$. The rate-determining elliptic operator therefore loses rank, but the algebraic Hamiltonian and conformal scalar constraints survive. The loss of rank does not erase the zero-mode constraints and does not generate an H^2 term.

Break condition: derive, from the frozen action and interface, a non-vanishing homogeneous term omitted by Version 5, show that one of the two algebraic constraints disappears, or show that the stated zero-mode reduction is mathematically invalid.

V5-R2 – SIGN OF THE CONSTITUTIVE PRESSURE

For

$$S_z = - \int dT N_0 V \varepsilon_z(e), \quad dV/V = de,$$

Version 5 claims

$$\rho_z = \varepsilon_z, \quad p_z = - \frac{d(V\varepsilon_z)}{dV} = -(\varepsilon_z + \varepsilon'_z) < 0.$$

The Version-4 compressive-pressure reading is therefore retired rather than repaired.

Break condition: show that the declared variation gives a different pressure, sign, or additional homogeneous term in the stated domain, and that the difference affects the subsequent constraints.

V5-R3 – GHC-1

Variation with respect to the homogeneous cadence multiplier N_0 gives

$$\boxed{P^{(3)}R = \rho_m + u_\gamma + \varepsilon_z(e) + u_0} \quad (\text{GHC-1}).$$

The claim is a static homogeneous bulk constraint. It contains no Friedmann H^2 term, no external energy reservoir, and no fitted dynamical coefficient.

Break condition: exhibit an omitted term or incorrect variation that changes GHC–1, or prove that the displayed equation cannot follow from the frozen action plus the explicitly declared homogeneous constitutive sector.

V5-R4 – GEC-1, MONOTONICITY AND SUB-CAPACITY UNIQUENESS

The homogeneous conformal constraint gives

$$\boxed{\rho_m + 2u_\gamma - 2u_0 = 2\varepsilon_z(e) + 3\varepsilon'_z(e)} \quad (\text{GEC-1}).$$

With $B(e) = 2\varepsilon_z + 3\varepsilon'_z$, Version 5 claims

$$B'(e) = 2\varepsilon'_z(e) + 3\varepsilon''_z(e) > 0,$$

$B(0) = 3\kappa/e_{\text{cap}}$ and $B(e) \rightarrow +\infty$ as $e \rightarrow e_{\text{cap}}^-$. Hence, when

$$\rho_m + 2u_\gamma - 2u_0 \geq \frac{3\kappa}{e_{\text{cap}}},$$

there is exactly one admissible solution $e_{\text{eq}} \in [0, e_{\text{cap}})$.

Break condition: invalidate GEC–1, the derivative chain, the monotonicity, the threshold, or the claimed existence/uniqueness result under the stated assumptions.

V5-R5 – HBR-1, THE DERIVED BULK RATE

Using

$$\dot{\rho}_m = -3H\rho_m - s, \quad \dot{u}_\gamma = -4Hu_\gamma + s, \quad \dot{u}_0 = 0, \quad \dot{e} = 3H,$$

Version 5 claims that preservation of GEC–1 yields

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

and therefore

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

On the regular branch the denominator is strictly positive, so $s > 0 \Rightarrow H > 0$ and $s = 0 \Rightarrow H = 0$.

Break condition: find an algebraic, variational, dimensional, or ledger error that changes HBR–1 or its sign conclusion; or prove that an undisclosed source, response coefficient, or rate equation is required to obtain it.

V5-R6 – MUTUAL PRESERVATION OF GHC-1 AND GEC-1

For the conformal bulk flow, $\dot{R} = -2HR$. Version 5 claims that differentiating the right-hand side of GHC–1 and using the frozen bulk ledger gives

$$\frac{d}{dT}(\rho_m + u_\gamma + \varepsilon_z + u_0) = -2H(\rho_m + u_\gamma + \varepsilon_z + u_0),$$

where the equality is exactly GEC–1. Thus GHC–1 is preserved and no second independent homogeneous rate equation appears.

Break condition: show that the equality fails under the declared bulk ledger, that $\dot{R} = -2HR$ is inapplicable to the fixed-label bulk element used in the proof, or that Dirac preservation

produces an additional independent homogeneous condition that overdetermines the system.

V5-R7 – HOMOGENEOUS BULK CLOSURE AND SCOPE SEPARATION

Version 5 claims that Eqs. GHC–1, GEC–1, HBR–1 and $\dot{e} = 3H$ close the homogeneous bulk once s and the constitutive parameters are specified. It further claims that the total manifested-volume decomposition

$$H_{\text{AE}} = H + g_{\partial}$$

is exact, while g_{∂} belongs to a distinct $k_F \neq 0$ boundary conversion problem. No Friedmann equation, H_0 , Ω_m , external equation of state, external energy reservoir or new fitted dynamical response coefficient is used to derive the bulk closure.

Break condition: demonstrate a missing homogeneous degree of freedom, free function or dynamical coefficient required for closure; show that a boundary-production term necessarily enters the zero-mode constraints and invalidates the claimed separation; or identify an imported external cosmological equation hidden in the derivation.

MATERIALITY RULE

A typographical mistake, wording dispute, bibliographic error, or local algebraic error that leaves V5-R1–V5-R7 true is an erratum, not a winning falsification. A submission must reconstruct the corrected chain and identify the central proposition that ceases to hold.

6 What does not constitute a winning falsification

The following are insufficient by themselves:

- stating that RM is unconventional, speculative, or not established physics;
- invoking the authority of general relativity, Friedmann cosmology, the Standard Model, an institution, or a consensus without deriving a contradiction inside the frozen target;
- showing that HCR–1 or the Version-4 attractor is wrong – Version 5 already retires both;
- stating that boundary production g_{∂} is not yet derived – Version 5 explicitly leaves it as a $k_F \neq 0$ debt;
- stating that κ or e_{cap} is not yet independently calibrated – this is disclosed and is not used as a fitted expansion-history coefficient in the bulk theorem;
- stating that the Conicus3D benchmark has not empirically validated RM – Version 5 makes no such claim;
- substituting $k_F = 0$ with the unrelated assumption of vanishing spatial curvature;
- treating an internal photon-to-AE conversion as an external energy flux without proving that the frozen control volume requires that interpretation;
- attacking another RM version, a website, a social-media summary, or the complete cosmological programme instead of the frozen eight-page target;
- submitting only the output or opinion of an AI system without a signed, reproducible demonstration for which human authors accept responsibility.

7 Submission dossier

Each dossier must contain:

- S1. a signed manuscript naming the exact proposition V5-R1–V5-R7 under attack and the exact page/equation/assumption disputed;
- S2. a complete derivation or data analysis separating assumptions, established inputs, calculations and conclusions;
- S3. all reproducibility material needed for independent checking, including source code where computation is used, software versions, commands, data and file fingerprints;
- S4. a public, timestamped and immutable deposit, preferably with a DOI;
- S5. author names, affiliations and persistent identifiers;
- S6. a declaration of competing interests;
- S7. a summary of at most two pages stating the exact breaking point, why it is material, and why the target cannot be restored by a correction that leaves the challenged proposition intact.

A participant may use AI, symbolic algebra or numerical software. The submission remains the responsibility of the named human authors and must be independently reproducible.

8 Independent and adversarial evaluation

The scientific merits cannot be decided by the author of RM alone. The legal activation rules must appoint an odd-numbered independent jury including, at minimum:

- one specialist in constrained Hamiltonian systems / Dirac analysis;
- one specialist in gravitation, differential geometry or mathematical relativity;
- one specialist in field theory, cosmology or mathematical physics appropriate to the route invoked.

For an empirical submission, the jury must additionally include expertise in the relevant observational or experimental domain.

The intended procedure has four stages: admissibility, technical assessment, an adversarial response from the RM author, and a reasoned jury decision. A winning formal falsification must survive the response and at least one independent reproduction of the decisive calculation. The final report, accepted calculation, rebuttal and any minority opinion should be public.

If several complete submissions independently establish the same fatal error, priority is determined by the timestamp of the first *complete* dossier received through the official channel established by the activation rules.

9 Proposed reward

The declared intention is to award one **gross prize of 50,000 EUR** to the first eligible university, research institution, or institutionally eligible team whose complete dossier is recognised as winning under the activated rules.

Before opening, the separate legal rules must specify at least:

- legal identity of the organiser and eligible beneficiaries;
- opening and closing dates and official submission channel;
- proof of funds and the mechanism guaranteeing the 50,000 EUR;
- treatment of simultaneous, collective and previously published work;
- taxation, currency, costs and payment timetable;
- jury composition, independence, conflicts and recusal;
- applicable law, remedies and personal-data processing;

- absence of any entry fee or required purchase.

Publication of this scientific protocol alone does not open the competition and creates no right to payment.

10 The no-repair rule

CONTRACT OF CONTRADICTION

If a frozen Version-5 proposition is validly falsified, that proposition is not protected by renaming, retroactive recalibration, insertion of a new coefficient, or migration of an assumption after the fact. The failed branch remains in the historical audit register as failed. A genuinely new action or constitutive law is a new branch and receives a new version.

The prize, if legally activated, therefore rewards a result that improves the scientific state of the programme by identifying a real failure – not a rhetorical victory over an unconventional ontology.

11 Traceability and computational assistance

The target and this protocol were prepared with computational and artificial-intelligence assistance used for algebraic checking, adversarial criticism, drafting and document production. No AI system is an independent certifier, juror, financial guarantor or legal adviser. Scientific responsibility remains with the author; after activation, adjudication belongs to the independent jury.

Done in Cannes on 15 September 2026.

Draft scientific protocol – before legal review and signature

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Appendix A – publication and activation checklist

	Check	Status
1	Frozen target PDF matches SHA-256 9531ed5dda246d113bd5d95b87336f92340ce1f6fe149884ea5187c52eb27a2b	Completed
2	Target page count verified as 8 pages	Completed
3	Exact frozen PDF deposited publicly without recompilation	Required before opening
4	Separate legal rules reviewed by a professional competent in applicable French law	Required
5	Funds guaranteed and supporting evidence retained	Required
6	Independent jury appointed; conflicts and recusal procedure published	Required
7	Opening/closing dates, official submission address and dossier format published	Required
8	Data-protection notice and retention period published	Required
9	Append-only public archive of questions, submissions, decisions and results established	Required
10	Any translated protocol reproduces the same target hash and scientific propositions	Required before use

Minimum legal references carried forward from protocol v1.3 for professional review:

- French Civil Code, Article 1113.
- French Civil Code, Article 1114.
- French Civil Code, Article 1116.
- CNIL guidance applicable to personal data in prize competitions.

Appendix B – compact referee sheet

THE EIGHT-PAGE TEST

A referee does not need to adjudicate the whole RM programme. The winning dossier must answer one question: **which exact Version-5 proposition fails, on which line of mathematics, under which frozen assumption?**

V5-R1	Does the homogeneous rank loss leave the two algebraic scalar constraints intact?
V5-R2	Is $p_z = -(\varepsilon_z + \varepsilon'_z) < 0$ the correct homogeneous constitutive pressure?
V5-R3	Does variation in N_0 give GHC-1 exactly as written?
V5-R4	Does conformal preservation give GEC-1 and a unique sub-capacity branch under the threshold?
V5-R5	Does preservation of GEC-1 give HBR-1 with no hidden rate law or fitted coefficient?
V5-R6	Is GHC-1 then preserved identically, with no additional homogeneous equation?
V5-R7	Do these equations genuinely close the homogeneous bulk while leaving g_∂ to the $k_F \neq 0$ boundary sector?

One proposition. One fatal error. 50,000 EUR if the legally activated protocol says you are first.