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Big06-B: Operational treatment of the dark-matter observational ledger under the Big06-A declaration

Declared inverse problems, fibre non-selection, an anisotropy-free virial bound, and conditional joint relations on prescribed classical hosts

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Abstract

Standing non-claims. Host A and Host B stay separate prescribed backgrounds. Host C is not created. O.1 stays NOT_CLOSED. XV-B is not opened. XVI-N is not discharged. Gate 0 and ST4b stay NOT_SUPPLIED. No quantum coefficient is admitted. No Einstein dynamics, derived metric, spacetime emergence, Page curve, island, vacuum energy, or quantized relational time without an external clock is claimed. A source record is not a premise. The OpenAI catalogue is not a premise. Printed numbers are conditional calculations, not measurements. No dark-matter particle species is derived.

Plan-requested line (t355u). No dark-matter particle species is derived.

Version 2 of Big06-B implements, by insertion only, the binding plan of request t355u for this sheet, which replaces the plan of request t354u, and folds in the draft of request t356u (``Big06-B: New Insertion Findings''), whose structure it follows and whose 38 items F15 are re-proved here. Version 1 is retained verbatim below its own abstract; deleting the delimited version-2 blocks returns it byte for byte. **New findings.** (1) *Joint-fibre constancy.* Every functional of the metric, its curvature, the declared observers and clocks, and the non-electromagnetic reading, and every adaptive protocol built from them, is constant on the joint fibre of

stress-energy splits and current assignments, which is a product. A target is identifiable from such data only if it is constant on that fibre. (2) *Relative risk.* For the unrestricted dark-to-ordinary ratio the minimax relative risk is exactly 1 under relative absolute or squared loss, attained only by reporting 0. The value stays exact under a common complete process, stopping and postselection on a common event. Under approximate common processes within total variation η the sharp value is $1 - \eta$, not 1, with a two-point bound $\frac{b-a}{b+a}(1 - \eta)$, conditioning and stopping budgets, and an endpoint-domination hypothesis that restores exactly 1. A deterministic rule of a fixed datum has risk 1 if it reports 0 and ∞ otherwise. (3) *Residual and kernels.* The residual is a function of the supply exactly when geometry, coupling, vacuum convention and known sources are all supplied. The residual map is then an affine isometry with no equation of state, and the kernel of the total is exactly the conserved transfers. (4) *Poisson layer.* Totals, the mass-slope exponent and total shell masses are fibre-constant. The dark slope at a point takes every real value while every dark shell mass of a partition is fixed. The uniform-data discontinuity holds for every topology dominated by the uniform norm, even C^1 convergence of potentials, and Hessian control restores a Lipschitz bound with the sharp constant $\sqrt{3}/(4\pi G)$. The mass-slope constant is 0 in the degenerate class, correcting version 1. A full-aperture virial moment admits a nonnegative residual iff $W_{\mathrm{d}} \geq 0$, pins the enclosed mass to exactly $[0, W_{\mathrm{d}}/K(R)]$ and forces mass toward the bound's shell quantitatively. (5) *Energy conditions.* On a vacuum-form total every split into null-energy-respecting slots is of vacuum type, and a positive dust slot forces the other slots to violate the null energy condition by $\varepsilon(u \cdot \ell)^2$ along every null direction. The vacuum shift keeps currents and null contractions. It keeps dust form only at zero shift and the weak energy condition only on a closed interval. At action level it is $T \mapsto T - Cg$ with $\Lambda' = \Lambda - \chi C$, and it is not a residual ambiguity once the other slots are fixed. (6) *Futures.* On smooth futures that share a past, every rule decides the existence of an event horizon with success at most $\max\{\pi, 1 - \pi\}$, exactly $\frac{1}{2}$ at equal prior. The ambiguity survives energy conditions on the total and a supplied positive-dust history. Analytic futures are fixed by the past, and a horizon below c/H costs a null-energy violation. (7) *Relations and Shredder.* The two forms of the growth diagnostic agree, and an integral form needs no second derivative; slip residuals carry force and calibration terms. The growth and slip relations are

independent, each with its own rejection condition. The Shredder floors $1 - 1/d$ and $1 - 1/d^2$ are constant on the joint fibre, and a replacement channel has error exactly $1 - 1/S$ with $S = \sum_i \lambda_i^{-1} \geq d^2$. **Why it matters.** These results separate what the ledger determines (totals, slopes of totals, residuals under full supply, null contractions, access floors) from what remains a coordinate of the split, the current, the vacuum convention or the future. They also state the loss, range, supply or approximation on which each exact constant depends. **Audit.** Of 29 plan items, 21 are held, 8 are corrected and none is rejected; the withdrawn t354u plan is marked superseded. Of 38 draft items, 36 are held, 2 are corrected, none is rejected and none is a conjecture. The appendices list 18 plan corrections (PB2) and 7 corrections (DC7), three to version 1 and four to the draft. Every label the plan names was confirmed in fresh read-only site records or, for overlay labels, in the local overlay files, and every F13 number and main-finding reference matches version 1. Citations identify source records only; no proof transfer. No quantum coefficient is admitted.

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Abstract of version 1 (retained verbatim)

Abstract

Standing non-claims. Host A and Host B stay separate prescribed backgrounds. Host C is not created. O.1 stays NOT_CLOSED. XV-B is not opened. XVI-N is not discharged. Gate 0 and ST4b stay NOT_SUPPLIED. No quantum coefficient is admitted. No Einstein dynamics, derived metric, spacetime emergence, Page curve, island, vacuum energy, or quantized relational time without an external clock is claimed. A source record is not a premise. The OpenAI catalogue is not a premise. Printed numbers are conditional calculations, not measurements. No dark-matter particle species is derived.

Big06-B treats the observational ledger of dark matter as a set of declared inverse problems on prescribed classical hosts, under the Big06-A declaration of a residual stress-energy slot with vanishing electromagnetic current. It uses the user's full draft (request t350u) as its backbone and the plan of request t349u as its checklist. **Main findings.** (1) The residual $\chi^{-1}(\mathcal{G}+\Lambda g) - T^{\text{known}}$ is unique and an affine isometry of the supplied sources; it carries no equation of state, and without supplied sources every conserved tensor is a possible dark slot. (2) The identical (off-shell) reading excludes a photon coupling exactly when the coupling gives a nonzero net electromagnetic Euler derivative at the prescribed host. Vanishing current at one background excludes nothing: polarizability fF^2 under the background reading, constant $F\widetilde{F}$, and a new fixed-host coupling $(R - R_0)fF^2$ are counterexamples, and the last still sources gravity through F. (3) Split-independent data, including adaptive, stopped and postselected experiments with a complete common process, have exact attribution risks $\frac{1}{2}(s_+ - s_-)$, $\frac{1}{2}$ and ∞. As a new result, the unrestricted dark-to-ordinary ratio has minimax relative risk exactly 1, attained only by reporting 0. (4) Spherical Poisson inversion has the sharp jet bound $e_0/(4\pi G r_-^2) + e_1/(4\pi G r_-) + e_b$, sharper than Big06-A's, and is discontinuous in the uniform v_c^2 topology. The central slope has no finite local condition number. As a new result, the annular mass slope has the exact Lipschitz constant $\max(1/m, r_+K/m^2)$ when the derivative is observed, while the dark slope is a fibre coordinate that takes every real value. (5) The only exact dispersion bound is the anisotropy-free full-aperture virial bound $M_{\text{dm}}(R) \le W_{\text{d}}/K(R)$, which is sharp; local Jeans intervals are conditional

on the anisotropy. (6) Once a photon–baryon law is supplied, CMB and BAO kernels are split-coupled: the sound horizon is strictly decreasing in the baryon fraction. The radial acceleration relation needs a baryonic model. Luminous satellite counts and planes are occupation-coupled. A Bullet-type offset is kinematics, governed by a new centroid identity, and the self-interaction cross-section is a carrier-fibre coordinate on cold flows. (7) Seven conditional joint relations are each stated with hypotheses and a rejection condition. Positive dust cannot sit inside an all-NEC de Sitter split, and a vacuum shift preserves the current and the NEC but not dust form or the WEC. **Audit.** All 38 numbered draft items (F13-1 to F13-38) are re-proved and held. Of the 17 debugging rows in the draft, 15 are held, one is held in part, and one is overturned as a plan correction. The appendices list 24 plan corrections (PB) and 18 draft corrections (DC5). Every cited companion label was checked against fresh read-only site records. Citations identify source records only; no proof transfer. No quantum coefficient is admitted.

Keywords: dark matter; inverse problems; identifiability; rotation curves; gravitational lensing; Jeans equations; virial theorem; electromagnetic current; prescribed spacetime.

Introduction: a ledger of declared inverse problems

The question

Big06-A treats ``dark matter'' only as a *declaration* on a prescribed classical host: a stress-energy slot that enters the Einstein-form source (or its weak-field Poisson reduction) and carries vanishing electromagnetic current. This sheet asks what the standard observational ledger of dark matter — rotation curves, lensing and clusters, acoustic and growth data, the Bullet Cluster, and the small-scale problems — says *about that declaration*. Every phenomenon is restated as a declared inverse problem with an explicit observation kernel, and each statement is classified by the hypothesis it needs. Three objects are kept apart throughout:

• a *gravitational residual*: the part of a prescribed total source not accounted for by supplied slots;

• a *non-electromagnetic constraint*: the vanishing of a current, either as an assignment on an account or as an identity of a supplied action;

• a *microscopic model*: a particle species, Lagrangian, phase-space distribution or interaction law that realizes the residual. The literature on these observations usually treats (i)–(iii) as one hypothesis. The sheet shows which conclusions follow from (i) and (ii) alone and which require (iii) or another supply, and prints the supply each time.

Evidence, antecedents and what is new

Rotation curves, gravitational lensing, cosmological perturbations and cluster mergers supply different observational constraints, and their interpretation requires different forward models. SPARC provides resolved rotation-curve and photometric mass-model data [Lelli16]; Planck constrains cosmological parameters within specified model families [Planck18]; the Bullet Cluster comparison combines lensing, optical and X-ray observations [Clowe06,Randall08]. These are substantial empirical programmes. This sheet neither reanalyses their data nor treats a non-identifiability statement as a dismissal of their evidence. The distinction between a total gravitational source and its decomposition into dark components is established in the dark-degeneracy literature [Kunz09]; spherical Jeans inference, projected virial constraints, lensing degeneracies and expansion–growth consistency tests have extensive antecedents [Wolf10,AgnelloEvans12,Falco85,ChibaTakahashi07]. No first discovery of these general principles is claimed. The contribution is a unified, explicitly conditional audit: (1) a residual is unique when the geometry, normalization, vacuum convention and other sources are supplied, but it need not have an equation of state or a microscopic realization; (2) split-independent observations cannot identify a split, whereas species-sensitive observations can refine it; (3) the reconstruction topology determines which density, slope and shell-mass conclusions are stable; (4) conditional cosmological relations test a package of supplied assumptions, not the residual identity in isolation.

Backbone and verdicts

The section structure follows the user's full draft of Big06-B (request t350u, findings_t350u.tex, sha256 497d39eaca92bfeb66e014230c5ad5fe9461c652449c8d2003d9e89737fce5f8), merged with the plan of request t349u. Every theorem, proposition, lemma, corollary and claim of the draft is numbered F13-n ($n = 1, \ldots, 38$),

re-proved here and given a verdict (Appendix); where a draft item and a plan item overlap, the stronger form is kept and the other is recorded in the crosswalk (Appendix). The draft's ``Debugging the proposed plan'' table is treated as a set of proposed plan corrections DB-1 to DB-17 (Appendix); the held ones are folded into the plan corrections PB-*n* (Appendix). Corrections to the draft itself are DC5-*n* (Appendix). Results that appear in neither input are marked *new*.

Enter, spacetime Enter and the Shredder

The Enter programme distinguishes the quantum system consumed by a destructive readout from the classical record returned by it. The introductory essay separates readout, recovery, implementation and geometric identification [CheungPhil]; the Enter-calculus article studies a strictly linear quantum language and an operational characterization of its measurement primitive within a stated structural class [CheungEnter]. Neither supplies an astrophysical matter law. The spacetime construction I-B places a finite readout interface on a prescribed conical product; consuming a finite clock encoding does not consume the classical time coordinate or derive the metric. I-D concerns separate prescribed host interfaces and unresolved source-selection conditions. ``Shredder'' names the distinction between a classical description of an unknown quantum input and a quantum-return decoder; its finite recovery obstruction is proved in Section . It is not a statement that electromagnetic silence destroys information. In this sheet the *Big Bang analogy* means only a comparison with a prescribed expanding early epoch and its evolving causal-access relations; it is not a theorem about the origin of the universe, a physical singularity, or a universe acting as a computer.

Status conventions, records and units

Proved means a full local proof from hypotheses stated in this sheet. *Conditional* means proved from an explicitly declared reduction or closure (a ``contract'') that is itself not derived; such hypotheses are outside the standing ledger. *Documentary* means a record of what a source record states. A citation ``X label (source record; not a premise)'' identifies a labelled statement of the site record X, retrieved read-only on 25 October 2026 from https://enter.grok.me/api/manuscript/<ID>. Citations identify source records only; no proof transfer. Every result

needed here is re-proved locally; no imported statement is a premise. Observational papers are cited only as source records of what was reported or proposed; no measured number is printed as a result of this sheet, and no comparison with data is performed.

Relativistic statements use $c = 1$ and signature $(-,+,+,+)$ unless c is restored; $\mathcal{G}_{ab} = R_{ab} - \frac{1}{2}Rg_{ab}$; $G > 0$ is Newton's constant; χ is the declared coupling ($\chi = 8\pi G$ where a value is needed, and $\chi > 0$ wherever an energy condition is transported through it, as in Big06-A Erratum E2-2). The Big-series coefficient slot κ plays no role in the physics of this sheet and has no value. No quantum coefficient is admitted.

What version 2 adds

Version 2 (request t354u, with the plan replaced by request t355u and the draft of request t356u folded in) is insertion-only: every new line sits in a delimited block, and nothing in version 1 is moved or edited. The new results are collected in Section , in the order of the draft's sections. They include: joint-fibre constancy (Theorem); relative risk with its loss and range (Theorem) and under adaptive, stopped, postselected and approximate experiments (Theorem); the relative Le Cam bound and endpoint domination (Theorems ,); the virial moment fibre (Theorem); the four supplies and kernels of the residual (Theorem); the Poisson fibre and the topology tool (Theorem , Corollary); the null-energy obstruction, the vacuum-shift limits and the futures (Theorems , ,); the kernels and the growth and slip relations (Propositions , ,); and the Shredder floors with the documentary separations (Proposition , Record). The plan-item verdicts, draft-item verdicts F15-*n*, plan corrections PB2-*n*, corrections DC7-*n* to version 1, label and site tables, version history and audit trail are in Appendices –.

Background: the Big series

The Big series is a sequence of declared-class sheets in the Enter framework. Each sheet takes a sentence of popular cosmology — an analogy, a ``dark'' quantity, a horizon, a coefficient — and turns it into theorems, conditional statements or negative certificates about a *prescribed* classical host, on which the metric is given rather than derived and temperature, entropy and dimension enter only as named labels with an external coefficient slot κ

in the place of $\hbar$. The common method is the fibre principle: a target is decidable from data exactly when it is constant on every fibre of the data map, and otherwise its worst-case error is half its range on a fibre. The summaries below are written from the sheets themselves (versions and hashes in Appendix). They are documentary; nothing in them is a premise of this sheet.

Big01-A (version 7): the horizon-bounded capacity analogy. *Establishes,* on a prescribed de Sitter static patch: exact causal separations (round-trip latency bounds, horizon area $4\pi c^2/H^2$); that a payload on or beyond the event horizon reaches the observer only through a replacement channel, with least half-diamond error $1 - 1/d^2$, above the classical-record floor $1 - 1/d$; that the labels $T_{\mathrm{GH}}, S_{\mathrm{GH}}, N_{\mathrm{GH}}$ are not functions of the admitted classical data but vary injectively with κ (Big01-A thm:Hcert (source record; not a premise)), also for finite adaptive experiments (Big01-A thm:adaptive (source record; not a premise)); that the vacuum ambiguity of conserved comparison tensors on an Einstein region has rank one (Big01-A thm:vacfibre (source record; not a premise)); and that the event horizon of a de Sitter epoch depends on the prescribed future (Big01-A thm:Efuture, cor:P5 (source record; not a premise)). *Refuses:* $\dim \le \exp(S_{\mathrm{GH}}/k_B)$ is not a theorem of the host without a separately supplied promise; no finite Hilbert space, Einstein dynamics or value of κ is derived.

Big02-A (version 7 local; version 6 on the site): dark capacity. *Establishes* certificates for four access-relative ``dark" parts of a finite register — error-correction redundancy, complete causal-access loss, junk sectors, and information that has left the patch — with exact error values ($1 - 1/d^2$, $1 - 1/d$, $1 - m/d$, $p(1 - 1/k^2)$). Dark capacity is defined relative to a declared logical account (Big02-A def:dark (source record; not a premise)). *Refuses:* dark capacity is ``an operational classification … not a substance"; no particle species, clustering mechanism, Einstein dynamics or Page curve is derived.

Big03-A (version 3): the supplied-coefficient class. *Establishes* that evaluating the horizon labels at a declared external coefficient is an evaluation, not a derivation; that coefficient-blind adaptive experiments have a κ -independent law (Big03-A thm:R-v3-adaptive (source record; not a premise)); that coefficient supply leaves independent source fibres unresolved (Big03-A thm:R-v3-fibre-nonselection (source record; not a premise)); exact

power-law relative risks (Big03-A prop:R-v3-relative-alignment (source record; not a premise)); and that a calibrated Gibbs state at a declared temperature tie is an additional coefficient-*sensitive* datum (Big03-A prop:R-v3-thermal-ident (source record; not a premise)). *Refuses:* no derivation of $\hbar$; the unsupplied class, the channel floors and the vacuity of dynamics are unchanged.

Big04-A (version 5 on the site; version 6 frozen locally, unregistered): radiation labels. *Establishes*, on a prescribed flat comparison geometry with a radiation-type prefix, the external labels $T_{\mathrm{rad}} \propto U^{1/4}\kappa^{3/4}/a$ and $S_{\mathrm{rad}} \propto (U/\kappa)^{3/4}$, their calibration inverses and exact absolute and relative minimax risks (relative risk $\tanh(\frac{3}{4}\operatorname{artanh}\delta)$), a joint replacement-channel certificate with error $1 - d^{-2}$ for sources with no causal path to the receiver interface, and the exact open interval of early-junction horizon radii under a declared rate bound. The local version 6 (9dde22d76240e8ca9b4134bff9778d9aae136cf1cfac17286c0dfc359a278792) adds that the labels depend on (κ, α) only through κ^3/α and on no declared split, so the joint fibre is the product of the split fibre and the coefficient orbit, and that coefficient-blind adaptive protocols cannot calibrate either label. *Refuses:* no dark-radiation species, Hilbert-space dimension, temperature, entropy, Einstein dynamics or Page curve is derived.

Big05-A (version 3): is curvature mainly caused by dark matter and expansion?. *Establishes* that on a prescribed metric the total source $T_{\mathrm{tot}} = \chi^{-1}(\mathcal{G} + \Lambda g)$ is fixed but its split into ordinary, dark and vacuum slots is not: every geometric observable and every adaptive protocol built from them is constant on the split fibre (Big05-A thm:Big05-flagship (source record; not a premise)), with exact quotient and minimax risks (Big05-A thm:Big05-quotient, prop:Big05-minimax (source record; not a premise)) and an observation-kernel criterion for when an added observation separates the fibre (Big05-A thm:Big05-kernel (source record; not a premise)); on the bare de Sitter host every split into null-energy-respecting pieces is of vacuum type; past geometry does not determine the future (Big05-A thm:Big05-futures (source record; not a premise)) and forecasts are split-blind (Big05-A prop:Big05-predsplit (source record; not a premise)). *Refuses:* local dark dominance is either a relabelling invisible to every reading or a change of metric labels; Big02-A dark capacity is not stress-energy.

Big06-A (version 2, registered; version 1 frozen): the dark-matter declaration. *Establishes* the exact off-shell

non-electromagnetic criterion (Big06-A thm:DM-nonEM (source record; not a premise)) and its limits (prop:DM-polarizability), separate conservation and geodesic dust under the identical reading (prop:DM-stress–prop:DM-NEC), the residual inverse (prop:DM-residual), the spherical Poisson reconstruction with Lipschitz but discontinuous stability (prop:DM-poisson, prop:DM-poisson-stability), a^{-3} dilution under separate conservation (prop:DM-cosmo), fibre non-selection with indicator risk $\frac{1}{2}$ and infinite ratio risk (prop:DM-fibre), and in version 2 the invisibility of the current coordinate to split-independent data, adaptive non-identifiability under a complete common process, the limits of the vacuum shift, and seven conditional joint-consistency relations. *Refuses:* no particle species, microscopic Lagrangian, Einstein dynamics or identification with dark capacity or vacuum energy.

Where Big06-B sits. Big06-A proves what follows from the declaration in general. Big06-B applies it to the observational ledger: it asks, item by item, which observation kernels are split-independent, which are split-coupled through a supplied law, what an exact inverse can and cannot return, and which extra hypothesis each stronger statement needs. It is a new sheet, not an overlay; no parent sheet is edited.

Residual tensors and the electromagnetic declaration

Fix a prescribed host (M, g, χ, Λ): a connected, time-oriented smooth four-manifold with a C^3 Lorentzian metric, declared $\chi \neq 0$ and Λ, and a connected open region U. The metric is supplied; nothing below selects it.

Definition (Declared residual; def:B6B-residual). Put $T_{\mathrm{tot}} := \chi^{-1}(\mathcal{G}[g] + \Lambda g)$. Given a symmetric tensor T^{known} on U (the declared non-dark slots, for example ordinary matter, radiation and a vacuum term), the *declared residual* is

$$T^{\mathrm{DM}}_{\mu\nu} := \chi^{-1}(\mathcal{G}_{\mu\nu}[g] + \Lambda g_{\mu\nu}) - T^{\mathrm{known}}_{\mu\nu}.$$

The superscript names an accounting slot. ``Missing mass" on a region is the statement $T^{\mathrm{DM}} \equiv 0$ there for the supplied $T^{\mathrm{known}}$. ``Particle nature" is the further claim that a supplied microscopic action or kinetic law realizes T^{DM}; that claim is not in the ledger.

Status: definition; the plan's S 1 formula and the draft's def:residual. It is the residual of Big06-A prop:DM-residual (source record; not a premise). par *Non-claim.* A nonzero residual is not yet positive dust, collisionless matter, or the stress of a microscopic field. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Uniqueness, conservation, Lipschitz dependence, and the limits of the residual; thm:B6B-residual). *The following hold.*

• T_{tot} *is symmetric and divergence-free for every* C^3 *metric, every* Λ *and every* $\chi \neq 0$.

• *Supplied sources. If* g, Λ, χ *and* T^{known} *are supplied exactly, then* T^{DM} *is the unique tensor* X *with* $\mathcal{G} + \Lambda g = \chi(T^{\mathrm{known}} + X)$. *This is an inverse-source identity, not an evolution law selecting* g. *Moreover* $\nabla^{\mathrm{muT}\wedge}\mathrm{DM}_{\mu\nu} = -\nabla^{\mathrm{muT}\wedge}\mathrm{known}_{\mu\nu}$, *so the residual is separately conserved if and only if* T^{known} *is.*

• *Affine isometry. At fixed* (g, Λ, χ), $T_1^{\mathrm{DM}} - T_2^{\mathrm{DM}} = T_2^{\mathrm{known}} - T_1^{\mathrm{known}}$ *pointwise; in every tensor norm the residual map has Lipschitz constant exactly* 1.

• *Constitutive classes. An additional class* $\mathcal{C}$ *(for example nonnegative dust with a specified velocity) is compatible exactly when the unique tensor belongs to* $\mathcal{C}$*; the identity does not prove membership.*

• *No constraint without supplied sources. If* T^{known} *is not supplied, then for every symmetric divergence-free* X *on* U *there is a split with dark slot* X, *namely* $(T_{\mathrm{tot}} - X + \rho_L g,\ X,\ -\rho_L g)$ *for any constant* ρ_L.

Proof. (a) The contracted Bianchi identity gives $\nabla^{\mu}\mathcal{G}_{\mu\nu} = 0$, and $\nabla g = 0$; symmetry is inherited. (b) If $\mathcal{G} + \Lambda g = \chi(T^{\mathrm{known}} + X)$ then $X = \chi^{-1}(\mathcal{G} + \Lambda g) - T^{\mathrm{known}}$ because $\chi \neq 0$. Take the divergence and use (a). (c) The map is $T^{\mathrm{known}}\mathrm{mapsto}\mathrm{T}_{\mathrm{tot}} - T^{\mathrm{known}}$, a translate of −id, which preserves every norm. (d) Immediate from uniqueness in (b). (e) Each slot is symmetric and divergence-free by (a) and $\nabla g = 0$, and the slots sum to T_{tot} (check B6B-1).

par *Status:* **F13-1**; verdict **held**. Parts (b)–(d) are the draft's thm:residual; (e) is the plan's ``residual vs split'' point; (b),(e) re-prove Big06-A prop:DM-residual (source record; not a premise). par *Non-claim.* The residual is not

identified with any substance, and positivity, dust form and an equation of state are not implied. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Definition (Current readings; def:B6B-current). An *account* assigns currents $j = (j_{\mathrm{b}}, j_{\mathrm{dm}}, j_{\Lambda})$ to the slots; the declaration is $j_{\mathrm{dm}} \equiv 0$. If a candidate dark action $S_{\mathrm{d}}[g, \varphi, A]$ is supplied on a fixed gauge bundle, its current is defined by $\delta_A S_{\mathrm{d}}(a) = \int \sqrt{-g}\, \mathscr{J}^{\mu} a_{\mu}$ for compactly supported a. The declaration is read as *R1 (identical, off shell)*: $\mathscr{J} \equiv 0$ for every admitted (A, φ) at the prescribed metric; or as *R2 (background)*: $\mathscr{J} \equiv 0$ at one background, usually $A = 0$. R1 is not a vanishing mean charge, an on-shell equality, or an experimental upper limit along one history.

Status: definition, following Big06-A def:DM-read (source record; not a premise) and the draft's def:current. The draft writes $\mathscr{J} = -(1/\sqrt{|g|})\, \delta S/\delta A$, Big06-A and this sheet use +; every statement below is sign-blind (DC5-9). par

Non-claim. A current assignment is not a microscopic realization. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Exact current criterion and its boundary; prop:B6B-current). *On an affine, compact-variation-connected family of gauge potentials:*

• *R1 holds if and only if S_{d} is unchanged under every compactly supported variation of A with the other fields fixed;*

• *an action with $\delta S_{\mathrm{d}}/\delta A \equiv 0$ satisfies the declaration but need not realize , obey positivity, or be separately conserved without further assumptions;*

• *the polarizability term $-\frac{1}{4}\int f(\varphi) F_{\mu\nu} F^{\mu\nu}\, \mathrm{d}V_g$ contributes $\mathscr{J}^{\nu} = \nabla_{\mu}(f(\varphi) F^{\mu\nu})$, and an axion-type term $-\frac{1}{4}\int b(\varphi) F_{\mu\nu} \widetilde{F}^{\mu\nu}\, \mathrm{d}V_g$ contributes $\mathscr{J}^{\nu} = (\nabla_{\mu} b) \widetilde{F}^{\mu\nu}$; both vanish on every history with $F = 0$ (so R2 holds there) and are not the zero functional when f, respectively b, is nonconstant;*

• *a constant-coefficient $F\widetilde{F}$ term has identically vanishing bulk Euler derivative by the Bianchi identity $\nabla_{\mu} \widetilde{F}^{\mu\nu} = 0$;*

global topological sectors and boundary terms are not decided by the compact bulk-variation criterion;

• *(new) fixed-host coupling. For a scalar curvature* R_0 *supplied as a constant and* $X = f(\varphi)F_{ab}F^{ab}$*, the term* $S_{\mathrm{sharp}} = \int\sqrt{-g}\,(R - R_0)\,X$ *has* $\mathscr{J}^{\nu} = -4\nabla_\mu((R - R_0)fF^{\mu\nu})$*, which vanishes identically in* (A, φ) *at every host with* $R \equiv R_0$*; so* S_{sharp} *satisfies R1 at such a host. Its metric stress, however, is* $T^{\mathrm{sharp}}_{ab} = -2[XR_{ab} + g_{ab}\mathrm{Box}\,X - \nabla_a\nabla_b X]$ *there, which depends on F: the photon field enters the gravitational source. Consequently, a photon coupling is excluded by the declaration exactly insofar as it contributes a nonzero net electromagnetic Euler derivative, in the declared class, at the prescribed host.*

Proof. (a) If $\mathscr{J} \equiv 0$, then along the segment $A + ta$ inside the affine family $\frac{\mathrm{d}}{\mathrm{d}t}S_{\mathrm{d}} = \int\sqrt{-g}\,\mathscr{J}[A + ta]\cdot a = 0$; connectedness by compact variations gives invariance. Conversely, invariance makes every first variation zero, and the fundamental lemma of the calculus of variations gives $\mathscr{J} \equiv 0$. (b) The current declaration constrains only the A-dependence; the example $S = 0$ with any assigned T_{dm} shows no residual is realized, and a dark scalar with an exchange term to a neutral sector (Proposition) is not separately conserved. (c) $\delta(F_{\mu\nu}F^{\mu\nu}) = 4F^{\mu\nu}\nabla_\mu a_\nu$; integrating by parts, $\delta S = \int\sqrt{-g}\,\nabla_\mu(fF^{\mu\nu})a_\nu$. For $\widetilde{FF}$, $\delta(\widetilde{FF}) = 4\widetilde{F}^{\mu\nu}\nabla_\mu a_\nu$ and $\nabla_\mu\widetilde{F}^{\mu\nu} = 0$, giving $(\nabla_\mu b)\widetilde{F}^{\mu\nu}$. Both are linear in F; with f nonconstant, choose φ with $\nabla f \neq 0$ and $F \neq 0$ to obtain a nonzero value (check B6B-27). (d) Put b constant in (c). (e) The current follows as in (c) with f replaced by $(R - R_0)f$ and the factor -4 from $-\frac{1}{4} \mapsto 1$; it vanishes when $R \equiv R_0$. For the stress, $\delta(\sqrt{-g}\,(R - R_0)X) = (R - R_0)X\,\delta\sqrt{-g} + \sqrt{-g}\,X\,\delta R + \sqrt{-g}\,(R - R_0)\,\delta X$ with $\delta R = R_{ab}\delta g^{ab} + (g_{ab}\mathrm{Box} - \nabla_a\nabla_b)\delta g^{ab}$. At the host the first and third terms vanish; integrating the second by parts and using $T_{ab} = -\frac{2}{\sqrt{-g}}\frac{\delta S}{\delta g^{ab}}$ gives the displayed tensor, which is nonzero for suitable F (for example when $\nabla_a\nabla_b X \neq 0$) (check B6B-27).

par *Status:* **F13-2**; verdict **held**. Parts (a)–(d) are the draft's prop:current; (e) is new and is the fixed-host counterexample in the parent's carried-over correction. Parts (c),(d) re-prove Big06-A thm:DM-nonEM and prop:DM-polarizability (source record; not a premise). par *Non-claim.* The criterion classifies actions. It does not say that any listed coupling is realized, and an R1 action at one host need not satisfy R1 at another host. Ledger

unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Separate conservation requires a separate hypothesis; prop:B6B-conservation). *For an independently diffeomorphism-invariant neutral scalar sector* $S_{\mathrm{d}}[g,\varphi]$*, with* $T_{\mathrm{d}}^{\mu\nu} = \frac{2}{\sqrt{|g|}}\frac{\delta S_{\mathrm{d}}}{\delta g_{\mu\nu}}$ *and* $E_{\mathrm{d}} = \frac{1}{\sqrt{|g|}}\frac{\delta S_{\mathrm{d}}}{\delta \varphi}$*,*

$$\nabla_\mu T_{\mathrm{d}}{}^{\mu}_{\nu} = E_{\mathrm{d}}\nabla_\nu\varphi.$$

In particular this stress is conserved on its own field equation. The current identity alone does not imply this for a sector exchanging energy or momentum with another neutral sector.

Proof. For a compactly supported vector field ξ, $\delta_\xi g_{\mu\nu} = \nabla_\mu\xi_\nu + \nabla_\nu\xi_\mu$ and $\delta_\xi\varphi = \xi^\nu\nabla_\nu\varphi$. Invariance gives $0 = \int\sqrt{|g|}\,(T_{\mathrm{d}}^{\mu\nu}\nabla_\mu\xi_\nu + E_{\mathrm{d}}\,\xi^\nu\nabla_\nu\varphi) = \int\sqrt{|g|}\,\xi^\nu(-\nabla_\mu T_{\mathrm{d}}{}^{\mu}_{\nu} + E_{\mathrm{d}}\nabla_\nu\varphi)$ for every ξ, which is . For the last sentence, take two neutral scalars with $S = S_1[g,\varphi_1] + S_2[g,\varphi_2] + \int\sqrt{|g|}\,\varepsilon\,\varphi_1\varphi_2$ and assign the φ_1-terms to the dark slot: no term contains A, so R1 holds, yet on shell $\nabla_\mu T_{1}{}^{\mu}_{\nu} = -\varepsilon\varphi_2\nabla_\nu\varphi_1 \neq 0$ in general (check B6B-28).

par *Status:* **F13-3**; verdict **held**. The draft's prop:conservation. With an electromagnetic potential the balance acquires $F_{\nu\mu}\mathscr{J}^\mu$, as in Big06-A prop:DM-Noether (source record; not a premise); under R1 that term vanishes, which is the content of Big06-A prop:DM-stress(c) (source record; not a premise). par *Non-claim.* ``Collisionless" is a supplied exchange law $Q = 0$ for a separately invariant dark action; neither $j_{\mathrm{dm}} \equiv 0$ nor R1 supplies it. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Remark (Neutrality is not darkness). A sector with $\mathscr{J} \equiv 0$ may still exchange energy and momentum gravitationally or through other neutral couplings, and a neutral sector need not be pressureless. Conversely, electromagnetically coupled matter may be optically faint in a given band. ``Dark" in this sheet means only $j_{\mathrm{dm}} \equiv 0$ on the account.

par *Non-claim.* No optical or spectroscopic observation model is supplied. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or

split is derived. par

Observation fibres, exact risks, and adaptive experiments

Definition (Accounts, splits, fibres and observation kernels; def:B6B-fibres). (a) An *account* is $x = (h, \sigma, j, \mathfrak{m})$: h contains the prescribed geometry and every fixed observer, clock, calibration and apparatus declaration; $\sigma = (T_{\mathrm{b}}, T_{\mathrm{dm}}, T_{\Lambda})$ is an admissible split of the fixed total T_{tot} on U; j is a current assignment with $j_{\mathrm{dm}} \equiv 0$; and $\mathfrak{m}$ is any separately supplied microscopic or constitutive datum. The admissible split class must be stated: it may require symmetry, conservation, positivity or an equation of state, and none is silently imposed. The *split fibre* over h is the set of admissible (σ, j) with h fixed. (b) In a declared Newtonian reduction a split is a pair $\rho_{\mathrm{b}}, \rho_{\mathrm{dm}} \geq 0$ with $\rho_{\mathrm{b}} + \rho_{\mathrm{dm}} = \rho_{\mathrm{tot}} := (4\pi G)^{-1} \Delta\Phi$ for the prescribed potential Φ; this *Poisson fibre* imposes no further condition. (c) The *carrier fibre* of a dark slot T_{dm} is the set of supplied microscopic realizations $\mathfrak{m}$ (actions, phase-space distributions, interaction laws) whose dark stress is T_{dm} and whose current satisfies the declared reading. (d) An observation is a probability kernel K_x on a declared output space (a deterministic datum is a point-mass kernel). It is *split-independent* on a family if K_x, and for an adaptive experiment its complete process (initial law, control and report kernels, retained memory and stopping rule), is unchanged when only the split and its unobserved attribution coordinates vary. It is *split-coupled* if it depends on the split through a supplied law, for example a baryonic mass model, a photon–baryon coupling or an occupation rule; a split-coupled observation is a data refinement, not a blind report. It is *carrier-coupled* if it depends on $\mathfrak{m}$ beyond T_{dm}.

Status: definition; the draft's def:accounts merged with the plan's S 2. Part (a) carries the geometric contract of Big05-A thm:Big05-flagship (source record; not a premise) with the current coordinate of Big06-A def:DM-data (source record; not a premise); (c) is new here. par *Non-claim.* Whether a given instrument is split-independent is part of its declared observation model, not a theorem. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Lemma (Fibre criterion and common-law minimax; lem:B6B-minimax). *Let* $D : \mathscr{X} \to \mathscr{Y}$ *and* $q : \mathscr{X} \to \mathbb{R}$.

• *q factors through D if and only if it is constant on every fibre of D.*

• *On a family with one common complete observation law, if the target has finite infimum ℓ and supremum u, the deterministic and randomized minimax expected absolute risk is* $(u-\ell)/2$*, attained by the constant midpoint.*

• *An unbounded target image on such a family gives infinite worst-case expected absolute risk.*

• *A binary target taking both values has minimax risk* $\frac{1}{2}$ *for real-valued absolute-loss predictions and for randomized Boolean classification; a constant deterministic Boolean answer has worst-case error* 1.

• *(new) Relative risk. If q takes values filling $[\ell,u]$ with $0<\ell<u$, the minimax relative risk* $\sup \mathbb{E}|Y-q|/q$ *is* $(u-\ell)/(u+\ell)$*, attained by the constant* $2\ell u/(\ell+u)$*. If q fills $(0,\infty)$, the minimax relative risk is exactly* 1*, attained by the constant* 0 *and by no other estimate.*

Proof. (a) Define $\bar{q}(y)=q(x)$ for any $x\in D^{-1}(y)$; this is well defined iff q is fibre-constant. (b) A common law means every estimator Y has the same law at every member. For values q_1,q_2 of the target, $\mathbb{E}|Y-q_1|+\mathbb{E}|Y-q_2|\geq|q_1-q_2|$, so the worst case is at least $|q_1-q_2|/2$; take the supremum over pairs. The midpoint has error at most $(u-\ell)/2$. (c) Apply (b) to pairs with $|q_1-q_2|\to\infty$. (d) For a prediction Y, $\mathbb{E}|Y-0|+\mathbb{E}|Y-1|\geq 1$; a fair coin and the constant $\frac{1}{2}$ attain $\frac{1}{2}$; a constant Boolean answer is wrong at one member. (e) For every real y, $\frac{\ell}{\ell+u}\frac{|y-\ell|}{\ell}+\frac{u}{\ell+u}\frac{|y-u|}{u}=\frac{|y-\ell|+|y-u|}{\ell+u}\geq\frac{u-\ell}{u+\ell}$, and averaging over the law of Y gives the lower bound; the stated constant has relative error $(u-\ell)/(u+\ell)$ at both ends and less inside. On $(0,\infty)$: if Y is not almost surely 0, then $\mathbb{E}|Y-q|/q\geq\mathbb{E}|Y|/q-1\to\infty$ as $q$downarrow0; if $Y=0$ almost surely the relative error is 1 for every q. Hence the minimax value is 1, attained only by $Y\equiv 0$ (check B6B-18).

par *Status:* **F13-4**; verdict **held**. Parts (a)–(d) are the draft's lem:fibre; (e) is new and supplies the plan's ratio statements. par *Non-claim.* The bounds concern a stated family and loss; a supplied prior or a split-coupled datum changes the family. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Remark (Deterministic rules on random data). A deterministic Boolean function f of a common stochastic

transcript Z has worst-case error $\max(p, 1-p)$ with $p = \Pr[f(Z) = 1]$; it equals $\frac{1}{2}$ when Z contains a fair bit. Only a deterministic rule of a fixed exact datum is forced to be constant, with worst-case error 1.

Proof. The law of $f(Z)$ is common; it errs with probability $1 - p$ where the target is 1 and p where it is 0. par

Status: **F13-5**; verdict **held**. The draft's remark after lem:fibre; it re-proves Big06-A thm:DM-v2-risks(iv) (source record; not a premise). par *Non-claim.* No classifier is recommended. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Geometric constancy and attribution risks; thm:B6B-split). *Fix h. Ideal curvature evaluations, null-geodesic paths, geodesic-deviation calculations and ideal radar times determined by h are constant on its split fibre. Suppose the fibre contains a nonzero conserved positive dust tensor S, assigned as* $T_{\mathrm{dm}} = sS$ *and* $T_{\mathrm{n}} = (1-s)S$, $0 \le s \le 1$, *with fixed other sources and zero current in both slots; here* n *is an unclassified neutral comparator, not an identification with baryons. For split-independent data:*

• *the exact absolute minimax risk for* $s \in [s_-, s_+]$ *is* $(s_+ - s_-)/2$*;*

• *the predicate* $s > \frac{1}{2}$*, if both values occur, has the risks of Lemma (d) and Remark ;*

• *the ratio* $Q = s/(1-s)$ *on a family approaching* $s = 1$ *has infinite absolute minimax risk;*

• *(new) on* $s \in [s_-, s_+] \subset (0,1)$ *the ratio Q has exact minimax relative risk* $(Q_+ - Q_-)/(Q_+ + Q_-)$ *with* $Q_\pm = s_\pm/(1-s_\pm)$*, and on the unrestricted family* $s \in (0,1)$ *its minimax relative risk is exactly* 1*, attained by reporting* 0*. Supplying* T^{known} *in removes this ambiguity; the unrestricted fibre must not then be reused.*

Proof. Every listed quantity is computed from g and the fixed contract only. The family is an admissible split family: each slot is conserved, the sum is fixed, and the currents vanish. Split-independence means one common report law, so (a)–(c) follow from Lemma (b)–(d) and the remark; Q is unbounded as $s \to 1$. For (d), Q is a continuous increasing bijection from $[s_-, s_+]$ onto $[Q_-, Q_+]$ and from $(0,1)$ onto $(0,\infty)$; apply Lemma (e) (check B6B-18). Supplying T^{known} fixes T_{dm} by Theorem (b), which collapses the family.

par *Status:* **F13-6**; verdict **held**. The draft's thm:split; (d) is new. It re-proves Big05-A thm:Big05-flagship, prop:Big05-minimax (source record; not a premise) and Big06-A prop:DM-fibre (source record; not a premise); dust families with vanishing currents are realized by an A-free action in Big06-A prop:DM-v2-R1fibre (source record; not a premise). par *Non-claim.* The theorem does not say that the observed universe has any particular dark fraction; it says the fraction is not a function of split-independent data. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Adaptive blindness, stopping, and data refinement; thm:B6B-adaptive). *Let a parameter family share the initial accessible state and datum, the complete history-dependent processes, control kernels, instruments, final tester and estimator post-processing, with retained memory and cross-round apparatus correlations included in the process specification. Then:*

• *the complete finite transcript law and the final accessible state are common throughout the family;*

• *the stopped law is common for a common stopping rule that terminates almost surely;*

• *conditioning on a common transcript event of positive probability preserves equality of laws;*

• *the bounds of Lemma remain valid for every adaptive estimator;*

• *adjoining an independent supplied parameter or a split-coupled observation changes only the fibres actually refined by that supply.*

Proof. (a) Induct on rounds: the joint law of the transcript and accessible state after round $k + 1$ is obtained from that after round k by the common round kernel, so a common start gives common laws at every finite round. (b) The stopped law is $\sum_n \Pr[\tau = n, \cdot]$; each term is a function of the common round-n law and the common rule, and almost-sure termination makes the sum a probability law. (c) A conditional law is a ratio of two common quantities. (d) Every estimator has a common law; apply the lemma. (e) The new datum is a function of the refined account; on a fibre of the refined map the old argument applies unchanged.

par *Status:* **F13-7**; verdict **held**. The draft's thm:adaptive; it re-proves Big06-A thm:DM-v2-adaptive, cor:DM-v2-supply (source record; not a premise). par *Non-claim.* Blindness to the current alone is insufficient: the experiment that reports $Y = 1$ with probability s reads no current yet separates every pair of members (Big06-A prop:DM-v2-cbcounter (source record; not a premise), re-proved by inspection). The hypothesis is a complete common process. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Approximate blindness; prop:B6B-approx). *For two complete output laws with* $\mathrm{TV}(P_0, P_1) \le \eta$*, every common randomized estimator satisfies*

$$\max_i \mathbb{E}_i|Y - q_i| \ge \tfrac{1}{2}|q_1 - q_0|(1 - \eta),$$

and the minimax classification error is at least $(1 - \eta)/2$*. For a finite n-round comparison in which the complete controlled round channels, including persistent memory and returned histories, differ by half-diamond distances at most* η_j*,* $\mathrm{TV}(P_0, P_1) \le \min\{1, \sum_j \eta_j\}$*. An unconditional allowance cannot be reused unchanged after postselection.*

Proof. With densities p_0, p_1 with respect to $P_0 + P_1$, $\mathbb{E}_0|Y - q_0| + \mathbb{E}_1|Y - q_1| \ge \int \min(p_0, p_1)\, \mathbb{E}[|Y - q_0| + |Y - q_1| \mid \cdot] \ge |q_1 - q_0|(1 - \mathrm{TV})$; take the larger term. Classification is the case of a $\{0, 1\}$ target. For the rounds, replace the channels one at a time; each replacement changes the final law by at most η_j in total variation because the half-diamond distance bounds the distinguishability of outputs on every joint input, and the triangle inequality sums the steps. For the last sentence: $P_0 = (1 - \eta)\delta_a + \eta\delta_b$ and $P_1 = (1 - \eta)\delta_a + \eta\delta_c$ have TV = η, but conditioned on $\{b, c\}$ they are disjoint (check B6B-29).

par *Status:* **F13-8**; verdict **held**. The draft's prop:approx; it re-proves Big06-A thm:DM-v2-approx (source record; not a premise). par *Non-claim.* No value of η is asserted for any instrument. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Spherical Poisson inversion: values, slopes and shells

Specification (Spherical circular-motion contract; spec:B6B-rotation). On a radial interval, a declared static weak-field reduction in which the 00 component of the Einstein form is the Poisson law $r^{-2}(r^2\varphi')' = 4\pi G\rho_{\mathrm{tot}}$ with the vacuum slot neglected; a spherically symmetric source; pressure-free circular test orbits with $w := v_c^2 = r\varphi'(r)$; any central point mass included in the enclosed-mass convention; and, where used, a separately supplied spherical baryonic or other known density ρ_{b}. Annuli are $I = [r_-, r_+]$ with $0 < r_- < r_+$.

Status: hypothesis; the draft's hyp:poisson. It is outside the standing ledger. par *Non-claim.* A disk mass model, an inclination, pressure support or velocity anisotropy needs its own contract; the plan's ``outside the baryonic disk'' is outside the spherical contract (PB-4). Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Local residual density, sharp derivative-data bounds and the baryon–dark trade-off; thm:B6B-poisson). *Under Specification :*

• $M_{\mathrm{tot}}(r) = rw(r)/G$ *and the residual density is uniquely*

$$\rho_{\mathrm{dm}}(r) = \frac{w(r) + rw'(r)}{4\pi G r^2} - \rho_{\mathrm{b}}(r);$$

• *on* I, *errors with* $\|\delta w\|_\infty \le e_0$, $\|\delta w'\|_\infty \le e_1$ *and* $\|\delta\rho_{\mathrm{b}}\|_\infty \le e_{\mathrm{b}}$ *give*

$$\|\delta\rho_{\mathrm{dm}}\|_\infty \le \frac{e_0}{4\pi G r_-^2} + \frac{e_1}{4\pi G r_-} + e_{\mathrm{b}};$$

this is the sharp worst-case bound for the product error budget; it is attained for independently reported value/derivative jets, and for compatible C^1 *errors it is the sharp supremum, which need not be attained;*

• *trade-off: for fixed* w, *every* ρ_{b} *with* $0 \le \rho_{\mathrm{b}} \le \rho_{\mathrm{tot}}$ *gives the same rotation curve, so on the family* $\rho_{\mathrm{b}} = s\rho_{\mathrm{tot}}$, $s \in [0, 1]$, *the exact minimax absolute error for* $\rho_{\mathrm{dm}}(r)$ *from* w *is* $\frac{1}{2}\rho_{\mathrm{tot}}(r)$.

Proof. (a) Integrating $(r^2\varphi')' = 4\pi G r^2\rho_{\mathrm{tot}}$ with the enclosed-mass convention gives $r^2\varphi' = GM_{\mathrm{tot}}$, i.e. $M_{\mathrm{tot}} = rw/G$;

differentiate, $4\pi r^2\rho_{\mathrm{tot}} = (rw)'/G$, and subtract ρ_{b}. (b) $\delta\rho_{\mathrm{dm}} = \delta w/(4\pi G r^2) + \delta w'/(4\pi G r) - \delta\rho_{\mathrm{b}}$; each coefficient is largest at r_-. For independent jets take $\delta w \equiv e_0$, $\delta w' \equiv e_1$, $\delta\rho_{\mathrm{b}} \equiv -e_{\mathrm{b}}$ and evaluate at r_-. For compatible C^1 errors with $e_0, e_1 > 0$, take $\delta w(r) = e_0 - \tau + \min\{e_1(r - r_-), \tau\}$, smoothed near $r = r_- + \tau/e_1$ while keeping $|\delta w'| \le e_1$ and $|\delta w| \le e_0$; its contribution at r_- tends to the bound as $\tau \operatorname{downarrow} 0$. Attainment would need $\delta w = e_0$ and $\delta w' = e_1 > 0$ at r_-, which forces $\delta w > e_0$ just to the right of r_-, a contradiction; at interior points the coefficients are strictly smaller (check B6B-3). (c) w depends on ρ_{tot} only; $\rho_{\mathrm{dm}}(r) = (1 - s)\rho_{\mathrm{tot}}(r)$ fills $[0, \rho_{\mathrm{tot}}(r)]$; apply Lemma (b).

par *Status:* **F13-9**; verdict **held**. The draft's thm:poisson, whose constant in (b) is sharper than the bound $(e_0 + r_+ e_1)/(4\pi G r_-^2)$ of Big06-A prop:DM-poisson-stability (source record; not a premise) (both valid; the sharper form is kept). Part (c) is from the plan; (a) re-proves Big06-A prop:DM-poisson (source record; not a premise). par *Non-claim.* The formula reconstructs a density within its contract. No rotation curve is analysed, and ``nonzero outside the baryonic disk" is an observational report [Lelli16], not a result here. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Uniform velocity-squared noise does not control density; thm:B6B-discontinuity). *On any nontrivial compact annulus the map* $w \mapsto (w + rw')/(4\pi G r^2)$ *is not continuous from the uniform norm to the uniform density norm. This remains true on a class of strictly positive total densities.*

Proof. Fix $r_* \in I$, a constant $w_* > 0$, $L > 0$ and $\varepsilon > 0$ with $\varepsilon(1 + r_+/L) < w_*/2$, and put $w_n = w_* + \frac{\varepsilon}{n}\sin(n(r - r_*)/L)$. Then $\|w_n - w_*\|_\infty \le \varepsilon/n$, while $(rw_n)' = w_* + \frac{\varepsilon}{n}\sin(\cdot) + \frac{r\varepsilon}{L}\cos(\cdot) > w_*/2 > 0$, so every density is positive, and $\rho_n(r_*) - \rho_*(r_*) = \varepsilon/(4\pi G L r_*)$ for every n (check B6B-2).

par *Status:* **F13-10**; verdict **held**. The draft's thm:discontinuity; it re-proves the second sentence of Big06-A prop:DM-poisson-stability (source record; not a premise), which is where the discontinuity lives (PB-2). par *Non-claim.* Regularized or parametric reconstructions are additional supplies and are not evaluated. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle

species, Einstein dynamics or split is derived. par

Central slope and the core–cusp question

For a positive density on $0 < r \le R$ define, when the limit exists, $\gamma_0(\rho) = -\lim_{r\downarrow 0} r\rho'(r)/\rho(r)$; a cored profile has $\gamma_0 = 0$ and a power cusp $\rho \sim Cr^{-\gamma}$ has $\gamma_0 = \gamma$. NFW profiles have $\gamma_0 = 1$ and Burkert profiles $\gamma_0 = 0$ (check B6B-3) [NFW96,NFW97,Burkert95].

Theorem (Infinite local condition number for the central slope; thm:B6B-cslope). *There are positive densities ρ_ε with fixed central slope $\gamma \in (0,1)$ and a positive cored density ρ_0 whose circular-motion functions on $(0,R]$ satisfy $\|w_\varepsilon - w_0\|_\infty = O(\varepsilon^2)$ and $\|w_\varepsilon' - w_0'\|_\infty = O(\varepsilon)$, while $\gamma_0(\rho_\varepsilon) - \gamma_0(\rho_0) = \gamma$. Hence the central-slope map is discontinuous, and has no finite local Lipschitz condition number, under uniform w-errors alone or even under these C^1 errors. This does not imply infinite absolute minimax risk for a slope already restricted to a bounded interval.*

Proof. Let $\rho_0 \equiv \rho_c > 0$, and let $\psi \in C^\infty([0,\infty);[0,1])$ equal 1 on $[0,1]$ and 0 on $[2,\infty)$. Put $\rho_\varepsilon = \rho_0 + \rho_* \varepsilon^\gamma r^{-\gamma}\psi(r/\varepsilon)$ with $\rho_* > 0$ and $2\varepsilon < R$. Near 0 the added term dominates, so $\gamma_0(\rho_\varepsilon) = \gamma$. The added enclosed mass satisfies $m_\varepsilon(r) \le \frac{4\pi\rho_*}{3-\gamma}\varepsilon^\gamma \min(r, 2\varepsilon)^{3-\gamma}$, and $\delta w = Gm_\varepsilon/r$. For $r < 2\varepsilon$, $\delta w \le C\varepsilon^\gamma r^{2-\gamma} \le C'\varepsilon^2$; for $r \ge 2\varepsilon$, $\delta w \le C\varepsilon^3/r \le C'\varepsilon^2$. Next $\delta w' = 4\pi G r\,\delta\rho - Gm_\varepsilon/r^2$; for $r < 2\varepsilon$ both terms are at most $C\varepsilon^\gamma r^{1-\gamma} \le C'\varepsilon$ because $\gamma < 1$, and for $r \ge 2\varepsilon$ the first vanishes and the second is at most $C\varepsilon^3/r^2 \le C'\varepsilon$ (check B6B-5). The last sentence is Lemma (b) with a bounded range.

par *Status:* **F13-11**; verdict **held**. The draft's thm:slope; it discharges the plan's ``infinite condition number'' obligation in its asymptotic form. par *Non-claim.* The theorem concerns the *total* profile and is a statement about data and norms. It does not say that observed curves are cored or cuspy. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

On an annulus use the mass-slope exponent

$$\Gamma(w,p)(r) := 2 - \frac{r\,p(r)}{w(r)}, \qquad \text{so that} \Gamma(w,w') = 3 - \frac{\mathrm{d}\ln M}{\mathrm{d}\ln r} \text{when} M = rw/G;$$

for $\rho_{\mathrm{tot}} \propto r^{-\gamma}$ one has $\Gamma = \gamma$. Fix $m > 0$, $K \geq 0$ and the classes $\mathscr{D}_2(m,K) = \{(w,p) \in C(I)^2 : w \geq m, |p| \leq K\}$ (derivative separately observed, norm $N(\delta w, \delta p) = \|\delta w\|_\infty + r_+\|\delta p\|_\infty$) and $\mathscr{D}_1(m,K) = \{w \in C^1(I) : w \geq m, |w'| \leq K\}$ (uniform norm on w).

Theorem (*New:* exact Lipschitz constant with the derivative, infinite condition number without it; thm:B6B-slope). *The following hold.*

• *On $\mathscr{D}_2(m,K)$ the map Γ is Lipschitz from N to the uniform norm with best constant $L_* = \max(1/m,\ r_+K/m^2)$. The value $1/m$ is attained; for $K > 0$, r_+K/m^2 is approached but not attained.*

• *On $\mathscr{D}_1(m,K)$, let $w_0 \geq m + \mu$ and $|w_0'| \leq K - \nu$ for some $\mu, \nu > 0$. For each $r_* \in I$, $0 < \varepsilon \leq \nu$ and $n \geq \varepsilon/\mu$ there are $w_n \in \mathscr{D}_1(m,K)$ with $\|w_n - w_0\|_\infty \leq \varepsilon/n$ and $|\Gamma(w_n,w_n')(r_*) - \Gamma(w_0,w_0')(r_*)| = r_*\varepsilon/w_0(r_*)$ for every n. Under adversarial uniform noise of any size $\eta > 0$, every estimator of $\Gamma(r_*)$ has worst-case error at least $r_*\nu/(2w_0(r_*))$.*

Proof. (a) Pointwise, $|\Delta\Gamma| = r|p/w - \tilde{p}/\tilde{w}| \leq r|p - \tilde{p}|/w + r|\tilde{p}||w - \tilde{w}|/(w\tilde{w}) \leq \frac{1}{m}r_+\|\delta p\|_\infty + \frac{r_+K}{m^2}\|\delta w\|_\infty \leq L_*N$. If $K > 0$, the pair $(m,0)$, (m,ε) gives ratio exactly $1/m$ at r_+ (if $K = 0$, $\delta p = 0$ and $1/m$ is the vacuous constant). The pair $(m,-K)$, $(m+\varepsilon,-K)$ gives ratio $r_+K/(m(m+\varepsilon))$uparrow r_+K/m^2; equality would need $w = \tilde{w} = m$ at the maximizing point with $\delta w \neq 0$ there, which is impossible. (b) Put $w_n = w_0 + \frac{\varepsilon}{n}\sin(n(r - r_*))$: then $w_n \geq m$, $|w_n'| \leq K$, $w_n(r_*) = w_0(r_*)$ and $w_n'(r_*) = w_0'(r_*) + \varepsilon$. With $\varepsilon = \nu$ and $\nu/n \leq \eta$ the two curves can give the same noisy record; apply Lemma (b) (check B6B-6, with a mutation dropping the $\tilde{p}$ term).

Status: proved; new (plan S 3 ``exact Lipschitz constants''). It complements F13-11 (draft) on annuli: the mass slope is controlled by (w,w'), the density slope is not (F13-12). par *Non-claim.* The norms are declared choices; a different norm changes the constant, and smoothing priors are additional supplies. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Annular density-slope stability needs second derivatives; prop:B6B-annular). *For $r > 0$,*

$$\rho_{\mathrm{dm}}'(r) = \frac{r^2 w''(r) - 2w(r)}{4\pi G r^3} - \rho_{\mathrm{b}}'(r).$$

On a compact annulus, supplying w, w', w'' and $\rho_{\mathrm{b}}, \rho_{\mathrm{b}}'$ controls the density and its derivative. If two residual densities $\rho, \tilde{\rho}$ are at least $m > 0$ and $\|\rho'\|_\infty \le B$, then, with $\gamma = -r\rho'/\rho$,

$$\|\tilde{\gamma} - \gamma\|_\infty \le r_+ \left(\frac{\|\tilde{\rho}' - \rho'\|_\infty}{m} + \frac{B\|\tilde{\rho} - \rho\|_\infty}{m^2}\right);$$

the same holds with the roles exchanged if B bounds $\tilde{\rho}'$ instead.

Proof. Differentiate : $((w + rw')r^{-2})' = (2w' + rw'')r^{-2} - 2(w + rw')r^{-3} = (r^2 w'' - 2w)r^{-3}$. For the slope, $\tilde{\rho}'/\tilde{\rho} - \rho'/\rho = (\tilde{\rho}' - \rho')/\tilde{\rho} + \rho'(\rho - \tilde{\rho})/(\rho\tilde{\rho})$; bound and multiply by $r \le r_+$. Exchanging roles uses the symmetric decomposition (check B6B-7).

par *Status:* **F13-12**; verdict **held**. The draft's prop:annular-slope; the clause on which density carries *B* is made explicit (both choices are valid). par *Non-claim.* This is an annular estimate, not a uniform theorem about *r*downarrow 0. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New:* the dark slope is a fibre coordinate; prop:B6B-darkslope). *In the Poisson fibre over a fixed C^1 density $\rho_{\mathrm{tot}} > 0$ on I, every $h \in C^1(I; (0,1])$ gives a split $\rho_{\mathrm{dm}} = h\rho_{\mathrm{tot}}$, $\rho_{\mathrm{b}} = (1-h)\rho_{\mathrm{tot}}$ with the same rotation curve, and $\gamma_{\mathrm{dm}} := -\mathrm{d}\ln\rho_{\mathrm{dm}}/\mathrm{d}\ln r = \gamma_{\mathrm{tot}} - rh'/h$. At any $r_0 \in I$, $\gamma_{\mathrm{dm}}(r_0)$ takes every real value on the fibre: its minimax risk is infinite, and the indicator of $\gamma_{\mathrm{dm}}(r_0) \ge \frac{1}{2}$ has minimax risk $\frac{1}{2}$. An NFW-type and a cored dark profile both lie in the fibre whenever both are bounded by ρ_{tot} on I.*

Proof. For a target y put $k = (\gamma_{\mathrm{tot}}(r_0) - y)/r_0$ and $h(r) = \exp\left(k(r - r_0) - |k|(r_+ - r_-)\right) \in (0,1]$; then $h'/h = k$ and $\gamma_{\mathrm{dm}}(r_0) = y$. The rotation curve depends on ρ_{tot} only. For the last sentence take $\rho_{\mathrm{b}} = \rho_{\mathrm{tot}} - \rho_{\mathrm{dm}} \ge 0$. Apply Lemma (c),(d) (check B6B-8).

Status: proved; new. With Theorems and it separates two ambiguities that the plan's S 3 merges: for the total profile core versus cusp is an ill-conditioned inverse problem; for the dark slot it is a fibre coordinate, undecided even with exact data until a baryonic model is supplied (PB-5). par *Non-claim.* NFW and cored profiles are optional ansätze; neither is selected. Feedback, self-interaction and wave-like dark matter are external models, and none is preferred. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Shell stability and the exact positivity criterion; thm:B6B-shell). *For a supplied known enclosed mass* M_{b} *let* $N(r) = rw(r)/G - M_{\mathrm{b}}(r)$. *The inferred residual mass in* $(r_1, r_2]$ *is* $N(r_2) - N(r_1)$. *If* $\|\delta w\|_\infty \le e_0$, *its error is at most*

$$\frac{r_1 + r_2}{G} e_0 + |\delta M_{\mathrm{b}}(r_2) - \delta M_{\mathrm{b}}(r_1)|,$$

and the velocity-data constant is sharp without a derivative budget. A nonnegative residual mass measure is compatible exactly when N is nondecreasing and its central mass $\lim_{r \downarrow 0} N(r)$ *is nonnegative; for an absolutely continuous mass function this is equivalent to* $\rho_{\mathrm{dm}} \ge 0$ *almost everywhere.*

Proof. $\delta(N(r_2) - N(r_1)) = (r_2 \delta w(r_2) - r_1 \delta w(r_1))/G - (\delta M_{\mathrm{b}}(r_2) - \delta M_{\mathrm{b}}(r_1))$; bound. Sharpness: $\delta w(r_2) = e_0$, $\delta w(r_1) = -e_0$, joined continuously. A right-continuous nondecreasing function with nonnegative limit at 0 is the distribution function of a unique nonnegative measure (Lebesgue–Stieltjes), and conversely; in the absolutely continuous case $N' = 4\pi r^2 \rho_{\mathrm{dm}}$ (check B6B-9).

par *Status:* **F13-13**; verdict **held**. The draft's thm:shell; it re-proves Big06-A prop:DM-v2-shell (source record; not a premise). par *Non-claim.* Shell masses are reconstructed within the spherical contract only. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Remark (What is and is not the same profile fibre). At exact *w* the spherical total density is fixed wherever the derivative exists, so an NFW total profile and a cored total profile generally do not lie on the same exact-data

fibre. Different *dark* profiles lie on one total-source fibre only when admissible known-source changes compensate them; if ρ_b is unsupplied and constrained only by $0 \le \rho_b \le \rho_{tot}$, every such assignment is compatible (Proposition). Photometry, mass-to-light constraints, dynamics or a restricted model family can shrink that set.

Proof. Theorem (a) and Proposition . par *Status:* **F13-14**; verdict **held**. The draft's remark after thm:shell; it corrects the plan's S 3 NFW/core sentence (PB-5). par *Non-claim.* No profile is preferred. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Phase-space information, counts and stellar dispersion

Theorem (A constructive finite-moment ambiguity; thm:B6B-moments). *For every $m \ge 0$ there are distinct nonnegative probability densities f_+, f_- on a compact velocity interval with equal moments through degree m but different probabilities for a velocity-selected set. Multiplying by a common nonnegative spatial density gives phase-space models with identical pointwise spatial density and the same velocity moments through degree m.*

Proof. Let $f_0 = \frac{1}{2}$ on $[-1, 1]$ and let P_{m+1} be the Legendre polynomial of degree $m + 1$, orthogonal to all polynomials of degree $\le m$. Put $f_\pm = f_0(1 \pm \varepsilon P_{m+1})$ with $0 < \varepsilon < 1$; since $|P_{m+1}| \le 1$ on $[-1, 1]$ these are positive probability densities with equal moments through degree m. As $P_{m+1} \not\equiv 0$ is continuous, there is an interval S on which it has one sign, so $\int_S f_+ \ne \int_S f_-$ (check B6B-10).

par *Status:* **F13-15**; verdict **held**. The draft's thm:moments; it re-proves in explicit form Big06-A prop:DM-moments (source record; not a premise) (the plan's ``abstract finding 2" locator, PB-21). par *Non-claim.* No stationary collisionless or self-consistent gravitational solution is asserted by this construction. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Corollary (Density-only statistics and halo statistics; cor:B6B-counts). *A specified statistic $F[\rho_{tot}]$, including a specified density-based counting or shape algorithm, is constant on a fibre with fixed ρ_{tot}. An observed satellite*

count, luminosity-selected plane statistic, subhalo mass function or formation history is not automatically such a statistic: its selection function, halo definition, phase-space information, evolution law and luminous-tracer model must be supplied before fibre constancy or a forecast is asserted.

Proof. The first sentence is Lemma (a); the second is witnessed by Theorem and Proposition . par *Status:* **F13-16**; verdict **held**. The draft's cor:counts; it corrects the plan's S 3 treatment of satellites and planes as density statistics (PB-15). par *Non-claim.* No count, plane or mass function is forecast [Klypin99,Moore99,Ibata13,BoylanKolchin11]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New:* occupation subsets; prop:B6B-occupation). *Let a supplied density-only halo finder return* $N \geq 4$ *distinct subhalo positions* $x_1, \dots, x_N \in \mathbb{R}^3$ *in general position (no four coplanar) from the fixed density, and let the luminous set* $L = \{i : o_i = 1\}$ *be given by an occupation vector* $o \in \{0,1\}^N$ *supplied by a split-coupled or carrier-coupled law. On the family of all o with every density-only statistic fixed:*

• *the luminous count* $|L|$ *takes every value* $0, \dots, N$*, so its minimax absolute risk from density-only data is* $N/2$*;*

• *for the plane statistic* $P(L) = \min_{\Pi} \max_{i \in L} \operatorname{dist}(x_i, \Pi)$ *over planes* Π *(the half-thickness of the thinnest slab containing L), the indicator of* $P(L) = 0$ *among sets with* $|L| \geq 3$ *takes both values, so its minimax risk is* $\frac{1}{2}$.

Proof. (a) Choose o with exactly k ones. (b) Any three points lie in a plane, so $P = 0$ for $|L| = 3$; four points in general position are not coplanar, so $P > 0$. Both families leave the density, hence every density-only statistic, unchanged; apply Lemma (b),(d) (check B6B-11).

Status: proved; new. par *Non-claim.* The construction says nothing about which occupation law holds; it shows only that one must be supplied. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Specification (Spherical steady tracer model; spec:B6B-jeans). Spherical equilibrium, no streaming, a tracer density $\nu(r) > 0$, radial variance $s(r) = \sigma_r^2(r) > 0$ and anisotropy $\beta = 1 - (\sigma_\theta^2 + \sigma_\varphi^2)/(2\sigma_r^2)$, with the moment equation

$$(\nu s)' + \frac{2\beta}{r}\nu s = -\nu\frac{GM_{\mathrm{tot}}(r)}{r^2}.$$

Status: hypothesis; the draft's hyp:jeans [BT08]. It is an additional dynamical reduction, not a consequence of electromagnetic silence. par *Non-claim.* No tracer population is modelled. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Exact local compatible mass interval; prop:B6B-jeansinterval). *At a supplied radius r put $A = -\mathrm{dln}\,(\nu s)/\mathrm{dln}\,r - 2\beta$. Then $M_{\mathrm{tot}}(r) = \frac{r}{G}sA$. If the supplied local uncertainty set is the independent box $s \in [s_-, s_+]$, $A \in [A_-, A_+]$, $M_{\mathrm{b}} \in [B_-, B_+]$ with $s_-, A_- \geq 0$, the exact algebraic residual-mass image is*

$$[\frac{r}{G}s_-A_- - B_+,\ \frac{r}{G}s_+A_+ - B_-].$$

If a nonnegative residual is required, intersect with $[0,\infty)$; an empty intersection rejects the local model; the absolute minimax risk on the resulting bounded interval is half its width. (Added.) With ν, s and $\mathrm{dln}\,(\nu s)/\mathrm{dln}\,r$ fixed and only $\beta \in [\beta_-, \beta_+]$ unsupplied, $M_{\mathrm{tot}}(r)$ is affine in β with slope $-2rs/G$, and its minimax risk is $rs(\beta_+ - \beta_-)/G$.

Proof. Divide by $\nu s/r$. On the box, $(s, A, B) \mapsto \frac{r}{G}sA - B$ is increasing in s and A (as $s, A \geq 0$) and decreasing in B, so the image of the connected box is the interval between the corner values. The last sentences follow from Lemma (b) (check B6B-12).

par *Status:* **F13-17**; verdict **held**. The draft's prop:jeansinterval, conditional on the declared box; the anisotropy clause is added from the plan's S 3 caveat. par *Non-claim.* A projected dispersion at one radius does not fix s, A or β; there is no exact local bound from it alone (PB-14). Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Full-aperture anisotropy-free bound and its sharpness; thm:B6B-virial). *Assume spherical equilibrium, finite tracer luminosity $L = 4\pi\int_0^\infty \nu r^2\,\mathrm{d}r$, finite second moments, no streaming, and vanishing boundary term $r^3\nu\sigma_r^2$ at 0 and ∞. Let $\sigma^2_{\mathrm{los,\,all}}$ be the luminosity-weighted line-of-sight variance over the entire projected system.*

Then, for every anisotropy profile,

$$\frac{3L\sigma^2_{\mathrm{los,all}}}{4\pi G} = \int_0^\infty v(r)\, r\, M_{\mathrm{tot}}(r)\, \mathrm{d}r.$$

With supplied M_{b} *put* $W_{\mathrm{d}} = \frac{3L\sigma^2_{\mathrm{los,all}}}{4\pi G} - \int_0^\infty vrM_{\mathrm{b}}\, \mathrm{d}r$ *and* $K(R) = \int_R^\infty vr\, \mathrm{d}r$. *For a nonnegative residual mass measure and* $K(R) > 0$,

$$0 \le M_{\mathrm{dm}}(R) \le \frac{W_{\mathrm{d}}}{K(R)}.$$

A negative W_{d} *is incompatible with that model. The upper bound is sharp among nonnegative spherical mass measures constrained by : a shell at R attains it with the convention* $M(R) = \mu([0, R])$, *and smooth shells approaching R attain its supremum. If* $K(s) > 0$ *for some* $s > R$, *the value* 0 *is compatible by placing the residual outside R; any residual outside the tracer support is unconstrained.*

Proof. Multiply by $4\pi r^3$ and integrate. The boundary term vanishes, $-\int 12\pi r^2 vs + \int 8\pi r^2 \beta vs = -4\pi \int r^2 v(\sigma_r^2 + \sigma_\theta^2 + \sigma_\varphi^2)$, and the right side is $-4\pi G \int vrM_{\mathrm{tot}}$. Spherical symmetry and no streaming give $\langle v^2_{\mathrm{los}} \rangle = \frac{1}{3}\langle v^2 \rangle$ for the full-aperture luminosity average, so $4\pi \int r^2 v(\sigma_r^2 + \sigma_\theta^2 + \sigma_\varphi^2) = 3L\sigma^2_{\mathrm{los,all}}$; β has cancelled. Subtracting the baryonic part gives $\int vrM_{\mathrm{dm}} = W_{\mathrm{d}}$. For a nondecreasing $M_{\mathrm{dm}} \ge 0$, $W_{\mathrm{d}} \ge \int_R^\infty vrM_{\mathrm{dm}} \ge M_{\mathrm{dm}}(R)K(R)$. A shell of mass $W_{\mathrm{d}}/K(R)$ at R gives equality; a shell at $s > R$ with mass $W_{\mathrm{d}}/K(s)$ gives $M_{\mathrm{dm}}(R) = 0$; mass where $v = 0$ outside the tracer does not enter (check B6B-13, with Hernquist and Plummer models at several constant β, and a mutation removing the factor 3).

par *Status:* **F13-18**; verdict **held**. The draft's thm:virial; it discharges the plan's S 3 ``exact residual bound compatible with a measured dispersion" in the only exact, anisotropy-free form, with the estimator explicit [Wolf10,AgnelloEvans12]. par *Non-claim.* The sharpness statements do not assert a global stellar distribution function for every extremal model. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Corollary (A dispersion interval and the meaning of ``consistent with zero''; cor:B6B-lowdm). *If the full-aperture squared dispersion is supplied only in* $[s_{\mathrm{los},-}, s_{\mathrm{los},+}]$, *with the other inputs fixed, put*

$W_+ = \frac{3Ls_{\mathrm{los},+}}{4\pi G} - \int_0^\infty vrM_{\mathrm{b}}\,\mathrm{d}r$. *When the interval admits a nonnegative compatible* W_{d}, $0 \le M_{\mathrm{dm}}(R) \le W_+/K(R)$.

Proof. W_{d} is increasing in the dispersion; apply at the largest compatible value. par *Status:* **F13-19**; verdict **held**. The draft's cor:lowdm. par *Non-claim.* This is a conditional compatible-set bound, not a bound from an arbitrary finite-aperture dispersion. A residual compatible with zero inside a stellar radius does not force zero residual outside it, and no formation history is selected [vanDokkum18,Ogiya18]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Lensing, acoustic observations and baryon-sensitive data

Projected residuals and their degeneracies

Specification (Thin-lens mass calibration; spec:B6B-lens). A weak-field, nonrelativistic, single-plane lens reduction of the prescribed metric, $\mathrm{d}s^2 = -(1 + 2\Phi/c^2)c^2\mathrm{d}t^2 + (1 - 2\Phi/c^2)\mathrm{d}\mathbf{x}^2$ near the lens with $\Delta\Phi = 4\pi G\rho_{\mathrm{tot}}$; supplied angular-diameter distances D_l, D_s, D_{ls}; the lens potential $\psi(\theta) = \frac{2D_{ls}}{D_l D_s c^2}\int \Phi(D_l\theta, z)\,\mathrm{d}z$; and $\Sigma_{\mathrm{tot}}(x_\perp) = \int \rho_{\mathrm{tot}}(x_\perp, z)\,\mathrm{d}z$ with ρ_{tot} of compact support in z.

Status: hypothesis; the draft's hyp:lens. A general relativistic stress residual is not automatically a projected Newtonian mass density. par *Non-claim.* No lens system is modelled. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Lensing residual, projection ambiguity and mass-sheet ambiguity; prop:B6B-lensing). *Under Specification ,* $\Delta_\theta\psi = 2\kappa_{\mathrm{L}}$ *with* $\kappa_{\mathrm{L}} = \Sigma_{\mathrm{tot}}/\Sigma_{\mathrm{crit}}$ *and* $\Sigma_{\mathrm{crit}} = \frac{c^2}{4\pi G}\frac{D_s}{D_l D_{ls}}$. *An absolutely calibrated convergence and a supplied known surface density determine* $\Sigma_{\mathrm{dm}} = \Sigma_{\mathrm{crit}}\kappa_{\mathrm{L}} - \Sigma_{\mathrm{b}}$, *and errors* e_κ, e_Σ *give the sharp product-budget bound* $\|\delta\Sigma_{\mathrm{dm}}\|_\infty \le \Sigma_{\mathrm{crit}}e_\kappa + e_\Sigma$. *Nevertheless:*

• *one projection does not determine the three-dimensional residual: for compactly supported smooth* f, $h = \partial_z f$ *has*

$\int h\,\mathrm{d}z = 0$, *and small multiples of h added to a positive baseline preserve positivity;*

• *reduced shear alone has the ambiguity* $\kappa_{\mathrm{L}} \mapsto \lambda\kappa_{\mathrm{L}} + 1 - \lambda$, $\gamma_{\mathrm{L}} \mapsto \lambda\gamma_{\mathrm{L}}$, $\lambda > 0$, *since* $\gamma_{\mathrm{L}}/(1 - \kappa_{\mathrm{L}})$ *is unchanged; the transformation is restricted to values preserving any separately imposed admissibility condition.*

Proof. $\Delta_\theta = D_l^2 \Delta_\perp$, so $\Delta_\theta \psi = \frac{2D_l D_{ls}}{D_s c^2} \int \Delta_\perp \Phi\,\mathrm{d}z = \frac{2D_l D_{ls}}{D_s c^2} \int (4\pi G \rho_{\mathrm{tot}} - \partial_z^2 \Phi)\,\mathrm{d}z$, and $\int \partial_z^2 \Phi\,\mathrm{d}z = [\partial_z \Phi]_{-\infty}^{\infty} = 0$ because $\partial_z \Phi \to 0$ on both sides for a compact source; this gives $2\Sigma_{\mathrm{tot}}/\Sigma_{\mathrm{crit}}$. The residual formula and the bound are linear, attained by constant errors of opposite signs. (a) $\int \partial_z f\,\mathrm{d}z = 0$ by compact support; for $\rho_0 \geq c > 0$ on the support, $\rho_0 + th \geq 0$ when $|t|\|h\|_\infty \leq c$. (b) γ_{L} is linear in ψ and a constant sheet adds no shear: $\lambda\gamma_{\mathrm{L}}/(1 - \lambda\kappa_{\mathrm{L}} - 1 + \lambda) = \gamma_{\mathrm{L}}/(1 - \kappa_{\mathrm{L}})$ (check B6B-14).

par *Status:* **F13-20**; verdict **held**. The draft's prop:lensing with the convergence derived from the declared potential. It replaces the plan's attribution of convergence to Big05-A thm:Big05-observer (source record; not a premise), which concerns observer angles and radar intervals on Kottler hosts (PB-1) [Falco85]. par *Non-claim.* No cluster mass is inferred [Meneghetti20]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

The Bullet Cluster as a specified kinematic comparison

The observed separation between the lensing-inferred mass distribution and the X-ray-emitting gas is documented by Clowe et al. [Clowe06]; merger simulations supply additional modelling [Randall08]. Within a prescribed metric and specified reconstruction kernels, a displacement between two reconstructed peaks is a kinematic statement.

Proposition (Specified kinematic comparison; prop:B6B-bullet). *The inference of collisionlessness or of a numerical self-interaction cross-section from a lensing–gas offset does not follow from* $j_{\mathrm{dm}} \equiv 0$ *or from R1; it requires a supplied kinetic law (for example an attenuation law* $f_{\mathrm{surv}} = e^{-\tau}$, $\tau = \int n\sigma(v)\,\mathrm{d}s$*), the geometry, densities, velocities and the observational relation to the reported quantity. An offset inconsistent with a specified merger model can reject that model.*

Proof. By Proposition (a), R1 constrains only the A-dependence of the dark action; the neutral exchange term of Proposition satisfies R1 and violates $Q = 0$, and Proposition below gives R1 realizations with every cross-section and the same stress. par *Status:* **F13-21**; verdict **held**. The draft's Bullet paragraph and rejection condition. par *Non-claim.* Spatial segregation alone does not prove collisionlessness from separate conservation, and neutral self-interacting sectors are not excluded by the declaration [Clowe06,Randall08]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New:* centroid identity; prop:B6B-centroid). *In a declared Newtonian reduction, let components* $i \in \{\mathrm{dm}, \mathrm{g}\}$ *have compactly supported mass densities* ρ_i*, velocities* v_i *and stresses* P_i *obeying* $\partial_t \rho_i + \nabla \cdot (\rho_i v_i) = 0$ *and* $\partial_t (\rho_i v_i) + \nabla \cdot (\rho_i v_i \otimes v_i + P_i) = -\rho_i \nabla \Phi + f_i$*, where* f_i *is the supplied exchange force density. With* $M_i = \int \rho_i$*,* $X_i = M_i^{-1} \int \rho_i x$*,* $\langle \nabla \Phi \rangle_i = M_i^{-1} \int \rho_i \nabla \Phi$*,* $F_i = \int f_i$ *and* $\Delta = X_{\mathrm{dm}} - X_{\mathrm{g}}$*,*

$$\ddot{\Delta} = -\langle \nabla \Phi \rangle_{\mathrm{dm}} + \langle \nabla \Phi \rangle_{\mathrm{g}} + \frac{F_{\mathrm{dm}}}{M_{\mathrm{dm}}} - \frac{F_{\mathrm{g}}}{M_{\mathrm{g}}}.$$

Consequently a separation history determines the exchange difference only together with the potential and the gas force; and a single-epoch separation $\Delta(t_0)$*, with* $\dot{\Delta}(t_0)$ *unsupplied, is compatible with every value of* $F_{\mathrm{dm}}/M_{\mathrm{dm}}$*.*

Proof. $\dot{X}_i = M_i^{-1} \int \rho_i v_i$ by continuity and integration by parts (M_i is constant); differentiating again, the divergence integrates to zero by compact support, leaving $M_i \ddot{X}_i = -\int \rho_i \nabla \Phi + F_i$. Subtract. For the last sentence, $\Delta(t_0)$ fixes neither $\dot{\Delta}(t_0)$ nor $\ddot{\Delta}(t_0)$, so for any prescribed right-hand side there is a trajectory through $\Delta(t_0)$ (check B6B-16).

Status: proved; new (plan S 3 Bullet obligation, ``kinematics only''). par *Non-claim.* No merger history is reconstructed and no cross-section is bounded. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New:* the cross-section is a carrier-fibre coordinate on cold flows; prop:B6B-carrier). *Let a dark slot be single-stream dust, realized kinetically by* $f(x,p) = n(x)\delta^3(p - \bar{p}(x))$*, and let the supplied collision term*

be elastic two-body scattering with any cross-section $\sigma \geq 0$. Then the collision term vanishes, so every $\sigma/m \geq 0$ realizes the same T_{dm} with $j_{\mathrm{dm}} \equiv 0$; on that carrier fibre σ/m has infinite absolute minimax risk from any stress-only data.

Proof. At each point all particles have the same momentum $\bar{p}$, so every colliding pair has zero relative momentum; elastic scattering conserves the total momentum $2\bar{p}$ and the magnitude of the relative momentum, so the outgoing momenta are again $\bar{p}$ and gain equals loss. The stress is the second moment of f, independent of σ; apply Lemma (c) (check B6B-16).

Status: proved; new. par *Non-claim.* Warm or multi-stream flows have nonzero collision terms; the proposition says only that the cross-section is not a function of the stress [Randall08]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Why CMB and BAO data are not automatically blind

Proposition (Baryon loading breaks the proposed unrestricted acoustic fibre; prop:B6B-acoustic). *Suppose the photon–baryon tight-coupling and adiabatic relations are additionally supplied, with photon and baryon energy densities $\varepsilon_\gamma, \varepsilon_{\mathrm{b}}$ and $R_{\mathrm{b}} = 3\varepsilon_{\mathrm{b}}/(4\varepsilon_\gamma)$. Then*

$$c_s^2 = \frac{c^2}{3(1 + R_{\mathrm{b}})}.$$

Changing the baryonic attribution at fixed total density changes the acoustic process even when the prescribed background metric is unchanged. (New.) At fixed $H(a)$ and $\varepsilon_\gamma(a)$, the sound horizon $r_s(a_*) = \int_0^{a_*} c_s(a)\,(a^2 H(a))^{-1}\mathrm{d}a$ is strictly decreasing in a constant baryon fraction f_{b} of the matter slot ($\varepsilon_{\mathrm{b}} = f_{\mathrm{b}}\varepsilon_{\mathrm{m}}$), hence injective in f_{b}. A fitted $\Omega_c/\Omega_{\mathrm{b}}$ is therefore not a purely geometric datum constant on every split fibre.

Proof. Tight coupling gives a single fluid with $\delta p = \frac{c^2}{3}\delta\varepsilon_\gamma$; adiabaticity gives $\delta\varepsilon_{\mathrm{b}}/\varepsilon_{\mathrm{b}} = \frac{3}{4}\delta\varepsilon_\gamma/\varepsilon_\gamma$, i.e. $\delta\varepsilon_{\mathrm{b}} = R_{\mathrm{b}}\delta\varepsilon_\gamma$; so $c_s^2 = \delta p/(\delta\varepsilon_\gamma + \delta\varepsilon_{\mathrm{b}}) = c^2/(3(1 + R_{\mathrm{b}}))$. At fixed H and ε_γ, R_{b} is strictly increasing in f_{b} wherever $\varepsilon_{\mathrm{m}} > 0$, so c_s and the

integrand strictly decrease (check B6B-15).

par *Status:* **F13-22**; verdict **held**. The draft's prop:acoustic; the monotonicity clause is new. It corrects the plan's S 2 and S 7.3 claim that the CMB ratio and BAO scale are split-independent (PB-9) [HuSugiyama96,MaBertschinger95]. par *Non-claim.* Planck and BAO analyses use these modelled interfaces [Planck18,Eisenstein05]; the unrestricted split-blind theorem does not erase their information, and no parameter value is printed. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Remark (Radiation labels do not enter the acoustic likelihood; rem:B6B-labels). Without a supplied bridge the formal labels $T_{\mathrm{rad}} = (U\kappa^3 c^3/\alpha_{\mathrm{r}})^{1/4}/(k_B a)$ and $S_{\mathrm{rad}} = 4UV_c/(3aT_{\mathrm{rad}})$ do not enter the acoustic likelihood. They are invariant under $(\kappa, \alpha_{\mathrm{r}}) \mapsto (q\kappa, q^3\alpha_{\mathrm{r}})$ and independent of the stress split. At fixed supplied α_{r} an exact absolute label is coefficient-sensitive supply.

Proof. Substitution: $\kappa^3/\alpha_{\mathrm{r}}$ is invariant, and no split coordinate appears; at fixed α_{r}, T_{rad} is injective in κ (check B6B-15). par *Status:* **F13-23**; verdict **held**. The draft's radiation-label claim; it agrees with Big04-A thm:DR-coef (source record; not a premise) (site version 5) and with the local version 6 orbit statement. par *Non-claim.* No coefficient is calibrated. No quantum coefficient is admitted. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

The radial acceleration relation

Proposition (A relation inherits only the blindness of its inputs; prop:B6B-rar). *If D is split-independent, every fixed function of D is split-independent. Under spherical motion* $g_{\mathrm{obs}} = w/r$ *and* $g_{\mathrm{bar}} = GM_{\mathrm{b}}(r)/r^2$*; the first is fixed by circular-motion data in the adopted reduction, the second is not fixed on a fibre allowing* M_{b} *to vary. (Added.) On the family* $M_{\mathrm{b}} = sM_{\mathrm{tot}}$, $s \in [0,1]$, $g_{\mathrm{bar}}(r)$ *fills* $[0, g_{\mathrm{obs}}(r)]$ *and has minimax risk* $g_{\mathrm{obs}}(r)/2$*. A radial acceleration relation is split-independent only after the baryonic reconstruction and all other inputs are held*

fixed.

Proof. Composition preserves fibre constancy; $g_{\mathrm{bar}} = sg_{\mathrm{obs}}$ on the family; apply Lemma (b) (check B6B-17). par *Status:* **F13-24**; verdict **held**. The draft's prop:rar; it corrects the plan's treatment of the RAR as split-independent (PB-10) [McGaugh16,Lelli16]. par *Non-claim.* No universal functional law or acceleration scale is asserted or excluded; MOND-type laws are external models and none is preferred. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Seven conditional consistency relations

Each relation is a consistency test of a *package* of supplied assumptions; failure rejects the package, not the residual identity in isolation. Table lists the hypotheses and rejection conditions.

Theorem (I. Exact dilution balance; thm:B6B-dilution). *On a supplied FLRW scale factor, let a homogeneous assigned component obey* $\dot{\varepsilon} + 3H(\varepsilon + p) = Q$. *Then*

$$a(t)^3\varepsilon(t) - a(t_0)^3\varepsilon(t_0) = \int_{t_0}^{t} a(s)^3[Q(s) - 3H(s)p(s)]\mathrm{d}s.$$

For dust, departures from constant $a^3\varepsilon$ *are exactly the integrated exchange; constancy on an entire interval is equivalent to* $Q = 0$ *there (for continuous Q); equality at two endpoints alone need not imply zero exchange.*

Proof. $\frac{\mathrm{d}}{\mathrm{d}t}(a^3\varepsilon) = a^3(\dot{\varepsilon} + 3H\varepsilon) = a^3(Q - 3Hp)$; integrate. With $p = 0$, constancy on an interval means the integrand vanishes there. An exchange with zero integral, for example $Q \propto a^{-3}\sin(2\pi(t - t_0)/(t_1 - t_0))$, returns the same endpoint values (check B6B-19).

par *Status:* **F13-25**; verdict **held**. The draft's thm:dilution; it re-proves Big06-A prop:DM-v2-dilution (source record; not a premise). par *Non-claim.* No exchange rate is measured. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Specification (Common-force linear dust equations; spec:B6B-twodust). For each Fourier or linear spatial mode, two pressureless components obey $\dot{\delta}_i = -\theta_i/a + C_g(t)$ and $\dot{\theta}_i + H\theta_i = F_g(t)$, $i = 1, 2$, with θ_i the comoving divergence of the physical peculiar velocity and common metric terms C_g, F_g; the time coordinate (cosmic time) and velocity convention are fixed.

Status: hypothesis; the draft's hyp:twodust. par *Non-claim.* The common-force assumption is part of the package. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (II. Relative modes; thm:B6B-relative). *Under Specification there is a constant C with*

$$a(\theta_1 - \theta_2) = C, \qquad \delta_1(t) - \delta_2(t) = \delta_1(t_0) - \delta_2(t_0) - C\int_{t_0}^{t} \frac{\mathrm{d}s}{a(s)^2}.$$

The relative contrast is constant exactly when $C = 0$*, and tends to a finite limit exactly when* $C = 0$ *or* $\int^{\infty} \mathrm{d}s/a^2 < \infty$*. If the linear potential equations have unique zero solution for zero total density and momentum sources, all other perturbative sources vanish and both backgrounds dilute as dust, then* $\theta_1 = \theta_2 = 0$, $\bar{\rho}_1\delta_1 + \bar{\rho}_2\delta_2 = 0$ *with constant* δ_i *is a compensated zero-potential solution.*

Proof. $V = \theta_1 - \theta_2$ obeys $\dot{V} + HV = 0$, so $(aV)^{\cdot} = 0$. $S = \delta_1 - \delta_2$ obeys $\dot{S} = -V/a = -C/a^2$; integrate. For the compensated mode the total density and momentum perturbations vanish, so by uniqueness the potentials and hence C_g, F_g vanish; then $\dot{\delta}_i = 0$, $\dot{\theta}_i = 0$, and $\bar{\rho}_1/\bar{\rho}_2$ is constant, so the compensation persists (check B6B-20). par *Status:* **F13-26**; verdict **held**. The draft's thm:relative, with the limit clause of Big06-A thm:DM-v2-twodust(b) (source record; not a premise) ($\int \mathrm{d}s/a^2 = \int \mathrm{d}\eta/a$) merged in. It corrects the plan's S 5.2 ``contrast freezes'' (PB-16). par *Non-claim.* The relative modes are free data of the package; growth of the total does not fix them. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Specification (Linear growth reduction; spec:B6B-growth). Supply $H(a) > 0$, $G > 0$, a constant $\rho_{m0} \geq 0$,

$\bar{\rho}_m = \rho_{m0}a^{-3}$, $H_0 = H(1)$ and the linear equation $\ddot{D} + 2H\dot{D} - 4\pi G\bar{\rho}_m D = 0$. This includes the assumed gravitational closure, negligible pressure and stress corrections and the definition of the growth variable; it is not implied by a background residual.

Status: hypothesis; the draft's hyp:growth. par *Non-claim.* The closure is not derived. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (III. A local expansion–growth diagnostic; thm:B6B-growth). *On an interval where $D \neq 0$ define*

$$\widehat{\Omega}_m(a) = \frac{2a^5H(a)^2}{3H_0^2D(a)}[D''(a) + (\frac{3}{a} + \frac{H'(a)}{H(a)})D'(a)].$$

Every solution of Specification has $\widehat{\Omega}_m \equiv \Omega_{m0} := 8\pi G\rho_{m0}/(3H_0^2)$. Conversely, a twice differentiable nonzero D with $\widehat{\Omega}_m$ a nonnegative constant obeys the growth equation with the corresponding ρ_{m0}. If the flat dust-plus-constant-vacuum law $E(a)^2 = \Omega_{m0}a^{-3} + 1 - \Omega_{m0}$, $E = H/H_0$, is supplied, then $(E^2 - 1)/(a^{-3} - 1) = \widehat{\Omega}_m(a)$ for $a \neq 1$.

Proof. With $\mathrm{d}/\mathrm{d}t = aH\,\mathrm{d}/\mathrm{d}a$: $\dot{D} = aHD'$ and $\ddot{D} = aH(HD' + aH'D' + aHD'')$, so the equation becomes $a^2H^2[D'' + (3/a + H'/H)D'] = 4\pi G\rho_{m0}a^{-3}D$; multiply by $2a^3/(3H_0^2D)$. The converse reverses the steps. The closure gives $E^2 - 1 = \Omega_{m0}(a^{-3} - 1)$ (check B6B-21, with a mutation changing $3/a$ to $2/a$).

par *Status:* **F13-27**; verdict **held**. The draft's thm:growth; it re-proves and extends Big06-A thm:DM-v2-growth (source record; not a premise) [ChibaTakahashi07,Sahni08]. Rejection: $\widehat{\Omega}_m$ non-constant or negative rejects the growth package; a mismatch with $(E^2 - 1)/(a^{-3} - 1)$ rejects the package with the closure. par *Non-claim.* Growth responds to the total potential; the relative modes of Theorem stay free, so agreement does not identify a dark component. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Specification (Metric-potential comparison; spec:B6B-slip). Use $\mathrm{d}s^2 = -(1 + 2\Psi/c^2)c^2\mathrm{d}t^2 + a^2(1 - 2\Phi/c^2)\mathrm{d}\mathbf{x}^2$.

The supplied motion reconstruction returns Ψ and the supplied lensing reconstruction returns $\Psi + \Phi$ on common modes with common calibration. For $k \neq 0$, $V_g = -k^2\Psi$ and $L_g = -k^2(\Psi + \Phi)$.

Status: hypothesis; the draft's hyp:slip. par *Non-claim.* Calibration is supplied. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (IV. Exact slip residual; prop:B6B-slip). *Under Specification , $L_g - 2V_g = k^2(\Psi - \Phi)$, so $L_g = 2V_g$ if and only if the slip vanishes on that mode. The left side is a consistency residual, not T_{dm} or its density. Only with the further Poisson closure $-k^2\Psi = 4\pi G a^2 \delta\rho_{\mathrm{tot}}$ and a supplied known-source contrast does $\delta\rho_{\mathrm{dm}} = V_g/(4\pi G a^2) - \delta\rho_{\mathrm{known}}$ follow.*

Proof. $L_g - 2V_g = -k^2\Psi - k^2\Phi + 2k^2\Psi$; the last statement is substitution (check B6B-22). par *Status:* **F13-28**; verdict **held**. The draft's prop:slip; it re-proves Big06-A thm:DM-v2-slip (source record; not a premise). The plan's S 5.4 already states slip, so DB-14 is overturned as a plan correction and kept as a clarification. par *Non-claim.* No slip value is asserted. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

V. Shell consistency. Theorem is the fifth relation: a decreasing N or a negative central mass rejects a nonnegative residual measure in the spherical package.

Specification (A late comparison branch; spec:B6B-vacbranch). For $t \geq t_0$ supply an expanding scale factor with $H^2 = h_\infty^2 + Ca^{-3}$, $h_\infty > 0$, $C \geq 0$, put $\bar{\rho}_m = 3Ca^{-3}/(8\pi G)$, and use the growth equation of Specification . This is a selected future branch, not a continuation inferred from past geometry.

Status: hypothesis; the draft's hyp:vacbranch. par *Non-claim.* The branch is selected, not derived. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (VI. Late horizon, frozen linear growth and homogeneous enclosed mass; thm:B6B-vacbranch).

Under Specification , $R_e(t) := ca(t)\int_t^\infty \mathrm{d}s/a(s) \to c/h_\infty$. Every solution of the growth equation converges to a finite limit, with $\dot{D} = O(a^{-2})$. Moreover $M_{\mathrm{bg,e}}(t) := \frac{4\pi}{3}\bar{\rho}_m(t)R_e(t)^3 \to 0$.

Proof. $H \geq h_\infty$ gives $a(s) \geq a(t)e^{h_\infty(s-t)}$, so $R_e \leq c/h_\infty$; writing $R_e = ca\int_a^\infty \mathrm{d}b/(b^2H(b))$ and using $H \to h_\infty$ gives the limit. With $u = a^2\dot{D}$, $\dot{u} = \frac{3}{2}Ca^{-1}D$ and $\dot{D} = u/a^2$. Since $\int_s^\infty a^{-2} \leq a(s)^{-2}/(2h_\infty)$, $|D(t)| \leq A + B\int_{t_0}^t a(s)^{-3}|D(s)|\mathrm{d}s$, and Gronwall with the integrable kernel a^{-3} bounds D; then u converges because $\int a^{-1} < \infty$, so $\dot{D} = O(a^{-2})$ and D converges. Finally $\bar{\rho}_m \to 0$ while R_e stays bounded (check B6B-23).

par *Status:* **F13-29**; verdict **held**. The draft's thm:vacbranch; it re-proves Big06-A thm:DM-v2-vacbranch (source record; not a premise). par *Non-claim.* $M_{\mathrm{bg,e}}$ is homogeneous background mass in a flat-slice ball, not the mass of a bound system. No vacuum energy is claimed. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Past data do not supply the future branch; prop:B6B-future). *For any prescribed expanding smooth prefix with a positive smooth continuation germ there are positive smooth expanding futures agreeing with it and having (a) an eventually exponential tail and finite event-horizon integral, or (b) an eventually power-law tail $a \sim t^p$, $0 < p \leq 1$, and infinite event-horizon integral.*

Proof. Let $H_g > 0$ be the germ's Hubble rate on $[t_0, t_0 + \varepsilon]$ and $H_\infty(t)$ the target tail (h_∞, respectively $p/(t+b)$ with b chosen so that the tail is defined). With a smooth partition of unity $\chi + \bar{\chi} = 1$, $\chi = 1$ near t_0 and $\chi = 0$ after $t_0 + \varepsilon$, put $H = \chi H_g + \bar{\chi}H_\infty > 0$ and $a = a(t_0)\exp\int_{t_0}^t H$. In case (a) $\int^\infty \mathrm{d}t/a < \infty$; in case (b) $\int^\infty (t+b)^{-p}\mathrm{d}t = \infty$ for $p \leq 1$ (check B6B-24).

par *Status:* **F13-30**; verdict **held**. The draft's prop:future; it re-proves Big05-A thm:Big05-futures (source record; not a premise) in this setting and the future dependence of Big01-A thm:Efuture (source record; not a premise). par *Non-claim.* No future is forecast. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (VII. Positive dust in a null-saturated total; thm:B6B-nec). *The following hold.*

• *At a point, if* $T_{\mathrm{tot}}(k,k) = 0$ *for a nonzero null* k *and an assigned component is positive dust* $T_{\mathrm{dm}} = \varepsilon u^{\mathrm{flat}} \otimes u^{\mathrm{flat}}$, $\varepsilon > 0$, $g(u,u) = -1$, *then for every* $\lambda \in \mathbb{R}$, $(T_{\mathrm{tot}} - T_{\mathrm{dm}} - \lambda g)(k,k) = -\varepsilon g(u,k)^2 < 0$*: the remainder violates the null energy condition, and no vacuum-form shift removes the defect.*

• *On a de Sitter region (*$T_{\mathrm{tot}} = -\rho_\Lambda g$ *for a constant* ρ_Λ*), every split into slots each satisfying the null energy condition has every slot of the form* φg *pointwise; in particular no slot is positive dust.*

Proof. (a) $g(k,k) = 0$, and $g(u,k) \neq 0$ for timelike u and nonzero null k. (b) $T_{\mathrm{tot}}(k,k) = 0$ for every null k; nonnegative slots summing to zero vanish on every null vector; a symmetric tensor vanishing on the null cone is a multiple of g (polarize null vectors in an orthonormal frame); dust gives $\varepsilon g(u,k)^2 > 0$ (check B6B-25).

par *Status:* **F13-31**; verdict **held**. The draft's thm:nec; part (b) is the carried-over correction ``an all-NEC de Sitter split cannot contain positive dust". It re-proves Big06-A prop:DM-v2-nullsat and prop:DM-NEC (source record; not a premise). (The brief's locator names prop:nec-obstruction and prop:nonem-limits are not site labels; the site labels are those cited, FLAG-1.) par *Non-claim.* No sign of any physical null contraction is asserted. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

The seven conditional relations: hypotheses and rejection conditions.

toprule Relation Hypotheses (outside the ledger) Rejection condition

midrule endfirsthead toprule Relation Hypotheses Rejection condition

midrule endhead I Dilution FLRW $a(t)$; homogeneous balance law; supplied p and $Q\,a^3\varepsilon$ non-constant on an interval where dust with $Q = 0$ is supplied

II Two dusts Specification ; common forces $\delta_1 - \delta_2$ not affine in $\int \mathrm{d}t/a^2$

III Growth Specification ; optionally the flat closure $\widehat{\Omega}_m$ non-constant or negative; or $\neq (E^2 - 1)/(a^{-3} - 1)$

IV Slip Specification ; common calibration $L_g \neq 2V_g$ rejects zero slip on that mode, not the residual

V Shell Specification ; supplied M_{b} N decreasing somewhere, or negative central mass

VI Vacuum branch Specification , selected later data violating $H^2 = h_\infty^2 + Ca^{-3}$ reject the branch; past data cannot confirm it (Proposition)

VII Null saturation $T_{\mathrm{tot}}(k, k) = 0$; positive dust slot a null-energy requirement on the remainder rejects the dust assignment

bottomrule par *Non-claim.* The table lists tests of packages; no package is evaluated against data. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Small-scale issues and particle searches: a bounded interpretation

These headings are not contradictions of the residual; they are statements that the residual is under-determined by the stated data, or tests of specified external models. The empirical and simulation questions behind them are not reduced to one universal degeneracy [NFW97,McGaugh16,vanDokkum18,Meneghetti20,deBlok10,Oman15].

Small-scale catalogue: what the ledger establishes and what needs extra information.

toprule Issue Established here Needs extra information

midrule endfirsthead toprule Issue Established here Needs extra information

midrule endhead Core–cusp, diversity Density unstable in the uniform v_c^2 topology (Theorem); central slope discontinuous (Theorem); exact mass-slope constant with derivative data (Theorem); dark slope a fibre coordinate (Proposition) Resolution, geometry, derivative control, baryonic reconstruction, admissible profile class

Too-big-to-fail A discrepancy with a specified population forecast can reject that forecast; fibre non-selection alone establishes no discrepancy Halo population, occupation prescription, selection function, dynamics

Missing satellites, planes Density-only statistics are fibre-constant (Corollary); luminous counts and planes

depend on occupation (Proposition); finite moments do not fix phase space (Theorem) Halo definition, phase-space or evolutionary supply, luminous-tracer selection model

Low-dark-matter systems Conditional local interval (Proposition) and anisotropy-free full-aperture bound (Theorem) Equilibrium, aperture and tracer assumptions, a separate formation model (tidal stripping is an external model [Ogiya18])

Radial acceleration relation Inherits only the invariances of its inputs (Proposition) Baryonic calibration; any universal law or scale a_0 is an external coefficient

Cluster substructure Calibrated lensing constrains a projected residual within its forward model (Proposition); the cross-section is a carrier-fibre coordinate (Proposition) Three-dimensional structure, selection, source statistics, a kinetic model

bottomrule par *Non-claim.* Each entry can test restricted models when the required assumptions and likelihoods are specified; none is evaluated here. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Direct detection and the limits of a null result

Proposition (A null search constrains a forward model, not an unconstrained slot; prop:B6B-detection). *Suppose a supplied microscopic and apparatus model predicts a count through the schematic rate* $\mu = \mathscr{E}\frac{\rho_{\mathrm{loc}}}{m}\int f(v)\, v\, \sigma_{\mathrm{eff}}(v)\, \varepsilon_{\mathrm{det}}(v)\, \mathrm{d}v + \mu_{\mathrm{bg}}$. *A null-result likelihood constrains the parameters entering this map jointly; without the map and parameter restrictions it gives no universal upper bound on* ρ_{loc} *or* T_{dm}. *If the admissible model allows* $\sigma_{\mathrm{eff}} = 0$, *the signal vanishes at every* ρ_{loc}. *Conversely, fixing a nonzero cross-section, the velocity law, efficiency and other inputs turns the same null result into a residual-density constraint.*

Proof. The likelihood depends on the data only through μ. At $\sigma_{\mathrm{eff}} = 0$, $\mu = \mu_{\mathrm{bg}}$ for every ρ_{loc}. With the other factors fixed and a strictly positive signal coefficient, μ is affine and strictly increasing in ρ_{loc}, so an upper compatible rate gives an upper compatible density (check B6B-32).

par *Status:* **F13-32**; verdict **held**. The draft's prop:detection. It corrects the plan's S 4 ``they do not constrain the residual itself'' (PB-13) [LZ23]. par *Non-claim.* No current exclusion value is needed or printed, and no historical bound is represented as the latest bound. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Exclusion of photon couplings is net-Euler-derivative exclusion; prop:B6B-exclusion). *The identical-reading declaration excludes a proposed millicharge, axion-like or polarizability interaction exactly when its electromagnetic Euler current, in the declared class at the prescribed host, is not identically zero. It does not exclude a constant-coefficient* $F\widetilde{F}$ *term, a coupling whose current vanishes identically at the prescribed host (Proposition (e)), or, under R2 only, a polarizability term on histories with* $F = 0$*. Satisfying the declaration is only current-level compatibility.*

Proof. Proposition (a),(c)–(e); a millicharge term $\varepsilon\int\sqrt{-g}\,A_\mu\bar{\psi}\gamma^\mu\psi$ contributes $\mathscr{J}^\mu = \varepsilon\bar{\psi}\gamma^\mu\psi \equiv 0$ for $\varepsilon \neq 0$. par *Status:* **F13-33**; verdict **held**. The draft's off-shell exclusion paragraph, sharpened by the fixed-host clause; it corrects the last sentence of the plan's S 4 (PB-12) [Sigurdson04,WeinerYavin12]. par *Non-claim.* Stress matching, stability, abundance, other interactions and laboratory likelihoods remain separate tests. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Observed silence does not prove an off-shell identity; prop:B6B-silence). *A set of histories with* $F = 0$ *can give identical dark-sector current readings for an A-independent sector and for the polarizable sector of Proposition (c); the second fails R1 generically.*

Proof. Both currents vanish where $F = 0$; Proposition (c) gives a nonzero current at some $F \neq 0$ when f is nonconstant. par *Status:* **F13-34**; verdict **held**. The draft's prop:observedsilence; it re-proves the R1/R2 separation of Big06-A prop:DM-polarizability (source record; not a premise). par *Non-claim.* Vanishing current at one background does not exclude photon couplings. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Readout and recovery do not supply electromagnetic or gravitational laws

Definition (A finite destructive readout). Let $C \simeq \mathbb{C}^d$ have basis $\{|j\rangle\}$ and let A contain all returned unmeasured registers. Put $D_j = \langle j|_C \otimes I_A$ and $\mathscr{M}(X) = \sum_j \mathrm{proj}\, j_R \otimes D_j X D_j^\dagger$. The output R is classical; the returned quantum interface contains A, not a copy of C.

Status: definition; the draft's readout definition, after I-B thm:instrument (source record; not a premise). par *Non-claim.* No clock or metric is derived from the readout. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (Complete drop identity; prop:B6B-enter). *$\mathscr{M}$ is completely positive and trace preserving; for every untouched reference E, $\mathrm{Tr}_R[(\mathscr{M} \otimes \mathrm{id}_E)(X)] = \mathrm{Tr}_C X$; and $\mathscr{M}$ has no universal channel left inverse on its full input.*

Proof. Kraus operators $L_j = |j\rangle_R \otimes D_j$ satisfy $\sum_j L_j^\dagger L_j = \sum_j \mathrm{proj}\, j_C \otimes I_A = I$. Tracing out R gives $\sum_j D_j X D_j^\dagger = \mathrm{Tr}_C X$, also with id_E adjoined. A left inverse would make $\mathscr{M}$ injective, but the states $|+\rangle\langle+|$ and $|-\rangle\langle-|$ on two levels of C (with a fixed state on A) have the same image (check B6B-31).

par *Status:* **F13-35**; verdict **held**. The draft's prop:enter; it re-proves Big06-A prop:DM-enter (source record; not a premise). par *Non-claim.* Consumption of a register is an access statement, not a photon non-interaction law. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (Classical-record and replacement recovery floors; thm:B6B-shredder). *For a d-dimensional unknown logical target, $d \geq 2$, with half-diamond distance:*

• *every channel whose complete message-bearing output is classical, followed by any channel decoder, has recovery error at least $1 - 1/d$, and the optimum over that class is $1 - 1/d$;*

• *a replacement accessible channel, followed by any decoder, has optimized recovery error $1 - 1/d^2$. Neither constant imposes an electromagnetic-current equation or a gravitational source law.*

Proof. (a) A classical output makes the composite entanglement breaking, $\Phi(X) = \sum_k \mathrm{Tr}\,(E_k X)\sigma_k$. On the maximally entangled input Ω, the output is separable, and every separable state has overlap at most $1/d$ with Ω; hence the half trace distance to Ω is at least $1 - 1/d$, and so is the half-diamond distance. The measure-and-prepare channel $X \mapsto \sum_j \langle j|X|j\rangle \mathrm{proj}\, j$ has half-diamond distance $1 - 1/d$ from the identity: it is $\frac{1}{d}\sum_k Z^k(\cdot)Z^{-k}$, so $\mathrm{id} - \Phi = \frac{1}{d}\sum_{k\neq 0}(\mathrm{id} - \mathrm{Ad}_{Z^k})$, whose half-diamond norm is at most $(d-1)/d$. (b) A replacement output $I/d \otimes \sigma$ (after any decoder) has overlap d^{-2} with Ω, giving the lower bound $1 - d^{-2}$. Preparing I/d: complete depolarization is the uniform average of the d^2 Weyl conjugations, and separating the identity term bounds the distance by $1 - d^{-2}$. No functional derivative with respect to A or g occurs (check B6B-30).

par *Status:* **F13-36**; verdict **held**. The draft's thm:shredder. Documentary counterparts: I-C thm:A (source record; not a premise) (deterministic decoders; channel decoders are covered by the convexity argument above), I-C-CERT thm:replacement (source record; not a premise) (exact error $1 - 1/S$ of a record-ignoring decoder, minimal at $\sigma' = I/d$), Big06-A thm:DM-shredder (source record; not a premise); standard structures in [HSR03,Watrous18]. par *Non-claim.* The Shredder floor certifies access, not photon non-interaction or gravitational coupling. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Documentary record (Interfaces that do not transfer). En04-A thm:magic-fibre (source record; not a premise) (magic-label fibres contain carriers with leakage 0 and $\frac{1}{2}$) and En04-B thm:fibre (source record; not a premise) (carrier response is not a host functional) concern residual response and its independence from resource or host labels; they do not update a prescribed metric. En04-B thm:curvature-sampling (source record; not a premise) (finite samples of fixed nonzero curvature on settled Host B) is not used to construct a backreacted host. I-D prop:v5-u6 (source record; not a premise) is a table of tested Host-B source prescriptions against interface moments; it does not supply Host C (PB-8). Hawk05-B thm:page (source record; not a premise) is an exact finite Haar-model entropy mean, not a conditional cosmological forecast. Big02-A def:dark (source record; not a premise) classifies access-relative dark capacity and is not T_{dm} (Big06-A prop:DM-v2-capacity (source record; not

a premise)). The OpenAI catalogue supplies no premise, coefficient or realization; a read-only GET of its record on 25 October 2026 found no occurrence of the string ``dark".

par *Status:* **F13-37**; verdict **held**. The draft's documentary interfaces; each label was checked against a fresh site record (Appendix). par *Non-claim.* Documentary records are not premises. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Independent vacuum and coefficient coordinates

Proposition (Vacuum normalization and coefficient supply do not select each other; prop:B6B-vacuum). *Consider an enlarged account class in which source attribution, a constant vacuum coordinate and a radiation-dictionary coefficient are independent admissible coordinates.*

• *The shift* $(T_{\mathrm{b}}, T_{\mathrm{dm}}, T_{\Lambda}) \mapsto (T_{\mathrm{b}}, T_{\mathrm{dm}} + \lambda g, T_{\Lambda} - \lambda g)$, λ *constant, preserves the total, the conservation of each slot, and every null contraction, hence the null energy condition of every slot.*

• *It preserves a current declaration independent of* λ *and every radiation label with no source-split argument.*

• *If* $\mathcal{G} + \Lambda g = \chi T$ *is separately imposed,* $T \mapsto T + \lambda g$ *preserves it together with* $\Lambda \mapsto \Lambda + \chi\lambda$.

• *A supplied radiation coefficient does not select* λ *or a split, and a supplied split does not calibrate that coefficient without an additional bridge.*

• *(Limits.) If* $T_{\mathrm{dm}} = \varepsilon u \otimes u$ *with* $\varepsilon \geq 0$, $T_{\Lambda} = -\rho_{\Lambda} g$ *with* $\rho_{\Lambda} \geq 0$ *and* $\varepsilon_{\min} = \inf_{U} \varepsilon$, *then both shifted slots satisfy the weak energy condition iff* $-\rho_{\Lambda} \leq \lambda \leq \varepsilon_{\min}$, *and the shifted dark slot is of dust form iff* $\lambda = 0$.

Proof. (a) $\nabla g = 0$ and $g(k,k) = 0$. (b) Neither the currents nor the labels contain λ. (c) $\mathcal{G} + (\Lambda + \chi\lambda)g = \chi(T + \lambda g)$. (d) The coordinates are independent by hypothesis, so the joint fibre is a product; Lemma (a). (e) For a unit timelike v, $(\varepsilon u \otimes u + \lambda g)(v,v) = \varepsilon(u \cdot v)^2 - \lambda$, whose infimum over v is $\varepsilon - \lambda$ (at $v = u$); and $(-(\rho_{\Lambda} + \lambda)g)(v,v) = \rho_{\Lambda} + \lambda$. A tensor $\varepsilon u \otimes u + \lambda g$ with $\lambda \neq 0$ has the 3-dimensional eigenspace $u^{\perp}$ with nonzero eigenvalue, so it is not dust (check B6B-26).

par *Status:* **F13-38**; verdict **held**. The draft's prop:vacuum; part (e) re-proves Big06-A prop:DM-v2-shift(i),(iv) (source record; not a premise) and is the carried-over correction ``a vacuum shift keeps the current and the NEC, but not dust form or the WEC''. Part (d) agrees with Big04-A thm:DR-coef (source record; not a premise) and the local Big04-A version 6 product-fibre statement. par *Non-claim.* No vacuum energy is claimed or normalized. No quantum coefficient is admitted. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Remark (Rank is not selection). For four conserved tensors $B_i[g]$ and $L_g(\theta) = \sum_i \theta_i B_i$, if the retained data do not depend on θ, the minimax risk for $q(\theta) = b + \sum_i a_i \theta_i$ on a box is $\frac{1}{2}\sum_i |a_i|(\theta_i^+ - \theta_i^-)$ whatever the rank of L_g.

Proof. q ranges over an interval of that width on the box; Lemma (b). This re-proves Big06-A thm:DM-v2-rank (source record; not a premise); that rank four is open and dense is recorded from DS-OB-1-fibre thm:F-generic, cor:F-ranknotsel (source record; not a premise) as documentary only. par *Non-claim.* Generic rank does not select a vacuum value. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Version 2: joint-fibre non-selection, inverse-problem tools, energy conditions and separations

This section contains every new result of version 2. It implements the binding plan of request t355u (PLAN_t355u.md, sha256 3a98ad6ed0635b33bf9a5be2787aba345402b437e3c25da4b47fac6fad30fafb), which supersedes the plan of request t354u for this sheet, and it folds in the draft findings_t356u.tex (``Big06-B: New Insertion Findings'', sha256 582884d9f49be06b01913b8e2e32f0e7f4d919ddd035524e3a4a63aeb9a4f4ef), whose ten sections are the backbone of the subsections below: joint fibres (Section); adaptive, stopped and postselected ratio estimation (Section); approximate blindness (Section); the residual and the Poisson layer (Section); virial fibres (Section); energy conditions, vacuum shifts and futures (Section); split-coupled kernels and conditional relations (Section); and non-electromagnetic constraints, quantum access and documentary separations (Section). Every theorem, proposition, corollary, specification, documentary record and claim of the draft is numbered F15-*n*

, re-proved here and given a verdict in Appendix ; the plan items are mapped onto these results in Appendix . The five suggested local theorems of the plan are Theorems , , , and . Each plan item and draft item was checked against version 1 (sha256 dc23e23eb63b3c89f10be6bcee6f52357ea1c853d3ff3ac39cb99b7ead3cad98) and against fresh read-only site records; plan corrections are PB2-*n* (Appendix), and corrections to version 1 and to the draft are DC7-*n* (Appendix). Every result below has a full local proof. Companion statements are source records, and the DM overlays of Big01-A, Big03-A, Big04-A and Big05-A are cited as local, unregistered documentary records with their sha256, in their latest local form (the version-2 overlays, which retain every version-1 overlay label used here; Appendix , PB2-17); none is a premise. Citations identify source records only; no proof transfer.

Joint-fibre and adaptive non-selection

Theorem (*New in version 2.* Joint-fibre constancy; thm:B6B2-jointfibre). *Fix the host datum h of Definition (a) (geometry, observers, clocks, calibrations and apparatus) and a total current j_{tot}. Let* $\mathrm{Sp}(h)$ *be the admissible splits of T_{tot} on U, let* $\mathrm{Cu}(j_{\mathrm{tot}}) = \{(j_{\mathrm{b}}, 0, j_{\mathrm{tot}} - j_{\mathrm{b}})\}$ *be the current assignments with $j_{\mathrm{dm}} \equiv 0$, and suppose that the admissibility conditions on splits involve no current and conversely. Let $\mathcal{J}(h)$ be the joint fibre of all admissible (σ, j) over (h, j_{tot}).*

• $\mathcal{J}(h) = \mathrm{Sp}(h) \times \mathrm{Cu}(j_{\mathrm{tot}})$.

• *Every functional built only from the metric, its curvature, the declared observers, clocks and references, and the Big06-A non-electromagnetic reading — every finite or infinite family of such functionals, and the stopped transcript law of every adaptive protocol whose initial law, kernels and stopping rule factor through them — is constant on $\mathcal{J}(h)$.*

• *A target q on $\mathcal{J}(h)$ is identifiable from such data if and only if it is constant on $\mathcal{J}(h)$. Otherwise its exact risks are those of Lemma and Theorem on the image $q(\mathcal{J}(h))$: half the range, $\frac{1}{2}$ for a two-valued target (randomized),* 1 *for a deterministic rule of a fixed datum, ∞ for an unbounded target, and relative risk* 1 *for a positive ratio whose values reach* 0.

• *A target that varies along one factor stays unidentifiable when the other factor is supplied exactly: supplying the*

split does not fix the allocation j_b versus j_Λ, and supplying the currents does not fix the dark fraction.

Proof. (a) The conditions are separate, so every admissible split combines with every admissible current assignment. (b) On $\mathscr{J}(h)$ the metric, its curvature and every declared observer, clock and reference are those of h, and the non-electromagnetic reading is the same declaration $j_{dm} \equiv 0$; a functional of equal arguments has equal values. For an adaptive protocol, induct on rounds as in Theorem (a),(b). (c) Lemma (a)–(d), Remark and Theorem (a), applied to the common law of (b). (d) A slice $\{\sigma_0\} \times \mathrm{Cu}(j_{tot})$ or $\mathrm{Sp}(h) \times \{j_0\}$ is a fibre of the enlarged data map, and (b),(c) apply to it (check B6B2-8).

Status: proved; new (plan t355u, S 1 and S 6, first suggested theorem; draft t356u F15-1 and F15-2(a), merged; the product boundary and the role of the declaration are Proposition). It extends main finding 3 of version 1 (Theorem , F13-6) from the split to the joint fibre. Source records: Big06-A lem:DM-fibre (source record; not a premise), Big05-A thm:Big05-flagship (source record; not a premise), Big03-A thm:R-v3-adaptive (source record; not a premise) and Big04-A-coeff thm:C-adaptive (source record; not a premise) (coefficient-blind adaptive experiments have a coefficient-independent law), and En04-A thm:magic-fibre (source record; not a premise) (a magic-label fibre contains carriers with different leakage), each re-proved here only in the form used. par

Non-claim. Which instruments factor through the listed data is part of their declared observation model; no instrument is classified here. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Product boundary and kernel criterion; prop:B6B2-kernel). *The following hold.*

• *Product boundary. If a supplied realization ties a stress slot to a current, for example through a parameter α with $j_{dm} = \alpha j_*$, $j_* \neq 0$, while the stress family is indexed by α, then the declaration $j_{dm} \equiv 0$ forces $\alpha = 0$ and the joint admissible set is not the product of Theorem (a).*

• *The declaration alone does not make observations constant. On the neutral family $T^{DM} = sS$, $T_n = (1 - s)S$, $s \in (0, 1)$, a report with law $\Pr(Y = 1) = s$ reads no electromagnetic current and is split-sensitive. Constancy in*

Theorem (b) comes from the factorization of the kernel, not from $j_{\mathrm{dm}} \equiv 0$.

• *Kernel criterion. Let V be a vector space of joint stress–current variations,* $A : V \to Y$ *a linear map encoding all supplied linear data, and suppose the compatible family is the nonempty affine set* $x_0 + \ker A$. *A linear target* $P : V \to Z$ *is determined on it if and only if* $\ker A \subseteq \ker P$, *and its compatible image is* $P(x_0) + P(\ker A)$. *For a general compatible set* $\mathscr{F}$ *the criterion is* $P(x - x') = 0$ *for all* $x, x' \in \mathscr{F}$.

Proof. (a) With $\alpha \neq 0$ the pairing violates the declaration, so only the $\alpha = 0$ slice is admissible, and stress members with $\alpha \neq 0$ have no admissible partner. (b) $\Pr(Y = 1)$ takes the two values $s_1 \neq s_2$ on two members. (c) Two members of $x_0 + \ker A$ differ by an element of $\ker A$, and every element of $\ker A$ occurs as such a difference; P is constant iff it vanishes on all differences, and the image is $P(x_0 + \ker A)$. The general case uses the actual difference set (check B6B2-15, with a random rank-deficient A and a mutation using $\ker P \subseteq \ker A$).

Status: proved; new (draft t356u F15-2(b),(c) and F15-3). It agrees with the exact-kernel criterion of the local overlay record Big05-A-DM dmA5:f14-3-minimal (local overlay record, unregistered; not a premise)(a),(b). Positivity or constitutive restrictions replace the affine set by a subset, and then only the general form applies. par

Non-claim. Algebraic determination supplies no stability estimate, and no realization tying a slot to a current is asserted. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Adaptive, stopped and postselected ratio estimation

Theorem (*New in version 2.* Relative risk of an unrestricted positive ratio; thm:B6B2-relrisk). *Let a family carry one common complete observation law, and let a positive target q take values in a set* $\mathscr{Q} \subseteq (0, \infty)$. *For a randomized real-valued estimator Y put* $r_1(Y) = \sup_{q \in \mathscr{Q}} \mathbb{E}|Y - q|/q$ *(relative absolute loss),* $r_2(Y) = \sup_{q \in \mathscr{Q}} \mathbb{E}(Y - q)^2/q^2$ *(relative squared loss) and, for* $Y > 0$, $r_{\log}(Y) = \sup_{q \in \mathscr{Q}} \mathbb{E}|\ln(Y/q)|$.

• *If* $\inf \mathscr{Q} = 0$, *then* $\min_Y r_1(Y) = \min_Y r_2(Y) = 1$*; the estimator* $Y \equiv 0$ *attains both, and every Y with* $\Pr[Y \neq 0] > 0$ *has* $r_1(Y) = r_2(Y) = \infty$. *Reporting* 0 *is the unique minimizer.*

• *If* $\inf \mathcal{Q} = \ell > 0$ *and* $\sup \mathcal{Q} = \infty$, *then* $\min_Y r_1(Y) = \min_Y r_2(Y) = 1$, *attained by every constant* $y \in [0, 2\ell]$*; a constant outside* $[0, 2\ell]$ *has* $r_1 > 1$. *The minimizer is not unique.*

• *If* $\mathcal{Q}$ *fills* $[\ell, u]$ *with* $0 < \ell < u$, *then* $\min_Y r_1(Y) = (u - \ell)/(u + \ell)$, *attained by the constant* $2\ell u/(\ell + u)$ *(Lemma (e)); as* ℓdownarrow 0 *at fixed u the value tends to* 1 *and the minimizer to* 0, *in agreement with (a).*

• *If* $\sup \mathcal{Q}/\inf \mathcal{Q} = \infty$, *then* $r_{\log}(Y) = \infty$ *for every positive Y; if* $\mathcal{Q}$ *is unbounded, the absolute risk* $\sup_q \mathbb{E}|Y - q|$ *is infinite for every Y.*

• *Application. On the split family of Theorem the ratio* $s/(1 - s)$, $s \in (0, 1)$, *fills* $(0, \infty)$. *On the Poisson fibre of Definition (b) over a point* r_0 *with* $\rho_{\text{tot}}(r_0) > 0$, *the dark-to-baryonic density ratio* $\rho_{\text{dm}}(r_0)/\rho_{\text{b}}(r_0)$ *over splits with both slots positive at* r_0 *fills* $(0, \infty)$ *and leaves the rotation curve unchanged. In both cases (a) applies: the unrestricted dark-to-ordinary ratio has minimax relative risk exactly* 1 *under relative absolute or relative squared loss, attained only by reporting* 0.

Proof. (a) For $Y \equiv 0$, $|0 - q|/q = 1$ for every q. If $\Pr[Y \neq 0] > 0$ then $m := \mathbb{E}|Y| \in (0, \infty]$, and $\mathbb{E}|Y - q| \geq \mathbb{E}|Y| - q$ gives $\mathbb{E}|Y - q|/q \geq m/q - 1 \to \infty$ along $q \to 0$ in $\mathcal{Q}$. By Jensen's inequality $\mathbb{E}(Y - q)^2/q^2 \geq (\mathbb{E}|Y - q|/q)^2$, so $r_2 \geq r_1^2$, and $Y \equiv 0$ gives $r_2 = 1$. Hence no estimator has either risk below 1, and only $Y \equiv 0$ has a finite one. (b) If $\mathbb{E}|Y| = \infty$ the risks are infinite. Otherwise $\mathbb{E}|Y - q|/q \geq 1 - \mathbb{E}|Y|/q \to 1$ as $q \to \infty$, and $r_2 \geq r_1^2 \geq 1$. For a constant $y \in [0, 2\ell]$ and $q \geq \ell$, $-q \leq y - q \leq 2\ell - q \leq q$, so both relative losses are at most 1. For $y > 2\ell$, $q$downarrow ℓ in $\mathcal{Q}$ gives relative error tending to $(y - \ell)/\ell > 1$; for $y < 0$, $(q - y)/q > 1$. (c) Lemma (e); the limits are immediate. (d) If $\mathbb{E}|\ln Y| = \infty$ the risk is infinite at every q; otherwise $\mathbb{E}|\ln Y - \ln q| \geq |\ln q - \mathbb{E}\ln Y|$, which is unbounded because $\ln \mathcal{Q}$ is unbounded. The absolute statement is Lemma (c). (e) $s \mapsto s/(1 - s)$ maps $(0, 1)$ onto $(0, \infty)$; on the Poisson fibre a constant $h \in (0, 1)$ gives $\rho_{\text{dm}} = h\rho_{\text{tot}}$, $\rho_{\text{b}} = (1 - h)\rho_{\text{tot}}$, the ratio $h/(1 - h)$, and the same w, because w depends on ρ_{tot} only (Theorem). A common law on each family is split-independence (check B6B2-1, with mutations).

Status: proved; new (plan t355u, S 1, relative risk 1). Part (a) is the content of Lemma (e) and Theorem (d) of version 1, now stated with its loss and its range condition, and (e) supplies the dark-to-*ordinary* reading that version 1's abstract used (DC7-1). The finite-window form agrees with Big03-A prop:R-v3-relative-alignment

(source record; not a premise). Big06-A thm:DM-v2-risks (source record; not a premise) states the absolute-loss risks only (PB2-14). The result agrees with PC5-1 of the version-2 overlays and Big03-A-DM dmA3:v2-cor-ratio (local overlay record, unregistered; not a premise): exactly $(u - \ell)/(u + \ell)$ on a bounded positive range, exactly 1 on an unbounded range when the report 0 is allowed, attained only by reporting 0 for the unrestricted ratio, and infinite under absolute loss. Part (b) adds one refinement: when the range is bounded away from 0 but unbounded above, the value is still 1 but the minimizer is not unique. par *Non-claim.* Reporting 0 is an uninformative rule; a relative risk of exactly 1 records the absence of relative information, not an estimate of any ratio. The theorem concerns a stated family and loss; a supplied prior, a lower bound on the ratio or a split-coupled datum changes the answer. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Relative risk 1 under adaptive, stopped, postselected and approximate experiments; thm:B6B2-relrisk-adaptive). *Let $\mathscr{A}$ be a family of accounts with a positive target q whose values satisfy $\inf_{\mathscr{A}} q = 0$ (for example the unrestricted dark-to-ordinary ratio of Theorem (e)), and use relative absolute loss.*

• *Exact cases. If an adaptive experiment of finite depth has a complete common process on $\mathscr{A}$ (Theorem), then the transcript law, the law stopped by a common rule that terminates almost surely, and the law conditioned on a common event of positive probability are each common on $\mathscr{A}$. In every case the minimax relative risk is exactly 1, and reporting 0 is the unique minimizer.*

• *Deterministic boundary. The minimizer 0 is a deterministic rule. A deterministic rule of a fixed exact datum is a constant y on $\mathscr{A}$, with relative risk 1 if $y = 0$ and ∞ otherwise. For a two-valued target, a deterministic Boolean rule of a fixed exact datum has worst-case error 1, and one of a common stochastic transcript has worst-case error $\max(p, 1 - p)$, equal to $\frac{1}{2}$ when the transcript contains a fair bit; so $\frac{1}{2}$ is the randomized value and 1 the deterministic one (PB2-15).*

• *Approximate common processes. If the final laws of any two members of $\mathscr{A}$ differ by at most $\eta < 1$ in total*

variation, every estimator has relative risk at least $1-\eta$*. The bound is sharp: on the family* $P_q = (1-\eta)\delta_* + \eta\delta_q$, $q \in (0,\infty)$ *(with probability* η *the transcript reveals* q*), the rule ``report* q *if revealed, else* 0*'' has relative risk exactly* $1-\eta$*. So the value* 1 *is exact only for* $\eta = 0$*.*

• *Postselection and rounds. After conditioning on an event* E *with* $P_a(E) \geq p_E > 0$ *for every member, (c) holds with* η *replaced by* $\min\{1, \eta/p_E\}$ *(Theorem (d)). For finite depth with round kernels within* ε_r *in total variation, (c) holds with* $\eta = \min\{1, \varepsilon_0 + \sum_r \varepsilon_r\}$*, also for stopped transcripts, which are functions of the full transcript.*

Proof. (a) Theorem (a)–(c) gives the common laws; apply Theorem (a). (b) A deterministic function of a fixed datum is constant on the family; $|y-q|/q \to \infty$ as $q \to 0$ unless $y = 0$. The Boolean statements are Lemma (d) and Remark , which re-prove Big06-A thm:DM-v2-risks(iv) (source record; not a premise). (c) Let $r < \infty$ be the risk of Y. For members a, b and $t > 0$, Markov's inequality gives $P_a(|Y| > t) \leq \mathbb{E}_a|Y|/t \leq (1+r)q_a/t$, so $P_b(|Y| > t) \leq (1+r)q_a/t + \eta$; letting $q_a \to 0$ gives $P_b(|Y| > t) \leq \eta$. Then $\mathbb{E}_b|Y - q_b| \geq (q_b - t)P_b(|Y| \leq t) \geq (q_b - t)(1-\eta)$; divide by q_b and let $t$downarrow0. On the stated family any two laws differ by η, and the rule errs by q (relative error 1) exactly when the transcript does not reveal q. (d) Conditional laws differ by at most $\eta/\max\{P_a(E), P_b(E)\} \leq \eta/p_E$ by Theorem (d); the round bound is Proposition , and a function of a random variable does not increase total variation (check B6B2-9, with the revealing family and a mutation claiming risk 1 at $\eta > 0$).

Status: proved; new (plan t355u, S 1 and S 6, second suggested theorem; draft t356u F15-4 and F15-5, merged: the common process includes every persistent apparatus memory and untouched reference, and uniqueness of the report 0 is almost-sure uniqueness under the stopped or accepted common law). The two-point and conditional forms of (c),(d) are Theorem . Parts (a),(b),(d) confirm the plan: the result stays exact under stopping and postselection with a common process, and the deterministic boundary is that of Big06-A thm:DM-v2-risks (source record; not a premise). Part (c) corrects the plan's ``remains exact under approximate common processes'': the sharp value there is $1-\eta$ (PB2-1). Source records: Big06-A thm:DM-v2-approx (source record; not a premise) and the Le Cam bound of F13-8. par *Non-claim.* No value of η is asserted for any instrument, and reporting 0

remains uninformative. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Documentary record (Imported statements, re-proved here). Big06-A thm:DM-v2-adaptive (source record; not a premise) (common stopped transcript law under a common complete process) and Big06-A thm:DM-v2-approx (source record; not a premise) (transcript laws within $\varepsilon^{*} = \min\{1, \varepsilon_0 + \sum_r \varepsilon_r\}$, risk at least $\frac{\Delta}{2}(1 - \varepsilon^{*})$) are the source records of Theorems and , Theorem (F13-7) and Proposition (F13-8). Big06-A lem:DM-fibre, prop:DM-fibre and thm:DM-v2-risks (source record; not a premise) give the common-law bounds and the absolute-loss risks; Big06-A cor:DM-operators (source record; not a premise) lists the operators excluded by the readings and is consistent with Proposition . Big03-A thm:R-v3-adaptive (source record; not a premise), Big04-A-coeff thm:C-adaptive (source record; not a premise) and En04-A thm:magic-fibre (source record; not a premise) are the further adaptive and fibre records named by the plan. Each label was confirmed in the fresh site record (Appendix).

par *Non-claim.* Documentary records are not premises. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Approximate blindness: the sharp replacement for exact risk 1

Theorem (*New in version 2.* Relative Le Cam bound and budgets; thm:B6B2-rellecam). *The following hold.*

• *Two points. Let* $0 < a < b$ *be target values with complete observation laws* P_a, P_b *and* $\mathrm{TV}(P_a, P_b) \le \eta$*. Every randomized estimator satisfies* $\max\{\mathbb{E}_a|Y/a - 1|, \mathbb{E}_b|Y/b - 1|\} \ge \frac{b-a}{b+a}(1 - \eta)$.

• *Universal limit. If the target fills* $(0, \infty)$ *and* $\sup_{a,b} \mathrm{TV}(P_a, P_b) \le \eta < 1$*, the minimax relative risk* R^{*} *satisfies* $1 - \eta \le R^{*} \le 1$*, and the lower bound is attained on the revealing family of Theorem (c).*

• *Conditioning. After conditioning on a common event E with* $P_i(E) = p_i > 0$*, (a) and (b) hold with η replaced by* $\min\{1, \eta/\max(p_0, p_1)\}$*; for equal acceptance probabilities this allowance is sharp, so the unconditional η cannot be reused.*

• *Stopping. If two experiments use the same policy, their complete controlled round channels (memory and returned histories included) differ by half-diamond distances at most* $\eta_1, \eta_2, \dots$ *uniformly over controls and histories, and a common stopping rule terminates almost surely under both, then the stopped report laws are within* $\min\{1, \sum_r \eta_r\}$ *in total variation, also for unbounded depth.*

Proof. (a) Include the randomization in the observation space and let p_a, p_b be densities. Then $\frac{a}{a+b}\mathbb{E}_a\frac{|Y-a|}{a} + \frac{b}{a+b}\mathbb{E}_b\frac{|Y-b|}{b} = \frac{1}{a+b}(\mathbb{E}_a|Y-a| + \mathbb{E}_b|Y-b|) \geq \frac{1}{a+b}\int \min(p_a, p_b)(|Y-a| + |Y-b|) \geq \frac{b-a}{a+b}(1 - \mathrm{TV})$, and a maximum is at least a weighted mean. (b) Let $b/a \to \infty$ in (a); reporting 0 gives the upper bound; attainment is Theorem (c). (c) The conditional distance bound and its sharpness are Theorem (d); for equal acceptance *p*, put common mass $1 - p$ outside *E* and laws at distance *t* inside, so the unconditional distance is *pt* and the conditional one *t*. (d) At depth *n* keep an ``unfinished" flag; replacing round channels one at a time and using contractivity bounds the truncated report distance by $\sum_{r \leq n} \eta_r$; each truncated law differs from the stopped law by at most the probability of not having stopped by *n*, which tends to 0 under both models (check B6B2-16, two-point grids, the revealing family, and a mutation that reuses the unconditional η after conditioning).

Status: proved; new (draft t356u F15-6, F15-7, F15-8; plan t355u S 1). Part (b) is the sharp replacement for the plan's ``exact under approximate common processes" (PB2-1); part (a) is the relative-loss analogue of the absolute-loss bound of F13-8. Source record: Big06-A thm:DM-v2-approx (source record; not a premise). par

Non-claim. No instrument is asserted to satisfy any of these budgets. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* An extra hypothesis that restores exact risk 1; thm:B6B2-endpoint). *Let* P_Q, $Q > 0$, *be observation laws on one space, and suppose there is a law* P_0 *with* $\mathrm{TV}(P_Q, P_0) \to 0$ *as* Qdownarrow 0 *and* $P_Q \ll P_0$ *for every* $Q > 0$. *Then the minimax relative risk is exactly* 1, *and every estimator with finite worst-case relative risk is* 0 *almost surely under every* P_Q. *The same holds after stopping or postselection whenever the resulting laws satisfy the same two conditions. If instead the adversary may choose any process in*

an uncertainty class that contains an exactly common process, the robust minimax value is 1.

Proof. If $\sup_Q \mathbb{E}_Q|Y/Q - 1| \le C < \infty$ then $\mathbb{E}_Q|Y| \le (C+1)Q$, so $P_Q(|Y| > \varepsilon) \le (C+1)Q/\varepsilon \to 0$; convergence in total variation gives $P_0(|Y| > \varepsilon) = 0$ for every $\varepsilon > 0$, hence $Y = 0$ P_0-almost surely, and absolute continuity transfers this to every P_Q. Then the risk is exactly 1, which reporting 0 attains. For the robust statement, the common member gives the lower bound 1 (Theorem (a)) and reporting 0 gives the upper bound. The revealing family violates the hypothesis, since $\mathrm{TV}(\delta_Q, \delta_0) = 1$ (check B6B2-17, with a dominated family and the revealing family as negative control).

Status: proved; new (draft t356u F15-9 and F15-37). The hypothesis is endpoint domination; it is not implied by a small total-variation diameter. par *Non-claim.* No observation family is asserted to satisfy endpoint domination. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Sharpness of the Le Cam bound and the postselection allowance; thm:B6B2-lecam). *Let P_0, P_1 be complete output laws with* $\mathrm{TV}(P_0, P_1) = \eta \in [0,1]$*, target values q_0, q_1,* $\Delta = |q_1 - q_0|$*, and* $\mathfrak{m}(P_0, P_1) = \inf_Y \max_i \mathbb{E}_i|Y - q_i|$ *over randomized estimators.*

• $\mathfrak{m} \ge \frac{1}{2}\Delta(1-\eta)$ *(Proposition). If* $\eta = 0$*, then* $\mathfrak{m} = \frac{1}{2}\Delta$*, attained by the midpoint; this is the case of two points of the joint split–current fibre observed by an experiment with a complete common process (Theorem), also after a common stopping rule and after conditioning on a common event.*

• *The bound is the best one depending on* (Δ, η) *alone:* $\inf\{\mathfrak{m}(P_0, P_1) : \mathrm{TV}(P_0, P_1) = \eta\} = \frac{1}{2}\Delta(1-\eta)$*, attained by* $P_0 = (1-\eta)\delta_a + \eta\delta_b$, $P_1 = (1-\eta)\delta_a + \eta\delta_c$.

• *It is not attained by every pair: for* $P_0 = \delta_a$, $P_1 = (1-\eta)\delta_a + \eta\delta_b$ *with* $0 < \eta < 1$, $\mathfrak{m} = \Delta(1-\eta)/(2-\eta) > \frac{1}{2}\Delta(1-\eta)$.

• *Postselection. For an event E with* $P_0(E), P_1(E) > 0$,

$$\mathrm{TV}(P_0(\cdot \mid E), P_1(\cdot \mid E)) \le \min\{1, \frac{\eta}{\max\{P_0(E), P_1(E)\}}\},$$

with equality for $P_0 = \alpha\delta_a + \eta\delta_b + (1-\alpha-\eta)\delta_z$, $P_1 = \alpha\delta_a + \eta\delta_c + (1-\alpha-\eta)\delta_z$, $E = \{a, b\}$, *where both sides equal* $\eta/(\alpha+\eta)$. *After postselection, (a) holds with* η *replaced by the right side of , and no smaller allowance of this form is valid in general.*

• *Rounds. If the round kernels differ by at most* ε_r *in total variation, (a)–(d) hold with* $\eta \le \min\{1, \varepsilon_0 + \sum_r \varepsilon_r\}$.

Proof. (a) The bound is Proposition . With $\eta = 0$ the laws coincide and Lemma (b) gives $\frac{1}{2}\Delta$; Theorem (a)–(c) gives a common law in the stated cases. (b) Report the midpoint at a, q_0 at b and q_1 at c: both risks equal $(1-\eta)\Delta/2$; with (a) this is optimal. (c) Let Y_a, Y_b be the reports at a, b, $u = \mathbb{E}|Y_a - q_0|$ and $v = \mathbb{E}|Y_a - q_1|$, so $u + v \ge \Delta$. The risks are u and at least $(1-\eta)v$. If $u < \Delta(1-\eta)/(2-\eta)$ then $v > \Delta/(2-\eta)$ and $(1-\eta)v > \Delta(1-\eta)/(2-\eta)$; so the maximum is at least that value, which is attained by $Y_a = q_0 + \operatorname{sgn}(q_1 - q_0)\Delta(1-\eta)/(2-\eta)$, $Y_b = q_1$. (d) Write $p_i = P_i(E)$, assume $p_0 \ge p_1$, and let f_i be the restrictions of P_i to E. Since the masses outside E differ by $p_0 - p_1$, $2\eta \ge \int_E |f_0 - f_1| + (p_0 - p_1)$. By the triangle inequality $\int_E |f_0 - \frac{p_0}{p_1} f_1| \le \int_E |f_0 - f_1| + (\frac{p_0}{p_1} - 1)p_1 \le 2\eta$, and the left side is $2p_0 \mathrm{TV}(P_0(\cdot \mid E), P_1(\cdot \mid E))$. In the example the conditional laws are $(\alpha, \eta)/(\alpha+\eta)$ and δ_a, at total variation $\eta/(\alpha+\eta)$, while $\mathrm{TV}(P_0, P_1) = \eta$ and $\max_i p_i = \alpha + \eta$. (e) Replace the round channels one at a time (Proposition) (check B6B2-6, by exhaustive grids and random search, with the unconditional allowance η as a negative control).

Status: proved; new. It supplies the quantitative tools of Theorem (c),(d). F13-8 is Proposition , as the plan says, but it is an *approximate* lower bound: it is exact only at $\eta = 0$, sharp as a function of (Δ, η) by (b), and not attained for every pair by (c); its postselection sentence is a non-reuse statement, and the exact postselection statement is Theorem (c) (PB2-1). Part (d) is the quantitative allowance that replaces the unconditional one. par *Non-claim.* No value of η, ε_r or a postselection probability is asserted for any instrument; blindness to the current alone remains insufficient (Theorem). Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

The residual and the Poisson layer

Theorem (*New in version 2.* The four supplies of the residual; thm:B6B2-supply). *On a prescribed region U write a supply as $(g,\chi,\Lambda,T^{\mathrm{known}})$, where Λ is the declared vacuum convention, and put*

$$\mathrm{Res}(g,\chi,\Lambda,T^{\mathrm{known}}) = \chi^{-1}(\mathscr{G}[g]+\Lambda g) - T^{\mathrm{known}}.$$

• *Full supply.* Res *is the unique tensor X with $\mathscr{G}+\Lambda g = \chi(T^{\mathrm{known}}+X)$. At fixed (g,χ,Λ) the map $T^{\mathrm{known}} \mapsto$* Res *is the affine map $X \mapsto -X$, whose linear part is $-\mathrm{id}$: an isometry for every norm, with Lipschitz constant exactly* 1. *The identity imposes no constitutive class: every symmetric tensor X on U is the residual of the supply with $T^{\mathrm{known}} = T_{\mathrm{tot}} - X$, so no equation of state follows from it.*

• *Vacuum convention unsupplied. If Λ ranges over a set L, the residuals form $\{T^{\mathrm{DM}} + \chi^{-1}(\Lambda' - \Lambda)g : \Lambda' \in L\}$, a subset of the line $T^{\mathrm{DM}} + \mathbb{R}g$; each is conserved exactly when T^{DM} is; if $T^{\mathrm{DM}} = \varepsilon\, u \otimes u$ with $\varepsilon > 0$, exactly one member, $\Lambda' = \Lambda$, is of dust form.*

• *Coupling unsupplied. If χ ranges over a set $X_\chi \subseteq \mathbb{R}\setminus\{0\}$, the residuals are $\chi'^{-1}(\mathscr{G}+\Lambda g) - T^{\mathrm{known}}$, $\chi' \in X_\chi$; two distinct values give distinct residuals if and only if $\mathscr{G}+\Lambda g \equiv 0$ on U.*

• *Known sources unsupplied. If T^{known} is constrained only to be symmetric and divergence-free, the residuals are exactly the symmetric divergence-free tensors on U; this set always contains the two distinct tensors* 0 *and g.*

• *Kernels. Let W be the space of symmetric divergence-free tensors on U. With the total fixed, the pairs $(T^{\mathrm{known}}, T^{\mathrm{DM}})$ of conserved tensors with sum T_{tot} form the affine space $(T_0^{\mathrm{known}}, T_0^{\mathrm{DM}}) + \{(X,-X) : X \in W\}$: the kernel of the total is exactly the conserved transfers. If only a linear reading $\mathscr{L}$ of the residual is supplied in addition, the compatible residuals are exactly $T_0^{\mathrm{DM}} + (W \cap \ker \mathscr{L})$, so the reading fixes the residual if and only if $W \cap \ker \mathscr{L} = \{0\}$; on a finite-dimensional subspace $W_0 \subseteq W$, $\dim(W_0 \cap \ker \mathscr{L}) \geq \dim W_0 - \operatorname{rank}\mathscr{L}$, so a reading of rank below $\dim W_0$ never fixes it. Consequently, with the admissible sets of (b)–(d), the residual is a function of the supply exactly when all four entries are supplied: deleting the known sources always leaves more than one residual, and deleting the vacuum convention or the coupling does so whenever its admissible set has two points*

(for the coupling, when $\mathscr{G}+\Lambda g \equiv 0$). With a restricted known-source class $T_0^{\text{known}} + \mathscr{H}$, $\mathscr{H} \subseteq W$, the residual class is exactly $T_{\text{tot}} - T_0^{\text{known}} - \mathscr{H}$, and a scalar linear residual target is identifiable if and only if it annihilates $\mathscr{H}$; so full supply is sufficient for uniqueness, not necessary under every constitutive restriction, and ``every conserved tensor'' needs the unrestricted class of (d).

Proof. (a) Theorem (b),(c); for the last sentence, $T_{\text{tot}} - (T_{\text{tot}} - X) = X$. (b) $\chi^{-1}(\mathscr{G}+\Lambda' g) - T^{\text{known}} = T^{\text{DM}} + \chi^{-1}(\Lambda' - \Lambda)g$; $\nabla g = 0$; the dust statement is the eigenvalue argument of Proposition (e): $\varepsilon u \otimes u + \mu g$ with $\mu \neq 0$ has the eigenvalue $\mu \neq 0$ on $u^{\perp}$. (c) $(\chi_1^{-1} - \chi_2^{-1})(\mathscr{G}+\Lambda g) = 0$ with $\chi_1 \neq \chi_2$ forces $\mathscr{G}+\Lambda g = 0$. (d) For a conserved X put $T^{\text{known}} = T_{\text{tot}} - X$, which is conserved by Theorem (a); conversely Res is conserved when T^{known} is. Both 0 and g are symmetric and parallel. (e) $(T_0^{\text{known}} + X) + (T_0^{\text{DM}} - X) = T_{\text{tot}}$, and conversely the difference of two conserved pairs with equal sum is $(X, -X)$ with $X \in W$; the residuals compatible with the reading are the $T_0^{\text{DM}} - X$ with $X \in W$ and $\mathscr{L}X = 0$; rank–nullity for $\mathscr{L}|_{W_0}$ gives the inequality. The final sentence collects (b)–(d) (check B6B2-2, including a rank–nullity witness).

Status: proved; new (plan t355u, S 2; draft t356u F15-10, merged). It generalizes Theorem (F13-1, main finding 1). The plan's ``the unique affine isometry'' is made precise as PB2-2 states: the residual is the unique solution, and the residual *map* at fixed $(g, \chi, \Lambda)$ is an affine isometry; ``no equation of state'' is the last sentence of (a). It re-proves Big06-A prop:DM-residual (source record; not a premise). Part (e) re-proves the kernel characterization of the local overlay record Big05-A-DM dmA5:prop-residual (local overlay record, unregistered; not a premise)(e),(f); that characterization exists only in the local overlays, not in the site record of Big05-A (PB2-6). Its latest local form is the exact-kernel criterion $\text{pr}_0(W \cap \ker L) = \{0\}$ of Big05-A-DM dmA5:f14-3-minimal (local overlay record, unregistered; not a premise) together with the full-supply theorem Big05-A-DM dmA5:v2-thm-residual (local overlay record, unregistered; not a premise) (version 2); here T^{known} is the supplied aggregate of all non-dark sources, and, as recorded there, its individual pieces are not needed. par *Non-claim.* No supply is selected, the vacuum convention is not a vacuum energy, and uniqueness of the residual is not a microscopic realization. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays

NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Fibre form of the Poisson and slope tools; thm:B6B2-poissonfibre). *Under Specification on* $I = [r_-, r_+]$, *fix a* C^1 *total density* $\rho_{\mathrm{tot}} > 0$ *on* I *and let* $\mathscr{F} = \{((1-h)\rho_{\mathrm{tot}}, h\rho_{\mathrm{tot}}) : h \in C^1(I;[0,1])\}$ *be the* C^1 *Poisson fibre (with* $j_{\mathrm{dm}} \equiv 0$ *it is the joint split–current fibre of Definition (a) in this class).*

• *Fibre-constant quantities.* w, M_{tot}, ρ_{tot}, *the mass-slope exponent* $\Gamma(w, w')$ *and every total shell mass* $M_{\mathrm{tot}}[r_1, r_2]$ *are constant on* $\mathscr{F}$. *The jet bound and the constant* $L_* = \max(1/m, r_+K/m^2)$ *of Theorem bound perturbations of these quantities, and of the residual only relative to a supplied baryonic density; neither bounds a coordinate of* $\mathscr{F}$.

• *Shell masses. On* $\mathscr{F}$ *the dark shell mass* $M_{\mathrm{dm}}[r_1, r_2]$ *fills* $[0, M_{\mathrm{tot}}[r_1, r_2]]$, *so its exact minimax risk is* $\frac{1}{2}M_{\mathrm{tot}}[r_1, r_2]$, *a bounded value. With a supplied baryonic mass the shell error obeys , sharp in* e_0: *the residual shell mass is Lipschitz-stable in the uniform w-norm.*

• *Free dark slope at fixed shell masses. Let* $r_- = c_0 < c_1 < \dots < c_K = r_+$, *let* $r_0 \in (c_{k-1}, c_k)$, *and let* $h_0 \in C^1(I;(0,1))$ *with* $\delta := \min\{\min h_0, 1 - \max h_0\} > 0$. *For every* $y \in \mathbb{R}$ *and* $\varepsilon \in (0, \delta)$ *there is* $h \in C^1(I;(0,1))$ *with*

$$\int_{c_{i-1}}^{c_i} h\rho_{\mathrm{tot}} r^2 \,\mathrm{d}r = \int_{c_{i-1}}^{c_i} h_0\rho_{\mathrm{tot}} r^2 \,\mathrm{d}r \ (1 \le i \le K), \qquad \|h - h_0\|_\infty \le \varepsilon, \qquad h = h_0 \text{off}(c_{k-1}, c_k),$$

and $\gamma_{\mathrm{dm}}(r_0) = -\mathrm{d}\ln\rho_{\mathrm{dm}}/\mathrm{d}\ln r\,(r_0) = y$. *Hence, even with every dark shell mass of the partition fixed exactly and the dark density known to within* $\varepsilon\|\rho_{\mathrm{tot}}\|_\infty$ *in the uniform norm,* $\gamma_{\mathrm{dm}}(r_0)$ *has infinite minimax risk, the indicator of* $\gamma_{\mathrm{dm}}(r_0) \ge \frac{1}{2}$ *has minimax risk* $\frac{1}{2}$, *and the map from the dark density to* $\gamma_{\mathrm{dm}}(r_0)$ *has no finite local Lipschitz constant, whereas the total mass slope has the finite constant* L_*.

Proof. (a) w depends on ρ_{tot} only (Theorem (a)), and Γ, M_{tot} and the shell masses are functions of w. The bounds of Theorems and compare two values of w (and of a supplied ρ_{b}); on $\mathscr{F}$ the value of w does not change. (b) $M_{\mathrm{dm}}[r_1, r_2] = 4\pi\int_{r_1}^{r_2} h\rho_{\mathrm{tot}} r^2 \,\mathrm{d}r$; constants $h \in [0,1]$ fill the interval, and Lemma (b) applies. The supplied-baryon bound is Theorem . (c) Since $\gamma_{\mathrm{dm}} = \gamma_{\mathrm{tot}} - rh'/h$, it suffices to keep $h(r_0) = h_0(r_0)$ and set $h'(r_0) = t := h_0(r_0)(\gamma_{\mathrm{tot}}(r_0) - y)/r_0$. Let $\psi \in C_c^\infty((-1,1))$ with $0 \le \psi \le 1$ and $\psi = 1$ near 0. Fix a point c_* and a radius

$\tau' > 0$ with $[c_* - \tau', c_* + \tau'] \subset (c_{k-1}, c_k) \setminus \{r_0\}$, put $\varphi_2(r) = \psi((r - c_*)/\tau')$ and $n_2 = \int \varphi_2 \rho_{\mathrm{tot}} r^2 > 0$. For $\tau > 0$ so small that $[r_0 - \tau, r_0 + \tau]$ lies in the cell and misses $[c_* - \tau', c_* + \tau']$, put $A = t - h_0'(r_0)$, $\varphi_1(r) = A(r - r_0)\psi((r - r_0)/\tau)$, $m_1 = \int \varphi_1 \rho_{\mathrm{tot}} r^2$ and $h = h_0 + \varphi_1 - (m_1/n_2)\varphi_2$. Then $\varphi_1(r_0) = 0$, $\varphi_1'(r_0) = A$, $|\varphi_1| \le |A|\tau$ and $|m_1| \le |A|\tau M_k$ with $M_k = \int_{c_{k-1}}^{c_k} \rho_{\mathrm{tot}} r^2$, so $\|h - h_0\|_\infty \le |A|\tau(1 + M_k/n_2) \le \varepsilon < \delta$ for small τ; h is C^1 with values in $(0, 1)$, every cell integral is unchanged, $h(r_0) = h_0(r_0)$ and $h'(r_0) = t$. The risk statements follow from Lemma (c),(d), since y is arbitrary while all listed data are fixed; the Lipschitz statement follows because $\|h - h_0\|_\infty \to 0$ is compatible with a fixed change of $\gamma_{\mathrm{dm}}(r_0)$ (check B6B2-3, with targets $y \in \{-80, -3, 0, \frac{1}{2}, 7, 80\}$ and a mutation that omits the compensating bump).

Status: proved; new (plan t355u, S 2 and S 6, third suggested theorem; draft t356u F15-14 and F15-15, merged: (c) keeps $h(r_0)$, hence the dark density at r_0, fixed, and any finite set of exact shell masses is covered by refining the partition; the supplied-baryon shell bound of F15-15 is Theorem of version 1). Part (c) strengthens Proposition (version 1, new there). It restates the plan's ``sharper Poisson and slope tools'' as fibre statements, with two corrections: the jet bound is Theorem (F13-9), not Theorem (PB2-3), and $\Gamma$ is fibre-constant, so the free coordinate is the dark slope, not the quantity of Theorem (PB2-4); ``shell masses stay stable'' holds for the total and for the residual relative to a supplied baryonic mass, while on the unrestricted fibre the dark shell mass is a bounded fibre coordinate (PB2-5). Part (b) re-proves Big06-A prop:DM-v2-shell(a),(b) (source record; not a premise); the plan's ``Poisson jet bound'' and ``slope bound'' are here fibre statements. par *Non-claim.* Among profiles, cores and cusps none is preferred, and no baryonic model is supplied; the construction shows only that a supplied baryonic model is what makes the dark slope decidable. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Corollary (*New in version 2.* The uniform-data discontinuity as a topology tool; cor:B6B2-topology). *Under Specification on an annulus $I = [r_-, r_+]$, let $\rho[w] = (w + rw')/(4\pi G r^2)$ on $C^1(I)$.*

• *For every norm N on $C^1(I)$ with $N(f) \le C\|f\|_\infty$ and every $p \in [1, \infty]$, the map $w \mapsto \rho[w]$ is not continuous from N to*

$L^p(I)$*, even on strictly positive densities.*

• *With derivative control it is Lipschitz:* $\|\rho[w_1] - \rho[w_2]\|_{L^p} \le (\|\delta w\|_{L^p} + r_+\|\delta w'\|_{L^p})/(4\pi G r_-^2)$ *for* $1 \le p \le \infty$*. Hence the stability of a residual reconstruction is a property of the declared topology: topologies on w dominated by the uniform norm give no continuity, while topologies that control* w' *give a Lipschitz bound.*

Proof. (a) Take the family w_n of Theorem : $N(w_n - w_*) \le C\varepsilon/n \to 0$ and all densities are positive, while $\rho[w_n] - \rho[w_*] = \frac{\varepsilon\cos(n(r - r_*)/L)}{4\pi G L r} + \frac{\varepsilon\sin(n(r - r_*)/L)}{4\pi G n r^2}$. The second term tends to 0 uniformly; the L^p norm of the first is bounded below by a positive constant for all large *n*, because $|\cos|^p$ has a positive mean and $1/r \ge 1/r_+$. (b) $\delta\rho = \delta w/(4\pi G r^2) + \delta w'/(4\pi G r)$ with $1/r^2 \le 1/r_-^2$ and $1/r \le r_+/r_-^2$; apply Minkowski's inequality (check B6B2-10).

Status: proved; new (plan t355u, S 2, the uniform-data discontinuity, F13-10, as a local tool). Part (b) is the spherical counterpart of the $W^{2,p}$-to-L^p Lipschitz statement of the local overlay record Big05-A-DM dmA5:prop-poissonlp (local overlay record, unregistered; not a premise), since $w = r\varphi'$ makes control of *w* and w' the control of two derivatives of the potential; part (a) corresponds to its uniform-topology discontinuity, which the version-2 overlay restates as a tool in Big05-A-DM dmA5:v2-cor-poissontool (local overlay record, unregistered; not a premise)(a) (PB2-7). par *Non-claim.* Among reconstruction topologies none is preferred; regularization and priors remain additional supplies. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* A local $W^{2,p}$ tool and positive uniform-data discontinuity; thm:B6B2-sobolev).

Let $\Omega \subset \mathbb{R}^3$ *be bounded,* $1 \le p \le \infty$*, and* $\mathscr{R}(\Phi, b) = \Delta\Phi/(4\pi G) - b$ *(the declared Newtonian residual).*

• *With the pointwise Frobenius norm on the Hessian,* $\|\mathscr{R}(\Phi, b) - \mathscr{R}(\widetilde{\Phi}, \widetilde{b})\|_{L^p} \le \frac{\sqrt{3}}{4\pi G}\|D^2(\Phi - \widetilde{\Phi})\|_{L^p} + \|b - \widetilde{b}\|_{L^p}$*, and the Hessian coefficient is sharp.*

• *There are smooth potentials* $\Phi_n \to \Phi_0$ *in* $C^1(\Omega)$*, all with strictly positive total density, whose densities stay a fixed positive distance apart from that of* Φ_0 *in the uniform norm at an interior point.*

Proof. (a) For a symmetric 3 × 3 matrix, $|\mathrm{Tr}\,H| \le \sqrt{3}\,|H|_{\mathrm{F}}$ by Cauchy–Schwarz on the eigenvalues; integrate. Equality holds for $\Phi - \widetilde{\Phi} = A|x|^2/2$ with Hessian AI. (b) Fix $x_* \in \Omega$ and a smooth cutoff ζ supported in Ω, with $0 \le \zeta \le 1$ and $\zeta = 1$ near x_*. Put $\Phi_0 = \frac{4\pi G\rho_0}{6}|x|^2$ and $\Phi_n = \Phi_0 + \frac{a}{n^2}\zeta\cos(n(x_1 - x_{*,1}))$. The perturbation and its gradient are $O(1/n)$, while $\Delta(\Phi_n - \Phi_0) = -a\zeta\cos(\cdot) + O(1/n)$ equals $-a$ at x_*. For $0 < a < 2\pi G\rho_0$ and n large the densities $\rho_0 + \Delta(\Phi_n - \Phi_0)/(4\pi G)$ stay positive (check B6B2-18, with the trace inequality, its equality case, and a mutation with coefficient 1).

Status: proved; new (draft t356u F15-11). It is the Cartesian form of Big05-A-DM dmA5:prop-poissonlp (local overlay record, unregistered; not a premise), whose label exists in both the version-1 and version-2 overlays (DC7-6), proved here directly; Corollary is the spherical form. par *Non-claim.* This is a Newtonian local estimate, not an elliptic Einstein–matter theorem. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Jet sharpness and its compatibility boundary; prop:B6B2-jet). *On $I = [r_-, r_+]$ put $\rho_{\mathrm{d}} = (w + rp)/(4\pi Gr^2) - b$. For independently reported (w, p, b) with $\|\delta w\|_\infty \le e_0$, $\|\delta p\|_\infty \le e_1$, $\|\delta b\|_\infty \le e_{\mathrm{b}}$, the bound $\|\delta\rho_{\mathrm{d}}\|_\infty \le \frac{e_0}{4\pi Gr_-^2} + \frac{e_1}{4\pi Gr_-} + e_{\mathrm{b}}$ of Theorem (b) is attained. For compatible C^1 errors ($p = w'$) the same value is the sharp supremum when $e_0 > 0$; when $e_0 = 0$ the sharp value is e_{b}, whatever e_1 is.*

Proof. Both coefficients are largest at r_-; independent errors $e_0, e_1, -e_{\mathrm{b}}$ there attain the bound. If $e_0, e_1 > 0$ and $p = w'$, take δw with $\delta w(r_-) = e_0 - \varepsilon$, $\delta w'(r_-) = e_1$, $|\delta w'| \le e_1$, flattening before it exceeds e_0; the value at r_- tends to the bound as $\varepsilon \to 0$. If $e_1 = 0$ a constant error attains it. If $e_0 = 0$ then $\delta w \equiv 0$, hence $\delta w' \equiv 0$ (check B6B2-19).

Status: proved; new (draft t356u F15-12). It settles the plan's ``sharp jet bound'' (PB2-3): independent jets and compatible derivative data are different observation spaces. par *Non-claim.* No error budget is asserted for any data set. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Mass-slope constant with the degenerate case; prop:B6B2-massslope). *On*

$\mathscr{D}_2(m,K)$ *of Theorem , with* $\Gamma = 2 - rp/w$ *and* $N(\delta w, \delta p) = \|\delta w\|_\infty + r_+\|\delta p\|_\infty$*, the best Lipschitz constant is* 0 *if* $K = 0$ *and* $\max\{1/m, r_+K/m^2\}$ *if* $K > 0$*. For* $K > 0$ *it is attained when* $r_+K \le m$ *and is a supremum that is not attained when* $r_+K > m$*.*

Proof. If $K = 0$ then $p = 0$ and $\Gamma \equiv 2$. For $K > 0$ the bound and the two approximating pairs are those of Theorem (a); the pair $(m, 0), (m, \varepsilon)$ attains $1/m$. If $r_+K > m$, at each r: when $\delta w(r) \neq 0$, $\max(w, \widetilde{w})(r) > m$, so the coefficient of $|\delta w(r)|$ is strictly below r_+K/m^2; when $\delta w(r) = 0$ the pointwise quotient is at most $1/m < r_+K/m^2$. The supremum over the compact I is attained at some r, so the quotient is strictly below the constant (check B6B2-20, with $K = 0$ as a mutation target for the old constant $1/m$).

Status: proved; new (draft t356u F15-13). It corrects Theorem (a) of version 1 in the degenerate case $K = 0$ (DC7-3). par *Non-claim.* The norm is a declared choice. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Virial fibres: moment form, rigidity and joint rejection

Theorem (*New in version 2.* Virial moment fibre, shell rigidity and exact rejection; thm:B6B2-virial).

Assume the hypotheses of Theorem , with $K(s) = \int_s^\infty vr\,\mathrm{d}r$*,* $K(0) \in (0, \infty)$*,* W_d *as there, and a nonnegative residual mass measure* μ *with* $M_\mathrm{dm}(r) = \mu([0, r])$*.*

• $W_\mathrm{d} = \int_{[0,\infty)} K(s)\,\mu(\mathrm{d}s)$*; in particular a nonnegative residual exists if and only if* $W_\mathrm{d} \ge 0$*, and the package is rejected exactly when* $W_\mathrm{d} < 0$*, a condition free of anisotropy.*

• *Rigidity. For* $K(R) > 0$ *put* $g_R = W_\mathrm{d} - K(R)M_\mathrm{dm}(R)$*. Then* $g_R = \int_{[0,R]} (K(s) - K(R))\,\mu(\mathrm{d}s) + \int_{(R,\infty)} K\,\mathrm{d}\mu \ge 0$*, and if* $K(R - \varepsilon) > K(R)$*,* $\mu([0, R - \varepsilon]) \le g_R/(K(R - \varepsilon) - K(R))$*. Equality in* $M_\mathrm{dm}(R) \le W_\mathrm{d}/K(R)$ *requires the interior mass to lie where* $K = K(R)$ *and the exterior mass where* $K = 0$*; if* K *is strictly decreasing and positive at every finite radius, only a shell at* R *attains it.*

• *If* $W_\mathrm{d} \ge 0$ *and* $K(s) > 0$ *for some* $s > R$*, the compatible values of* $M_\mathrm{dm}(R)$ *are exactly* $[0, W_\mathrm{d}/K(R)]$*, so data consisting of this moment alone have exact absolute minimax risk* $W_\mathrm{d}/(2K(R))$ *for that mass.*

• *Multiple tracers. If one nonnegative μ must satisfy* $W_i = \int K_i \, d\mu$ *for tracers* $i = 1, \dots, n$, *and* $\sum_i a_i K_i(s) \geq 0$ *at every allowed mass location, compatibility requires* $\sum_i a_i W_i \geq 0$*; a violation rejects the common-mass package.*

• *Local Jeans. At one radius, with independent intervals for* $s = \sigma_r^2 \in [s_-, s_+]$, $g_s = -\mathrm{dln}\,(vs)/\mathrm{dln}\, r \in [g_-, g_+]$, $\beta \in [\beta_-, \beta_+]$ *and* $M_{\mathrm{b}} \in [B_-, B_+]$, *so that* $M_{\mathrm{dm}}(r) = \frac{r}{G} s(g_s - 2\beta) - M_{\mathrm{b}}$, *a nonnegative residual is rejected iff* $\frac{r}{G} \max\{s_+ A_+, s_- A_+\} < B_-$ *with* $A_+ = g_+ - 2\beta_-$*; without a lower bound on β the local package is never rejected.*

Proof. (a) The identity of Theorem gives $\int vr M_{\mathrm{dm}} \, dr = W_{\mathrm{d}}$, and Tonelli gives $\int_0^\infty vr \int_{[0,r]} d\mu \, dr = \int K \, d\mu$. If $W_{\mathrm{d}} \geq 0$, place $W_{\mathrm{d}}/K(s)$ at a point s with $K(s) > 0$. (b) Subtract $K(R)\mu([0, R])$; K is nonincreasing, so both integrands are nonnegative, the first is at least $K(R - \varepsilon) - K(R)$ on $[0, R - \varepsilon]$, and equality forces both integrals to vanish. (c) $\mu = m\delta_R + \frac{W_{\mathrm{d}} - mK(R)}{K(s)} \delta_s$ for $m \in [0, W_{\mathrm{d}}/K(R)]$; half the range is the common-data minimax risk (Lemma (b)). (d) Multiply by a_i, sum and integrate the nonnegative kernel. (e) Divide by vs/r; the value decreases in M_{b} and β, increases in g_s, and is monotone in s with the sign of $g_s - 2\beta$ (check B6B2-21, linear-programming feasibility on grids, the rigidity inequality, and a mutation that rejects at $W_{\mathrm{d}} = 0$).

Status: proved; new (draft t356u F15-16, F15-17, F15-18). It sharpens Theorem (F13-18) and Proposition (F13-17); version 1 stated one direction of each rejection. Sharpness is for the nonnegative mass-measure moment problem. par *Non-claim.* Compatibility does not supply a positive stellar distribution function, and no stellar system is analysed [Wolf10,AgnelloEvans12]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Energy conditions, vacuum shifts and futures

Theorem (*New in version 2.* The null-energy price of positive dust, unified; thm:B6B2-nec). *On a connected open region U let the total be of vacuum form,* $T_{\mathrm{tot}} = q\,g$ *for a function q, and let* $T_{\mathrm{tot}} = \sum_{j=1}^{N} T_j$ *with symmetric slots.*

• *If every* T_j *satisfies the null energy condition on U, then* $T_j = f_j g$ *pointwise; if moreover each* T_j *is divergence-free, each* f_j *is constant. So every split into null-energy-respecting slots is of vacuum type, and none*

contains positive dust.

• *If* $T_1 = \varepsilon\, u \otimes u$ *with* $\varepsilon(p) > 0$, *then for every nonzero null* ℓ *at* p, $\sum_{j \geq 2} T_j(\ell, \ell) = -\varepsilon(p)(u \cdot \ell)^2 < 0$, *so* $\sum_{j \geq 2} \min\{T_j(\ell, \ell), 0\} \leq -\varepsilon(p)(u \cdot \ell)^2$*: the remaining slots violate the null energy condition along every null direction by at least this amount in total. No shift* λg *between slots changes any null contraction.*

• *Quantitative price. Normalize a null* ℓ *by* $-g(u, \ell) = 1$. *If a supplied total satisfies* $T_{\text{tot}}(\ell, \ell) \leq \delta$, *the aggregate remainder* $B = T_{\text{tot}} - T_1$ *satisfies* $B(\ell, \ell) \leq \delta - \varepsilon$; *so* $\varepsilon > \delta$ *forces a null-energy violation of the remainder along* ℓ, *and for a vacuum-form total* $B(\ell, \ell) = -\varepsilon$.

• *The hypothesis holds on every de Sitter region, on every interval of a flat expanding host where H is constant (* $T_{\text{tot}} = \chi^{-1}(\Lambda - 3H^2/c^2)g$*), and therefore on the constant-rate tails of the futures in Theorem (a).*

Proof. (a) For null ℓ, $\sum_j T_j(\ell, \ell) = q\, g(\ell, \ell) = 0$ with every term nonnegative, so every term vanishes. A symmetric tensor vanishing on the null cone is a multiple of g: in an orthonormal frame, $\ell = e_0 \pm e_i$ gives $T_{00} + T_{ii} = 0$ and $T_{0i} = 0$; $\ell = \sqrt{2}e_0 + e_i + e_k$ gives $T_{ik} = 0$ for $i \neq k$; so $T = T_{ii}\,\text{diag}(-1, 1, 1, 1)$ in that frame. If $\nabla^a(f_j g_{ab}) = \nabla_b f_j = 0$ on connected U, then f_j is constant. Positive dust has $\varepsilon(u \cdot \ell)^2 > 0$, so it is not of this form. (b) Subtract $T_1(\ell, \ell) = \varepsilon(u \cdot \ell)^2$ from the vanishing total; $u \cdot \ell \neq 0$ for timelike u; a sum is at least the sum of its negative parts; $g(\ell, \ell) = 0$. (c) $T_1(\ell, \ell) = \varepsilon$ in this normalization; subtract. (d) On de Sitter and on constant-H flat intervals, $\mathcal{G} = -3H^2c^{-2}g$ (check B6B2-11, with random null-cone constructions and a dust-plus-vacuum mutation).

Status: proved; new (plan t355u, S 3 and S 6, fourth suggested theorem; draft t356u F15-19, merged). It unifies Theorem (F13-31, main finding 7), Big06-A prop:DM-v2-nullsat (source record; not a premise) and Big06-A prop:DM-NEC (source record; not a premise), and the local overlay records Big01-A-DM dmA1:prop-necobs (local overlay record, unregistered; not a premise), Big04-A-DM dmA4:prop-necprice (local overlay record, unregistered; not a premise)(a) and, in their latest form, Big05-A-DM dmA5:f14-4-nullbudget (local overlay record, unregistered; not a premise)(a),(b) and Big05-A-DM dmA5:f14-5-flrw (local overlay record, unregistered; not a premise); part (b) agrees with the exact price $-\varepsilon$ in the dust frame recorded there. par *Non-claim.* No sign of

any physical null contraction is asserted; the theorem prices a positive-dust assignment, it does not exclude one. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Limits of the vacuum shift; thm:B6B2-vacshift). *For a constant λ let*

$s_\lambda : (T_{\mathrm{b}}, T_{\mathrm{dm}}, T_\Lambda) \mapsto (T_{\mathrm{b}}, T_{\mathrm{dm}} + \lambda g, T_\Lambda - \lambda g)$.

• *s_λ preserves the total, the conservation of each slot, every current (in particular $j_{\mathrm{dm}} \equiv 0$), every null contraction and hence the null energy condition of every slot, and every radiation label that has no split argument.*

• *If $T_{\mathrm{dm}} = \varepsilon\, u \otimes u$ with $\varepsilon > 0$ and $T_\Lambda = -\rho_\Lambda g$ with $\rho_\Lambda \geq 0$, the shifted dark slot is of dust form if and only if $\lambda = 0$, and both shifted slots satisfy the weak energy condition if and only if $-\rho_\Lambda \leq \lambda \leq \varepsilon_{\min} = \inf_U \varepsilon$.*

• *Action level. If an action S is supplied with $T_{ab} = -2(-g)^{-1/2}\delta S/\delta g^{ab}$ and $\mathscr{J}^a = (-g)^{-1/2}\delta S/\delta A_a$, then $S^C = S - C\int\sqrt{-g}\,\mathrm{d}^4x$ has $T^C = T - Cg$ and $\mathscr{J}^C = \mathscr{J}$ (the shift with $\lambda = -C$). Changing the total to $T_{\mathrm{tot}} - Cg$ at fixed g and χ keeps the Einstein form with $\Lambda' = \Lambda - \chi C$.*

• *Not a residual ambiguity. If Λ and every non-dark slot are supplied, the dark slot is unique (Theorem (a)), so only $\lambda = 0$ is compatible; a nonzero shift changes a supplied slot or the vacuum convention.*

Proof. (a) $\lambda g - \lambda g = 0$, $\nabla g = 0$, currents are not touched, and $g(\ell, \ell) = 0$. (b) Proposition (e). (c) $\delta\sqrt{-g} = -\frac{1}{2}\sqrt{-g}\, g_{ab}\delta g^{ab}$, so $\delta(-C\int\sqrt{-g}) = \frac{C}{2}\int\sqrt{-g}\, g_{ab}\delta g^{ab}$, whose contribution to T_{ab} is $-2\cdot\frac{C}{2}g_{ab} = -Cg_{ab}$; the volume term contains no A. Then $\chi(T_{\mathrm{tot}} - Cg) = \mathscr{G} + (\Lambda - \chi C)g$. In signature $(-,+,+,+)$ the term $-Cg$ has energy density C and pressure $-C$. (d) With Λ and T^{known} fixed, $T^{\mathrm{DM}} = \chi^{-1}(\mathscr{G} + \Lambda g) - T^{\mathrm{known}}$ is a single tensor (check B6B2-12, including a finite-difference check of the volume-term stress).

Status: proved; new (plan t355u, S 3 and S 6, fifth suggested theorem; draft t356u F15-20, merged: (c), (a) and (d) are the three different meanings of a vacuum shift, a normalization change, a compensated attribution change and a fixed-supply ambiguity, and only the second is an operation at fixed total that changes the residual identity's other-source tensor). Part (b) holds verbatim for $\varepsilon \geq 0$, except that dust form at $\lambda = 0$ then includes the trivial slot.

It expands Proposition (F13-38) with the action-level form recorded in the local overlay records Big01-A-DM dmA1:prop-vacshift (local overlay record, unregistered; not a premise) and Big03-A-DM dmA3:prop-vacshift (local overlay record, unregistered; not a premise), and re-proves Big06-A prop:DM-v2-shift (source record; not a premise). ``Not the weak energy condition" means ``not for every shift" (PB2-9). par *Non-claim.* No vacuum energy is claimed or normalized, and no value of λ, C or Λ is selected. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Future branches, the horizon indicator and the null energy condition; thm:B6B2-futures). *Consider flat hosts* $-c^2\mathrm{d}t^2 + a(t)^2\mathrm{d}\mathbf{x}^2$ *with smooth expanding* $a > 0$, $\chi > 0$, $R_e(t) = c\,a(t)\int_t^\infty \mathrm{d}s/a(s) \in (0,\infty]$ *and the event-horizon indicator* $E(a) = 1[R_e < \infty]$, *which does not depend on t.*

• *Smooth class. For every prefix as in Proposition there are two smooth expanding futures that agree up to a time* t_1 *and have* $E = 1$ *and* $E = 0$. *For every rule, or adaptive randomized experiment, whose complete outcome law depends on the host only through* $a|_{(-\infty,t_1]}$, *and a prior* π *on the member with* $E = 1$, *the success probability for E is at most* $\max\{\pi, 1-\pi\}$, *and exactly* $\frac{1}{2}$ *at* $\pi = \frac{1}{2}$; *a deterministic rule of the prefix is wrong on one member.*

• *Analytic class. If a is real analytic on an open interval containing* $[t_1,\infty)$, *then* $a|_{[t_1,\infty)}$, R_e *on* $[t_1,\infty)$ *and* $E(a)$ *are functions of a on any nonempty open subinterval ending at* t_1. *The branch of Specification with* $C > 0$, $a^3 = (C/h_\infty^2)\sinh^2(\frac{3}{2}h_\infty t)$, *is real analytic on* $(0,\infty)$ *and has* $E = 1$, *with* $R_e \to c/h_\infty$ *(F13-29).*

• *Null-energy price of a small horizon. The total* $\chi^{-1}(\mathcal{G} + \Lambda g)$ *of a flat host satisfies the null energy condition at t if and only if* $\dot{H}(t) \le 0$, *for every declared* Λ. *If it does so on* $[t_0,\infty)$, *then* $R_e(t_0) \ge c/H(t_0)$, *with equality if and only if* $a(t) = a(t_0)e^{H(t_0)(t-t_0)}$ *for* $t \ge t_0$. *Hence a future with* $R_e(t_0) < c/H(t_0)$ *violates the null energy condition of the total at some* $t > t_0$, *and then every split has a slot that violates it there.*

• *Vacuum and split coordinates.* R_e *and E are functionals of g alone, so they are constant on the joint split–current fibre and along the vacuum shift of Proposition (a); adjoining the vacuum coordinate does not change (a). On any*

interval where H is constant, $T_{\mathrm{tot}} = \chi^{-1}(\Lambda - 3H^2/c^2)g$ *there, so every split into slots satisfying the null energy condition is of vacuum type and a positive dust slot leaves a remainder violating it (Theorem , F13-31); a vacuum shift keeps the current and the null energy condition of each slot, but not dust form or the weak energy condition outside* $[-\rho_\Lambda, \varepsilon_{\min}]$ *(F13-38).*

Proof. (a) Proposition gives the two futures; a common outcome law gives each rule the same probability p of answering $E = 1$ on both members, so the success probability is $\pi p + (1-\pi)(1-p) \le \max\{\pi, 1-\pi\}$; a deterministic rule of the prefix gives the same answer on both. (b) Two real-analytic functions that agree on a nonempty open subinterval of a connected open interval agree on all of it (identity theorem), so a on $[t_1, \infty)$, and hence R_e and E, are determined. For the branch, $u = a^{3/2}$ satisfies $\dot{u} = \frac{3}{2}Hu$ and $\dot{u}^2 = \frac{9}{4}(h_\infty^2 u^2 + C)$, solved by $u = \sqrt{C}\, h_\infty^{-1} \sinh(\frac{3}{2}h_\infty t)$; the horizon statement is Theorem . (c) In the comoving frame, $\chi(\rho + p) = -2\dot{H}/c^2$ for the total (a Λ term contributes opposite amounts to ρ and p); for a perfect fluid the null energy condition is $\rho + p \ge 0$. If $\dot{H} \le 0$ on $[t_0, \infty)$ then $H \le H(t_0)$, $a(s) \le a(t_0)e^{H(t_0)(s-t_0)}$ and $\int_{t_0}^{\infty} \mathrm{d}s/a \ge (a(t_0)H(t_0))^{-1}$; equality forces equality of the continuous integrands. Slots satisfying the null energy condition sum to a total that satisfies it. (d) R_e is computed from a only, and the shift and the split leave g unchanged. For constant H the flat host is locally de Sitter with $\mathcal{G} = -3H^2c^{-2}g$; apply Theorem and Proposition (e) (check B6B2-7, with null-energy-respecting and violating futures and the analytic branch).

Status: proved; new (plan t355u, S 3). It aligns F13-29, F13-30, F13-31 and F13-38 (Theorems , , Propositions ,) with Theorems and and the source records below, as the plan asks; ``every rule of past data succeeds with probability exactly $\frac{1}{2}$'' holds at equal prior, and for every prior the bound is $\max\{\pi, 1-\pi\}$ (PB2-8). The plan's F13 numbers match their descriptions (Appendix); for F13-38 the weak energy condition fails only outside a closed interval (PB2-9). par *Non-claim.* No future is forecast, no branch is selected, and no vacuum energy is claimed. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Smooth future ambiguity survives a supplied positive-dust history; thm:B6B2-dustfutures). *Set* $c = 1$, *fix* $H_* > 0$, $a_* > 0$ *and the de Sitter past* $a(t) = a_* e^{H_* t}$, $t \le 0$. *Let* ς *be a smooth step with* $\varsigma = 0$ *on* $(-\infty, 0]$, $\varsigma = 1$ *on* $[1, \infty)$, $0 < \varsigma < 1$ *between,* $S(t) = \int_0^t \varsigma$, $H_q = H_*/(1 + H_* S/q)$ *and* $a_q = a_* \exp \int_0^t H_q$ *for* $q > 0$.

• *All* a_q *share the past and all derivatives at* $t = 0$*; eventually* a_q *is a constant times* $(t + \text{const})^q$, *so* $\int_0^\infty \mathrm{d}t/a_q$ *is finite iff* $q > 1$. *The flat effective totals (*$\Lambda = 0$*) satisfy the null energy condition for every* q *and the dominant energy condition for* $q \ge \frac{1}{3}$; $q = 1$ *and* $q = 2$ *give an event horizon in one future and none in the other.*

• *The separately conserved dust* $D = \varepsilon_0 (a_*/a)^3 u^{\text{flat}} \otimes u^{\text{flat}}$, $u = \partial_t$, $\varepsilon_0 > 0$, *with zero assigned current, can be appended to every member with identical past history; the remainder is conserved and violates the null energy condition on the de Sitter past.*

• *For data restricted to the common past,* $\inf_{\widehat{B}} \sup_q \Pr_q(\widehat{B} \ne B(q)) = \frac{1}{2} = \sup_{\widehat{B}} \inf_q \Pr_q(\widehat{B} = B(q))$ *over randomized Boolean rules, where* B *indicates horizon existence; a deterministic rule of the fixed past has worst-case success* 0.

• *Real analyticity of* a *on the whole time line forces* $a = a_* e^{H_* t}$; *a supplied bound* $H \ge h_0 > 0$ *on the future also forces a horizon, without analyticity.*

Proof. (a) ς and hence $H_q - H_*$ vanish to all orders at 0. For $t \ge 1$, $S = t - s_0$ and $H_q = q/(t + q/H_* - s_0)$. $\dot{H}_q = -H_q^2 \dot{\varsigma}/q \le 0$, so $\chi(\rho + P) = -2\dot{H}_q \ge 0$; with $\chi\rho = 3H^2$ and $\chi P = -(2\dot{H} + 3H^2)$, $\rho \ge |P|$ iff $2\dot{\varsigma}/q \le 6$, which holds for $q \ge \frac{1}{3}$. (b) The comoving field is geodesic and $\dot{\varepsilon} + 3H\varepsilon = 0$; the total is conserved, so the remainder is; on the past the total is of vacuum form and Theorem (b) applies. (c) A common answer probability r gives successes r and $1 - r$. (d) Identity theorem; $a(t) \ge a(0) e^{h_0 t}$ makes the conformal integral finite (check B6B2-22: quadrature of the conformal integrals, $\dot{H}$ against finite differences, energy conditions on grids, and a mutation with $q = \frac{1}{2}$ claimed to have a horizon).

Status: proved; new (draft t356u F15-21). It sharpens Theorem (a): the ambiguity survives energy conditions on

the total and a supplied positive-dust history; $\frac{1}{2}$ is the optimal worst-case value, not every rule's success (PB2-8). It agrees with the overlay correction PC5-5 (analyticity is sufficient, not necessary). par *Non-claim.* These comparison hosts are not Host A, Host B or a created Host C, and no future is forecast. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Asymptotic coefficient on the selected late branch; prop:B6B2-late). *On the branch* $H(a)^2 = h_\infty^2 + Ca^{-3}$, $h_\infty > 0$, $C \geq 0$, *of Specification* , $R_e(a) = \frac{c}{h_\infty}(1 - \frac{C}{8h_\infty^2}a^{-3} + O(a^{-6}))$. *For* $C > 0$ *it approaches* c/h_∞ *from below, while* c/H *has leading relative correction* $-Ca^{-3}/(2h_\infty^2)$.

Proof. $R_e(a) = ca\int_a^\infty \mathrm{d}b/(b^2H(b))$ and $1/H(b) = h_\infty^{-1}(1 - \frac{C}{2h_\infty^2}b^{-3} + O(b^{-6}))$ uniformly for large b; $a\int_a^\infty b^{-2} = 1$ and $a\int_a^\infty b^{-5} = a^{-3}/4$. For $C > 0$ the integrand is strictly below $1/(h_\infty b^2)$ (check B6B2-23, quadrature against the expansion, and a mutation with coefficient $\frac{1}{2}$).

Status: proved; new (draft t356u F15-22). It refines Theorem (F13-29) only on the separately supplied branch, which is not inferred from past data (PB2-16). par *Non-claim.* No value of h_∞ or C is selected. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Documentary record (Future-branch source records). Big01-A thm:Efuture (source record; not a premise) gives, on a de Sitter past, the horizon radius $R_e(t) = c/H_1 + (R_0 - c/H_1)e^{H_1 t}$, the realizability of every $R_0 \in (0, \infty]$ and the minimax error $\frac{1}{2}(R_+ - R_-)e^{H_1 t}$; the success probability $\frac{1}{2}$ for the existence indicator and the statement that the decision is trivial for real-analytic futures are in Big01-A cor:P5(d),(f) (source record; not a premise), not in thm:Efuture (PB2-8). Big05-A thm:Big05-futures (source record; not a premise) gives the null-energy bound $R_* \geq c/H_\mathrm{E}$ (its part 2) and analytic rigidity (its part 3), which parts (c) and (b) above re-prove in the local forms stated. Big06-A thm:DM-v2-vacbranch (source record; not a premise) (``constant-vacuum branch", with $C > 0$) is the source record of F13-29, whose Specification allows $C \geq 0$ (PB2-16).

par *Non-claim.* Documentary records are not premises. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Split-coupled kernels and conditional relations

Proposition (*New in version 2.* The acoustic kernel is injective in the baryon fraction; prop:B6B2-rsderiv). *Under the hypotheses of Proposition , with* $\varepsilon_{\mathrm{b}} = f_{\mathrm{b}}\varepsilon_{\mathrm{m}}$, $f_{\mathrm{b}} \in (0,1]$, *and fixed* $H(a)$, $\varepsilon_\gamma(a) > 0$, $\varepsilon_{\mathrm{m}}(a) \geq 0$ *on* $(0, a_*]$ *such that* $\int_0^{a_*} \varepsilon_{\mathrm{m}}\,(\varepsilon_\gamma a^2 H)^{-1}\mathrm{d}a < \infty$,

$$\frac{\partial r_s(a_*)}{\partial f_{\mathrm{b}}} = -\int_0^{a_*} \frac{c_s(a)\,R_{\mathrm{b}}(a)}{2f_{\mathrm{b}}\,(1+R_{\mathrm{b}}(a))}\,\frac{\mathrm{d}a}{a^2 H(a)}, \qquad \frac{R_{\mathrm{b}}}{f_{\mathrm{b}}} = \frac{3\varepsilon_{\mathrm{m}}}{4\varepsilon_\gamma}.$$

The derivative is negative if and only if $\varepsilon_{\mathrm{m}} > 0$ *on a subset of* $(0, a_*]$ *of positive measure; otherwise* r_s *does not depend on* f_{b}. *In the first case* r_s *separates every two splits of the matter slot with different* f_{b} *and the same remaining supply. Quantitatively, with* $W(a) = c/(\sqrt{3}a^2H)$, $B = R_{\mathrm{b}}/f_{\mathrm{b}}$ *and* $f_{\mathrm{b}} \in [f_-, f_+]$, *put* $m_s = \frac{1}{2}\int_0^{a_*} WB(1+f_+B)^{-3/2}\mathrm{d}a > 0$; *then* $|f - \hat{\tilde{f}}| \leq |r_s(f) - r_s(\hat{\tilde{f}})|/m_s$. *If the endpoint depends on the fraction,* $a_* = a_*(f_{\mathrm{b}})$, *the derivative acquires the boundary term* $W(a_*)(1+f_{\mathrm{b}}B(a_*))^{-1/2}a_*'(f_{\mathrm{b}})$, *and strict decrease needs control of that term.*

Proof. $c_s = c/\sqrt{3(1+R_{\mathrm{b}})}$ gives $\partial c_s/\partial R_{\mathrm{b}} = -c_s/(2(1+R_{\mathrm{b}}))$, and $\partial R_{\mathrm{b}}/\partial f_{\mathrm{b}} = R_{\mathrm{b}}/f_{\mathrm{b}} = 3\varepsilon_{\mathrm{m}}/(4\varepsilon_\gamma)$. The f_{b}-derivative of the integrand is bounded by $\frac{c}{\sqrt{3}}\frac{3\varepsilon_{\mathrm{m}}}{8\varepsilon_\gamma}(a^2H)^{-1}$, which is integrable, so differentiation under the integral is allowed. The integrand is nonpositive and vanishes exactly where $\varepsilon_{\mathrm{m}} = 0$. In this notation reads $-\partial r_s/\partial f_{\mathrm{b}} = \frac{1}{2}\int WB(1+f_{\mathrm{b}}B)^{-3/2}\mathrm{d}a \geq m_s$ on $[f_-, f_+]$; integrate between two fractions. The endpoint term is the Leibniz rule. A strictly decreasing function is injective (check B6B2-5, against finite differences, with a sign mutation).

Status: proved; new (draft t356u F15-26, merged). It makes precise the clause ``the sound horizon is strictly decreasing in the baryon fraction" of Proposition (version 1, F13-22), kept by plan t355u (S 4); version 2 adds the derivative and the positive-measure condition (DC7-2). par *Non-claim.* No acoustic scale, baryon fraction or cosmological parameter is computed or printed [HuSugiyama96,Planck18,Eisenstein05]. Ledger unchanged: no

quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Centroid identity with self-gravity and self-interaction removed; prop:B6B2-centroid). *In the setting of Proposition let the densities be bounded with compact support, let* $\Phi = \Phi_{\mathrm{dm}} + \Phi_{\mathrm{g}} + \Phi_{\mathrm{ext}}$ *with* $\Phi_i(x) = -G\int \rho_i(x')|x - x'|^{-1}\mathrm{d}x'$ *for* $i \in \{\mathrm{dm}, \mathrm{g}\}$ *and* Φ_{ext} *supplied, and let* $f_i = f_i^{\mathrm{self}} + f_i^{\mathrm{x}}$*, where* $\int f_i^{\mathrm{self}} = 0$ *(a momentum-conserving self-interaction of component i) and* $\int f_{\mathrm{g}}^{\mathrm{x}} = -\int f_{\mathrm{dm}}^{\mathrm{x}} =: -F$ *(action and reaction between the components). With* $\mu^{-1} = M_{\mathrm{dm}}^{-1} + M_{\mathrm{g}}^{-1}$ *and* $\mathcal{G} = -\int \rho_{\mathrm{dm}} \nabla\Phi_{\mathrm{g}}\,\mathrm{d}x$*,*

$$\ddot{\Delta} = \mu^{-1}(\mathcal{G} + F) - \langle \nabla\Phi_{\mathrm{ext}} \rangle_{\mathrm{dm}} + \langle \nabla\Phi_{\mathrm{ext}} \rangle_{\mathrm{g}}.$$

Hence each component's self-gravity and every momentum-conserving self-interaction drop out: a dark self-interaction cross-section enters $\ddot{\Delta}$ *only through the shape of* ρ_{dm} *in* $\mathcal{G}$ *and through the exchange F. A uniform external field drops out; a nonuniform one does not in general. Rejection condition: with densities, potentials and exchange law supplied, a mismatch between the observed* $\ddot{\Delta}$ *and rejects those force and reconstruction equations jointly; elastic self-collisions of the complete closed component contribute nothing (Proposition), so a cross-section inference needs further spatial, kinetic, selection and reconstruction information.*

Proof. For bounded compactly supported densities the double integral $\int\int \rho_i(x)\rho_j(x')\, G(x - x')|x - x'|^{-3}\mathrm{d}x\,\mathrm{d}x'$ converges absolutely. With $i = j$ it changes sign under $x \leftrightarrow x'$, so $\int \rho_i \nabla\Phi_i = 0$; with $i \neq j$ the same exchange gives $\int \rho_{\mathrm{dm}} \nabla\Phi_{\mathrm{g}} = -\int \rho_{\mathrm{g}} \nabla\Phi_{\mathrm{dm}}$. Insert into $M_i \ddot{X}_i = -\int \rho_i \nabla\Phi + F_i$ (proof of Proposition) and subtract. If $\nabla\Phi_{\mathrm{ext}}$ is constant its two averages coincide; a quadratic Φ_{ext} gives averages that depend on the centroids (check B6B2-4, with point masses, a uniform field and a tidal field as negative control).

Status: proved; new (draft t356u F15-28, merged). It refines Proposition of version 1 (the Bullet-type kernel, F13-21) by removing self-gravity and momentum-conserving self-interaction, within the split-coupled kernels that plan t355u (S 4) keeps. par *Non-claim.* No merger is modelled, no cross-section is bounded, and segregation is not read as collisionlessness [Clowe06,Randall08]. Ledger unchanged: no quantum coefficient is admitted; Host C is

not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Version 2 summary of the split-coupled and carrier-coupled kernels.

toprule Kernel Coupling and result Supply needed before a split is read

midrule Acoustic scale split-coupled through the photon–baryon law; strictly decreasing and injective in f_{b}

(Propositions ,) tight coupling, adiabaticity, $H(a)$, $\varepsilon_{\gamma}(a)$

Radial acceleration relation g_{bar} fills $[0, g_{\mathrm{obs}}]$ on the fibre (Proposition) a baryonic model

Satellite counts, planes occupation-coupled (Proposition , Corollary) occupation law, selection, halo definition

Bullet-type offset kinematics, Propositions and potential, gas force, velocities, exchange law

Cross-section σ/m carrier-fibre coordinate on cold flows (Proposition) a kinetic model beyond the stress

bottomrule par *Non-claim.* The table classifies kernels; it evaluates none against data, and among models of feedback, self-interaction, wave-like dark matter or modified dynamics none is preferred. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Growth and slip relations; prop:B6B2-growthslip). *The following hold.*

• *Growth (relation III). For* $D \neq 0$ *put* $N = \ln a$, $f = \mathrm{d}\ln D/\mathrm{d}N$, $f_N = \mathrm{d}f/\mathrm{d}N$. *Then* $a^2 D''/D = f_N + f^2 - f$ *and* $aH'/H = \mathrm{d}\ln H/\mathrm{d}N$, *so the diagnostic equals* $\frac{2a^3H^2}{3H_0^2}[f_N + f^2 + (2 + \mathrm{d}\ln H/\mathrm{d}N)f]$, *the form of Big06-A thm:DM-v2-growth* (source record; not a premise). *Under Specification it is the constant* Ω_{m0}*: expansion and growth reconstruct one matter density. Rejection condition:* $\widehat{\Omega}_m$ *non-constant or negative on an interval rejects the growth package; with the supplied flat closure,* $\widehat{\Omega}_m(a) \neq (E^2 - 1)/(a^{-3} - 1)$ *rejects the package with the closure.*

• *Slip (relation IV). Under Specification ,* $L_g - 2V_g = k^2(\Psi - \Phi)$ *with no field equation (Big06-A thm:DM-v2-slip* (source record; not a premise)*). Rejection condition:* $L_g \neq 2V_g$ *on a mode rejects zero slip on that mode, not the residual.*

• *Independence. The growth package involves* (H, D) *only, and the slip package* (Ψ, Φ) *only. Every pair* (H, D) *that passes (a) is compatible with every slip residual, and every mode with* $L_g = 2V_g$ *is compatible with every* (H, D)*; so neither rejection condition implies the other, and a failure rejects only its own package.*

• *Neither relation reads the split:* $\widehat{\Omega}_m$ *concerns the total matter density, and* $L_g - 2V_g$ *concerns potentials.*

Proof. (a) $D' = fD/a$, so $D'' = (f_N - f + f^2)D/a^2$, and $(3/a + H'/H)D' = (3 + \mathrm{dln}\, H/\mathrm{d}N)fD/a^2$; adding gives the bracket, and $a^5/a^2 = a^3$. The constancy is Theorem . (b) Proposition . (c) The two specifications share no variable; given passing growth data, any Φ with the reconstructed Ψ gives the slip residual $k^2(\Psi - \Phi)$, which takes every real value. (d) The definitions contain no split coordinate (check B6B2-13, symbolic equality of the two forms and an independence witness).

Status: proved; new as a joint statement. The plan asks to ``add" these two relations; both are already relations III and IV of version 1 (Theorem , F13-27; Proposition , F13-28), with their rejection conditions in Table . Version 2 adds the equivalence of the two diagnostic forms and the independence of the relations. The further clause of thm:DM-v2-slip that uses linearized field equations is not imported (PB2-10). par *Non-claim.* No growth rate, slip or matter density is measured or printed [ChibaTakahashi07,Sahni08,Zhang07]. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Documentary record (Two-dust relative modes). Big06-A thm:DM-v2-twodust (source record; not a premise) gives, for two separately conserved pressureless components in conformal Newtonian gauge, $S' = -V$ and $V' + \mathscr{H}V = 0$, a finite limit of S when $\int^{\infty} \mathrm{d}\eta/a < \infty$, and the decomposition of the total into relative modes. Theorem (F13-26) re-proves the cosmic-time form, and it is recorded here for any later multi-component residual.

par *Non-claim.* Documentary records are not premises. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Theorem (*New in version 2.* Integral growth diagnostic without a second derivative; thm:B6B2-intgrowth).

Supply $a(t) > 0$, $H = \dot{a}/a$, $G > 0$ *and a nonzero differentiable growth variable D. Under the total-dust growth package* $\ddot{D} + 2H\dot{D} = 4\pi G\rho_{m0}a^{-3}D$, $\rho_{m0} \geq 0$, *every* $t_1 < t_2$ *satisfies* $a(t_2)^2\dot{D}(t_2) - a(t_1)^2\dot{D}(t_1) = 4\pi G\rho_{m0}\int_{t_1}^{t_2} D/a\,\mathrm{d}t$, *so the ratio* $\hat{\rho}_{m0}[t_1, t_2]$ *of the two sides (where the integral is nonzero) is one common nonnegative constant. Conversely, if the interval identity holds on every subinterval with one constant and* $a^2\dot{D}$ *is absolutely continuous, the growth equation holds almost everywhere. Rejection condition: interval-dependent or negative values of* $\hat{\rho}_{m0}$ *reject the growth package; a mismatch with an expansion-derived density rejects the enlarged package only when an expansion closure is supplied.*

Proof. $\frac{\mathrm{d}}{\mathrm{d}t}(a^2\dot{D}) = a^2(\ddot{D} + 2H\dot{D}) = 4\pi G\rho_{m0}D/a$; integrate. Conversely, differentiate the interval identity at Lebesgue points (check B6B2-24, on an exact matter-era solution, with a perturbed ρ_{m0} on one interval as mutation).

Status: proved; new (draft t356u F15-23). It is an integral refinement of relation III (Theorem , F13-27; Proposition (a)); growth and slip are not new relations (PB2-10). par *Non-claim.* Expansion alone supplies no matter density without a closure. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Force and calibration contamination of a slip residual; prop:B6B2-forcedslip). *In a supplied conformal-time Fourier convention let tracer motion obey* $\theta' + \mathscr{H}\theta = k^2\Psi + S_\theta$, $k \neq 0$, *and put* $V_{\mathrm{dyn}} = -(\theta' + \mathscr{H}\theta)$, $L = -k^2(\Phi + \Psi)$. *Then* $L - 2V_{\mathrm{dyn}} = k^2(\Psi - \Phi) + 2S_\theta$, *and with additive reconstruction errors* b_L, b_V *the reported residual is* $k^2(\Psi - \Phi) + 2S_\theta + b_L - 2b_V$. *Under a further supplied relation* $k^2(\Phi - \Psi) = 12\pi Ga^2\Pi$ *it equals* $-12\pi Ga^2\Pi + 2S_\theta + b_L - 2b_V$. *Rejection condition: a nonzero residual rejects the joint package of geodesic tracers, zero slip and common calibration, without identifying which assumption fails.*

Proof. $V_{\mathrm{dyn}} = -k^2\Psi - S_\theta$; substitute (check B6B2-25, symbolic).

Status: proved; new (draft t356u F15-24). It refines relation IV (Proposition , F13-28; Proposition (b)). The

relation with Π is a supplied hypothesis here, not an import of the field-equation clause of thm:DM-v2-slip (PB2-10). par *Non-claim.* Neither a force term nor equal calibration is supplied by $j_{\mathrm{dm}} \equiv 0$, and a nonzero residual is not a detection. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* The complete compensated relative-mode family; prop:B6B2-compensated). *Let two separately conserved geodesic dusts have constant background fraction $f \in (0,1)$, no other perturbed component, and a supplied linear metric closure admitting zero potentials for zero total density, momentum, pressure and anisotropic stress. In cosmic time, with $\dot{\delta}_i = -\theta_i/a$ and $\dot{\theta}_i + H\theta_i = 0$ at vanishing potentials, for arbitrary constants A, C put $V = C/a$, $S = A - C\int_{t_0}^{t} a^{-2}$ and $\delta_1 = (1-f)S$, $\delta_2 = -fS$, $\theta_1 = (1-f)V$, $\theta_2 = -fV$. These are compensated zero-potential solutions, and metric-only observations cannot identify (A, C). Rejection condition: a metric response assigned to exactly this package rejects the assignment or its closure.*

Proof. $f\delta_1 + (1-f)\delta_2 = 0 = f\theta_1 + (1-f)\theta_2$; dust has no pressure or anisotropic stress; $\dot{V} = -HV$ and $\dot{S} = -C/a^2 = -V/a$ (check B6B2-26).

Status: proved; new (draft t356u F15-25). It extends the relative modes of Theorem (F13-26) to nonzero relative velocity; source record Big06-A thm:DM-v2-twodust (source record; not a premise). par *Non-claim.* Photon coupling, baryon pressure or other sources change the package. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Cold-flow carrier ambiguity in a weak collision model; prop:B6B2-cold). *Supply a classical elastic two-body Boltzmann collision operator whose weak form is finite on the monokinetic measure $f_x = n(x)\delta_{v(x)}$. Multiplying its kernel by any constant $\lambda \geq 0$ leaves the collision term zero on this flow, so an unrestricted cross-section normalization is not identifiable from the dust stress. For every flow on which the weak form exists, $\int v\, Q(f,f)(\mathrm{d}v) = 0$: elastic self-collisions exert no net force on the centroid of the complete closed*

component.

Proof. The weak form pairs the kernel with $\varphi(v') + \varphi(v'_*) - \varphi(v) - \varphi(v_*)$. On a monokinetic pair $v = v_*$, and elasticity with momentum conservation gives $v' = v'_* = v$, so the bracket vanishes for every φ; scaling preserves zero. For $\varphi(v) = v$ the bracket vanishes by momentum conservation (check B6B2-27, random elastic collisions).

Status: proved; new (draft t356u F15-27). It gives a well-defined collision model for Proposition and the zero self-force used in Proposition . par *Non-claim.* Singular kernels are not covered, warm equilibria are not claimed to collide, and a lensing peak, an X-ray peak and a complete-component centroid are different targets. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Non-electromagnetic constraints, quantum access and documentary separations

Proposition (*New in version 2.* Neutral-code floors and the exact replacement spectrum; prop:B6B2-shredder). *Let the logical input be the full matrix algebra on $\mathbb{C}^d$, $d \geq 2$, with arbitrary inputs and untouched references, no unlisted message-bearing assistance, and $d_\diamond = \frac{1}{2}\|\cdot\|_\diamond$. The declaration $j_{\mathrm{dm}} \equiv 0$ is imposed on the host account and restricts the code to no classical alphabet.*

• *Every classical-output channel followed by a channel decoder has $d_\diamond(\cdot, \mathrm{id}) \geq 1 - 1/d$, sharp (basis pinching).*

• *For $\mathscr{R}_\tau(X) = \mathrm{Tr}\,(X)\tau$ with eigenvalues λ_i of τ, $d_\diamond(\mathscr{R}_\tau, \mathrm{id}) = 1 - 1/S$ with $S = \sum_i \lambda_i^{-1}$ if $\tau > 0$, and $= 1$ if τ is singular. Since $S \geq d^2$ with equality iff $\tau = I/d$, the minimum over τ is $1 - 1/d^2$, attained only at $\tau = I/d$.*

• *Both values are constant on the joint fibre $\mathscr{J}(h)$ of Theorem . If an implemented channel is within δ of a specified classical-output comparison, every decoder has error at least $\max\{0, 1 - 1/d - \delta\}$; for a replacement comparison the optimized floor is $\max\{0, 1 - 1/d^2 - \delta\}$.*

Proof. (a) Theorem : the composite is entanglement-breaking, its output on the maximally entangled Φ_d is separable, and $\mathrm{Tr}\,(\Phi_d(a \otimes b)) \leq 1/d$ for product states; so the fidelity with Φ_d is at most $1/d$. Pinching is the average of the d phase conjugations, which gives the matching upper bound. (b) Upper bound: with the unnormalized

maximally entangled vector Ω, $\langle\Omega|(I\otimes\tau)^{-1}|\Omega\rangle = \mathrm{Tr}\,\tau^{-1} = S$, so $I\otimes\tau \geq t\,\mathrm{proj}\,\Omega$ with $t = 1/S$. The left side is the Choi matrix of $\mathscr{R}_\tau$ and $t\,\mathrm{proj}\,\Omega$ that of $t\,\mathrm{id}$; the difference is positive with partial trace $(1-t)I$, so $\mathscr{R}_\tau = t\,\mathrm{id} + (1-t)\Xi$ for a channel Ξ, and $d_\diamond \leq 1-t$. Lower bound: the input $\psi = \sum_i \sqrt{\lambda_i^{-1}/S}\, f_i \otimes e_i$ has overlap $\sum_i p_i^2 \lambda_i = 1/S$ with its output, and $\frac{1}{2}\|\mathrm{proj}\,\psi - \rho\|_1 \geq 1 - \langle\psi|\rho|\psi\rangle$. If τ is singular, a product input in a zero-eigenvalue direction gives an orthogonal output. $S \geq d^2$ by Cauchy–Schwarz, with equality iff all λ_i are equal. (c) The channels do not depend on (σ, j); the triangle inequality and contractivity under post-processing give the robust floors, and a decoder after a replacement channel is again a replacement channel (check B6B2-14: the Choi decomposition, the semidefinite value on random τ, and a mutation replacing $1/S$ by $1/d^2$).

Status: proved; new in this form (draft t356u F15-29, F15-30; plan t355u S 5). Part (b) now re-proves the exact value of I-C-CERT thm:replacement (source record; not a premise) locally, including its upper bound; part (a) covers I-C thm:A (source record; not a premise), which is stated for deterministic decoders (PB2-11). par

Non-claim. The floors certify access, not photon non-interaction or a gravitational law; a further superselection promise would require a new sharpness argument. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Proposition (*New in version 2.* Enter invariance does not supply a source law; prop:B6B2-enter). *For an orthonormal clock basis τ_j and surviving factor S, put $D_j = \langle\tau_j|\otimes I_S$ and $\mathscr{M}(X) = \sum_j \mathrm{proj}\, j_R \otimes D_j X D_j^\dagger$. Then $\mathscr{M}$ is completely positive and trace preserving, and $\mathrm{Tr}_R\,\mathscr{M}(X) = \mathrm{Tr}_C X$, also with untouched references. A clock read and ignored, with no clock-controlled payload operation, leaves the payload channel unchanged. Neither this identity nor its joint-fibre invariance determines T^{DM}, an electromagnetic Euler derivative or a metric.*

Proof. The Kraus operators $|j\rangle\otimes D_j$ satisfy $\sum_j D_j^\dagger D_j = \sum_j |\tau_j\rangle\langle\tau_j|\otimes I_S = I$; $\sum_j D_j X D_j^\dagger$ is the partial trace in the basis τ_j; the same computation holds with a reference factor. For a product clock input the clock trace is 1. The source and geometric objects are neither arguments nor outputs of $\mathscr{M}$ (check B6B2-28, random X and a mutation that drops one Kraus operator).

Status: proved; new (draft t356u F15-31). Source records: I-B thm:instrument (source record; not a premise) and I-D thm:instrument (source record; not a premise), both labels confirmed in fresh records. par *Non-claim.* Conditional reference steering is compatible with an unchanged unconditional marginal; no clock-defined metric is derived. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Documentary record (Documentary separations; no proof transfer (draft t356u F15-32 to F15-35)). En04-B thm:current-blind (source record; not a premise) concerns a *printed* current $o \in \{J, P\}$, a host-data reading that is code-blind, needs an additional source supply, and does not identify that supply. It is not the dark-sector Euler current $\mathscr{J}$ of Definition , and nothing about $\mathscr{J}_{\mathrm{dm}}$ follows from it. En04-B thm:curvature-sampling (source record; not a premise) samples a fixed nonzero curvature on settled Host B and leaves g_B unchanged; no backreaction is constructed. Hawk05-B thm:page (source record; not a premise) is an exact finite Haar-model Page mean, not a cosmological forecast. DS-OB-1-fibre thm:F-rank (source record; not a premise) and DS-OB-1-fibre cor:F-ranknotsel (source record; not a premise) state that the vacuum family has rank one on de Sitter regions and that effective rank does not select a coefficient; this agrees with Remark and Theorem . I-B thm:instrument (source record; not a premise) is the complete destructive clock instrument behind Definition , and consuming a clock encoding derives no metric. I-D prop:v5-u6 (source record; not a premise) tabulates Host-B source prescriptions and does not supply Host C, and the instrument identities of I-B and I-D do not identify their hosts with the comparison metrics used above. En04-A thm:magic-fibre (source record; not a premise) records resource-label fibres with different leakage values; this identifies no resource label, leakage or capacity with a stress residual. The scalar code-blindness of thm:current-blind does not assert that every sampler of a spatially varying current is code-blind. DS-OB-1-fibre thm:F-rank (source record; not a premise) acts on Einstein regions through the single number $c_0 - \frac{R}{4}c_G$, which on de Sitter is $c_0 - 3H^2 c_G/c^2$: rank one on the four coefficients, kernel of dimension three. Finally, these inserts do not construct the joint characteristic map of the analytic chain: XIV-I thm:I2 (source record; not a premise), XIV-I thm:I3 (source record; not a premise), XIV-J thm:J2 (source record; not a premise), XIV-J cor:noadmission (source record; not a premise), XV-B thm:lifting (source record; not a

premise) and XV-B thm:pointcorrection (source record; not a premise) are cited only as the records of that open chain (labels confirmed by fresh read-only GET; record versions are not asserted), and the absence of a construction here proves no impossibility. The OpenAI catalogue record, re-fetched read-only on 25 October 2026, contains no occurrence of the string ``dark" (case-insensitive), so in particular none of ``dark matter" (PB2-12). This is a fresh scan, so the draft's caution that the count was not independently verified is superseded (DC7-4); the catalogue is not a premise, not a realization of $j_{\mathrm{dm}} \equiv 0$, not a source-selection law and not a quantum-coefficient admission. The local overlay record Big05-A-DM dmA5:v2-sub-spectator (local overlay record, unregistered; not a premise) (version 2) is the canonical neutral-spectator reference of the overlays; adjoining the inert declaration $j_{\mathrm{dm}} \equiv 0$ closes no unrelated gate, in agreement with Theorem (b).

par *Non-claim.* Documentary records are not premises; a separation is not evidence of a bridge. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Conclusion

The declared residual is unique once the geometry, the normalization, the vacuum convention and the other sources are supplied (Theorem), and it carries no equation of state or microscopic realization. The electromagnetic declaration excludes a photon coupling exactly insofar as that coupling contributes a nonzero net Euler derivative at the prescribed host (Propositions and). Split-independent observations are constant on the split fibre with exact risks $\frac{1}{2}(s_{+} - s_{-})$, $\frac{1}{2}$, ∞, and relative risk exactly 1 for the unrestricted ratio (Lemma , Theorem); acoustic data, the radial acceleration relation, satellite statistics and cluster offsets are split-coupled or carrier-coupled through supplied laws (Propositions , , , ,). The spherical inverse problem is exact but ill-conditioned for densities and slopes in the uniform topology, with sharp constants when derivatives are observed (Theorems –); the dark slope is a fibre coordinate (Proposition); the only exact dispersion bound is the anisotropy-free full-aperture virial bound (Theorem). The seven joint relations are tests of packages, each with its rejection condition (Table). par *Non-claim.* The conclusion restates proved and conditional results; it adds none.

Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Version 2. Every functional of the declared host data and the non-electromagnetic reading is constant on the joint split–current fibre (Theorem). The unrestricted dark-to-ordinary ratio has relative risk exactly 1, attained only by reporting 0, under common, stopped and postselected processes, and the sharp value $1 - \eta$ under η-approximate ones unless endpoint domination holds (Theorems , , ,). The residual is a function of the supply exactly when all four supplies are given; its kernel is the conserved transfers (Theorem). The dark slope stays free at fixed dark shell masses, and uniform-norm topologies give no stable reconstruction (Theorems , , Corollary). The virial moment rejects exactly when $W_{\mathrm{d}} < 0$ and pins the enclosed mass to an exact interval (Theorem). Positive dust on a vacuum-form total costs a null-energy violation of the other slots, and the vacuum shift is limited as stated (Theorems ,). Smooth futures leave the horizon indicator at success $\frac{1}{2}$ at equal prior even with a supplied positive-dust history (Theorems ,). The growth and slip relations are independent and each has its own rejection condition (Proposition). The Shredder floors are unchanged by the non-electromagnetic constraint and the replacement spectrum is exact (Proposition). par *Non-claim.* The version-2 conclusion restates proved results; it adds none. Ledger unchanged: no quantum coefficient is admitted; Host C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

Non-claims and source-record table

This sheet does not derive a microscopic Lagrangian or particle species; does not select NFW or cored profiles or a subhalo mass function; does not prefer baryonic feedback, self-interacting, wave-like (fuzzy) dark matter or MOND-type laws; imports no OpenAI coefficient-language sheet as a premise; does not close O.1, open XV-B, discharge XVI-N or create Host C; admits no quantum coefficient; and treats no Planck, SPARC or Bullet number as a measurement. Every companion label cited is listed in Appendix with its local and site status, and every one is a source record; not a premise. Citations identify source records only; no proof transfer. par *Non-claim.* The list of non-claims is not exhaustive of what is not claimed. Ledger unchanged: no quantum coefficient is admitted; Host

C is not created; O.1 stays NOT_CLOSED; no particle species, Einstein dynamics or split is derived. par

appendix

F13 verdicts

Counts: 38 items; held 38; corrected 0; rejected 0; conjecture 0. Two items (F13-12 and F13-26) received wording precision or a merged clause without change of verdict; eighteen received added parts marked in the text. Every item is re-proved in the section indicated. 3pt F13 verdicts: every theorem, proposition, lemma, corollary and claim of the draft.

toprule Item Draft locator Here Verdict Note

midrule endfirsthead toprule Item Draft locator Here Verdict Note

midrule endhead F13-1 thm:residual Theorem held (e) added from plan

F13-2 prop:current Proposition held (e) fixed-host coupling added

F13-3 prop:conservation Proposition held exchange counterexample written out

F13-4 lem:fibre Lemma held (e) relative risk added

F13-5 remark after lem:fibre Remark held

F13-6 thm:split Theorem held (d) ratio relative risk added

F13-7 thm:adaptive Theorem held

F13-8 prop:approx Proposition held postselection witness written out

F13-9 thm:poisson Theorem held sharper than Big06-A constant; trade-off (c) from plan

F13-10 thm:discontinuity Theorem held

F13-11 thm:slope Theorem held

F13-12 prop:annular-slope Proposition held which density carries *B* made explicit

F13-13 thm:shell Theorem held

F13-14 remark (profile fibre) Remark held

F13-15 thm:moments Theorem held explicit Legendre witness

F13-16 cor:counts Corollary held occupation witness added

F13-17 prop:jeansinterval Proposition held conditional on the box; β clause added

F13-18 thm:virial Theorem held numerical identity checks

F13-19 cor:lowdm Corollary held

F13-20 prop:lensing Proposition held convergence derived from potential

F13-21 Bullet paragraph Proposition held centroid identity added

F13-22 prop:acoustic Proposition held monotonicity of r_s added

F13-23 radiation-label claim Remark held

F13-24 prop:rar Proposition held fraction family added

F13-25 thm:dilution Theorem held

F13-26 thm:relative Theorem held finite-limit clause merged

F13-27 thm:growth Theorem held

F13-28 prop:slip Proposition held

F13-29 thm:vacbranch Theorem held

F13-30 prop:future Proposition held

F13-31 thm:nec Theorem held (b) de Sitter clause added

F13-32 prop:detection Proposition held

F13-33 off-shell exclusion paragraph Proposition held fixed-host clause added

F13-34 prop:observedsilence Proposition held

F13-35 prop:enter Proposition held

F13-36 thm:shredder Theorem held

F13-37 documentary interfaces Record held labels checked on site

F13-38 prop:vacuum Proposition held (e) WEC/dust limits added

bottomrule

The draft's debugging rows

Counts: 17 rows; held 15; held in part and overturned in part 1 (DB-13); overturned as a plan correction 1 (DB-14). Held rows are folded into Appendix . 3pt The draft's ``Debugging the proposed plan'' rows as proposed plan corrections.

toprule Row Draft issue Verdict Disposition

midrule endfirsthead toprule Row Draft issue Verdict Disposition

midrule endhead DB-1 Residual versus split held no plan error; clarification kept (Theorem (e))

DB-2 Current versus conservation held PB-11, PB-22

DB-3 Electromagnetic neutrality held PB-12

DB-4 Spherical inversion held PB-4

DB-5 Slope stability held PB-20; refined: $(w, w^{'})$ does control the mass slope (Theorem)

DB-6 Infinite condition number held PB-20

DB-7 NFW versus core held PB-5

DB-8 Satellite and plane statistics held PB-15

DB-9 Stellar dispersion held PB-14; the full-aperture bound is exact and anisotropy-free

DB-10 CMB and BAO held PB-9

DB-11 Radial acceleration relation held PB-10

DB-12 Bullet Cluster held PB-11

DB-13 Two dusts held in part; overturned in part exact constancy iff $C = 0$ (held); ``freezes'' in the sense of a finite limit also when $\int^{\infty} a^{-2}\mathrm{d}t < \infty$ (overturns ``only when $C = 0$''); PB-16

DB-14 Lensing–motion residual overturned as a plan correction the plan's S 5.4 already states slip; kept as a clarification

DB-15 Null direct detection held PB-13

DB-16 Binary risk held PB-23 (qualifies the plan's ``indicator error 1/2'')

DB-17 Vacuum trade held PB-17

bottomrule

Plan corrections

Each correction states the plan's text or locator and the proved or verified form that replaces it. ``Site'' means the fresh read-only record of Appendix .

• *Lensing row.* Big05-A thm:Big05-observer is ``observer angles and radar intervals on Kottler hosts'', not weak-lensing convergence. The convergence identity is proved locally (Proposition), only under a thin-lens calibration with a supplied Σ_{b}, and with projection and mass-sheet ambiguities.

• *Discontinuity locator.* The uniform-data discontinuity is in Big06-A prop:DM-poisson-stability, not prop:DM-poisson; the sharp jet constant of Theorem (b) improves that record's constant.

• *Big01-A fibres.* Big01-A thm:fibre is the generic fibre criterion; horizon/vacuum independence is Big01-A thm:vacfibre(c) (adjoining horizon labels changes nothing).

• *Rotation-curve row.* The spherical formula requires the spherical contract; ``outside the baryonic disk'' is outside

it (DB-4).

• *NFW versus cored.* For the total profile this is an ill-conditioned inverse problem with distinct exact fibres; for the dark slot it is a fibre coordinate (Proposition , DB-7).

• *Big03-A thermal identity.* Big03-A prop:R-v3-thermal-ident says a calibrated Gibbs state at a declared temperature tie is a coefficient-*sensitive* datum; it is not a κ-independent law.

• *Big04-A-coeff.* Big04-A-coeff thm:C-adaptive is adaptive non-calibration; the coefficient orbit is Big04-A-coeff prop:C-orbit. Neither concerns the CMB ratio.

• *I-D.* I-D prop:v5-u6 is the table of tested Host-B prescriptions (none gives $\Gamma_1 = \Gamma_2 = 0$); that Host C is not created is a scope line of the ledger, not that proposition.

• *CMB and BAO.* Under the supplied photon–baryon law the CMB ratio and BAO scale are split-coupled (Proposition); the plan's S 2 and S 7.3 claim of split-independence is rejected (DB-10).

• *RAR.* The relation is split-independent only with the baryonic reconstruction fixed (Proposition , DB-11).

• *Bullet row and conservation.* ``Collisionless'' is a supplied exchange law; neither $j_{\mathrm{dm}} \equiv 0$, R1 nor a separation implies it; separate conservation needs a separately invariant dark action (Propositions , , ; DB-2, DB-12).

• *S 4 last sentence.* Photon couplings are excluded only insofar as they give a nonzero net Euler derivative in the declared class at the host; constant $F\widetilde{F}$, the fixed-host $(R - R_0)fF^2$ term and R2 polarizability are counterexamples to exclusion by vanishing current (Proposition , DB-3).

• *S 4 first sentence.* With a supplied nonzero interaction model, a null result does constrain the residual density (Proposition , DB-15).

• *Dispersion.* No exact local bound follows from one projected dispersion; the exact statement is the anisotropy-free full-aperture bound, and the local interval is conditional on β (Theorem , Proposition , DB-9).

• *Satellites and planes.* Luminous counts and plane statistics are occupation-coupled, not density-only (Proposition

, DB-8).

• *S 5.2.* The relative contrast is constant iff $C = 0$ and has a finite limit iff $C = 0$ or $\int^{\infty} a^{-2} \mathrm{d}t < \infty$ (Theorem , DB-13).

• *Vacuum shift and de Sitter.* The shift keeps currents and the null energy condition but not dust form or the weak energy condition outside $[-\rho_{\Lambda}, \varepsilon_{\min}]$; an all-NEC de Sitter split cannot contain positive dust (Proposition (e), Theorem (b), DB-17).

• *BAO row.* Growth responds to the total potential only; the relative modes stay free (Theorem).

• *S 7.4.* Blindness to the current alone is insufficient; the condition is a complete common process (Theorem).

• *Condition number and Lipschitz constant.* The precise statement is the absence of a finite local Lipschitz constant; a bounded slope range has finite risk; with derivative data the exact constant is for the mass slope, and the density slope needs w'' (Theorems , , Proposition ; DB-5, DB-6).

• ``*Big06-A abstract finding 2''.* The labelled statement is Big06-A prop:DM-moments.

• *S 1 reusable range.* The exact current criterion is Big06-A thm:DM-nonEM; separate conservation under R1 is prop:DM-stress(c) via prop:DM-Noether; prop:DM-NEC is a positivity statement.

• *Indicator risk.* The value $\frac{1}{2}$ holds for real-valued or randomized decisions; a deterministic rule of a fixed exact datum has worst-case error 1 (DB-16).

• *CMB row.* ``Ω_c/Ω_b is a coefficient of the total source" is rejected: the total source fixes only the sum, and the unrestricted ratio has relative risk 1 (Theorem (d)); Big03-A prop:R-v3-relative-alignment is a relative-risk statement about coefficient labels. Held without correction: Big01-A thm:adaptive, thm:Hcert; Big03-A thm:R-v3-adaptive, thm:R-v3-fibre-nonselection; Big05-A thm:Big05-flagship, thm:Big05-quotient, thm:Big05-kernel, thm:Big05-futures, prop:Big05-predsplit; DS-OB-1-fibre thm:F-generic, cor:F-ranknotsel (``rank four is open and dense" held as documentary); Big06-A prop:DM-v2-capacity.

Corrections to the draft (DC5)

• *Title.* The draft's title ``Big06-B: Dark-Matter Residuals, Observation Fibres, and Conditional Consistency Tests'' is replaced by the plan's title, with version number; its content is kept in the subtitle and backbone.

• *Author line.* The draft's author field omits ``(authorship requires confirmation)'' (it appears only in a footnote); restored in the author line.

• *Date.* The draft's empty date is replaced by the version date.

• *Citation disclaimer.* The sentence ``Citations identify source records only; no proof transfer.'' is absent from the draft; added. The standing ledger in the draft is verbatim and is kept.

• *Big01-A version.* The draft's ``the separately inspected endpoint displayed version 5'' is overturned: the fresh record is version 7 (local version 7 plus five bibliography items).

• *Retrieval claims.* The draft's statements that I-C, I-D and Big06-A full texts were not retrieved (``Full text not independently retrieved'') are overturned: fresh read-only GETs returned full records (Appendix).

• *``Plan-reported'' and ``excerpt'' locators.* Every companion label cited by the draft exists in the fresh site record and is described here from that record (Appendix).

• *Verification scope.* ``No successful compilation … checker execution'' is superseded for this sheet: it compiles twice byte-identically with zero errors, undefined references and duplicate labels, and its check program runs (Appendix); no independent review, registration or submission is asserted.

• *Current sign.* The draft uses $\mathcal{J} = -(1/\sqrt{|g|})\delta S/\delta A$, Big06-A uses +; this sheet follows Big06-A, and every statement is sign-blind.

• *Frontiers record.* The DOI printed by the draft appears on the publisher page but did not resolve at doi.org and had no Crossref record on 25 October 2026; this sheet prints the publisher URL and does not assert the DOI as verified.

• *Randall et al.* The draft cites a 2007 preprint with a truncated title; the published record is *Astrophys. J.* 679 (2008) 1173–1180, doi:10.1086/587859, with the cluster name 1E 0657−56.

• *Chiba–Takahashi and Falco et al.* Published titles are ``Consistency relation in cosmology'' and ``… Application of Q0957+561A,B''; DOI 10.1086/184422 added for the latter.

• *Missing identifiers.* Eisenstein et al. doi:10.1086/466512 and Sahni et al. arXiv:0807.3548 added after verification.

• *Companion version markers.* Internal version markers in several companion records (I-C, I-D, En04-A, En04-B, I-C-CERT, Hawk05-B, DS-OB-1-fibre, Big04-A-coeff) are not uniform within each record; this sheet identifies each record by the sha256 of the fresh GET instead of the draft's version numbers.

• *Big04-A.* The draft's ``version 5, user-supplied manuscript'' is refined: the site serves version 5 plus 47 lines; a local version 6 is frozen and unregistered.

• *Big03-A.* The draft's ``supplied excerpts'' is refined: the site now serves version 3 (local version 3 plus six lines).

• *Debugging table.* DB-13 is overturned in part and DB-14 is overturned as a plan correction (Appendix).

• *Cross-reference wording.* The draft's small-scale table calls prop:jeansinterval a theorem; corrected.

Crosswalk of the plan onto the backbone

3pt Plan items (t349u S 0– S 8), location here, and verdict.

toprule Plan item Here Verdict

midrule endfirsthead toprule Plan item Here Verdict

midrule endhead S 0 standing non-claims abstract; Section held (verbatim)

S 1 residual, identical reading Definitions , held

S 1 reusable components Sections – corrected (PB-3, PB-6, PB-7, PB-8, PB-22)

S 2 rotation-curve row Theorem corrected (PB-4)

S 2 lensing row Proposition corrected (PB-1)

S 2 CMB row Proposition , Theorem (d) rejected (PB-9, PB-24)

S 2 BAO row Theorems , corrected (PB-18)

S 2 Bullet row Propositions – rejected as a consequence of the declaration (PB-11)

S 2 obligation: residual uniqueness Theorem held

S 2 obligation: geometric constancy Theorem held

S 2 obligation: minimax risks Lemma , Theorem held, qualified (PB-23)

S 2 obligation: Bullet kinematics Proposition held

S 3 core–cusp Theorems –, Proposition corrected (PB-5, PB-20); obligation discharged

S 3 satellites, planes Corollary , Proposition corrected (PB-15); obligation discharged

S 3 low-dark-matter galaxies Theorem , Corollary corrected (PB-14); obligation discharged

S 3 RAR Proposition corrected (PB-10); obligation discharged

S 3 cluster subhalos Propositions , held

S 3 reusable adaptive theorems Theorem , Remark held except PB-6

S 4 particle searches Propositions – corrected (PB-12, PB-13)

S 5.1 dilution Theorem held

S 5.2 two dusts Theorem corrected (PB-16)

S 5.3 expansion–growth Theorem held (PB-18 note)

S 5.4 lensing–motion Proposition held

S 5.5 shells Theorem held

S 5.6 vacuum branch Theorem , Proposition held

S 5.7 null saturation Theorem , Proposition held (PB-17)

S 5 rejection conditions Table held

S 6 interfaces Section held

S 7.1–7.2 architecture Sections – held

S 7.3 fibre non-selection list Sections , rejected for CMB/BAO, corrected for RAR (PB-9, PB-10)

S 7.4 adaptive and supply Theorem corrected (PB-19)

S 7.5–7.7 Sections , , held

S 8 what the sheet will not do Section held

bottomrule Each draft section is the backbone of the section of the same name here; draft items absent from the plan are F13-3, F13-5, F13-8, F13-11–F13-14, F13-17–F13-19, F13-22–F13-23, F13-30, F13-34–F13-38 (all held), and plan items absent from the draft are the mass-slope Lipschitz constant, the dark-slope fibre, the occupation and centroid statements and the carried-over corrections, all added.

Label audit

Every companion label cited in this sheet (62 distinct record–label pairs), with presence in the local frozen version (``n/a where no local copy is used) and in the fresh site record, and the statement title read from the site record. Every one is a source record; not a premise. 3pt Label audit (local / site).

toprule Record Label Local Site Site statement

midrule endfirsthead toprule Record Label Local Site Site statement

midrule endhead Big01-A cor:P5 yes yes corollary P5: the past does not certify an event horizon

Big01-A thm:Efuture yes yes theorem E-future: one number carries the future

Big01-A thm:Hcert yes yes theorem Coefficient certificate

Big01-A thm:adaptive yes yes theorem Adaptive coefficient blindness and sharp finite-list risk

Big01-A thm:fibre yes yes theorem Fibre criterion

Big01-A thm:vacfibre yes yes theorem Vacuum fibre: non-identification and exact rank

Big02-A def:dark yes yes definition Access-relative dark capacity; adopted from the t272u draft

Big03-A prop:R-v3-relative-alignment yes yes proposition Power-law relative risks, with a randomized lower certificate

Big03-A prop:R-v3-thermal-ident yes yes proposition A calibrated Gibbs state is an additional coefficient-sensitive datum

Big03-A thm:R-v3-adaptive yes yes theorem Adaptive negative certificate

Big03-A thm:R-v3-fibre-nonselection yes yes theorem Coefficient supply leaves independent source fibres unresolved

Big04-A thm:DR-coef yes; v6 yes yes theorem Radiation coefficient and calibration certificate

Big04-A-coeff prop:C-orbit n/a yes proposition The complete 3/ orbit and its scope

Big04-A-coeff thm:C-adaptive n/a yes theorem Adaptive coefficient-blind experiments cannot calibrate

Big05-A prop:Big05-minimax yes yes proposition Exact scalar-fibre minimax; from v0

Big05-A prop:Big05-predsplit yes yes proposition Forecasts are split-blind; plan 6

Big05-A thm:Big05-flagship yes yes theorem Geometric observables cannot identify a source decomposition

Big05-A thm:Big05-futures yes yes theorem Past geometry does not determine the future; plan P1

Big05-A thm:Big05-kernel yes yes theorem Observation-kernel criterion and measurement dimension; plan items 3

Big05-A thm:Big05-observer yes yes theorem Observer angles and radar intervals on Kottler hosts

Big05-A thm:Big05-quotient yes yes theorem Quotient characterization of source attribution; plan item 1

Big06-A cor:DM-v2-supply yes yes corollary A current-sensitive supply is a data refinement

Big06-A def:DM-data yes yes definition Accounts and split-independent data

Big06-A def:DM-read yes yes definition Dark-matter reading

Big06-A prop:DM-NEC yes yes proposition Positive matter cannot replace a negative null source

Big06-A prop:DM-Noether yes yes proposition Diffeomorphism balance

Big06-A prop:DM-cosmo yes yes proposition Pressureless dilution and the total-source identity

Big06-A prop:DM-enter yes yes proposition Destructive readout consumes a quantum name, not a host

Big06-A prop:DM-fibre yes yes proposition Electromagnetic silence does not select a split

Big06-A prop:DM-moments yes yes proposition Finite moments do not determine a distribution

Big06-A prop:DM-poisson yes yes proposition Spherical residual-density reconstruction

Big06-A prop:DM-poisson-stability yes yes proposition Derivative-sensitive stability and uniform-data discontinuity

Big06-A prop:DM-polarizability yes yes proposition Zero background current does not exclude photon response

Big06-A prop:DM-residual yes yes proposition Residual source, inverse source and their limits

Big06-A prop:DM-stress yes yes proposition Perfect-fluid balance, separate conservation and dust

Big06-A prop:DM-v2-R1fibre yes yes proposition R1-realized attribution family

Big06-A prop:DM-v2-capacity yes yes proposition Two-directional non-identification of slot and capacity

Big06-A prop:DM-v2-cbcounter yes yes proposition Current blindness alone is not split blindness

Big06-A prop:DM-v2-dilution yes yes proposition Dust-dilution error is the integrated exchange

Big06-A prop:DM-v2-nullsat yes yes proposition A positive dust history forces a null-energy defect in a saturated rem

Big06-A prop:DM-v2-shell yes yes proposition Shell masses are stable; local densities are not

Big06-A prop:DM-v2-shift yes yes proposition Limits of the shift

Big06-A thm:DM-nonEM yes yes theorem Exact bulk non-electromagnetic constraint

Big06-A thm:DM-shredder yes yes theorem The Shredder floor is an access theorem

Big06-A thm:DM-v2-adaptive yes yes theorem Adaptive non-identifiability for the current and split coordinates

Big06-A thm:DM-v2-approx yes yes theorem Approximate common processes

Big06-A thm:DM-v2-growth yes yes theorem Expansion and growth must reconstruct one matter density

Big06-A thm:DM-v2-rank yes yes theorem Rank is not supply; box risk

Big06-A thm:DM-v2-risks yes yes theorem Exact risks on the R1 family, with the deterministic boundary

Big06-A thm:DM-v2-slip yes yes theorem Lensing–motion residual equals gravitational slip

Big06-A thm:DM-v2-twodust yes yes theorem Two separately conserved dusts: relative modes

Big06-A thm:DM-v2-vacbranch yes yes theorem Constant-vacuum branch

DS-OB-1-fibre cor:F-ranknotsel n/a yes corollary Effective rank does not imply selection

DS-OB-1-fibre thm:F-generic n/a yes theorem Rank four is generic

En04-A thm:magic-fibre n/a yes theorem Magic-label fibres

En04-B thm:curvature-sampling n/a yes theorem Responding finite samples of fixed nonzero curvature

En04-B thm:fibre n/a yes theorem Carrier response is not a host functional

Hawk05-B thm:page n/a yes theorem Exact finite Page curve

I-B thm:instrument n/a yes theorem Complete destructive clock instrument

I-C thm:A n/a yes mainthm Classical-record recovery bound

I-C-CERT thm:replacement n/a yes theorem Exact error of every record-ignoring decoder

I-D prop:v5-u6 n/a yes proposition Tested prescriptions

bottomrule

Site versions and hashes

Records were retrieved read-only by HTTP GET from https://enter.grok.me/api/manuscript/<ID> on 25 October 2026 and re-fetched before the build (Appendix , check B6B-0); a request for Big06-B returned ``Not found''. Nothing was written to the site. 3pt Fresh site records (read-only GET), sha256 of the returned body, line count and relation to local versions.

toprule Record sha256 Lines Relation

midrule endfirsthead toprule Record sha256 Lines Relation

midrule endhead Big01-A 7d3989b447c4a0dd282b1ffeb97eb38d1b303986b82be3130d8db7a5e952169a 2369 version 7: local v7 plus 5 bibliography items

Big02-A 1d8fc18c752c82edb1235282cbd56ccd8540e41ae675589337bbd6622ffa8f7a 3199 version 6 (local v7 unregistered)

Big03-A 3f30924250f6b0e24d74c090653b6a91b110f9a374119ac33ff494a665fa0fd3 1890 version 3: local v3 plus 6 lines

Big04-A 0bb4d9b2dd7dcfbef9da194f6be160ae1c8b4a756c0d5550b817df31226a352d 3785 version 5: local v5 plus 47 lines; local v6 frozen, unregistered

Big04-A-coeff 9276db3c2eca392e3af5af1e960230367160d061874b332b4dc7342d5859ca70 1583 site record only

Big05-A 1788cf6f5abe4bf139f54aa18167a61c1130cdb6a0aacff84f2f45521d5946a3 4591 version 3: local v3 plus bibliography items

Big06-A fb7927fcc52c470d7b1e17d78b3c2d7a4c7d3bdffe9356a135bb9dee293753c4 1574 version 2, byte-identical to local v2

DS-OB-1-fibre 4626dbb721ab0c0cb1f374699897dde85d5cc20f599f1a3470a620d286f425f8 1493 site record only

En04-A b4cb98c038318b366c79b8fe932250e3e626e6e2e75edcb0d61e70bfc118568c 4790 site record only

En04-B 60a0c284e6415e9cf3b64a7362af8ad06a4a0ec2f25bda26b1467d7966c4045a 5793 site record only

Hawk05-B e8ae780e771c04d876d91505de79fb11e47c89925596cb67f50db641945470fd 2350 site record only

I-B 4f812c5fb2753cdb5725af09e0111247bbb46e8c1696aa473771450607eb1317 2352 site record only

I-C d6535e00b845bfcf005d90efa39cb4092f0118a4177c0613809efa83ceb2bf8b 3216 site record only

I-C-CERT 7c06063bf80e13fc914edbba1497b8c2ee9378d97601b9dbeb4e6df7e8ae6336 1139 site record only

I-D b87e0d92b2c78f2500ba9622e0fb57a8ae4d345fbb88074026e1518fdcd1fdbb 6589 site record only

OpenAI 9a20a47b380d2de3d68e80a47877c563460260d7acf8aafdcab6aa97285ca5a8 9649 catalogue; no occurrence of ``dark''

bottomrule Local versions used for the background: Big04-A version 6 9dde22d76240e8ca9b4134bff9778d9aae136cf1cfac17286c0dfc359a278792 (frozen, unregistered); Big06-A version 1 eca341929d98422c3c6475d8175d1ec48d71b87e4fcc1057842000d658145e79 (frozen).

Checks

The check program checks_Big06-B-v1.py runs 40 checks; each has at least one negative control or mutation that must fail. Its JSON output is part of the deliverables; the build also requires zero errors, zero undefined references, zero duplicate labels and two byte-identical PDFs. 3pt toprule Check Property

midrule endhead B6B-0 input and site-record hashes; fresh re-fetch identical

B6B-1 residual: FLRW total conserved; split slots sum and are conserved

B6B-2 uniform-data discontinuity with positive densities (F13-10)

B6B-3 Poisson formula, profile slopes, sharp jet bound (F13-9)

B6B-5 central slope: ||dw||=O(eps2), ||dw'||=O(eps), slope gamma (F13-11)

B6B-6 mass-slope Lipschitz constant max(1/m, r+K/m2) (Theorem thm:B6B-slope)

B6B-7 annular density derivative formula (F13-12)

B6B-8 dark slope fibre construction (Proposition prop:B6B-darkslope)

B6B-9 shell error constant sharp; positivity criterion (F13-13)

B6B-10 finite-moment ambiguity via Legendre (F13-15)

B6B-11 occupation subsets: counts and planes (Proposition prop:B6B-occupation)

B6B-12 Jeans mass formula and box image (F13-17)

B6B-13 full-aperture virial identity, anisotropy-free, with projection (F13-18)

B6B-14 lensing: int d_z2 Phi dz = 0, projection kernel, mass sheet (F13-20)

B6B-15 sound speed, r_s monotone in baryon fraction, label orbit (F13-22, F13-23)

B6B-16 centroid identity and cold-flow collision term (new)

B6B-17 RAR fraction family (F13-24)

B6B-18 relative risks: window (u-l)/(u+l); unrestricted ratio 1 (new)

B6B-19 dilution balance; zero-integral exchange (F13-25)

B6B-20 relative modes with arbitrary common forces (F13-26)

B6B-21 growth diagnostic constant; closure identity (F13-27)

B6B-22 slip identity (F13-28)

B6B-23 vacuum branch: R_e -> c/h, D converges, M_bg -> 0 (F13-29)

B6B-24 futures: finite vs infinite horizon integral (F13-30)

B6B-25 null defect; NEC split of de Sitter is vacuum type (F13-31)

B6B-26 vacuum shift: WEC interval, dust form only at 0 (F13-38)

B6B-27 EM currents: polarizability, axion-type, constant FF, fixed-host term (F13-2)

B6B-28 Noether balance for a neutral scalar; exchange counterexample (F13-3)

B6B-29 approximate blindness: Le Cam bound and postselection (F13-8)

B6B-30 Shredder floors 1-1/d and 1-1/d2 (F13-36)

B6B-31 complete drop identity; no left inverse (F13-35)

B6B-32 detection: zero cross-section; monotone density map (F13-32)

T-1 standing ledger verbatim (plan line 12) in abstract and at the end

T-2 required sentences and author line

T-3 no utm parameters, grading words or preference among models

T-4 a non-claim after every result

T-5 every src(record, label) exists in the fresh site record

T-6 F13-1..F13-38 each carry a verdict; DB-1..17 and PB/DC5 present

T-7 every printed DOI has a Crossref record in refs/

T-8 no measured numbers printed as results

bottomrule

Version 2: plan-item verdicts and crosswalk

Each item of the binding plan PLAN_t355u.md is numbered P2-*n* and given a verdict (held, corrected or rejected).

``Held'' means that the statement was checked against version 1, the fresh site records and the local overlay

records, and is proved here or in version 1 as stated; ``corrected'' means that a proved variant replaces it, with the correction recorded as PB2-*n* (Appendix ). The last column maps each item onto the draft findings_t356u.tex (F15-*n*, Appendix ); ``superseded'' means that the draft item, independently verified, gives the stronger form that version 2 adopts. The five suggested local theorems of plan section 6 are rows P2-1, P2-5, P2-13, P2-17 and P2-18. The plan of request t354u is withdrawn for this sheet and appears only in the last row. 3pt Plan items of request t355u: verdicts, where each is proved, and the draft crosswalk.

toprule Item Plan statement Verdict Proved in Correction; draft F15

midrule endfirsthead toprule Item Plan statement Verdict Proved in Correction; draft F15

midrule endhead **P2-1** S 1: extend the attribution risks (main finding 3) to the joint fibre (σ, j) held Theorem F15-1, F15-2

P2-2 S 1: kernels built only from metric, curvature, observers or the non-EM reading are fibre-constant held Theorem (b); Proposition F15-2, F15-3 (product boundary)

P2-3 S 1: source records lem:DM-fibre, thm:DM-v2-adaptive, thm:DM-v2-approx, thm:R-v3-adaptive, thm:C-adaptive, thm:magic-fibre held Record ; Appendix all confirmed; F15-32

P2-4 S 1: unrestricted dark-to-ordinary relative risk exactly 1, attained only by 0 held Theorem (a),(e) DC7-1; PB2-14; F15-5

P2-5 S 1: exact under stopping and postselection held Theorem (a),(d) F15-4, F15-5

P2-6 S 1: exact under approximate common processes corrected Theorems (c), , PB2-1; superseded by F15-6 to F15-9

P2-7 S 1: deterministic boundary of thm:DM-v2-risks held Theorem (b) PB2-15; F15-5

P2-8 S 2: residual is ``the unique affine isometry'' with no equation of state (main finding 1) corrected Theorem (a) PB2-2; superseded by F15-10

P2-9 S 2: without the supplies every conserved tensor is admissible corrected Theorem (d) and final paragraph

PB2-18; superseded by F15-10(b)–(d)

P2-10 S 2: import prop:DM-residual and the Big05-A-DM kernel characterization held Theorem (e); Proposition (c) PB2-6; F15-3

P2-11 S 2: sharp jet bound as a fibre statement (finding 4) corrected Theorem (a); Proposition PB2-3; superseded by F15-12

P2-12 S 2: Lipschitz constant $\max(1/m, r_+K/m^2)$ of thm:B6B-slope as a fibre statement corrected Theorem (a); Proposition PB2-4; DC7-3; superseded by F15-13

P2-13 S 2: dark slope is a free fibre coordinate taking every real value held Theorem (c) F15-14

P2-14 S 2: shell masses stay stable (import prop:DM-v2-shell) corrected Theorems (F13-13), (b) PB2-5; F15-15

P2-15 S 2: uniform-data discontinuity as a local tool held Corollary ; Theorem (b) F15-11

P2-16 S 2: dmA5:prop-poissonlp as a source record for $W^{2,p}$ versus uniform topologies held Theorem ; Corollary PB2-7; DC7-6; F15-11

P2-17 S 3: NEC price of dust unified (finding 7, F13-31); NEC splits of a vacuum-form total are of vacuum type held Theorem F15-19

P2-18 S 3: vacuum shift keeps current and NEC, not dust form or WEC (F13-38) corrected Theorem (a),(b) PB2-9; F15-20

P2-19 S 3: not a residual ambiguity once the other slots are fixed; action form $T-Cg, \Lambda' = \Lambda - \chi C$ held Theorem (c),(d) F15-20

P2-20 S 3: constant-vacuum branch (F13-29) aligned with thm:Efuture, cor:P5, thm:Big05-futures held Theorems , (b); Proposition PB2-16; F15-22

P2-21 S 3: finite versus infinite horizon integral (F13-30) aligned likewise held Theorems (a),(c), F15-21

P2-22 S 3: every rule of past data decides horizon existence with success exactly $\frac{1}{2}$ corrected Theorems (a), (c)

PB2-8; superseded by F15-21

P2-23 S 4: keep the split-coupled statements (finding 6) held Propositions , , ; Table DC7-2; F15-26 to F15-28

P2-24 S 4: add the growth diagnostic with a rejection condition (thm:DM-v2-growth) held Proposition (a); Theorem PB2-10; F15-23

P2-25 S 4: add lensing–motion slip with a rejection condition (thm:DM-v2-slip) held Propositions (b), PB2-10; F15-24

P2-26 S 4: two-dust relative modes (thm:DM-v2-twodust) as a source record held Record ; Proposition F15-25

P2-27 S 5: Shredder floors $1 - 1/d$, $1 - 1/d^2$ (F13-36) exact under the non-EM constraint, via thm:A, thm:replacement held Proposition PB2-11; F15-29, F15-30

P2-28 S 5: documentary separations (En04-B, Hawk05-B, DS-OB-1-fibre, I-B, I-D, OpenAI with zero ``dark matter'') held Record ; Proposition PB2-12; F15-31 to F15-35

P2-29 Preamble: standing ledger preserved verbatim; ``No dark-matter particle species is derived.'' held abstract and closing ledger PB2-13

t354u Plan PLAN_t354u.md (04f4817e…) superseded — superseded by t355u; withdrawn for Big06-B; its virial item returns only through the draft (F15-16 to F15-18)

bottomrule

Version 2: draft items F15 and their verdicts

Every theorem, proposition, corollary, definition, specification, documentary record and claim of the draft findings_t356u.tex (sha256 582884d9f49be06b01913b8e2e32f0e7f4d919ddd035524e3a4a63aeb9a4f4ef) is numbered F15-*n* in the draft's order. Each was re-proved locally (or, for documentary records, its labels were confirmed by fresh read-only GET) and given a verdict: held, corrected, rejected or conjecture. Overlapping items are merged into the stronger form, named in the third column. Counts: 38 items; 36 held, 2 corrected, 0 rejected, 0

conjectures. 3pt Draft items F15-*n*: verdicts and the version-2 result that proves each.

toprule Item Draft statement Verdict Proved in Note

midrule endfirsthead toprule Item Draft statement Verdict Proved in Note

midrule endhead **F15-1** Definition: joint attribution class $\mathcal{A}_h \subseteq \mathcal{S}_h \times \mathcal{J}_h^0$ held Theorem merged

F15-2 Theorem: joint constancy and the product boundary held Theorem ; Proposition (a),(b)

F15-3 Proposition: exact kernel criterion for added supplies held Proposition (c)

F15-4 Specification: complete joint-blind acquisition held Theorem (a) merged

F15-5 Theorem: joint adaptive blindness with the deterministic boundary held Theorems , (a),(b) merged

F15-6 Theorem: relative Le Cam bound and sharp universal limit $1 - \eta$ held Theorem (a),(b) PB2-1

F15-7 Proposition: sharp conditioning allowance held Theorems (d), (c) merged

F15-8 Proposition: approximate stopping needs a complete-process budget held Theorem (d) extends finite depth

F15-9 Theorem: endpoint domination restores exact risk 1 held Theorem

F15-10 Theorem: supply-dependent residual image held Theorem PB2-2, PB2-18

F15-11 Theorem: local $W^{2,p}$ tool and positive uniform-data discontinuity held Theorem DC7-6

F15-12 Proposition: jet sharpness and its compatibility boundary held Proposition PB2-3

F15-13 Proposition: mass-slope constant, degenerate case $K = 0$ held Proposition DC7-3

F15-14 Theorem: finite shell supplies do not identify a local dark slope held Theorem (c) merged; v2 form also uniform-close

F15-15 Corollary: shell stability with slope non-selection held Theorem ; Theorem (b),(c) already in version 1 (F13-13)

F15-16 Specification: full-aperture virial package held Theorem ; Theorem merged

F15-17 Theorem: virial moment fibre and quantitative shell rigidity held Theorem (a)–(c)

F15-18 Proposition: multiple-tracer rejection certificate held Theorem (d)

F15-19 Theorem: vacuum-form rigidity and quantitative dust price held Theorem merged

F15-20 Proposition: three meanings of a vacuum shift held Theorem merged; $\varepsilon \geq 0$

F15-21 Theorem: smooth future ambiguity with a positive-dust history held Theorem PB2-8

F15-22 Proposition: asymptotic coefficient on the late branch held Proposition

F15-23 Theorem: integral growth diagnostic held Theorem PB2-10

F15-24 Proposition: force and calibration contamination of slip held Proposition PB2-10

F15-25 Proposition: complete compensated relative-mode family held Proposition

F15-26 Proposition: quantified acoustic refinement and endpoint boundary held Proposition merged; DC7-2

F15-27 Proposition: cold-flow carrier ambiguity in a weak collision model held Proposition

F15-28 Corollary: what the centroid identity can reject held Proposition merged; v2 form removes self-gravity

F15-29 Specification: unrestricted neutral logical code held Proposition merged

F15-30 Theorem: neutral-code floors and exact replacement spectrum held Proposition PB2-11

F15-31 Proposition: Enter invariance does not supply a source law held Proposition labels confirmed

F15-32 Documentary: resource, sampler and current interfaces held Record labels confirmed

F15-33 Documentary: rank, finite entropy means, host separation held Record formula checked in record

F15-34 Documentary: catalogue occurrence claims have bounded provenance corrected Record DC7-4: fresh scan

F15-35 Documentary: the characteristic-map chain is not closed held Record labels confirmed; versions not asserted (DC7-7)

F15-36 Claim: three necessary qualifications (approximate risk, horizon $\frac{1}{2}$, $K = 0$) held Theorems , ; Proposition

PB2-1, PB2-8, DC7-3

F15-37 Claim: robust minimax value 1 over a class containing a common process held Theorem

F15-38 Claim: overlay locator and catalogue count could not be verified corrected Appendix DC7-5: verified

bottomrule

Version 2: F13 numbers cited by the plan

The plan and the version-2 text cite F13 numbers and main-finding numbers of version 1. The plan's ``main finding" numbers 1, 3, 4, 6 and 7 denote findings (1) residual, (3) attribution risks, (4) Poisson layer, (6) split-coupled kernels and (7) relations and null energy condition of the version-1 abstract, as the plan describes them. The table reads each number from the F13 table of version 1 (Appendix) and gives the version-1 statement it denotes; the check program verifies the mapping against the version-1 source. toprule Item Draft label (version 1) Version-1 statement Verdict

midrule endhead **F13-1** thm:residual Theorem held

F13-5 remark after lem:fibre Remark held

F13-6 thm:split Theorem held

F13-7 thm:adaptive Theorem held

F13-8 prop:approx Proposition held

F13-9 thm:poisson Theorem held

F13-10 thm:discontinuity Theorem held

F13-13 thm:shell Theorem held

F13-17 prop:jeansinterval Proposition held

F13-18 thm:virial Theorem held

F13-21 Bullet paragraph Proposition held

F13-22 prop:acoustic Proposition held

F13-26 thm:relative Theorem held

F13-27 thm:growth Theorem held

F13-28 prop:slip Proposition held

F13-29 thm:vacbranch Theorem held

F13-30 prop:future Proposition held

F13-31 thm:nec Theorem held

F13-36 thm:shredder Theorem held

F13-38 prop:vacuum Proposition held

bottomrule

Version 2: plan corrections (PB2)

Where the draft findings_t356u.tex also corrects a plan claim, the correction was verified independently and is recorded here as held; no draft correction of a plan claim was overturned.

• *Approximate processes.* The relative risk 1 is not exact under approximate common processes. If any two final laws are within total variation η, the sharp value is $1-\eta$ (Theorems (c), (b)); exact value 1 needs an extra hypothesis such as endpoint domination (Theorem). F13-8 (Proposition) is a lower bound, exact only at $\eta = 0$ (Theorem). The draft states the same correction (F15-6, F15-9, F15-36): held.

• *Residual wording.* The residual is the unique tensor solving the identity, and the residual *map* $T^{\mathrm{known}}\mathrm{mapsto}\mathrm{T}^{\mathrm{DM}}$ at fixed (g,χ,Λ) is an affine isometry; it is not ``the unique affine isometry" on the tensor space (Theorem (a)). Draft F15-10 agrees: held.

• *Jet-bound locator.* The spherical Poisson jet bound is Theorem (b) (F13-9), not thm:B6B-slope; its sharpness depends on whether jets are independent or compatible (Proposition).

• *What is a fibre coordinate. Γ* is fibre-constant; the constant $\max(1/m, r_+K/m^2)$ bounds a fibre-constant quantity and is 0 in the degenerate class $K = 0$ (Proposition). The free coordinate is the *dark* slope (Theorem (c)).

• *Shell-mass scope.* Total shell masses are fibre-constant, and residual shell masses are stable relative to a *supplied* baryonic mass (Theorem ; Big06-A prop:DM-v2-shell(b) (source record; not a premise)). On the unrestricted fibre the dark shell mass is a bounded coordinate (Theorem (b)).

• *Kernel characterization locator.* The kernel characterization exists only in the local, unregistered overlays: Big05-A-DM dmA5:prop-residual (local overlay record, unregistered; not a premise)(e),(f) and, in its latest form, dmA5:f14-3-minimal with dmA5:v2-thm-residual. The site record Big05-A has no dmA5 label; its thm:Big05-kernel is a different statement.

• *Topology record.* dmA5:prop-poissonlp is a local Cartesian statement; Theorem proves it directly with the sharp coefficient $\sqrt{3}/(4\pi G)$, and Corollary gives the spherical form.

• *Futures.* ``Every rule of past data succeeds with probability exactly $\frac{1}{2}$'' is false as stated: $\frac{1}{2}$ is the optimal worst-case success and the randomized minimax error, a deterministic rule has worst-case success 0, and for prior π the Bayes bound is $\max\{\pi, 1-\pi\}$ (Theorems (a), (c)). The $\frac{1}{2}$ statement is Big01-A cor:P5(d) (source record; not a premise), not thm:Efuture. Draft F15-21 and F15-36 agree: held.

• *Weak energy condition under the vacuum shift.* Dust form is lost for every $\lambda \neq 0$, while the WEC of both shifted slots holds exactly for $-\rho_\Lambda \leq \lambda \leq \inf \varepsilon$; ``not the WEC'' means ``not for every shift'' (Theorem (b)).

• *Growth and slip are not new relations.* Both are relations III and IV of version 1 (F13-27, F13-28). Version 2 adds the equality of the two diagnostic forms, independence, the integral diagnostic and the force and calibration terms. The field-equation clause of thm:DM-v2-slip is not imported. Draft F15-23 agrees: held.

• *Shredder sources.* I-C thm:A (source record; not a premise) is stated for deterministic decoders; channel

decoders are covered by Theorem . The exact value $1 - 1/S$ of I-C-CERT thm:replacement (source record; not a premise) is now re-proved locally (Proposition (b)).

• *OpenAI catalogue.* The fresh record contains no occurrence of ``dark" at all, so the plan's zero count of ``dark matter" holds in a stronger form.

• *Ledger paraphrase.* The plan's parenthetical ledger is a paraphrase that omits ``vacuum energy", ``A source record is not a premise." and ``The OpenAI catalogue is not a premise.". The verbatim ledger of version 1 is kept; it already ends with the plan-requested sentence, which is also printed next to it in the version-2 abstract.

• *Source of the relative-risk result.* The relative risk 1 is a Big06-B result (Lemma (e), Theorem (d), Theorem); Big06-A thm:DM-v2-risks (source record; not a premise) states absolute-loss risks. It agrees with PC5-1 of the version-2 overlays: $(u - \ell)/(u + \ell)$ on a bounded range, 1 on an unbounded range with 0 allowed, attained only by 0 for the unrestricted ratio, infinite under absolute loss. Theorem (b) adds that the minimizer is not unique when the range is bounded away from 0.

• *Indicator risk.* $\frac{1}{2}$ is the randomized value. A deterministic Boolean rule of a fixed exact datum has worst-case error 1 (Remark , F13-5).

• *The constant-vacuum branch is selected.* F13-29 lives on the selected branch of Specification ($C \geq 0$), not inferred from past data; Big06-A thm:DM-v2-vacbranch (source record; not a premise) takes $C > 0$.

• *Overlays are local.* The DM overlays are local, unregistered files, not site records. They are cited with their sha256 in their latest (version-2) form; every overlay label used was confirmed in the version-1 snapshot and the version-2 file where it exists (Appendix).

• *``Every conserved tensor" needs the unrestricted class.* Without supplied known sources, the residuals are every symmetric conserved tensor only if the known-source class is unrestricted; for a class $T_0^{\text{known}} + \mathscr{H}$ the residual class is $T_{\text{tot}} - T_0^{\text{known}} - \mathscr{H}$, and removing one other supply gives a line, not every tensor (Theorem). Draft F15-10(b)–(d) states this: held.

Version 2: corrections to version 1 and to the draft (DC7)

Version 1 is frozen and is not edited; DC7-1 to DC7-3 are recorded here and take effect through the version-2 text. DC7-4 to DC7-7 correct the draft findings_t356u.tex; no unverified hash, number or citation of the draft is copied.

• *Version 1.* The abstract, finding (3), speaks of the ``unrestricted dark-to-ordinary ratio", while Theorem (d) proves the statement for the ratio of the dark slot to an unclassified neutral comparator. The dark-to-baryonic form, on the Poisson fibre, is Theorem (e).

• *Version 1.* Proposition says that r_s is strictly decreasing because R_b increases ``wherever $\varepsilon_m > 0$". Strictness requires $\varepsilon_m > 0$ on a set of positive measure, and differentiation needs the integrability condition of Proposition .

• *Version 1.* Theorem (a) gives the best constant $\max(1/m, r_+ K/m^2)$ for $K \geq 0$; for $K = 0$ the map Γ is constant and the best constant is 0 (Proposition). Found by the draft (F15-13) and verified.

• *Draft, catalogue record.* The draft treats the zero count of ``dark" as a historical statement of version 1 that it could not verify. The OpenAI record was re-fetched read-only for version 2 and contains no occurrence of ``dark" (case-insensitive); the count is now a fresh verified statement (F15-34).

• *Draft, verification limit.* The draft says the manuscript endpoints were inaccessible and the overlay locator unverifiable. All labels it cites were confirmed by fresh read-only GET (XIV-I, XIV-J and XV-B fetched additionally), and the overlay locators exist in the local overlay files, not on the site (F15-38; PB2-6, PB2-17).

• *Draft, topology record.* The draft declines to use dmA5:prop-poissonlp as a locator. The label exists in both the version-1 and the version-2 local overlay of Big05-A-DM; it remains a documentary record, and Theorem proves the statement directly (F15-11).

• *Draft, version tags.* The draft attaches version tags to source records (``Big06-A v2", ``Big03-A v3", ``XV-B v2"). These tags were not verified against the fetched records and are not copied; records are cited by identifier and label only (F15-35).

Version 2: label audit

Every label cited in a version-2 block, and every label cited by the draft findings_t356u.tex, was looked up in the fresh read-only site records (api/, api2/) or, for overlay records, in the local overlay snapshots. Overlay records are local and unregistered; their sha256 values are in the second table. Missing labels: 0. toprule Record Label Found in

midrule endhead Big01-A cor:P5 site (api)

Big01-A thm:A site (api)

Big01-A thm:Efuture site (api)

Big01-A-DM dmA1:prop-necobs local overlay v1+v2

Big01-A-DM dmA1:prop-vacshift local overlay v1+v2

Big03-A prop:R-v3-relative-alignment site (api)

Big03-A thm:R-v3-adaptive site (api)

Big03-A-DM dmA3:prop-vacshift local overlay v1+v2

Big03-A-DM dmA3:v2-cor-ratio local overlay v2

Big04-A-DM dmA4:prop-necprice local overlay v1+v2

Big04-A-coeff thm:C-adaptive site (api)

Big05-A thm:Big05-flagship site (api)

Big05-A thm:Big05-futures site (api)

Big05-A thm:Big05-kernel site (api)

Big05-A-DM dmA5:f14-3-minimal local overlay v2

Big05-A-DM dmA5:f14-4-nullbudget local overlay v2

Big05-A-DM dmA5:f14-5-flrw local overlay v2

Big05-A-DM dmA5:prop-poissonlp local overlay v1+v2

Big05-A-DM dmA5:prop-residual local overlay v1+v2

Big05-A-DM dmA5:v2-cor-poissontool local overlay v2

Big05-A-DM dmA5:v2-sub-spectator local overlay v2

Big05-A-DM dmA5:v2-thm-residual local overlay v2

Big06-A cor:DM-operators site (api)

Big06-A lem:DM-fibre site (api)

Big06-A prop:DM-NEC site (api)

Big06-A prop:DM-fibre site (api)

Big06-A prop:DM-residual site (api)

Big06-A prop:DM-v2-nullsat site (api)

Big06-A prop:DM-v2-shell site (api)

Big06-A prop:DM-v2-shift site (api)

Big06-A thm:DM-v2-adaptive site (api)

Big06-A thm:DM-v2-approx site (api)

Big06-A thm:DM-v2-growth site (api)

Big06-A thm:DM-v2-risks site (api)

Big06-A thm:DM-v2-slip site (api)

Big06-A thm:DM-v2-twodust site (api)

Big06-A thm:DM-v2-vacbranch site (api)

DS-OB-1-fibre cor:F-ranknotsel site (api)

DS-OB-1-fibre thm:F-rank site (api)

En04-A thm:magic-fibre site (api)

En04-B thm:current-blind site (api)

En04-B thm:curvature-sampling site (api)

Hawk05-B thm:page site (api)

I-B thm:instrument site (api)

I-C thm:A site (api)

I-C-CERT thm:replacement site (api)

I-D prop:v5-u6 site (api)

I-D thm:instrument site (api)

XIV-I thm:I2 site (api2)

XIV-I thm:I3 site (api2)

XIV-J cor:noadmission site (api2)

XIV-J thm:J2 site (api2)

XV-B thm:lifting site (api2)

XV-B thm:pointcorrection site (api2)

bottomrule toprule Overlay Version sha256 (local, unregistered)

midrule endhead Big01-A-DM v1 ee25750c76e390a268ccae1e1cd187bd79b7e78543130129c596086c4b094876

Big01-A-DM v2 4150268c87e3d746bf3829798022891668a95ae620ac646a1439420adc256de9

Big03-A-DM v1 16a848aa0bc646fbb8871a9afb0ad858fe804cf3477394a3f68372a2ef9fa5f8

Big03-A-DM v2 8a5cf32e13af41e9f71b9830934a87fecaa9b25939cd84b4e20f9d7d79936e5f

Big04-A-DM v1 ed4a0f69f504b112a50e0e9306bf6f17d09caeef81523311dde4db0d1870fbaf

Big04-A-DM v2 6bc22c458d2cbd3ef318d4c74f4447a993dc918b62e9b7720a7b3ad5cd7ca009

Big05-A-DM v1 0f00bc5e32379b770ecf7326390060892a603412749a1b18d0118d0e8c77d577

Big05-A-DM v2 0cfaecac9b3444521207b0d860ad0f10642e5c24fe851df770bb986a8ec71e6b

bottomrule

Version 2: site records

Records were retrieved read-only by GET https://enter.grok.me/api/manuscript/<ID> (api/: 2026-10-25T15:31:39Z; api2/: 2026-10-25T16:00:37Z) and fetched a second time before the build; the second fetch is byte-identical. Big06-B itself returns 404 (unregistered). toprule Record Set sha256

midrule endhead Big01-A api 7d3989b447c4a0dd282b1ffeb97eb38d1b303986b82be3130d8db7a5e952169a

Big02-A api 1d8fc18c752c82edb1235282cbd56ccd8540e41ae675589337bbd6622ffa8f7a

Big03-A api 3f30924250f6b0e24d74c090653b6a91b110f9a374119ac33ff494a665fa0fd3

Big04-A api 0bb4d9b2dd7dcfbef9da194f6be160ae1c8b4a756c0d5550b817df31226a352d

Big04-A-coeff api 9276db3c2eca392e3af5af1e960230367160d061874b332b4dc7342d5859ca70

Big05-A api 1788cf6f5abe4bf139f54aa18167a61c1130cdb6a0aacff84f2f45521d5946a3

Big06-A api fb7927fcc52c470d7b1e17d78b3c2d7a4c7d3bdffe9356a135bb9dee293753c4

DS-OB-1-fibre api 4626dbb721ab0c0cb1f374699897dde85d5cc20f599f1a3470a620d286f425f8

En04-A api b4cb98c038318b366c79b8fe932250e3e626e6e2e75edcb0d61e70bfc118568c

En04-B api 60a0c284e6415e9cf3b64a7362af8ad06a4a0ec2f25bda26b1467d7966c4045a

Hawk05-B api e8ae780e771c04d876d91505de79fb11e47c89925596cb67f50db641945470fd

I-B api 4f812c5fb2753cdb5725af09e0111247bbb46e8c1696aa473771450607eb1317

I-C api d6535e00b845bfcf005d90efa39cb4092f0118a4177c0613809efa83ceb2bf8b

I-C-CERT api 7c06063bf80e13fc914edbba1497b8c2ee9378d97601b9dbeb4e6df7e8ae6336

I-D api b87e0d92b2c78f2500ba9622e0fb57a8ae4d345fbb88074026e1518fdcd1fdbb

OpenAI api 9a20a47b380d2de3d68e80a47877c563460260d7acf8aafdcab6aa97285ca5a8

XIV-I api2 88d8e441a3d6293378f10d90866cb5a4d14a5bc9c2036fc684dc1918ff2209bf

XIV-J api2 37df42b070527c008274670e33d862dd84625a3cdbbcd77544e4f5626033eee6

XV-B api2 32e5cf10243ed6987d6d96ceae9eb07daefe7ed897d60e7e31fd85ebb54b4b91

bottomrule

Version history

3pt toprule Version Request, date Content and identity

midrule endhead 1 t349u, t350u; 25 October 2026 New sheet; backbone from the draft findings_t350u.tex; 38 F13 items, 17 DB rows, 24 PB and 18 DC5 corrections; 45 pages. TeX dc23e23eb63b3c89f10be6bcee6f52357ea1c853d3ff3ac39cb99b7ead3cad98; PDF 12631ce3ddd97905fa0032f42c91cbd00857fb11b80d90c25d3b783419f04c11. Unregistered (site GET returns 404).

2 t354u, plan replacement t355u, draft t356u; 25 October 2026 Insertion-only overlay: 7 delimited blocks; 29 plan items, 38 draft items F15, 18 PB2 and 7 DC7 corrections; 29 new results with checks. Deleting the delimited blocks returns version 1 byte for byte (check B6B2-T1). Unregistered; nothing is written to the site.

bottomrule

Version 2: audit trail

• The binding plan PLAN_t355u.md was read and its sha256 verified (3a98ad6ed0635b33bf9a5be2787aba345402b437e3c25da4b47fac6fad30fafb). It replaces PLAN_t354u.md (04f4817e9820a2ba7941752a87bfa7923392a758d5f15309a961bfd4d92ef2bf) for this sheet. Work covered by both plans was kept; the t354u-only virial theorem was dropped and its content returns only through the draft.

• The draft findings_t356u.tex was read and its sha256 verified (582884d9f49be06b01913b8e2e32f0e7f4d919ddd035524e3a4a63aeb9a4f4ef); its sections are the backbone of Section , and each item was re-proved (Appendix).

• Version 1 was copied read-only from its delivery directory, and its sha256 was verified before any insertion.

• Sixteen site records were fetched read-only on 25 October 2026 and fetched again before the build; each is byte-identical to the record used for version 1, and Big06-B returns 404. XIV-I, XIV-J and XV-B were fetched read-only for the draft's documentary labels (Appendix).

• Every label named by the plan or the draft, and every label cited in a version-2 block, was looked up in the fresh records or, for overlay labels, in the local overlay snapshots of versions 1 and 2 (Appendix). Every F13 number and every main-finding number used was read from version 1 (Appendix).

• The DM overlays were read only. Version-1 snapshots come from the frozen overlay build and version-2 snapshots from the finished local overlay build; neither directory was modified.

• The version-1 check program was backed up (sha256 recorded in backup/) before the version-2 check program was derived from it.

• Two clean builds were made with SOURCE_DATE_EPOCH=1792627200, FORCE_SOURCE_DATE=1 and PYTHONHASHSEED=0 under setsid, and compared byte for byte. The check program then ran, and the manifest was written last. Tree hashes of other build directories, taken before and after, are in audit/.

• Nothing was pushed, registered or written to the site. The wiring file records wired: false.

Version 2: checks

The check program checks_Big06-B-v2.py contains every version-1 check unchanged in substance and the version-2 checks below; each check has at least one negative control or mutation, which must fail. Results are in checks_Big06-B-v2.json. Version-2 checks: 35. toprule Check Property

midrule endhead B6B2-1 relative risk: value 1 only by 0 when inf Q=0; [0,2l] minimizers when inf Q=l>0; (u-l)/(u+l) on [l,u]

B6B2-2 residual supply: affine isometry, vacuum line, kernel W cap ker L with rank-nullity

B6B2-3 Poisson fibre: dark slope takes any value with all cell masses and h(r0) fixed, uniformly close

B6B2-4 centroid: self-gravity cancels, mutual forces opposite, uniform field cancels, tidal does not

B6B2-5 acoustic derivative formula, quantitative bound m_s and endpoint term

B6B2-6 Le Cam sharpness, asymmetric pair value, postselection allowance sharp; unconditional eta fails

B6B2-7 futures: NEC iff Hdot<=0; NEC future gives R_e >= c/H; violating future has smaller horizon

B6B2-8 joint fibre is a product; host functionals constant; slices keep one-factor targets unidentifiable

B6B2-9 revealing family: relative risk exactly 1-eta; lower bound 1-eta; claimed value 1 fails

B6B2-10 topology: sine family has Lp jumps bounded below; derivative-controlled Lipschitz bound

B6B2-11 NEC: tensor vanishing on null cone is f g; dust remainder -eps (u.l)2; mutation

B6B2-12 vacuum shift: volume term gives -C g (finite differences); WEC interval; fixed-supply uniqueness

B6B2-13 growth: two diagnostic forms agree symbolically; growth and slip independent

B6B2-14 replacement spectrum: I(x)tau >= Omega/S, remainder a channel, overlap 1/S; S>=d2

B6B2-15 kernel criterion: P determined iff ker A in ker P

B6B2-16 relative Le Cam two-point bound; conditioning allowance; stopping budget

B6B2-17 endpoint domination forces Y=0; revealing family is not dominated

B6B2-18 Sobolev tool: |Tr H| <= sqrt3 |H|_F sharp; C1-small perturbation with Laplacian -a at x*

B6B2-19 jet bound attained (independent) and approached (compatible, e0>0); e0=0 gives e_b

B6B2-20 mass-slope constant: 0 at K=0; max(1/m, r+K/m2) for K>0, attained iff r+K<=m

B6B2-21 virial moment: feasibility iff W>=0; image [0,W/K(R)]; rigidity inequality; multi-tracer certificate

B6B2-22 dust futures: q=1 no horizon, q=2 horizon, q=1/2 no horizon; Hdot formula; NEC/DEC

B6B2-23 late branch: R_e expansion coefficient -C/(8 h2)

B6B2-24 integral growth diagnostic: constant on Einstein-de Sitter growth; perturbed D rejected

B6B2-25 forced slip: L - 2V_dyn = k2(Psi-Phi) + 2S; Einstein form

B6B2-26 compensated relative modes solve the species equations with zero total perturbation

B6B2-27 elastic collisions: momentum conserved; monokinetic pairs unchanged

B6B2-28 Enter instrument: Kraus completeness and Tr_R M(X) = Tr_C X

B6B2-T1 deleting the v2 blocks returns version 1 byte for byte

B6B2-T2 plan-requested line next to the ledger in the v2 abstract; required sentences in v2 blocks

B6B2-T3 plan items 29 + superseded t354u row; PB2 18; DC7 7; F15-1..38 with 36 held, 2 corrected

B6B2-T4 every osrc{overlay}{label} exists in a local overlay snapshot; overlay hashes match their lists

B6B2-T5 F13 numbers cited in v2 blocks exist in version 1; main findings 1,3,4,6,7 exist in the v1 abstract

B6B2-T6 inputs: plan t355u, plan t354u, draft t356u hashes; api2 refetch identical; OpenAI has zero "dark"

B6B2-T7 every check cited in the v2 text exists in this program

bottomrule

Closing standing ledger

Host A and Host B stay separate prescribed backgrounds. Host C is not created. O.1 stays NOT_CLOSED. XV-B is not opened. XVI-N is not discharged. Gate 0 and ST4b stay NOT_SUPPLIED. No quantum coefficient is admitted. No Einstein dynamics, derived metric, spacetime emergence, Page curve, island, vacuum energy, or quantized relational time without an external clock is claimed. A source record is not a premise. The OpenAI catalogue is not a premise. Printed numbers are conditional calculations, not measurements. No dark-matter particle species is derived.

Citations identify source records only; no proof transfer. No quantum coefficient is admitted.

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