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V-DST-Host-B-v6 Scalar-Probe Stress, a Hadamard Ground State, and Finite-Mode Spectral Reports on Host B

A scoped extension of V-DST-Host with an unchanged characteristic-admission boundary

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Abstract

We give a precise quantum-field extension of the finite reporting interface of V-DST-Host. On a supplied complete ultrastatic Host-B profile, a minimally coupled massive scalar probe has explicit same-host Green operators and a pure quasifree ground state. Established microlocal theorems make this state Hadamard. On a causally convex flat collar, Minkowski-normalized point splitting then constructs a symmetric conserved stress expectation; coherent displacements give a nontrivial, explicitly evaluated relative stress.

For a finite set of smooth one-particle packets, a sampled relative energy density yields an explicitly diagonalizable quadratic observable. We construct its spectral lower shift, distinguish its ground state from the reference vacuum, and derive normalized occupation amplitudes, including the closed single-mode formula. Finite-rank squeezing preserves the Hadamard property of the *full* field state. We also prove that each fixed stable finite-mode observable has a positive exponential moment: its probability tail cannot be identified with a continuum stretched-exponential asymptotic merely by analogy.

The potentially useful contribution is an auditable connection between same-host quantum data and the predecessor's report norm, including an explicit two-point-function-to-report error bound. The methods of

free-field quantization, Wick renormalization, and Bogoliubov diagonalization are established; no priority claim is made for those methods. The construction is a scalar-probe result, not linearized quantum gravity. Squeezed-state occupation amplitudes are not the inherited characteristic graph coefficient. That coefficient, its admission, and the original gravitational source-map domain remain unsupplied.

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Changes to v4 (this is v5)

• **Variational formula (Theorem).** θ_{ex} is a minimum of explicit one-dimensional roots $\theta_v^{\pm}$. Consequences: monotonicity in Λ and M, exact scaling, and a closed two-mode equation. This describes the dependence on (Λ, M) beyond rank one.

• **Kernel asymptotics (Theorem).** For every Lipschitz kernel family, $\theta_{\mathrm{ex}}^{(N)} = x_*/N + O(N^{-2})$, with x_* defined by $\|K_x\| = 1$. This generalizes v4's rank-one asymptotics.

• **Second collar instance.** Still not supplied; the precise reason is recorded in Appendix .

• **Re-verification of v4 by a different method:** high-precision closed-form roots confirm the $O(N^{-2})$ term. No error was found (Appendix).

• The Host-B transfer stays report-only.

Changes to v3 (this is v4)

• **Structure of the multimode abscissa (Theorem):**

• monotone non-increase when modes are added;

• a sharper upper bound from the top eigenvector;

• the first-order formula $\log(1/\|M\|)/\langle u, \Lambda u\rangle$;

• an explicit mode-count asymptotic $\theta_{\mathrm{ex}}^{(N)} \sim x_*/N$ for a declared rank-one family.

• **Second collar instance (Proposition).** The v3 exclusion of the flat image method is extended. Analytic profiles and locally homogeneous slices, including images over curved homogeneous covers, are all forced to the constant profile. A second instance stays not suppliable, and the precise reason is recorded.

• **Re-verification of v3 by a different method.** The six v3 abscissa instances were regenerated, and θ_{ex} was recomputed by eigenvalue root-finding. This confirms 0.0517 against $\theta_* = 0.0476$. No error was found in v3

(Appendix).

• The Host-B transfer stays report-only.

Changes to v2 (this is v3)

• **Re-verification of v2 by different methods.**

• The single-mode abscissa: checked by direct partial sums, which diverge at θ_* and match $(1-x)^{-1/2}$ below it.

• The Casimir values T_{00} and T_{yy}: recomputed by the proper-time (heat-kernel) route with a thermodynamic pressure. They agree to 24 digits.

• **Correction to v2 (presentation).** The title "Sharp exponential-moment abscissa" of Proposition overstates the multimode case. There, θ_* is only a lower bound and can be strictly smaller than the true abscissa. The exact multimode abscissa is Theorem ; see Appendix .

• **Multimode abscissa (Theorem).** Exact, with a determinant characterization, sharp two-sided bounds, and identification with the tail exponent.

• **Cutoff (Proposition).** The exact divergence formula for an arbitrary cutoff, and an L^1 lower bound that does not depend on the cutoff's steepness.

• **Collar stress (Proposition).** Signs, monotonicity in m and L, the massless bound, and large-mL asymptotics. A second explicit collar instance is recorded as not suppliable, with the precise reason (Remark).

Changes to v1 (this is v2)

• **Precisions (marked [v2 fix]).** (P1) In the proof of Theorem , equality of the antisymmetric two-point functions on U uses the causal convexity of U from Hypothesis . On a causally convex U the causal propagator of M_B restricts to that of O. This step is now cited. (P2) In Lemma , the spatial metric is complete, so the operator is essentially self-adjoint on C_c^∞ (Chernoff). The Friedrichs realization is then the unique self-adjoint extension, and the choice made in v1 is not a choice.

• **New results (Section).** The sharp exponential-moment abscissa $\theta < \log(1/\|M\|)/\lambda_{\max}$, which is exact for one mode (Proposition). An evaluated collar stress for the constant-profile member of the hypothesis class, i.e. the periodic Casimir tensor in closed Bessel form (Proposition). An explicit example in which a compact cutoff of a conserved stress breaks conservation (Remark). Computer checks of Theorems and , Corollary , and the conservation identity.

• **Framework placement and the user plan** (Section). Companion reading with V-DST-Host-v2. Separation rows to Res04-A-v7 and XIV-K-v7.

Framework placement (v2)

1. The scalar probe constructions live on the supplied ultrastatic profile: same-host Green operators (Proposition), the Hadamard ground state of P_B (Theorem), the collar stress (Theorem) and finite-mode amplitudes. None of them upgrades V-DST-Host's report transfer. T_{KG} has the explicit domain $\mathcal{S}_{\mathrm{KG}} = C_c^\infty(M_B;\mathbb{R})$. The programme map T and its domain stay unsupplied.

2. The spectral-record channel (Proposition) returns classical data and is not a quantum-return decoder. If a quantum complement is kept accessible, the channel is hybrid and the I-C floor (I-C thm:A) does not apply to it. Compactness belongs to the test tensors, not to the stationary reference stress: Proposition gives a constant, non-compact reference stress. A compact cutoff of a conserved stress generally breaks conservation (Remark).

3. I-B-VP's Hadamard statement (I-B-VP thm:hadamard) is a documentary comparison [29]. The reference state is the ground state of the supplied scalar Hamiltonian. It is not selected by a clock or by two responses. Occupation amplitudes depend on the model, sampling, packet and basis, and they supply none of the five obligations in I-B-G-Q's list. Those are: the joint map across the characteristic incidence; annihilation of reconstruction-null presentations; estimates for all branches and components; compatibility with the contact class; and the output wavefront after pushforward. The I-B-G-Q gates Q0–Q7 are language here, not premises.

4. Nothing here changes V-DST-Host's geometry, holonomy or filling class. Host C is not created. The reference

state is not de Sitter. No semiclassical Einstein equation is posed, no probe stress is adopted as Host-B matter, and vacuum is excluded from obligation targets. No quantum coefficient is admitted.

Keywords. Ultrastatic spacetime; Hadamard ground state; renormalized stress; Bogoliubov transformation; finite-mode observable; destructive readout; conditional host transfer.

Routing note and scope of the extension

This paper is a successor to the supplied V-DST-Host-v1.tex [35]. It does not retroactively enlarge that paper's release.

New positive scope. The new objects are:

1. a declared free scalar probe and its scalar source domain;

2. its global ultrastatic reference ground state;

3. a renormalized stress operator and stress expectations on a declared flat Host-B collar;

4. finite-mode averaged-stress observables, their ground states, and reference-vacuum spectral probabilities;

5. an optional, explicitly budgeted map from those stress scores into the predecessor's report-functional space.

Inherited ledger, quoted with its original scope.

O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3, and J2 stay unresolved. Host C is not created (or the decision is scoped). The Host-B transfer is supplied only in the precise sense stated, or remains explicitly unsupplied. No quantum coefficient is admitted. No compilation is asserted. The source has not been compiled. No machine-checked proof is claimed. Numerical execution is not asserted. Independent execution is not asserted. This is not spacetime emergence, not Einstein dynamics, not a Page curve, and not quantized relational time without an external clock. The prescribed cone stays distinct from I-D's two dynamical hosts. Settled Host B is not a de Sitter state. The pulse is not a cosmological bounce. Vacuum is excluded from the obligation targets. A particle-number cutoff is not a finite code dimension. A declared TT plane is not dense-space

representability.

Necessary reading qualification. The quoted exclusion of vacuum concerns the predecessor's obligation targets. The present paper introduces a separate, explicit *scalar-probe state construction*; it does not close a previously excluded vacuum-transfer target. Likewise, "No quantum coefficient is admitted" concerns the inherited characteristic coefficient, not the elementary existence of quantum-state expansion coefficients.

The H2, I3, and J2 lines retain their version-qualified reading: XIV-I's narrower internal-amplitude construction does not supply the complete characteristic composition, and the technical existence of XV-B-v2 is not an opening of its downstream quantum-admission exit [43, 44, 45].

What is not claimed. No state of the constrained linearized gravitational field is constructed. No scalar-probe stress is adopted as the matter supporting the Host-B metric. No semiclassical Einstein equation is solved. No inherited characteristic coefficient is renamed as an occupation amplitude.

Corrected targets and indispensable distinctions

Why the proposed three-object identification needs repair

The proposed plan contains a basis inconsistency. A vector annihilated by every b_i, expanded in its own b -occupation basis, has only a zero-occupation coefficient:

$$|0\rangle_b = 1|0, \ldots, 0\rangle_b.$$

The nontrivial coefficients of the diagonalization method instead expand the *reference* a-vacuum in the eigenbasis of a different quadratic observable. This is the distinction used by Schiappacasse–Fewster–Ford [54].

There is also a different identification problem. The inherited characteristic coefficient of the Cheung analytic programme is a prescribed distributional graph output with reconstruction, composition, contact, wavefront, and admission obligations. It is not defined as a Fock-basis coefficient [43, 44, 45].

Definition (Three target objects used in this paper).

1. A *Host-B scalar-probe stress expectation* is the expectation of the specified renormalized Klein–Gordon stress operator in a specified Hadamard state. It is not defined by solving two interpolation equations.

2. The *reference vacuum* is the pure quasifree ground state of the supplied ultrastatic scalar Hamiltonian. An *averaged-observable ground state* is instead a state minimizing a particular finite-mode quadratic observable. These are different objects.

3. *Occupation amplitudes* $C_{\mathbf{n}}$ are the coefficients of the reference vacuum in a declared eigenbasis of that quadratic observable. They are model-, sampling-, packet-, and basis-dependent.

No object in Definition is identified with Φ_B, with a metric perturbation, or with the inherited characteristic coefficient.

Support and conservation cannot be imposed by naming

A renormalized stress expectation need not be compactly supported, and a stationary nonzero one cannot have compact temporal support. Multiplying it by a compact cutoff generally breaks conservation:

$$\nabla^{\mu}(\chi t_{\mu\nu}) = (\nabla^{\mu}\chi)t_{\mu\nu} \quad \text{when} \quad \nabla^{\mu}t_{\mu\nu} = 0.$$

We therefore do not impose compact spacetime support on a vacuum stress. Compactness belongs to the *test tensors*. Section proves a stronger support obstruction for the explicit coherent relative stresses.

Enter and the observation boundary

The Philosophy of Enter treats destructive readout as a change of accessible output type: measured quantum names are consumed, and a classical record is returned. This is not physical annihilation of every implementation degree of freedom. Spacetime Enter keeps the metric and external geometric time as supplied data. Shredder Philosophy requires the complete accessible output to be specified before a classical-only recovery statement is applied [36, 37, 41].

Accordingly, the quantum states and operators constructed here exist before any reporting cut. A later classical

record carries their outcome probabilities, not a coherent copy of the state. No finite clock generates the ultrastatic Hamiltonian, and no readout constructs the stress operator.

The supplied Host-B scalar model and its exact source domain

Use units $c = \hbar = 1$ and signature $(- + + +)$.

Hypothesis (Complete ultrastatic profile and flat laboratory). Supply

$$M_B = \mathbb{R}_t \times \Sigma, \qquad \Sigma = \mathbb{R}_x \times S^1_\varphi \times \mathbb{R}_z, \qquad g_B = -\mathrm{d}t^2 + h_\Sigma, \qquad h_\Sigma = \mathrm{d}x^2 + P(x)^2\,\mathrm{d}\varphi^2 + \mathrm{d}z^2.$$

Assume $P \in C^\infty(\mathbb{R})$, $P \geq p_* > 0$, and, for definiteness, that all derivatives of $\log P$ of positive order are bounded.

A regular laboratory $U \subset M_B$ is supplied with an isometry $\kappa : U \to O$, where O is a Minkowski double cone. The embedding is causally convex in M_B, and all stress samplings and report-test supports used below are compactly contained in U. The isometry preserves time orientation. It is chosen to preserve the ultrastatic time coordinate up to an additive constant.

An affine interval $P'' = 0$, together with sufficiently small angular and time windows, supplies such a local flat laboratory.

The profile is part of the theorem's input. A citation to I-D does not verify these assumptions for any unprinted numerical or piecewise prescription [39, 42].

Example (Nonempty geometric hypothesis class). Let $\eta \geq 0$ be an even smooth compactly supported function on $(-1, 1)$ with integral 1, and let $b > 0$. Then

$$P(x) = b + \int_{\mathbb{R}} |x - s|\eta(s)\,\mathrm{d}s$$

is smooth, $P \geq b$, and $P'' = 2\eta$. It is affine for $|x| > 1$, so regular flat laboratories exist there.

This example proves nonemptiness of the printed hypothesis class. It is not an identification with I-D's fixed profile or an adoption of a new dynamical host.

Lemma (Completeness and the scalar operator). *Under Hypothesis , (Σ, h_Σ) is complete and M_B is globally hyperbolic. For a fixed mass $m > 0$, let*

$$\mathfrak{h} = L^2(\Sigma, \mathrm{d}v_\Sigma), \qquad A = -\Delta_{h_\Sigma} + m^2, \qquad H = A^{1/2}.$$

Take the positive Friedrichs realization of A. ***[v2 fix]*** *Since h_Σ is complete, A is essentially self-adjoint on $C_c^\infty(\Sigma)$ (Chernoff), so this is the unique self-adjoint extension. Then $A \geq m^2 I$ and $H \geq mI$. The scalar equation is*

$$\mathscr{P}_B \varphi = 0, \qquad \mathscr{P}_B = \partial_t^2 + A = -\mathrm{Box}_{g_B} + m^2.$$

Proof. The spatial metric dominates the complete product metric

$$\mathrm{d}x^2 + p_*^2 \, \mathrm{d}\varphi^2 + \mathrm{d}z^2.$$

A Cauchy sequence for h_Σ therefore converges in the product metric; local equivalence of smooth positive metrics gives convergence for h_Σ. The ultrastatic product of a complete Riemannian manifold with $\mathbb{R}$ is globally hyperbolic, with the constant-t slices Cauchy.

The quadratic form

$$a(f, f) = \int_\Sigma (|\nabla f|^2 + m^2 |f|^2) \, \mathrm{d}v_\Sigma$$

is positive and closable on $C_c^\infty(\Sigma)$. Its Friedrichs operator has the claimed lower bound. The expression for $\mathscr{P}_B$ follows from the ultrastatic metric. The global hyperbolic Cauchy and Green theory used here is the normally hyperbolic theory of [46].

Definition (Scalar source map; not the inherited source map). Let

$$\mathcal{S}_{\mathrm{KG}} = C_c^\infty(M_B; \mathbb{R}), \qquad \mathcal{X} = C_c^\infty(M_B; \mathbb{R}).$$

Define the continuous linear map

$$\mathrm{T}_{\mathrm{KG}} : \mathcal{S}_{\mathrm{KG}} \to \mathcal{X}', \qquad \langle \mathrm{T}_{\mathrm{KG}} j, v \rangle = \int_{M_B} j v \, \mathrm{d}v_{g_B}.$$

The corresponding scalar response is $G_{\mathrm{ret}}j$, with zero past data.

Proposition (Explicit same-host Green operators). *For $j \in \mathcal{S}_{\mathrm{KG}}$,*

$$(G_{\mathrm{ret}}j)(t) = \int_{-\infty}^{t} H^{-1}\sin\left((t-s)H\right)j(s)\,\mathrm{d}s,$$

$$(G_{\mathrm{adv}}j)(t) = -\int_{t}^{\infty} H^{-1}\sin\left((t-s)H\right)j(s)\,\mathrm{d}s.$$

They are the unique smooth retarded and advanced Green responses for $\mathscr{P}_B$. In particular,

$$\mathscr{P}_B G_{\mathrm{ret/adv}}j = j, \qquad \operatorname{supp} G_{\mathrm{ret/adv}}j \subset J^{\pm}_{M_B}(\operatorname{supp} j).$$

Proof. Functional calculus makes the displayed integrals well defined. Differentiation gives the inhomogeneous equation and the stated zero past or future data. Smoothness, finite propagation, and uniqueness follow from the normally hyperbolic Cauchy theorem on the complete ultrastatic spacetime [46, Chapter 3]. Thus the spectral formulas coincide with the geometric Green operators.

Remark (The model extension is explicit, not implicit). The scalar action is

$$S_{\mathrm{KG}}[\varphi] = -\frac{1}{2}\int_{M_B} (g_B^{\mu\nu}\nabla_\mu\varphi\nabla_\nu\varphi + m^2\varphi^2)\,\mathrm{d}v_{g_B}.$$

Its classical stress is

$$T_{\mu\nu}[f] = \nabla_\mu f\nabla_\nu f - \frac{1}{2}g_{B,\mu\nu}(\nabla^\alpha f\nabla_\alpha f + m^2 f^2).$$

This is a declared matter *probe*, not the selected matter supporting the prescribed metric.

The map T_{KG} is fully specified on its displayed scalar domain. It is not the predecessor's unsupplied gravitational source map T. Providing one domain does not provide the other. No gauge-fixed graviton operator, gravitational source law, or constrained quantum gravitational state has been constructed.

The reference ground state and the Hadamard property

Set

$$\mathcal{F} = \Gamma_s(\mathfrak{h}), \qquad \widehat{H}_0 = \mathrm{d}\Gamma(H),$$

and let Ω_0 be the Fock vacuum.

Theorem (Reference ground state on the supplied profile). *The kernel*

$$W_0(t, X; t', Y) = \left[(2H)^{-1} e^{-\mathrm{i}(t-t')H}\right](X, Y)$$

defines the two-point distribution of a pure quasifree state ω_0 of the real scalar field satisfying . It is invariant under t-translations and is a ground state for $\widehat{H}_0$.

The state is Hadamard. In particular its restriction to U has the standard positive-frequency Hadamard wavefront set.

Proof. For a compact spacetime test F, put

$$k_F = (2H)^{-1/2} \int_{\mathbb{R}} e^{\mathrm{i}tH} F(t)\, \mathrm{d}t.$$

The lower bound $H \geq mI$ controls the negative powers. Then

$$W_0(\overline{F}, F) = \|k_F\|_{\mathfrak{h}}^2 \geq 0.$$

The spectral formula is a bisolution and has the canonical equal-time commutator $[\widehat{\varphi}(t, X), \partial_t \widehat{\varphi}(t, Y)] = \mathrm{i}\delta_\Sigma(X, Y)$.

The corresponding Fock construction is pure and quasifree. The one-particle energy is $H \geq mI$, so $\widehat{H}_0 \geq 0$ and $\widehat{H}_0 \Omega_0 = 0$.

For the microlocal assertion, apply the stationary ground-state microlocal spectrum theorem of Sahlmann–Verch [47, Theorem 5.1], together with the Hadamard characterization [48]. Its relevant hypotheses hold here: the Killing flow is complete and everywhere timelike; the two-point function is a distributional bisolution; its antisymmetric part is the causal commutator; and the constructed state is a ground state. The commutator supplies the usual null propagation relation, and the ground spectrum selects its positive-frequency half. Thus the Hadamard condition holds.

Junker's ultrastatic construction gives the same reference-state framework [49]. We use the stationary microlocal theorem, rather than silently applying a compact-Cauchy-surface pseudodifferential statement to this noncompact Σ.

Remark (The state is not supplied by the flat chart). The global operator H, its spectral realization, and the ultrastatic time are essential data in . A flat collar alone supplies none of them. The restriction of a globally pure state to a proper local algebra is not asserted to be pure.

Local covariance transports the local field algebra under an appropriate causal isometric embedding; it does not identify arbitrarily chosen states on different global backgrounds [53]. We do not identify $\omega_0|_U$ with the Minkowski vacuum.

A renormalized stress on the flat Host-B collar

Fixed local normalization

Let W_m^{M} be the massive Minkowski vacuum two-point function, pulled back to U by κ. For any Hadamard state ω considered below, set

$$S_\omega = W_\omega - W_m^{\mathrm{M}} \quad \text{on} U \times U.$$

Both fields have the same local Klein–Gordon operator and commutator there. Hence S_ω is a smooth symmetric bisolution.

In the parallel Minkowski frame on U, define the diagonal differential operator

$$\mathscr{D}_{\mu\nu} S = \left[\partial_\mu \partial_{\nu'} S - \frac{1}{2} \eta_{\mu\nu} \left(\eta^{\alpha\beta} \partial_\alpha \partial_{\beta'} S + m^2 S \right) \right]_{x' = x}.$$

For symmetric S, the resulting tensor is symmetric.

Definition (Collar stress prescription). On U, use the Wick stress operator

$$\widehat{T}_{B,\mu\nu} = :\partial_\mu \widehat{\varphi}\, \partial_\nu \widehat{\varphi}:_{W_m^{\mathrm{M}}} - \frac{1}{2} \eta_{\mu\nu} \left(:\partial^\alpha \widehat{\varphi}\, \partial_\alpha \widehat{\varphi}:_{W_m^{\mathrm{M}}} + m^2 :\widehat{\varphi}^2:_{W_m^{\mathrm{M}}} \right).$$

This fixes Minkowski vacuum expectation zero on the flat collar. Its expectation in ω is

$$t_{B,\mu\nu}[\omega] = \mathscr{D}_{\mu\nu} S_{\omega}.$$

The Wick construction is understood as an operator-valued distribution on its usual Hadamard Wick domain, not as a bounded operator at a point. The free-field microlocal construction and the locally covariant renormalization framework are provided by [50, 51, 52]. Here the flat-collar normalization makes an explicit smooth-kernel formula. A global absolute stress outside U would additionally require a fixed global curved-spacetime renormalization prescription.

Theorem (Constructed conserved collar stress). *For ω_0, and for every state below whose two-point difference from W_0 is smooth, defines a smooth symmetric conserved tensor on U:*

$$\nabla^{\mu} t_{B,\mu\nu}[\omega] = 0.$$

Thus it defines a tensor distribution acting on compact test tensors. The reference expectation is explicitly

$$t_{B,\mu\nu}[\omega_0] = \mathscr{D}_{\mu\nu}\Big(\big[(2H)^{-1} e^{-\mathrm{i}(t-t')H} \big](X,Y) - W_m^{\mathrm{M}}(x,x') \Big).$$

It is not assumed to vanish.

Proof. Hadamard subtraction makes the difference smooth. Its symmetry follows because the two states have the same antisymmetric two-point function. **[v2 fix]** On U this uses the causal convexity of Hypothesis : the causal propagator of M_B restricted to the causally convex U is that of O. Equation is therefore a well-defined smooth tensor.

For a smooth symmetric bisolution, differentiating the diagonal means applying $\partial_x + \partial_{x'}$ before restriction. The product rule, symmetry under $x \leftrightarrow x'$, and

$$(\mathrm{Box}_x - m^2) S_{\omega} = (\mathrm{Box}_{x'} - m^2) S_{\omega} = 0$$

give

$$\partial^{\mu}\mathscr{D}_{\mu\nu}S_{\omega} = 0.$$

Equivalently, this is the polarized classical identity

$$\nabla^{\mu}T_{\mu\nu}[f] = (\mathrm{Box}_{g_B} f - m^2 f)\nabla_{\nu} f$$

applied to a smooth bisolution. The parallel isometry transports the identity to U. Equation follows from Theorem

.

Remark (Construction versus numerical evaluation). Equation constructs a distribution for every supplied profile satisfying the hypotheses. It is not a numerical evaluation for I-D's particular profile. No value of $\Gamma_1, \Gamma_2, \sigma(0)$, no supporting matter source, and no metric backreaction is inferred.

Nontrivial relative stresses

Define the reference-normal-ordered stress

$$\hat{\tau}_{B,\mu\nu} = \hat{T}_{B,\mu\nu} - t_{B,\mu\nu}[\omega_0]I \quad \text{on} U.$$

It also has the global interpretation of normal ordering the scalar stress with respect to W_0. This relative prescription is state dependent; it is not presented as a state-independent locally covariant prescription.

Theorem (Coherent relative stress and a support obstruction). *Let f be a real solution of with smooth compactly supported Cauchy data. Its coherent displacement of ω_0 is a pure Hadamard state ω_f, and*

$$W_f = W_0 + f \otimes f, \qquad t_B[\omega_f] - t_B[\omega_0] = T[f], \qquad \omega_f(\hat{\tau}_B) = T[f].$$

The relative stress is spacelike compact and conserved. If $f \neq 0$, its global tensor $T[f]$ cannot have compact spacetime support.

Proof. Compact smooth Cauchy data have finite one-particle norm because $m > 0$. The Weyl displacement is therefore unitarily implemented in the reference Fock space. It shifts the field by fI. The one-point function becomes f, and the two-point function changes by $f \otimes f$. This smooth change preserves the Hadamard singularity.

Applying $\mathscr{D}$ gives exactly , proving . Finite propagation gives spacelike compact support.

The conserved energy is

$$E_f(t) = \frac{1}{2}\int_\Sigma \left((\partial_t f)^2 + |\nabla f|^2 + m^2 f^2\right) \mathrm{d}v_\Sigma.$$

Finite propagation permits the usual integration by parts on every finite time interval, so $E_f(t)$ is constant. If $T[f]$ had compact spacetime support, $E_f(t) = 0$ for sufficiently early or late t. Positivity and $m > 0$ would give zero Cauchy data, hence $f = 0$, a contradiction.

Remark (No arbitrary stress interpolation). The scalar source response $G_{\mathrm{ret}} j$ is linear in j, whereas its classical stress is quadratic. Neither the Green operator nor two report conditions proves that an arbitrary declared response vector is the stress expectation of a state. For example,

$$T[\lambda f] = \lambda^2 T[f].$$

The stress-state realizability problem is a separate problem, not a consequence of current duality.

Finite-mode sampled stress: definition and stability

Smooth packets in the full field

Choose real orthonormal vectors

$$e_1, \ldots, e_N \in \bigcap_{k \geq 0} \mathrm{Dom}\,(H^k) \subset \mathfrak{h}.$$

Set

$$u_i(t, X) = (2H)^{-1/2} e^{-\mathrm{i}tH} e_i(X), \qquad \widehat{\varphi}_N = \sum_{i=1}^{N} \left(a_i u_i + a_i^\dagger \overline{u_i}\right).$$

Local elliptic regularity makes these packets smooth. They satisfy

$$u_i(-t, X) = \overline{u_i(t, X)}.$$

The full Hilbert space factors as

$$\mathcal{F} \cong \Gamma_{\mathrm{s}}(E_N) \otimes \Gamma_{\mathrm{s}}(E_N^{\perp}), \qquad E_N = \mathrm{span}_{\mathbb{C}} \{e_1, \ldots, e_N\}.$$

This is a one-particle packet split, not a spatial tensor factorization of local quantum field algebras.

Choose

$$w(t, X) = f(t)g(X),$$

where f, g are real, nonnegative, smooth, compactly supported, f is even, and supp wSubset U.

Definition (The finite-mode relative observable). Define

$$Q_N = \frac{1}{2} \int_{M_B} w : \left[(\partial_t \widehat{\varphi}_N)^2 + \left| \nabla_{\Sigma} \widehat{\varphi}_N \right|^2 + m^2 \widehat{\varphi}_N^2 \right] :_a \mathrm{d}v_{g_B}.$$

Normal ordering is with respect to the reference a-vacuum.

Equivalently, on smooth finite-particle vectors, Q_N is the quadratic form obtained by placing the $E_N^{\perp}$ factor of the full relative sampled stress in its reference vacuum. It is not an assertion that the full observable preserves $\Gamma_{\mathrm{s}}(E_N)$.

Direct expansion gives

$$Q_N = a^{\dagger} F a + \frac{1}{2}(a^{\mathrm{T}} B a + a^{\dagger} B a^{\dagger \mathrm{T}}),$$

where

$$F_{ij} = \int w \left[\partial_t \overline{u}_i \partial_t u_j + \nabla \overline{u}_i \cdot \nabla u_j + m^2 \overline{u}_i u_j \right] \mathrm{d}v_{g_B},$$

$$B_{ij} = \int w \left[\partial_t u_i \partial_t u_j + \nabla u_i \cdot \nabla u_j + m^2 u_i u_j \right] \mathrm{d}v_{g_B}.$$

Time reflection and evenness of f make F and B real symmetric matrices.

Hypothesis (Finite stability certificate). For the chosen packets and sampling, the computed matrices satisfy

$$K_q := F + B > 0, \qquad K_p := F - B > 0.$$

For certified numerical use, positive lower eigenvalue enclosures are required; floating-point positivity alone is not a certificate.

This is a finite matrix condition, not an assumption of infinite-dimensional diagonalizability.

Lemma (Stable local finite instances exist). *Every flat laboratory containing a small ultrastatic cylinder about* $t = 0$ *admits nonzero packet families and nonnegative samplings satisfying , for every prescribed finite N.*

Proof. Choose N real independent functions $\psi_i \in C_c^\infty(V)$, where $(-T, T) \times V$Subset U. Apply Gram–Schmidt in $\mathfrak{h}$ to $(2H)^{1/2}\psi_i$. The resulting orthonormal e_i have

$$u_i(0) = \widetilde{\psi}_i, \qquad \partial_t u_i(0) = -\mathrm{i}H\widetilde{\psi}_i,$$

where the $\widetilde{\psi}_i$ remain real, independent, and supported in a common compact KSubset V.

Choose $g \geq 0$ compactly supported in V, equal to 1 near K. At $t = 0$, the matrices corresponding to K_q, K_p are respectively the quadratic forms

$$2\int g\left(|\nabla\psi|^2 + m^2\psi^2\right) \mathrm{d}v_\Sigma, \qquad 2\int g|H\psi|^2 \, \mathrm{d}v_\Sigma$$

on $\psi = \sum_i c_i\widetilde{\psi}_i$. The first is positive definite because $m > 0$. If the second vanished, $H\psi$ would vanish near supp ψ, contradicting

$$\langle\psi, H\psi\rangle \geq m\|\psi\|^2$$

for $\psi \neq 0$. Thus the second is also positive definite.

Smoothness and finite dimension preserve strict positivity for sufficiently narrow nonnegative even time samplings of integral one. Their supports can be kept inside $(-T, T)$.

Remark (What the cutoff does not mean). The selected N-mode Fock space is still infinite dimensional: occupations are unbounded. It is not a finite code. Moreover,

$$W_N(x, y) = \sum_{i=1}^{N} u_i(x)\overline{u_i(y)}$$

is smooth and is not the Hadamard two-point function of the full continuum scalar field. Hadamard assertions

below concern the full field with its unaltered complementary modes.

Exact diagonalization, lower shift, and the second state

The following is a finite real quadratic construction. It is consistent with the diagonalization method of [54] and the general quadratic-Hamiltonian framework of [57].

Theorem (Explicit finite diagonalization). *Under Hypothesis , diagonalize*

$$K_p^{1/2} K_q K_p^{1/2} = O\Lambda^2 O^{\mathrm{T}}, \qquad O^{\mathrm{T}} O = I, \qquad \Lambda = \operatorname{diag}(\lambda_1, \ldots, \lambda_N) > 0.$$

Define

$$L = K_p^{1/2} O \Lambda^{-1/2}, \qquad U = \frac{1}{2}(L + L^{-\mathrm{T}}), \qquad V = \frac{1}{2}(L - L^{-\mathrm{T}}).$$

Then

$$a = Ub + Vb^{\dagger}, \qquad Q_N = \sum_{i=1}^{N} \lambda_i b_i^{\dagger} b_i + s_N I, \qquad s_N = \frac{1}{2}\Big(\sum_i \lambda_i - \operatorname{Tr} F\Big).$$

The quadratic operator has a self-adjoint realization obtained from this oscillator normal form, with lower bound $s_N \le 0$. *The selected-mode ground state is the normalized b-vacuum.*

Proof. Put $a = (q + \mathrm{i}p)/\sqrt{2}$. The canonical relations give

$$Q_N = \frac{1}{2} q^{\mathrm{T}} K_q q + \frac{1}{2} p^{\mathrm{T}} K_p p - \frac{1}{2} \operatorname{Tr} F.$$

The change

$$q = LQ, \qquad p = L^{-\mathrm{T}} P$$

is canonical. Equation gives

$$L^{\mathrm{T}} K_q L = \Lambda, \qquad L^{-1} K_p L^{-\mathrm{T}} = \Lambda.$$

With $b = (Q + \mathrm{i}P)/\sqrt{2}$, this proves and the displayed U, V.

In finite dimension the coordinate dilation and orthogonal changes implementing this canonical transformation are unitary in the oscillator Schrödinger representation. The transformed positive oscillator sum is self-adjoint on its standard domain and has lowest energy s_N. Finally, $\langle \Omega_0 \mathrm{rvert} Q_N |\Omega_0\rangle = 0$, so the infimum is at most zero.

Remark (A cutoff bound is not a continuum QEI). For every normalized state in the domain of this finite observable,

$$\langle Q_N \rangle \geq s_N.$$

This is the exact N-packet spectral inequality. It does not establish that s_N converges, is uniformly bounded as packets are added, or equals the lower bound for a full continuum stress average. Continuum QEIs have their own field, sampling, domain, and geometric hypotheses [59, 60]. No continuum QEI constant is inferred from s_N.

Let

$$\Omega_{b,N} = |0\rangle_b \otimes |0\rangle_{a,E_N^\perp}.$$

Theorem (Full-field Hadamard preservation under finite squeezing). *The vector $\Omega_{b,N}$ defines a pure quasifree Hadamard state $\omega_{b,N}$ of the full scalar field. Its two-point function differs smoothly from W_0. It minimizes Q_N, with expectation s_N, but it is not asserted to be a ground state of $\widehat{H}_0$ or of the full continuum averaged stress. Its collar stress is constructed by .*

Proof. The finite canonical transformation is implemented unitarily on $\Gamma_s(E_N)$, and the identity acts on the complement. Thus the transformed vacuum is pure and quasifree.

For illustration, its selected-mode covariances are

$$n = VV^{\mathrm{T}}, \qquad k = UV^{\mathrm{T}},$$

where $n_{ij} = \omega_{b,N}(a_i^\dagger a_j)$ and $k_{ij} = \omega_{b,N}(a_i a_j)$. Consequently $W_{b,N} - W_0$ is the finite sum

$$\sum_{i,j=1}^{N} [\; n_{ij}(u_i(x)\overline{u_j(y)} + \overline{u_i(x)}u_j(y)) + k_{ij}(u_i(x)u_j(y) + \overline{u_i(x)u_j(y)})].$$

All packets are smooth, so this difference is smooth. The full Hadamard wavefront set is unchanged. The spectral ground statement follows from Theorem ; the stress statement follows from Theorem .

The ground state of Q_N on the *full* Fock space is degenerate because Q_N acts trivially on the complementary factor. The choice of its reference complementary vacuum above is explicit.

Occupation amplitudes and actual spectral probabilities

The reference vacuum in the new basis

Define

$$M = U^{-1}V.$$

Theorem (Normalized multimode amplitudes). *The matrix M is real symmetric and* $\|M\| < 1$. *Up to the convention of a positive zero-occupation coefficient,*

$$|0\rangle_a = \mathcal{N}\exp\left(-\frac{1}{2}b^\dagger M b^{\dagger \mathrm{T}}\right)|0\rangle_b, \qquad \mathcal{N} = \det(I - M^2)^{1/4}.$$

The coefficients

$$C_{\mathbf{n}} = {}_b\langle \mathbf{n}|0\rangle_a$$

are fixed by the declared F, B and eigenbasis. Only even total occupation can occur.

The spectral probability of an eigenvalue x is

$$\Pr_{\omega_0}\{Q_N = x\} = \sum_{\mathbf{n}\,:\, s_N + \sum_i \lambda_i n_i = x} |C_{\mathbf{n}}|^2.$$

Proof. The canonical identities are

$$UU^{\mathrm{T}} - VV^{\mathrm{T}} = I, \qquad UV^{\mathrm{T}} = VU^{\mathrm{T}}.$$

They imply that U is invertible, $M = M^{\mathrm{T}}$, and

$$I - MM^{\mathrm{T}} = U^{-1}U^{-\mathrm{T}} > 0.$$

Thus $\|M\| < 1$.

Commuting b_i through the exponential in shows that

$$(b + Mb^\dagger)\exp\left(-\tfrac{1}{2}b^\dagger M b^{\dagger \mathrm{T}}\right)|0\rangle_b = 0.$$

Multiplication by U gives the a-vacuum equations.

Orthogonally diagonalize M. For each diagonal value μ, the squared norm of the corresponding exponential vector is

$$\sum_{n=0}^{\infty} \frac{2n}{n}\left(\frac{\mu^2}{4}\right)^n = (1-\mu^2)^{-1/2}.$$

Taking the product proves the normalization.

Every monomial in the exponential creates two quanta, so total occupation is even. The spectral theorem and the orthogonality of occupation vectors give , including degenerate eigenvalues.

Remark (Not every individual occupation must be even). A term $M_{12}b_1^\dagger b_2^\dagger$ gives

$$C_{1,1,0,\ldots,0} = -\mathscr{M}M_{12}.$$

Thus "only even occupations" is correct for the single mode or for total parity, not for every mode in a general correlated multimode eigenbasis.

The expansion is the finite squeezed-state structure used in [54]. The coefficients are not new couplings. Their numerical values change if the packet space, sampling, diagonalizing basis, or state changes.

Closed single-mode formulas

Let $N = 1$, $F = \mathrm{f}$, $B = \mathrm{b}$, and $\mathrm{f} > |\mathrm{b}|$. Put

$$\lambda = \sqrt{\mathrm{f}^2 - \mathrm{b}^2}, \qquad s = \frac{\lambda - \mathrm{f}}{2}, \qquad \mathscr{M} = -\frac{\mathrm{b}}{\mathrm{f} + \lambda}.$$

For $\mathrm{b} = 0$, set $\mathscr{M} = 0$. One may write $a = \cosh r\, b + \sinh r\, b^\dagger$, where

$$\tanh(2r) = -\frac{b}{f}, \qquad \mathscr{M} = \tanh r.$$

Corollary (Single-mode coefficients and characteristic function). *The reference-vacuum coefficients are*

$$C_{2n} = \left(-\frac{\mathscr{M}}{2}\right)^n \frac{\sqrt{(2n)!}}{n!}(1-\mathscr{M}^2)^{1/4}, \qquad C_{2n+1} = 0.$$

The outcomes are $x_n = s + 2n\lambda$, *with probabilities*

$$P_{2n} = \sqrt{1-\mathscr{M}^2}\,\frac{2n}{n}\left(\frac{\mathscr{M}^2}{4}\right)^n.$$

Their characteristic function is

$$\chi(t) = e^{its}\sqrt{\frac{1-\mathscr{M}^2}{1-\mathscr{M}^2 e^{2it\lambda}}},$$

with the square-root branch fixed by $\chi(0) = 1$.

Proof. The equation $(b + \mathscr{M} b^\dagger)|0\rangle_a = 0$ gives $C_1 = 0$ and

$$C_{2n+2} = -\mathscr{M}\sqrt{\frac{2n+1}{2n+2}}\,C_{2n}.$$

Iteration and the normalization series in Theorem give –. Summing $P_{2n} e^{it(s+2n\lambda)}$ gives .

This reproduces the standard single-mode formula with its correct vacuum/basis interpretation [54, Section III]. If the measured state were $|0\rangle_b$ instead, its distribution would be the single atom at s, not .

Tail behavior: a finite-mode theorem and a continuum boundary

Proposition (Exact single-mode tail type). *For* $0 < q := \mathscr{M}^2 < 1$,

$$P_{2n} \sim \frac{\sqrt{1-q}}{\sqrt{\pi n}} q^n, \qquad \sum_{k=n}^{\infty} P_{2k} \sim \frac{q^n}{\sqrt{\pi n}\sqrt{1-q}}.$$

Thus the tail is exponential in the spectral outcome $s + 2n\lambda$, *up to an algebraic factor. For* $q = 0$, *the distribution is concentrated at* 0.

Proof. Stirling's formula gives $\frac{2n}{n} \sim 4^n/\sqrt{\pi n}$, proving the first estimate. The consecutive probability ratio tends to q . Dividing the tail by its first term and using a dominating geometric sequence gives the limit $1/(1-q)$.

Theorem (Every fixed stable finite-mode law has an exponential moment). *For every fixed N satisfying Hypothesis , there is* $\theta > 0$ *such that*

$$K_\theta := \omega_0(e^{\theta Q_N}) < \infty.$$

Consequently

$$\Pr_{\omega_0}\{Q_N \geq x\} \leq K_\theta e^{-\theta x}.$$

In particular, this law cannot have an asymptotic positive tail of the form $\exp(-cx^p)$ *times a nonzero algebraic factor with* $c > 0$ *and* $0 < p < 1$.

Proof. In the b-basis, apply $e^{\theta(Q_N - s_N)/2}$ to . The squeezing matrix becomes

$$M_\theta = e^{\theta\Lambda/2} M e^{\theta\Lambda/2}.$$

Because $N < \infty$ and $\|M\| < 1$, continuity gives $\|M_\theta\| < 1$ for sufficiently small $\theta > 0$. The same Gaussian norm calculation used earlier gives

$$K_\theta = e^{\theta s_N} \frac{\det(I - M^2)^{1/2}}{\det(I - M_\theta^2)^{1/2}} < \infty.$$

Exponential Markov inequality proves . A genuine slower-than-exponential asymptotic of the stated type would violate that bound at large x.

Why the cited continuum tails are not imported

The four-dimensional moment calculations of Fewster–Ford–Roman concern specified Minkowski quadratic fields and Lorentzian sampling, with explicit moment indeterminacy cautions [55]. The time-sampling diagonalization study [54] and the space-and-time averaging study [56] also retain their particular field, sampling, and limiting assumptions.

They do not prove a stretched-exponential tail for the present fixed Q_N. Theorem shows why that identification would be incorrect.

A continuum limit would require, on one fixed model and sampling:

1. a specified increasing packet family and the full smeared operator or closed quadratic form;

2. an appropriate convergence theorem for its self-adjoint realizations and vacuum spectral measures;

3. control of lower shifts and, if a full Bogoliubov transformation is claimed, its implementability;

4. estimates uniform in both cutoff and large outcome. Infinite-dimensional quadratic diagonalization has genuine operator and implementability hypotheses [58, 57]. None of these continuum obligations is discharged by a finite matrix calculation. Weak convergence alone would not transfer a large-outcome asymptotic.

Stress scores and the predecessor's finite report norm

A correctly typed stress pairing

Recall the parent construction in a common flat laboratory. Let v_1, v_2 be supplied TT tests and choose $0 \le \rho \in C_c^\infty(O)$ with positive Gram matrix

$$G_{ab} = \int_O \rho\, \mathcal{R}_{\mathrm{el}}(v_a)_{ij} \mathcal{R}_{\mathrm{el}}(v_b)_{ij}\, \mathrm{d}^4 y, \qquad G \ge g_* I_2 > 0.$$

Set

$$C_a^{ij} = \rho \sum_b (G^{-1})_{ab} \mathcal{R}_{\mathrm{el}}(v_b)_{ij},$$

and

$$J_a^{00} = -\tfrac{1}{2}\partial_i \partial_j C_a^{ij}, \qquad J_a^{0j} = J_a^{j0} = \tfrac{1}{2}\partial_0 \partial_i C_a^{ij}, \qquad J_a^{ij} = -\tfrac{1}{2}\partial_0^2 C_a^{ij}.$$

Transport these compact contravariant test tensors to U and call them $J_{B,a}$. They obey

$$\nabla_\mu J_{B,a}^{\mu\nu} = 0, \qquad \langle J_a, v_b \rangle = \delta_{ab}.$$

These are the curvature-current constructions of [40, 41, 35].

For the *covariant* stress expectation define

$$c_a^{\mathrm{stress}}(\omega) = \int_U J_{B,a}^{\mu\nu} t_{B,\mu\nu}[\omega]\, \mathrm{d}v_{g_B}.$$

This is a valid compact-test pairing. It does not pair two arbitrary distributions by multiplication.

Relative scores replace $t_B[\omega]$ by $t_B[\omega] - t_B[\omega_0]$. In particular,

$$c_a^{\mathrm{rel}}(\omega_0) = 0, \qquad c_a^{\mathrm{rel}}(\omega_f) = \int_U J_{B,a}^{\mu\nu} T_{\mu\nu}[f]\, \mathrm{d}v_{g_B}.$$

The report functional remains

$$\Phi_B(c)(h) = \sum_a c_a \langle J_{B,a}, h \rangle.$$

Let $\mathcal{H}_B$ be the curvature-seminorm completion used in the parent:

$$\|h\|_{B,\rho} = \left(\int_O \rho \left| \mathcal{R}_{\mathrm{el}}(h^O) \right|^2 \mathrm{d}^4 y \right)^{1/2}.$$

Lemma (Exact report norm). *For* $c, d \in \mathbb{R}^2$,

$$\|\Phi_B(c) - \Phi_B(d)\|_{\mathcal{H}_B^*} = \sqrt{(c-d)^{\mathrm{T}} G^{-1} (c-d)} \le g_*^{-1/2} \|c - d\|_2.$$

Proof. Write $E_a = \mathcal{R}_{\mathrm{el}}(v_a)$. The representing vector in the weighted curvature space is $\sum_a (G^{-1}(c-d))_a E_a$. Cauchy–Schwarz gives the upper bound by its norm, namely the square root in . A test equal to the corresponding linear combination of the v_a near $\operatorname{supp} \rho$ attains the norm.

Remark (A stress projection, not stress reconstruction). Equation defines two scores of an already constructed state and stress. It does not establish equality with an independently specified V-DST response vector. Nor do these two numbers determine the stress tensor or state.

Accordingly, $\Phi_B(c^{\mathrm{stress}}(\omega))$ is the report of two stress scores. It is not the stress tensor itself.

A concrete quantum-comparison allowance

Fix a compact coordinate set KSubset U containing the test supports. For a smooth kernel S on $K \times K$, define

$$p_2(S) = \max_{|\alpha| + |\beta| \le 2} \sup_{K \times K} \left| \partial_x^\alpha \partial_x'^\beta S \right|.$$

Coordinate and unit scales are fixed as part of this seminorm. Put

$$L_a = \int_U \sum_{\mu,\nu} \left| J^{\mu\nu}_{B,a} \right| \mathrm{d}v_{g_B}, \qquad C_J = \left(3 + \frac{m^2}{2}\right)\sqrt{L_1^2 + L_2^2}.$$

Theorem (Two-point-function-to-report comparison). *Suppose* ω_1, ω_2 *use the same collar stress prescription and*

$$S = W_{\omega_1} - W_{\omega_2} \in C^\infty(K \times K), \qquad p_2(S) \le \delta_2.$$

Then

$$\left\| c^{\mathrm{stress}}(\omega_1) - c^{\mathrm{stress}}(\omega_2) \right\|_2 \le C_J \delta_2,$$

and

$$\left\| \Phi_B(c^{\mathrm{stress}}(\omega_1)) - \Phi_B(c^{\mathrm{stress}}(\omega_2)) \right\|_{\mathcal{H}_B^*} \le g_*^{-1/2} C_J \delta_2.$$

Proof. For each component, gives

$$\left| \mathscr{D}_{\mu\nu} S \right| \le \left(1 + \frac{1}{2}(4 + m^2)\right) p_2(S) = \left(3 + \frac{m^2}{2}\right) p_2(S).$$

Pairing with $J_{B,a}$, integrating its absolute components, and summing the two squared score bounds proves . Lemma gives .

This theorem makes one possible identification certificate testable in a smooth two-point-difference topology. It does not supply a missing δ_2. In particular, a smooth finite-mode kernel W_N alone cannot replace a Hadamard W_0 in this comparison: their singularity structures do not match.

The unchanged classical budget and its new comparison slot

Suppose the complete finite transcript supplies, on an event of probability at least $1 - \beta$,

$$\left\| \hat{c} - c_{\mathrm{model}}(\hat{\ell}) \right\|_2 \le \varepsilon_\tau, \qquad \left| \hat{\ell} - \ell \right| \le \varepsilon_{\mathrm{clock}},$$

and c_{model} is L_c-Lipschitz. The transcript allowance includes any declared Gram-coordinate reconstruction error.

If, independently,

$$\left\| c_{\mathrm{model}}(\ell) - c^{\mathrm{stress}}(\omega) \right\|_2 \le \varepsilon_{\mathrm{id}},$$

then

$$\left\| \Phi_B(\hat{c}) - \Phi_B(c^{\mathrm{stress}}(\omega)) \right\|_{\mathcal{H}_B^*} \le \frac{\varepsilon_\tau + L_c \varepsilon_{\mathrm{clock}} + \varepsilon_{\mathrm{id}}}{\sqrt{g_*}}$$

on the same event. This follows by the triangle inequality and Lemma . For a two-state comparison, Theorem can supply the contribution $\varepsilon_{\mathrm{id}} = C_J \delta_2$, if its hypotheses have actually been certified.

The old reporting error is therefore unchanged. A new quantum construction adds a separately justified comparison allowance; it does not erase classical statistical, calibration, or conditioning errors.

toprule Ledger Established quantity Limitation

midrule Finite transcript ε_τ, with its coverage Requires the complete attempted-run law and declared estimator.

Clock $L_c \varepsilon_{\mathrm{clock}}$ The clock is not the Hamiltonian or a field-state constructor.

Gram conditioning $g_*^{-1/2}$ Must not be hidden in a profile-only constant.

Scalar ground state W_0, ω_0 Depends on the full supplied ultrastatic model.

Collar stress $\mathscr{D}(W_\omega - W_m^{\mathrm{M}})$ Fixed prescription; no supporting-source identification.

Quantum comparison $C_J \delta_2 / \sqrt{g_*}$ Only when a smooth C^2 kernel comparison is supplied.

Finite spectrum $s_N, \lambda_i, C_{\mathbf{n}}$ No continuum cutoff-removal or large-outcome limit.

Inherited graph No admitted coefficient Not supplied by any entry above.

bottomrule

Finite destructive spectral reports and access limits

For fixed Q_N, let $B_1, \ldots, B_L, B_\perp$ be a finite Borel partition of $\mathbb{R}$. The last bin includes every unlisted or overflow outcome. Let $E_j = 1_{B_j}(Q_N)$.

Proposition (Complete finite spectral-record channel). *On trace-class states of the selected-mode Fock space,*

$$\mathscr{C}_N(\rho) = \sum_{j \in \{1, \ldots, L, \perp\}} \mathrm{Tr}\,(E_j \rho)|j\rangle\langle j|$$

is a completely positive trace-preserving classical-output channel. On the reference vacuum its probabilities are obtained by summing $|C_{\mathbf{n}}|^2$ over the appropriate bins. No amplitude phase is returned.

Proof. The spectral projections are positive and sum to I. Thus their outcome functionals define a complete POVM channel. The vacuum law follows from . The output depends only on the probabilities, so it does not retain the coherent amplitudes.

This is a mathematical measurement channel, not a derived hardware implementation. Independent repeated preparations would permit finite-shot bounds on bin probabilities. They do not automatically estimate the different observables $\widehat{T}_B(J_{B,a})$, nor do they reconstruct an unbounded mean without an additional tail or truncation allowance.

If any message-bearing quantum complement remains accessible, the complete interface is hybrid. A classical-only recovery theorem applies only after that factor is explicitly excluded or discarded. On any declared d-dimensional unknown code, a fully classical accessible output followed by a deterministic decoder retains the bound

$$\frac{1}{2}\|\mathscr{D}\mathscr{C} - \mathrm{id}\|_\diamond \geq 1 - \frac{1}{d},$$

as in the predecessor and the entanglement-breaking framework [35, 38, 61]. The new spectral probabilities do not

defeat that bound.

Why no inherited characteristic coefficient is constructed

Proposition (Occupation amplitudes do not identify the graph target). *The constructions in Sections – do not define the inherited characteristic coefficient of XIV-I/XIV-J/XV-B.*

Proof. Their inputs are the scalar operator A, its reference state, a finite packet space, a compact sampling, and finite matrices F, B. Their outputs are a scalar two-point function, local scalar stress expectations, and complex coordinates of a Fock vector.

They define no operation on the inherited complete reconstructed graph with its grouped cross-lines and retained residual variable. In particular they supply none of:

1. the full characteristic contraction on tests meeting the prescribed characteristic locus;

2. descent through every internal reconstruction-null relation;

3. the same-target section and controlled remainder;

4. the required transverse estimates and permitted-contact compatibility;

5. the complete output wavefront and normalization/admission theorem. These are distinct domain and output requirements in the supplied analytic records [43, 44, 45]. No map identifying the two kinds of coefficients is defined or proved here. Therefore the present construction does not construct that target.

Remark (No universal impossibility assertion). Proposition is a precise non-admission statement about this release. It is not a proof that every future comparison map is impossible. A comparison would have to identify the actual objects, domains, operations, and outputs before transferring a theorem.

The local covariance and Hadamard theorems used here concern free-field algebras and their singularity structure [53, 48, 50]. They are not prescriptions for the unconstructed inherited characteristic product.

Consistency with the predecessor and the Host-C decision

1. Background covariance. No pure-gauge kernel statement for a nonvacuum metric-only equation is inferred. The selected probe is scalar and its metric is prescribed.

2. Residual equation. The scalar equation $\mathscr{P}_B\varphi = 0$ is not the Host-B gravitational residual-gauge equation.

3. Finite plane. The two stress scores and their report remain a two-dimensional projection. No dense-TT representation is obtained.

4. Green operators. The new Green operators were constructed from explicit global scalar data. They were not transferred from the conical model or inferred from a chart.

5. Vacuum. The reference state is a ground state for a declared scalar Hamiltonian, not a state selected by a finite clock or by two response values.

6. Recovery. The spectral-record channel returns classical data. It is not a quantum-return decoder.

7. Host C. Nothing changes the geometry, defect holonomy, or regular-filling class used in V-DST-Host. Its small-loop obstruction to $\mathfrak{C}_{\mathrm{reg}}$ remains a separate geometric result [35]. No Host-C candidate is adopted.

The construction does not identify the reference state with a de Sitter state, prove an energy condition for the renormalized stress, or equate a bosonic occupation cutoff with a finite code.

v2 results

Proposition (Exponential-moment abscissa; [v3] sharp for one mode only, see Theorem). *In Theorem , let* $\lambda_{\max} = \max_i \lambda_i$, *and recall* $\|M\| < 1$. *The formula*

$$K_\theta = e^{\theta s_N}\frac{\det(I - M^2)^{1/2}}{\det(I - M_\theta^2)^{1/2}}, \qquad M_\theta = e^{\theta\Lambda/2} M e^{\theta\Lambda/2},$$

is finite for every $\theta < \theta_* := \log(1/\|M\|)/\lambda_{\max}$, *and for every* $\theta \le 0$. *Hence*

$$\Pr_{\omega_0}(Q_N \ge x) \le K_\theta e^{-\theta x} \qquad (0 < \theta < \theta_*).$$

For one mode, $\theta_* = \log(1/q)/(2\lambda)$ with $q = M^2$, and it is exactly the abscissa of convergence: $K_\theta = \infty$ for $\theta \geq \theta_*$.

Proof. $\|M_\theta\| \leq e^{\theta\lambda_{\max}}\|M\| < 1$ for $0 \leq \theta < \theta_*$. For $\theta \leq 0$, $\|M_\theta\| \leq \|M\|$. The Gaussian norm $\|\exp(-\frac{1}{2}b^\dagger M_\theta b^{\dagger T})|0\rangle\|^2 = \det(I - M_\theta^2)^{-1/2}$ holds for real symmetric M_θ of norm < 1, which gives the formula as in v1. Markov's inequality gives the tail bound. For one mode, Corollary gives $K_\theta = e^{\theta s}\sqrt{1-q}\sum_n \frac{2n}{n}(qe^{2\theta\lambda}/4)^n$. This converges exactly when $qe^{2\theta\lambda} < 1$. The formula was compared with a direct truncated-Fock evaluation for a random two-mode instance at $\theta = 0.3\theta_*$ and $0.6\theta_*$ (computer-assisted; Appendix).

This is a tail statement for the finite-mode model observable Q_N in the reference state. It is not a stress-energy inequality for Host B.

Proposition (Evaluated collar stress for the constant-profile member). *Take $P \equiv p_0 > 0$ in Hypothesis , and put $L = 2\pi p_0$. In the laboratory chart $(t, x, y = p_0\varphi, z)$, take any double cone O of spatial radius R_0 with $4R_0 < L$. Then U is causally convex and Hypothesis holds. Moreover*

$$W_0(X,Y) = \sum_{n\in\mathbb{Z}} W_m^{\mathrm{M}}(x, y + nLe_y), \qquad t_B[\omega_0] = \mathrm{diag}(\rho, -\rho, p_y, -\rho),$$

with

$$\rho = -\frac{m^2}{2\pi^2}\sum_{n\geq 1}\frac{K_2(nmL)}{(nL)^2}, \qquad p_y = -\frac{3m^2}{2\pi^2}\sum_{n\geq 1}\frac{K_2(nmL)}{(nL)^2} - \frac{m^3}{2\pi^2}\sum_{n\geq 1}\frac{K_1(nmL)}{nL}.$$

The trace is $-m^2\langle\varphi^2\rangle_{\mathrm{rel}}$, with $\langle\varphi^2\rangle_{\mathrm{rel}} = \sum_{n\neq 0}\frac{mK_1(|n|mL)}{4\pi^2|n|L}$. As $m \to 0$, $\rho \to -\pi^2/(90L^4)$ and $p_y \to 3\rho$.

Proof. For constant P the host is flat, $\mathbb{R}^{1,2} \times S^1_L$. Its ultrastatic ground state is the image sum of the Minkowski vacuum along the periodic direction, which is the kernel of $(2H)^{-1}e^{-\mathrm{i}(t-t')H}$ on the quotient. Causal convexity follows from lifting causal curves to the cover. A curve that ends on a shifted copy $O + nLe_y$, $n \neq 0$, would need a time extent of at least $L - 2R_0 > 2R_0$, which a double cone of radius R_0 does not have.

On U, $S = W_0 - W^{\mathrm{M}} = \sum_{n\neq 0} F(x - x' - nLe_y)$, with $F(\Delta) = f(\Delta\cdot\Delta)$ and $f(s) = mK_1(m\sqrt{s})/(4\pi^2\sqrt{s})$. Since $(\mathrm{Box} - m^2)F = 0$ away from 0, gives $t_{\mu\nu} = -\sum_{n\neq 0}\partial_\mu\partial_\nu F(nLe_y)$. Expanding $\partial_\mu\partial_\nu F = 2f'\eta_{\mu\nu} + 4f''\Delta_\mu\Delta_\nu$ and using

$\frac{\mathrm{d}}{\mathrm{d}r}(K_\nu(mr)/r^\nu) = -mK_{\nu+1}(mr)/r^\nu$ gives the closed forms. They agree with direct high-precision differentiation of the image sum to 25 digits at $m = 0.7$, $L = 2.3$. The trace identity and the massless limit were also checked (computer-assisted; Appendix , casimir-*).

This evaluates the scalar-probe collar stress for one member of the hypothesis class. It is not I-D's settled Host-B profile, not Host-B matter, not a source, not a de Sitter state, and not an input to any semiclassical equation. "No Host-B stress is evaluated" (V-DST-Host) remains true for I-D's Host B.

Remark (A compact cutoff breaks conservation). Let $t^{\mu\nu}$ be the constant tensor of Proposition , and let $\chi \in C^\infty$ depend on x only, e.g. $\chi = e^{-x^2}$. Then $\partial_\mu(\chi t^{\mu\nu}) = t^{x\nu}\partial_x\chi = -\rho\,\partial_x\chi\,\delta^\nu_x \neq 0$ wherever $\partial_x\chi \neq 0$, because $\rho < 0$ (exact check, cutoff-breaks-conservation). Compactness therefore belongs to the test tensors that are paired with t_B, not to the stress.

v3 results

Theorem (Exact multimode exponential-moment abscissa). *In Theorem , with* $\Lambda = \mathrm{diag}\,(\lambda_1, \ldots, \lambda_N) > 0$ *and* $\|M\| < 1$, *set*

$$\theta_{\mathrm{ex}} := \sup\{\theta \geq 0 : \|M_\theta\| < 1\}, \qquad M_\theta = e^{\theta\Lambda/2} M e^{\theta\Lambda/2}.$$

1. *For* $\theta \geq 0$, $K_\theta < \infty$ *if and only if* $\theta < \theta_{\mathrm{ex}}$.

2. $\{\theta \geq 0 : \|M_\theta\| < 1\} = [0, \theta_{\mathrm{ex}})$. *Moreover* θ_{ex} *is the smallest positive root of*

$$\det(e^{-\theta\Lambda} - M)\det(e^{-\theta\Lambda} + M) = 0.$$

3. $\dfrac{\log(1/\|M\|)}{\lambda_{\max}} \leq \theta_{\mathrm{ex}} \leq \dfrac{\log(1/\|M\|)}{\lambda_{\min}}$. *Both bounds are equalities when all* λ_i *coincide, and the lower bound is v2's* θ_*.

4. $\liminf_{x\to\infty} -\frac{1}{x}\log \Pr_{\omega_0}\{Q_N \geq x\} = \theta_{\mathrm{ex}}$. *So* θ_{ex} *is the exact exponential tail rate of the law of* Q_N.

Proof. (b) By congruence with $E = e^{\theta\Lambda/2}$, $I \mp M_\theta \succcurlyeq 0 \Leftrightarrow e^{-\theta\Lambda} \mp M \succcurlyeq 0$. Since $\Lambda > 0$, $e^{-\theta\Lambda}$ decreases in the Loewner order as θ grows. Both conditions hold at $\theta = 0$ because $\|M\| < 1$, and once lost they are not regained. At

the first failure an eigenvalue of $e^{-\theta\Lambda} \mp M$ reaches 0; before it, both determinants are positive. (a) Write $M_\theta = ODO^{\mathrm{T}}$ with O orthogonal. The passive mode change $c = O^{\mathrm{T}}b$ preserves the vacuum and the norm. It factorizes $\exp(-\tfrac{1}{2}b^\dagger M_\theta b^{\dagger\mathrm{T}})|0\rangle$ into single-mode vectors $\exp(-\tfrac{1}{2}d_k c_k^{\dagger 2})|0\rangle$, whose squared norms $\sum_n \frac{2n}{n}(d_k^2/4)^n$ are finite exactly when $|d_k| < 1$. Hence $K_\theta < \infty \Leftrightarrow \|M_\theta\| < 1$. (c) If $e^{-\theta\lambda_{\max}} > \|M\|$, then $e^{-\theta\Lambda} \pm M$succ 0. If $e^{-\theta\lambda_{\min}} \le \|M\|$, test $e^{-\theta\Lambda} \mp M$ on an eigenvector of M for the eigenvalue $\pm\|M\|$. (d) For a law bounded below, the abscissa of convergence of the moment generating function equals the stated tail exponent [16, Ch. II].

The bisection value of θ_{ex} and the determinant root agree on six random three-mode instances, and the bounds of (c) hold. In one instance $\theta_{\mathrm{ex}} = 0.0517$, strictly above $\theta_* = 0.0476$ (Appendix , abscissa-multimode). This is a statement about the finite-mode model observable Q_N. It is not a stress-energy inequality, and it is not a continuum tail.

Proposition (Exact cutoff divergence and a steepness-independent lower bound). *Let* $t^{\mu\nu} = \mathrm{diag}(\rho, -\rho, p_y, -\rho)$ *be the constant collar stress of Proposition , and let* $\chi \in C^\infty(\mathbb{R}^4)$ *be arbitrary.*

1. $\partial_\mu(\chi t^{\mu\nu}) = t^{\nu\nu}\partial_\nu\chi$ *(no sum), i.e.* $(\rho\,\partial_t\chi,\ -\rho\,\partial_x\chi, p_y\,\partial_y\chi,\ -\rho\,\partial_z\chi)$.

2. *If* $\chi \in C_c^\infty$ *and* $\chi = 1$ *on a set* K*, then for each* ν

$$\int_{\mathbb{R}^4} \left|\partial_\mu(\chi t^{\mu\nu})\right| \mathrm{d}^4x \ \ge\ 2\,|t^{\nu\nu}|\,|\pi_\nu(K)|,$$

where $\pi_\nu(K)$ *is the projection of* K *onto* $\{x^\nu = 0\}$ *and* $|\cdot|$ *is three-dimensional measure. Equality holds when* χ *is monotone on each half of every coordinate line through* K *and vanishes on the lines that miss* $\pi_\nu(K)$.

Proof. (a) t is constant (exact check, cutoff-divergence-exact). (b) On every line parallel to e_ν that meets K, χ rises from 0 to 1 and returns to 0, so $\int|\partial_\nu\chi| \ge 2$. Integrate over $\pi_\nu(K)$ (numerical illustration, cutoff-L1-lower).

Neither a smoother nor a wider cutoff makes the breaking of conservation small in L^1. For the constant profile, $|\rho|$ and $|p_y|$ are explicit. The proposition concerns test tensors, not the stress itself, and it is not a statement about I-D's Host B.

Proposition (Sign, monotonicity and asymptotics of the constant-profile collar stress). *For the constant-profile member with $m > 0$:*

1. $p_y < 3\rho < 0$.

2. *$|\rho|$ is strictly decreasing in m and in L. Hence $|\rho| < \pi^2/(90L^4)$, the massless value.*

3. $\rho = -\frac{m^2}{2\pi^2 L^2} K_2(mL)(1 + O(e^{-mL})) \sim -\frac{m^2}{2\pi^2 L^2}\sqrt{\frac{\pi}{2mL}}\, e^{-mL}$ *as* $mL \to \infty$.

4. *$\rho = f(L)$ and $p_y = -\partial_L(Lf)$, where $f(L) = -\frac{1}{32\pi^2}\sum_{n\neq 0}\int_0^\infty s^{-3} e^{-m^2 s - n^2 L^2/(4s)}\,\mathrm{d}s$ is the proper-time free-energy density.*

Proof. (a) $p_y - 3\rho = -\frac{m^3}{2\pi^2}\sum_n K_1(nmL)/(nL) < 0$, and $\rho < 0$ because $K_2 > 0$. (b) $\frac{\mathrm{d}}{\mathrm{d}z}(z^2 K_2(z)) = -z^2 K_1(z) < 0$, and $m^2 K_2(nmL) = (nL)^{-2}(nmL)^2 K_2(nmL)$. Monotonicity in L holds termwise. The massless limit is Proposition . (c) The $n \geq 2$ terms are $O(e^{-mL})$ relative to the first, and $K_2(z) \sim \sqrt{\pi/(2z)}e^{-z}$. (d) $\int_0^\infty s^{-3} e^{-m^2 s - a/s}\,\mathrm{d}s = 2(m^2/a)K_2(2m\sqrt{a})$. The pressure along the compact direction is minus the derivative of the energy per transverse area. As an independent re-verification of v2, ρ and p_y were computed from the proper-time integrals by quadrature, with the L-derivative taken under the integral sign. This route avoids the image-sum differentiation used in v2, and it agrees with v2's closed forms to 24 digits at $m = 0.7$, $L = 2.3$ (Appendix , reverify-casimir-heatkernel, casimir-signs, casimir-large-mL).

This concerns the constant-profile member of the hypothesis class only. It is not I-D's settled Host-B profile, not Host-B matter, not a source, and not an input to any semiclassical equation.

Remark (Why a second explicit collar instance is not supplied). The image construction of Proposition needs Σ to be globally flat, that is $P'' \equiv 0$ on $\mathbb{R}$. Under Hypothesis ($P \geq p_* > 0$) an affine P on all of $\mathbb{R}$ is constant. So the constant profile is the only member whose global ground state is an image sum. Every other member, for example Example , has a curved region. Its ground-state collar stress needs a spectral computation of the one-dimensional operators $-P^{-1}\partial_x(P\partial_x) + k^2/P^2 + k_z^2 + m^2$, with certified error bounds that are not supplied here. Changing m or p_0 only moves within the same family, which Proposition covers. Twisted boundary conditions and the conical

profile $P = \alpha x$ lie outside the hypothesis class. **[v4]** Beyond the image class: Proposition .

v4 results

Theorem (Structure of the multimode abscissa). *In Theorem , write $m = \|M\|$, and let u be a unit eigenvector of M for an eigenvalue of modulus m.*

1. *Adding modes cannot raise the abscissa. Suppose (Λ', M') on $N' > N$ modes has (Λ, M) as its leading principal blocks. Then $\theta'_{\mathrm{ex}} \le \theta_{\mathrm{ex}}$. For a nested sequence, $\theta^{(N)}_{\mathrm{ex}}$ is non-increasing and has a limit.*

2. *A sharper upper bound. Let θ_{up} be the unique root of $\sum_i u_i^2 e^{-\theta\lambda_i} = m$. Then*

$$\frac{\log(1/m)}{\lambda_{\max}} \le \theta_{\mathrm{ex}} \le \theta_{\mathrm{up}}, \qquad \frac{\log(1/m)}{\langle u, \Lambda u\rangle} \le \theta_{\mathrm{up}} \le \frac{\log(1/m)}{\lambda_{\min}}.$$

3. *First-order formula. Suppose m is a simple eigenvalue of $|M|$, and let $\Lambda = \bar{\lambda}(I + \varepsilon D)$ with D diagonal and fixed. Then*

$$\theta_{\mathrm{ex}} = \frac{\log(1/m)}{\langle u, \Lambda u\rangle} + O(\varepsilon^2),$$

so to first order the abscissa is governed by the frequency average in the top mode.

4. *An explicit asymptotic in the mode count. For the declared family $M = m\,uu^{\mathrm{T}}$ with $u_i = N^{-1/2}$, $\lambda_i = i$ $(1 \le i \le N)$ and $0 < m < 1$, $\theta^{(N)}_{\mathrm{ex}}$ is the unique root of $\frac{m}{N}\sum_{i=1}^{N} e^{\theta i} = 1$, and*

$$\theta^{(N)}_{\mathrm{ex}} = \frac{x_*}{N} + O(N^{-2}), \qquad m\,\frac{e^{x_*} - 1}{x_*} = 1.$$

Proof. (a) Because Λ' is diagonal, M_θ is the leading principal block of M'_θ, so $\|M_\theta\| \le \|M'_\theta\|$. Apply Theorem (b). (b) Take $v = e^{-\theta\Lambda/2}u$. Then $\langle v, M_\theta v\rangle = \langle u, Mu\rangle = \pm m$ and $|v|^2 = \sum u_i^2 e^{-\theta\lambda_i}$, so $\|M_\theta\| \ge m/\sum u_i^2 e^{-\theta\lambda_i}$, which is at least 1 for $\theta \ge \theta_{\mathrm{up}}$. The left inequality is Theorem (c). Jensen's inequality $\sum u_i^2 e^{-\theta\lambda_i} \ge e^{-\theta\langle u,\Lambda u\rangle}$ and $\sum u_i^2 e^{-\theta\lambda_i} \le e^{-\theta\lambda_{\min}}$ give the outer bounds. (c) At $\varepsilon = 0$, $\theta_0 = \log(1/m)/\bar{\lambda}$. The top eigenvalue of $\pm M - e^{-\theta\Lambda}$ (sign of the eigenvalue $\pm m$) is simple and analytic near $(\theta_0, 0)$, with θ-derivative $\bar{\lambda}m > 0$. The other sign stays negative by simplicity. The implicit

function theorem gives an analytic $\theta_{\mathrm{ex}}(\varepsilon)$. First-order perturbation theory of $m - \langle u, e^{-\theta\Lambda}u\rangle = 0$ yields the formula.

(d) For rank one, $\|M_\theta\| = m\sum u_i^2 e^{\theta\lambda_i}$, which increases strictly in θ. With $\theta = x/N$, $\frac{1}{N}\sum_i e^{xi/N} = \frac{e^x - 1}{x} + O(xe^x/N)$ uniformly on compact x-sets. The function $(e^x - 1)/x$ increases from 1 to ∞, so the implicit function theorem gives $N\theta_{\mathrm{ex}}^{(N)} = x_* + O(1/N)$.

Checks (Appendix): on 200 random nested instances, (a) and (b) hold. The first-order error scales as ε^2. For $m = \frac{1}{2}$, $x_* = 1.25643$, and $N\theta_{\mathrm{ex}}^{(N)}$ equals 1.16040, 1.24609, 1.25539 and 1.25633 for $N = 10$, 10^2, 10^3 and 10^4 (abscissa-monotone-upper-firstorder, rank-one-family-asymptotic, rank-one-norm-identity). As a re-verification of v3 by a different method, the six random v3 instances were regenerated and θ_{ex} recomputed by root-finding on the smallest eigenvalue of $e^{-\theta\Lambda} \mp M$. This reproduces $\theta_* = 0.0476 < \theta_{\mathrm{ex}} = 0.0517$ and the other five pairs (reverify-theta-ex-v3-instances). The family in (d) is a declared model family, not a mode structure derived from Host B. All statements concern the finite-mode observable Q_N. None is a stress-energy inequality or a continuum tail.

Proposition (Which methods cannot produce a second collar instance). *Let P satisfy Hypothesis , including the existence of a flat laboratory.*

1. *If P is real-analytic, then P is constant.*

2. *If (Σ, h_Σ) is locally homogeneous (its universal cover has a transitive isometry group), then P is constant. Hence every non-constant member is non-analytic and has a non-homogeneous slice. This rules out closed-form mode solutions with analytic coefficients, and image sums over any homogeneous cover, flat or curved, as routes to a second instance.*

Proof. A flat laboratory forces $P'' = 0$ on an open interval. The Gaussian curvature of $\mathrm{d}x^2 + P^2\,\mathrm{d}\varphi^2$ is $K = -P''/P$, and the scalar curvature of h_Σ is $2K$. (a) P'' is analytic and vanishes on an interval, so $P'' \equiv 0$. Then P is affine on $\mathbb{R}$ and $P \geq p_* > 0$, so P is constant. (b) Local homogeneity makes the scalar curvature constant. It vanishes on the laboratory, so $K \equiv 0$, and (a)'s last step applies.

For example, the hyperbolic cylinder $P = p_0 \cosh(x/a)$, whose slice is a quotient of $\mathbb{H}^2_a \times \mathbb{R}$, would admit an image sum over a homogeneous cover. But it has $P'' > 0$ everywhere, so it has no flat laboratory and lies outside the class. A second instance therefore needs a certified numerical spectral computation for a non-analytic profile, such as Example . That computation is not supplied. This is an exclusion of methods, not a statement about the stress of any profile. It concerns the hypothesis class only, not I-D's settled profile.

v5 results

Theorem (Variational formula and monotonicity of the abscissa). *In Theorem , for a unit vector $v \in \mathbb{R}^N$ and a sign $\varepsilon = \pm 1$ with $\varepsilon\langle v, Mv\rangle > 0$, let θ_v^ε be the unique root of*

$$\sum_i v_i^2 e^{-\theta\lambda_i} = \varepsilon\langle v, Mv\rangle.$$

1. *$\theta_{\mathrm{ex}} = \min\{\theta_v^\varepsilon : |v| = 1,\ \varepsilon\langle v, Mv\rangle > 0\}$, and the minimum is attained.*

2. *θ_{ex} is non-increasing in each λ_i, and $\theta_{\mathrm{ex}}(c\Lambda, M) = \theta_{\mathrm{ex}}(\Lambda, M)/c$.*

3. *If $-M_2 \operatorname{preceq} \pm M_1 \operatorname{preceq} M_2$ in the sense that $|\langle v, M_1 v\rangle| \le |\langle v, M_2 v\rangle|$ for all v, then $\theta_{\mathrm{ex}}(\Lambda, M_1) \ge \theta_{\mathrm{ex}}(\Lambda, M_2)$. In particular, for $0 \operatorname{preceq} M_1 \operatorname{preceq} M_2$ the abscissa decreases.*

4. *For $N = 2$, θ_{ex} is the smallest positive root of $(e^{-\theta\lambda_1} - M_{11})(e^{-\theta\lambda_2} - M_{22}) = M_{12}^2$ or of $(e^{-\theta\lambda_1} + M_{11})(e^{-\theta\lambda_2} + M_{22}) = M_{12}^2$. Taking $v = u$ in (a) recovers θ_{up} of Theorem (b).*

Proof. (a) By Theorem (b), $\theta < \theta_{\mathrm{ex}}$ if and only if $e^{-\theta\Lambda} \mp M \operatorname{succ} 0$, that is, $\sum_i v_i^2 e^{-\theta\lambda_i} > \varepsilon\langle v, Mv\rangle$ for every unit v and both signs. For fixed (v, ε) with $\varepsilon\langle v, Mv\rangle > 0$, the left side decreases strictly from 1 to 0, and $\varepsilon\langle v, Mv\rangle \le \|M\| < 1$. So the inequality holds exactly for $\theta < \theta_v^\varepsilon$. Pairs with $\varepsilon\langle v, Mv\rangle \le 0$ impose nothing. The map $v \mapsto \theta_v^\varepsilon$ is continuous on the open set where it is defined, and it tends to $+\infty$ at its boundary, so the infimum is attained. Since $M \neq 0$, the set is non-empty. (b) Each θ_v^ε is non-increasing in each λ_i. The scaling identity is immediate. (c) For M_1 the admissible set of pairs is smaller, and the right-hand sides are no larger, so each θ_v^ε is no smaller. (d) This is the 2×2 case of the determinant characterization.

On 60 random instances with $N = 2, \dots, 4$, minimizing over v reproduces the determinant root to relative accuracy $4 \cdot 10^{-12}$ (variational-formula). This concerns the finite-mode observable Q_N only. It is not a stress-energy inequality.

Theorem (Mode-count asymptotics for kernel families). *Let k be a symmetric Lipschitz function on $[0,1]^2$, and let K be its integral operator on $L^2(0,1)$, with $\|K\| < 1$. Set $\lambda_i = i$ and $M^{(N)}_{ij} = \frac{1}{N}k(i/N, j/N)$ for $1 \le i, j \le N$. Let K_x be the operator with kernel $e^{xs/2}k(s,t)e^{xt/2}$, and put*

$$x_* = \sup\{x \ge 0 : \|K_x\| < 1\}.$$

Then $0 < x_* < \infty$ (if $K \neq 0$), and

$$\theta^{(N)}_{\mathrm{ex}} = \frac{x_*}{N} + O(N^{-2}).$$

For $k \equiv m$, $\|K_x\| = m(e^x - 1)/x$, which recovers Theorem (d).

Proof. Let $\bar{s}$ be the step function equal to i/N on $((i-1)/N, i/N]$, and let k_N be the step kernel equal to $k(i/N, j/N)$ on the corresponding cells. On the span of the cell indicators, scaled by $\sqrt{N}$, multiplication by $e^{-x\bar{s}}$ and the operator K_N of k_N are represented by $e^{-\theta\Lambda}$ and $M^{(N)}$, with $\theta = x/N$. On the orthogonal complement, $K_N = 0$ and $e^{-x\bar{s}} > 0$. Hence, by Theorem (b),

$$N\theta^{(N)}_{\mathrm{ex}} = \sup\{x : e^{-x\bar{s}} \mp K_N \mathrm{succ}\, 0\}.$$

The same congruence argument gives $x_* = \sup\{x : e^{-xs} \mp K \mathrm{succ}\, 0\}$. Both operators differ from their limits by $O(1/N)$ in operator norm: $\|K_N - K\| \le \|k_N - k\|_{L^2} \le \mathrm{Lip}(k)\sqrt{2}/N$, and $\|e^{-x\bar{s}} - e^{-xs}\|_\infty \le x/N$. Let $\varphi_\pm(x) = \min \mathrm{spec}\,(e^{-xs} \mp K)$. Since 0 lies below the essential spectrum $[e^{-x}, 1]$ near $x = x_*$, the bottom of the spectrum is a finite-multiplicity isolated eigenvalue. Its analytic branches have derivative $-\langle f, s\, e^{-xs} f\rangle < 0$ for normalized eigenfunctions f (Rellich; [5, Ch. VII]), and f is continuous and not a.e. zero. So $\varphi_\pm$ crosses 0 transversally at x_*, and an $O(1/N)$ perturbation moves the crossing by $O(1/N)$ (Weyl). For $K \neq 0$, $x_* > 0$ because

$\|K\| < 1$, and $x_* < \infty$: pick h supported in $[s_0, 1]$, $s_0 > 0$, with $\langle h, Kh\rangle \neq 0$. Such an h exists because k is continuous and not identically zero. Then $g = e^{-xs/2}h$ has $|\langle g, K_x g\rangle|/\|g\|^2 \geq e^{xs_0}|\langle h, Kh\rangle|/\|h\|^2 \to \infty$. Finally, $\|M^{(N)}\| = \|K_N\| \to \|K\| < 1$, so Theorem applies for large N. For $k \equiv m$, K_x has rank one with norm $m\int_0^1 e^{xs}\,\mathrm{d}s$.

For $k(s,t) = \frac{1}{2}(1 + \cos\pi(s-t))$ with $m = \frac{1}{2}$, a rank-three kernel, $N\theta_{\mathrm{ex}}^{(N)}$ approaches the fine-grid value with error proportional to $1/N$ (kernel-asymptotics). The rank-one case agrees (kernel-rank-one-consistency). As a re-verification of v4 by a different method, 40-digit roots of the closed-form geometric sum give $N^2(\theta_{\mathrm{ex}}^{(N)} - x_*/N)$ stabilizing for $N = 10^2, \ldots, 10^5$, which confirms the $O(N^{-2})$ term (reverify-rank-one-second-order). The limit agrees with the next coefficient, obtained by expanding $\frac{m}{N}\sum_{i \leq N} e^{xi/N} = \frac{m(e^x - 1)}{x}(1 + \frac{x}{2N} + O(N^{-2}))$ and using $g(x) = m(e^x - 1)/x$, $g'(x_*) = (me^{x_*} - 1)/x_*$:

$$\theta_{\mathrm{ex}}^{(N)} = \frac{x_*}{N} - \frac{x_*^2}{2(me^{x_*} - 1)}\frac{1}{N^2} + O(N^{-3}) \qquad (k \equiv m),$$

which equals $-1.04346/N^2$ at $m = \frac{1}{2}$. These kernels are declared model families, not mode structures derived from Host B. The statements concern Q_N only and are not continuum tails.

Exact release and successor ledger

Theorem (V-DST-Host-B mathematical release). *For the supplied profile, scalar model, laboratory, packets, and samplings satisfying the hypotheses printed here:*

1. T_{KG} *has the explicit scalar source domain , and – are same-host scalar Green operators.*

2. *Equation constructs a pure quasifree ultrastatic reference ground state. It is Hadamard.*

3. *Equations – construct the specified collar stress operator and conserved stress expectation. Coherent states give the nontrivial relative stress .*

4. *Every stable finite-mode instance has the explicit diagonalization , lower shift* s_N*, and an averaged-observable ground state. The latter, with the reference complementary modes retained, is a full-field Hadamard state.*

5. *The reference vacuum has normalized coefficients . The single-mode coefficients and probabilities are –. They are spectral occupation amplitudes, not the inherited characteristic coefficient.*

6. *Fixed finite-mode tails obey Theorem . No continuum stretched-exponential tail or continuum QEI constant is obtained.*

7. *Compact stress-score pairings give a scoped report projection. When its independent comparison hypotheses hold, and retain the predecessor's classical error budget.*

8. *The inherited gravitational source map T, native gravitational response equation, full dynamical transfer, physical quantum-output realization, and inherited characteristic admission remain unsupplied.*

No quantum coefficient is admitted in the inherited characteristic sense. Host C is not created.

Inherited ledger, with the predecessor scope and the routing qualifications retained:

O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3, and J2 stay unresolved. Host C is not created (or the decision is scoped). The Host-B transfer is supplied only in the precise sense stated, or remains explicitly unsupplied. No quantum coefficient is admitted. No compilation is asserted. The source has not been compiled. No machine-checked proof is claimed. Numerical execution is not asserted. Independent execution is not asserted. This is not spacetime emergence, not Einstein dynamics, not a Page curve, and not quantized relational time without an external clock. The prescribed cone stays distinct from I-D's two dynamical hosts. Settled Host B is not a de Sitter state. The pulse is not a cosmological bounce. Vacuum is excluded from the obligation targets. A particle-number cutoff is not a finite code dimension. A declared TT plane is not dense-space representability.

Proof. Lemma , Definition , and Proposition prove (i). Theorem proves (ii) using the explicitly identified free-field microlocal theorems. Theorems and prove (iii).

Theorem and Theorem prove (iv). Theorem and Corollary prove (v). Proposition and Theorem prove (vi).

Lemma , Theorem , and the triangle inequality give (vii). Proposition and the explicit distinction between T_{KG} and

T establish the boundary in (viii). The ledger records inherited programme status; it is not a new verification of every cited manuscript.

What remains unsupplied

The theorem is a conditional scalar-probe construction, not a completion of the three-object plan as originally worded. Certification that I-D's exact settled profile satisfies the printed geometric assumptions, a native constrained gravitational field model and source-map domain, an identification with the original response vector, a full continuum averaged-stress spectral construction and tail analysis, a physical acquisition instrument, and the complete inherited characteristic composition/admission chain remain separate obligations. U6-sel stays open. No value of the native Host-B $\Gamma_{1,2}$ or $\sigma(0)$ is evaluated. The last reading bar remains open and declaredPath = null.

appendix

Debugging record

1. Two vacua, two questions. The reference Hamiltonian ground state and the ground state of a sampled quadratic observable are distinguished. Expanding the latter in its own vacuum basis cannot produce nontrivial C_{2n} .

2. Correct coefficient type. The occupation coefficients are not named an inherited characteristic graph coefficient. No relabelling bypasses its missing distributional map.

3. Hadamard control is for the full field. A finite sum of smooth packets is not a Hadamard continuum two-point function. The finite-squeezed state retains the full reference complement, making its two-point change smooth.

4. A local isometry is not a state-selection theorem. The global spectral operator constructs the reference vacuum. The chart supplies the local stress normalization, not global positive-frequency data.

5. Stress is not an arbitrary inverse source. A scalar source, a stress tensor, and a compact conserved test current have different types and defining requirements.

6. Support is not imposed by cutoff. Nonzero coherent stress is spacelike compact but cannot be compact in spacetime. Arbitrary cutoff multiplication generally breaks conservation.

7. Parity means total parity. Multimode two-particle sectors can contain one quantum in each of two different modes.

8. Finite lower shift is not a continuum QEI. No unproved passage from s_N to a continuum lower bound is made.

9. Finite-mode and continuum tails differ. The exponential-moment theorem prevents importing a stretched-exponential asymptotic into a fixed stable finite-mode law.

10. Source domains are not simultaneously supplied and unsupplied under one name. The scalar map is T_{KG} with an explicit domain. The original gravitational map remains T and is unsupplied.

11. Spectral probabilities are not a hardware derivation. The complete binned POVM has an overflow outcome. Neither its mathematical existence nor a finite occupation calculation constitutes an independently implemented detector.

Declarations

Authorship. The requested title-page name is retained, subject to confirmation. The author must approve the model choices, proofs, references, and any journal-specific disclosure before submission.

Source provenance. V-DST-Host-v1 is the supplied parent manuscript. Cheung references unavailable in full online form are cited only for the supplied documentary statements. No inspection of every underlying artifact, Arb certificate, or analytic manuscript is claimed.

Use of external mathematical theorems. The new algebraic calculations are printed explicitly. The global normally hyperbolic Cauchy theory, stationary Hadamard theorem, and Wick-field framework are imported with their stated scope and citations. A submission is not represented as independent of these established results.

Meaning of novelty. The proposed contribution is the scoped assembly and its state-to-report error certificate, together with a precise repair of the coefficient and tail identifications. Free-field ground-state construction,

Gaussian squeezing, and finite quadratic diagonalization are not claimed as new methods.

No supporting-source selection. Choosing a quantized scalar probe does not choose the matter responsible for the prescribed Host-B geometry. No Einstein backreaction equation or Host-C geometry is solved.

Verification. This is a single-file source intended for two pdfLaTeX passes. No successful compilation, proof-assistant verification, independent symbolic execution, numerical diagonalization, cutoff-extrapolation test, external registration, independent referee review, or journal acceptance is asserted.

AI assistance. AI assistance was used for drafting, consistency analysis, and reference consultation. It is not independent verification and does not assign authorship.

Open table (v2)

toprule Item Status after v2

midrule endhead Certification that I-D's settled profile satisfies Hypothesis Open.

Collar stress for a nonconstant profile Open. The constant profile is evaluated (Proposition).

Report-transfer upgrade to dynamical or quantum-output transfer Not supplied.

Domain of *T*; the five obligations; gates Q0–Q7 Open.

Host C; de Sitter reference; semiclassical Einstein equation Not created / not constructed / not posed.

U6-sel; last reading bar; Res02-A Q1–Q4, A1–A2; O.1/XVI-N/XV-B/H2/I3/J2 Unchanged.

bottomrule

Separation table (v2)

toprule Cited object Separation (never a premise)

midrule endhead V-DST-Host-v2 Companion. Its report norm (V-DST-Host thm:transfer) is reused in Lemma . Its holonomy rejection (V-DST-Host thm:hostc) is untouched.

I-B-G-Q-v2 The five obligations and gates Q0–Q7, as language.

V-DST-G-v2, V-DST-G-B-v2 Finite codes on the cone; their access cuts are different ledgers from Proposition .

Res04-A-v7 Cites V-DST-Host-B thm:ground and V-DST-Host-B thm:stress as an example of a stated renormalization condition, i.e. Minkowski normalization on the collar. Consistent; separation only.

XIV-K-v7 Cites V-DST-Host-B prop:noidentification: Fock data do not define the XIV-I/J/XV-B coefficient. Consistent.

bottomrule

User plan: implementation status

toprule Plan item Status Where / why

midrule endhead Placement; ledger Achieved Section ; Appendix .

(1) Probes do not upgrade report transfer; T_{KG} domain explicit; *T* unsupplied Achieved Section .

(2) Spectral record classical; hybrid case; compactness of tests; explicit cutoff example Achieved Section ; Remark .

(3) Hadamard documentary; reference state not selected by clock; amplitudes supply none of the five obligations; Q0–Q7 as language Achieved (text) Section .

(4) No change to Host geometry; no Host C; not dS; no semiclassical equation; vacuum excluded Achieved Section .

bottomrule

Plan corrections

Corrections common to the five sheets (verified against read-only fetches of 2026-10-21; Appendix).

1. *Versions.* The plan lists "I-B-G-v2". The manuscript endpoint serves I-B-G as version 1, and the label checks

use that copy. The other version tags agree with the served files: I-B v1, I-C v2, I-D v5, I-B-G-S v2, I-B-VP v3, I-B-VP-2 v1/v2 header, En09-B v6.

2. *Res03-A.* The plan says "local copy". The endpoint now serves Res03-A, and the fetched copy is used for label checks. An earlier fetch, from the FourSheets work, had returned "Not found".

3. *404s, recorded as plan-only locators with nothing asserted about content:* EntPhil, XIV-K, Res04-A, I-B-G-Q, V-DST-Host, V-DST-Host-B, V-DST-G and V-DST-G-B. For the last five, the supplied v1 files are used. For XIV-K and Res04-A, the local FourSheets v7 deliverables are used.

4. *Family 265* has no manuscript endpoint. It is documentary only. Oai212-A, Oai282-A/B, Oai283-A and Oai365-A were fetched and are documentary only.

5. *Attribution of the qubit errors.* The plan attributes $(3 - r)/4$ and $(1 - \sqrt{1 - r^2})/2$ to "the I-C fidelity bound". I-C supplies the classical-only floor $1 - 1/d$ (I-C thm:A). The two formulas are V-DST thm:qubit (V-DST eq:qubit-record, V-DST eq:qubit-keep). The retained fidelity formula is IV-DST thm:efficient. All of them are re-proved in V-DST-G thm:recovery and checked by computer.

6. *"Five obligations".* The plan's list for V-DST-Host-B paraphrases the five-item obligations list of I-B-G-Q (the five-item list just before its non-transfer section: joint map across the characteristic incidence; null annihilation; estimates; contact class; wavefront). The plan's regrouping is kept as a reading. It is not a new list.

7. *"Records do not determine the dictionary" (I-B).* I-B states the narrower facts that clock records and scalar profiles do not determine the lapse, the rod frame or the global deficit (I-B lem:nonidentifications, I-B prop:nonunique). The plan's phrase is a paraphrase.

Sheet-specific. The plan's "five obligations" come from I-B-G-Q (see above). The sheet itself names "reconstruction, composition, contact, wavefront, and admission obligations" without numbering them. No other plan statement for this sheet was found false.

Errors and imprecisions in v1

(S) Source does not typeset as supplied. The v1 file uses verb || without loading mathrsfs. A test run of pdflatex on an unmodified scratch copy stops with "Undefined control sequence". The v1 text does not claim compilation. v2 loads mathrsfs; no other markup change was needed.

1. (P1) Theorem : causal convexity is used tacitly in the symmetry step. Precision added.

2. (P2) Lemma : the Friedrichs choice is the unique self-adjoint extension because the spatial metric is complete. Precision added. No mathematical error was found.

Checked and found correct. Theorem ; the conservation in Theorem (exact, on an on-shell symmetric bisolution); Lemma (the K_q, K_p formulas, re-derived); Theorem (20 random 3-mode instances, residual $< 10^{-13}$); Theorem ; Theorem ; Corollary (P_{2n} against Fock numerics; $\tanh 2r = -b/f$); Proposition ; Theorem (two-mode Fock comparison); Theorem , constant $3 + m^2/2$, re-derived; Example .

Computer-assisted checks (v2)

All entries were produced by code/checks$_v$2.py (log logs/checks$_v$2.json), with exact computer algebra (sympy), 40-digit arithmetic (mpmath) or double-precision floating point (numpy/scipy), as stated per row. These are computer-assisted checks, not machine-checked proofs. This sheet: 16 checks, 16 passed. The whole package: 51 checks, 51 passed. toprule Id Method Result OK

midrule endhead diagonal-identities numpy float, 20 random 3-mode instances max residual 3.81e-14; ||M||<1 all: True yes tabularnewline single-ground numpy float, Fock cutoff 400 min eig -0.102277442495 vs s=(lambda-f)/2=-0.102277442495; gap 1.095445115010 vs 2*lambda? lambda=1.095445115010 yes tabularnewline single-P2n numpy float, Fock cutoff 400 P_2n numeric [0.956350737286, 0.040832957067, 0.002615144713, 0.00018609646, 1.3904962e-05, 1.068651e-06] vs formula [0.956350737286, 0.040832957067, 0.002615144713, 0.00018609646, 1.3904962e-05, 1.068651e-06] yes tabularnewline tanh2r sympy exact tanh(2r)=2M/(1+M2) with M=tanh r yes tabularnewline tanh2r-numeric numpy float

2M/(1+M2)=-0.538461538461538 vs -b/f=-0.538461538461538 yes tabularnewline two-mode-ground numpy float, Fock 40x40 min eig -0.5618029204 vs s_N -0.5618029204 yes tabularnewline expmoment-theta0.3 numpy float, Fock 40x40 K formula 1.0159542878 vs Fock 1.0159542878; ||M_theta||=0.4103 yes tabularnewline expmoment-theta0.6 numpy float, Fock 40x40 K formula 1.0865717972 vs Fock 1.0865718636; ||M_theta||=0.4931 yes tabularnewline abscissa-single exact algebra (float display) log(1/|M|)/lambda=1.123053991893 = log(1/q)/(2 lambda)=1.123053991893 yes tabularnewline casimir-rho mpmath (40 digits) T_00 image-sum -0.00231180610619615179 9 vs -(m2/2pi2) sum K2(nmL)/(nL)2 -0.00231180610619615179 9 yes tabularnewline casimir-pyy mpmath (40 digits) T_yy image-sum -0.008858938787340154828 1 vs closed form -0.008858938787340154828 1 yes tabularnewline casimir-trace mpmath -T00+Txx+Tyy+Tzz=-0.001923520468751699431 2 vs -m2<phi2>_rel=-0.001923520468751699431 2 yes tabularnewline casimir-massless-0.001 mpmath rho*L4=-0.10966205102851 vs -pi2/90=-0.109662271123215 yes tabularnewline casimir-massless-1.0e-5 mpmath rho*L4=-0.109662271101166 vs -pi2/90=-0.109662271123215 yes tabularnewline stress-conservation sympy exact divergence of D S for S=cos(k.(x-x')) on shell: [0, 0, 0, 0] yes tabularnewline cutoff-breaks-conservation sympy exact d_mu(chi Tmu nu) with chi=exp(-x12): [0, -2*p1*x1*exp(-x1**2), 0, 0] yes tabularnewline bottomrule

Status ledger (v2)

The standing programme status is unchanged by this v2. Each line is a routing declaration, not a theorem about omitted constructions.

• O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3 and J2 stay unresolved.

• Host A and Host B of I-D stay separate. Host C is not created; where a Host-C candidate class is tested (V-DST-Host def:hostcclass), it is rejected. The Host-B transfer is at most a report transfer; no dynamical or quantum-output transfer is supplied.

• The domain of the source map T is not supplied.

• Res02-A Q1–Q4 and A1–A2 remain open.

• The last reading bar remains open on every problem; declaredPath remains null; U6-sel remains open.

• No quantum coefficient is admitted.

• Cited inputs, including the four sibling sheets and the FourSheets v7 sheets, are documentary comparisons and never premises. OpenAI catalogue families (including Family 265, Oai212-A, Oai282-A/B, Oai283-A, Oai365-A) are documentary only.

• Registration and app paragraphs are kept as text only. Nothing has been registered, pushed, or written to any site or index.

• The v2 PDF was typeset in a working environment. That is not a proof check, an independent verification, or a claim about any other compilation. No machine-checked proof is claimed; the computer-assisted checks are listed with their scripts and logs.

• The author name Ngo Cheung is retained from the supplied v1. Retention and citation do not assign authorship or approval.

Package-level summary: what the five v2 sheets prove and refuse

This appendix is shared by I-B-G-Q-v2, V-DST-Host-v2, V-DST-Host-B-v2, V-DST-G-v2 and V-DST-G-B-v2. It records the common placement and is checked against the five sources. No sheet is a premise of another.

Common placement. All five sheets live on the prescribed conical product of I-B (I-B thm:locality: complete schedule locality; the target-adapted finite chain gives exact null transport, so the scheduled readout stays inside the causal cone). The access boundaries are those of I-C (I-C thm:A: once the complete accessible output is classical, every quantum-return decoder has half-diamond error at least $1 - 1/d$). The host separation is that of I-D (I-D thm:main, I-D def:host-A): the prescribed cone is neither of I-D's two dynamical hosts. Every classical code below is the output of a finite Enter experiment on a prescribed background. Such codes are source-weight expectations (V-DST-G), a curvature contrast (V-DST-G-B), a report functional (V-DST-Host), a stress score

(V-DST-Host-B), and a finite part with its scale law (I-B-G-Q). A code of this kind is not a residual-state certificate and not a geometric dictionary.

Conservation and trace do not imply sourcing. Three objects are conserved: the finite part P_v^{ab} of I-B-G-Q prop:conserved-running, the collar stress of V-DST-Host-B thm:stress, and the compact test currents of V-DST-Host lem:duality and V-DST-G-B prop:gauge. None of them is a source of a field equation. I-B-G-Q gives the model case: the object is finite and conserved, yet it still runs ($\partial_{\log v} P_v \neq 0$).

Proved in the package (each in its own sheet; computer checks in each sheet's checks appendix).

• I-B-G-Q: the actual-image compatibility criterion (thm:compatibility); the explicit finite part with $\partial_{\log v} u_v = 2\pi^2 \delta_0$. New in v2: its Dini form, its Fourier transform $2\pi^2(\log(v/|\xi|) + \log 2 - \gamma + \frac{1}{2})$, full wavefront at the origin, and an explicit characteristic incidence point at distance ≥ 1 from the apex worldsheet.

• V-DST-Host: an exact local report transfer with its Gram norm; a failure-inclusive finite budget; and rejection of the smooth-filling Host-C class $\mathfrak{C}_{\mathrm{reg}}$. New in v2: an explicit plane-wave instance of the separating plane, an explicit separator radius, and the repaired proof that the classical floor is sharp.

• V-DST-Host-B: same-host Green operators and the ground state of an ultrastatic scalar, the collar stress, squeezed-mode amplitudes, and the two-point budget. New in v2: the sharp exponential-moment abscissa, an evaluated collar stress for the constant-profile member of the hypothesis class, and an explicit cutoff example that breaks conservation.

• V-DST-G: exact access-dependent recovery errors $(3 - r)/4$ and $(1 - \sqrt{1 - r^2})/2$, and the record-only minimax obstruction $b = \sqrt{v_y^2 + v_z^2}$. New in v2: the sharp spectral range $2L_r(A)$ for every target, a coupling form of the perturbed lower bound, and a certified-radius selection rule.

• V-DST-G-B: one explicit classical curvature calibration, $\beta = \|B - A\|_{\mathrm{op}}$, with the record-invisible contrast $b_g > 0$. New in v2: a two-sided enclosure of β, the criterion for first-order cancellation and examples that break it, and the sharp four-probe constant 2.

Refused throughout. The package refuses all of the following:

• a metric, Einstein dynamics, a Page curve, or quantized relational time without an external clock;

• a Host-B dynamical or quantum-output transfer;

• Host C;

• the domain of T;

• a quantum coefficient (no quantum coefficient is admitted);

• a continuum acquisition instrument;

• dense-space representability from a declared TT plane;

• a finite code dimension from a particle-number cutoff;

• a de Sitter state for settled Host B. Each "new in v2" item ends with its own non-claim sentence in its sheet.

Label and locator audit (v2)

Generated by build$_v$2.py. External labels are checked against read-only fetches from https://enter.grok.me/api/manuscript/<ID> (v2/sources), the supplied v1 inputs, or the local FourSheets v7 deliverables. Internal: 83 labels and 53 reference targets in the body. External: 11 label citations, 11 found, 0 not found. Plan-only locators (endpoint 404; nothing is asserted about their content): EntPhil, XIV-K (endpoint), Res04-A (endpoint), I-B-G-Q (endpoint), V-DST-Host (endpoint), V-DST-Host-B (endpoint), V-DST-G (endpoint), V-DST-G-B (endpoint). Family 265 has no manuscript endpoint. toprule Source Label Kind sha256 (12) Status

midrule endhead I-B lem:nonidentifications v2 textbackslash loc 068bd093528f found

I-B prop:nonunique v2 textbackslash loc 068bd093528f found

I-B thm:locality v2 textbackslash loc 068bd093528f found

I-B-VP thm:hadamard v2 textbackslash loc 30e2d54465ee found

I-C thm:A v2 textbackslash loc 6684c95253a6 found

I-D def:host-A v2 textbackslash loc 4337d1e9b19c found

I-D thm:main v2 textbackslash loc 4337d1e9b19c found

IV-DST thm:efficient v2 textbackslash loc a8c8a4ecc523 found

V-DST eq:qubit-keep v2 textbackslash loc 30461089079d found

V-DST eq:qubit-record v2 textbackslash loc 30461089079d found

V-DST thm:qubit v2 textbackslash loc 30461089079d found

bottomrule

Artifacts and sha256 values (v2)

Paths are relative to /workspace/FiveSheets unless absolute. toprule Artifact sha256

midrule endhead v1 input (read only) newline inputs/V-DST-Host-B.tex

980b64cf29bd7ddc1f26813ffe6638f71d0932cb712e17b7847da38269ad990e

v2 front newline v2/work/V-DST-Host-B/front.tex

92887f04f62f3386446f8e08f83ed4ecbcdb14eb562dc39a378d4900fdca7fd8

v2 new results newline v2/work/V-DST-Host-B/new.tex

46d9f84268ce35ea7ee6dfca0992c8a2f22436b2f913dbb71f303a0c7ca82b77

v2 back matter newline v2/work/V-DST-Host-B/back.tex

bf398b72d68f2ede1b3a01690f5cd48004ec8fcc419f66214c8e14087c8b38ea

v2 errors and plan corrections newline v2/work/V-DST-Host-B/errs.tex

4ae83dc56d44eb4cb38ce839c4e4520ee3f61fe896d456c5dd3b905f994ec8db

common preamble additions newline v2/work/common/preamble_add.tex

cde921106a5e0c8d8d32a71a25267f8e0f0345f5f7f38457a0ead0c4db770483

common ledger newline v2/work/common/ledger.tex

e25b03f5544e4c50bd6232187fd23e0182f630dbb3af3c0b08cc458185d46cc1

common package appendix newline v2/work/common/package.tex

fa7bf314d6cefca0bbaade7e3f87d17375e4d920ab5f34a2ab54c0313a53c4db

common plan corrections newline v2/work/common/plancorr.tex

27fb6cb089007ad2b7cc3ae958636502b99b763f7b94c4aa70b725833e674cac

common bibliography additions newline v2/work/common/bib_add.tex

db996e7513e9a247c54443756ebadbb48fb59f52070c5d9f8b068532f8d0ab57

build script newline v2/code/build_v2.py

463f44f911937f42080361e862b5ff1ae28a49d8fda27cc2dfbb409cc72378db

checks script newline v2/code/checks_v2.py

f37c0e6aca2131df1eb342cfff03f21ec5cd6d92d89aef65d79a855824483387

checks log newline v2/logs/checks_v2.json

520e80db6d95ce15fc2b7db59516957da82ecc857b87a9ddad8e155bf827eac8

label extraction script newline v2/code/extlabels.py

caf41f5407b45ae32b5882a8c1dcc4a9b3dbff5236b07233ccd5a46c0324cfd7

fetch log newline v2/logs/fetch.txt a799d01327572d077bb8ec57f84f71e07b6ddaf65e7e49a32d6ce624f4bdfd12

frozen check before newline v2/logs/frozen_before.txt

28d815f6feb67cf5badcbf547c483330a2b0e0545fa84c2c00032975be090185

input hashes newline v2/logs/inputs.sha256

e422ced4df776d549732f68fb00e271b5f0a7cff9d36fb429c4299cfbb3ce508

source I-B newline v2/sources/I-B.tex

068bd093528f745e4604672993c922f8be8bd73f1924f31c01638c7bd8c24b0b

source I-B-VP newline v2/sources/I-B-VP.tex

30e2d54465ee3c8403ce241512d195f07fc158aaa960b74ba95cd53445bd45d5

source I-C newline v2/sources/I-C.tex

6684c95253a6b61d5690ad3374c6a38779c11d569fcc5d4c45a6bea639c5d187

source I-D newline v2/sources/I-D.tex

4337d1e9b19c8ea2cd22c7a4ac8a5f8121ea830c6006dbc2cb1a72d17ab2216f

source IV-DST newline v2/sources/IV-DST.tex

a8c8a4ecc523ddb4200bb695706aa301a4e0104561624c2a16234b6bcf76b2d0

source V-DST newline v2/sources/V-DST.tex

30461089079d614ba8d43c34cdf0c9e390cc969acc50aca51d0f87203ad4646c

bottomrule

Open table (v3)

toprule Item Status after v3

midrule endhead Certification that I-D's settled profile satisfies Hypothesis Open.

Collar stress for a nonconstant profile Open. Not suppliable by the image method (Remark).

Exponential-moment abscissa of Q_N Closed for every fixed N (Theorem). The continuum limit stays open.

Report-transfer upgrade to dynamical or quantum-output transfer Not supplied; the Host-B transfer stays report-only.

Domain of T; the five obligations; gates Q0–Q7 Open.

Host C; de Sitter reference; semiclassical Einstein equation Not created / not constructed / not posed.

U6-sel; last reading bar; Res02-A Q1–Q4, A1–A2; O.1/XVI-N/XV-B/H2/I3/J2 Unchanged.

bottomrule

Separation table (v3)

toprule Companion Relation (separation only)

midrule endhead V-DST-Host-v3 Companion sheet. Its report transfer does not use this collar stress. Its Host-C separators concern smooth fillings of a cone, a geometry excluded from this hypothesis class ($P \geq p_* > 0$).

I-B-G-Q-v3 Its benchmark running is a point-supported ambiguity. The collar stress here is smooth and conserved, and the two are unrelated.

V-DST-G-B-v3 Its compact test current and the cutoff statement here both put compactness on test objects, not on stresses.

FourSheets v7 (XIV-K-v7) The rows citing prop:noidentification stay consistent.

bottomrule

Plan corrections (v3)

• "Second explicit instance (massive, different collar)": not suppliable within Hypothesis by exact methods (Remark). The massive constant-profile family is treated in full (Proposition).

• "Generalize the decay abscissa θ_* beyond single mode (multi-mode exact or sharp bounds)": both are supplied (Theorem).

• The t210u corrections of Appendix stay in force. The read-only re-fetch on 2026-10-22 returned identical sources.

Errors and imprecisions found in v2

• (E1, presentation) The title of Proposition , "Sharp exponential-moment abscissa", is too strong for several

modes. Its statement is correct: finiteness for $\theta < \theta_*$, and exactness for one mode. But $\theta_* = \log(1/\|M\|)/\lambda_{\max}$ is in general only a lower bound for the abscissa. A random three-mode instance gives $\theta_* = 0.0476 < \theta_{\mathrm{ex}} = 0.0517$ (Appendix). The corrected statement is Theorem . In the v3 text the title is marked accordingly. The v1 errors (S), (P1) and (P2) are in Appendix .

Computer-assisted checks (v3)

All entries were produced by code/checks$_v$3.py (log logs/checks$_v$3.json), with exact computer algebra (sympy), multi-precision arithmetic (mpmath) or double-precision floating point (numpy/scipy), as stated per row. Re-verification rows use a method different from v2. These are computer-assisted checks, not machine-checked proofs. This sheet: 7 checks, 7 passed. The whole package: 43 checks, 43 passed. toprule Id Method Result OK

midrule endhead abscissa-multimode numpy (bisection vs determinant root) 0.0476<=0.0517(det root 0.0517)<=0.2081; 1.0433<=1.4222(det root 1.4222)<=1.7987; 0.3202<=0.3369(det root 0.3369)<=1.0005 ... yes tabularnewline reverify-thetastar-series mpmath partial sums at theta*: partial sums ['11.2697', '22.5605', '45.1316'] (grow like sqrt N, divergence); at 0.9theta*: 3.2505528161914763168 vs (1-x)(-1/2)=3.2505528161914763168 yes tabularnewline reverify-casimir-heatkernel mpmath proper-time quadrature + numerical L-derivative f(L)=-0.002311806106196151799 vs rho=-0.002311806106196151799; -d(Lf)/dL=-0.00885893878734015 vs p_y=-0.00885893878734015 yes tabularnewline casimir-signs float grid (9 points) rho<0 and p_y<3rho<0 at all grid points yes tabularnewline casimir-large-mL mpmath rho/leading at mL=3.5,14,56: ['1.6039167', '1.1380093', '1.033742'] yes tabularnewline cutoff-divergence-exact sympy exact div(chi t)= [rho*Derivative(chi(t, x, y, z), t), -rho*Derivative(chi(t, x, y, z), x), p_y*Derivative(chi(t, x, y, z), y), -rho*Derivative(chi(t, x, y, z), z)] yes tabularnewline cutoff-L1-lower numpy (plateau cutoff) int |dchi/dx| dx = 2.00000000 (>=2, =2 for monotone flanks) yes tabularnewline bottomrule

Status ledger (v3)

The standing programme status is unchanged by this v3. Each line is a routing declaration, not a theorem about

omitted constructions.

• O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3 and J2 stay unresolved.

• Host A and Host B of I-D stay separate. Host C is not created. Where a Host-C candidate class is tested (V-DST-Host def:hostcclass and its v3 widening), it is rejected, and the v3 limit-of-method statements construct comparison connections only; none is adopted as a host.

• The Host-B transfer is report-only; no dynamical or quantum-output transfer is supplied. The domain of the source map T is not supplied.

• Res02-A Q1–Q4 and A1–A2 remain open. The last reading bars remain open on every problem; declaredPath remains null; U6-sel remains open.

• No quantum coefficient is admitted.

• Cited inputs, including the sibling sheets (v2 and v3) and the FourSheets v7 sheets, are documentary comparisons and never premises. OpenAI catalogue families are documentary only.

• Registration and app paragraphs are kept as text only. Nothing has been registered, pushed, or written to any site or index. Manuscript sources were read by read-only GET requests only.

• No compilation claim is made in the mathematical sense: the v3 PDF was typeset in a working environment, which is not a proof check, an independent verification, or a claim about any other compilation. No machine-checked proof is claimed; computer-assisted checks are listed with scripts and logs. No independent review was performed.

• The author name Ngo Cheung is retained from the supplied v1. Retention and citation do not assign authorship or approval.

Package-level summary (v3): what the five v3 sheets prove and refuse

Placement (unchanged from v2). All five sheets sit inside the I-B prescribed-cone locality frame (I-B

thm:locality), the I-C shredder interface (I-C thm:A), and the I-D separation of Host A and Host B (I-D thm:main, I-D def:host-A). These are documentary placements, not premises. Conservation is not sourcing; a Ward identity is not a normalization; a separator is not a host.

What v3 adds (all computer-assisted where stated, with non-claims).

• I-B-G-Q-v3: for each gate Q0–Q7, a checkable necessary condition at benchmark level with an explicit counterexample class (extension classification by scaling degree; slow-rate convergence; chart-dependent scales; the square $|x|^{-8}$ needing three invariant constants and running $(\pi^2/96)\Delta^2\delta$; the conserved local ambiguity being one-dimensional); the angular-profile benchmark with exact Fourier transform and the criterion for vanishing running; the full stratification of the flat characteristic incidence, whose rank-drop locus is exactly the total diagonal.

• V-DST-Host-v3: a spectral separator radius $\log(1 + 2\sin(\mu/2))/(MC)$, strictly larger than v2's trace radius; an optimized trace bound; the exact metric-subclass threshold $\min(\mu, 2\pi - \mu)$, attained; the limit of the trace method; the widening to integrable fillings; the optimal plane-wave Gram constant and its $\kappa \to 0$ asymptotics.

• V-DST-Host-B-v3: the exact multimode exponential-moment abscissa (determinant characterization and two-sided bounds); the exact cutoff divergence and a steepness-independent L^1 lower bound; monotonicity and asymptotics of the constant-profile collar stress.

• V-DST-G-v3: a duality formula for the minimal range of exact reconstruction for every qubit instrument, with the depolarized instrument in closed form (re-deriving v2's $2L_r(A)$); a binary Le Cam bound that improves the coupling bound and is attained within the two-point method; a bracket for the selection crossover.

• V-DST-G-B-v3: closed forms of all bump moments through $K_0(\frac{1}{2}), K_1(\frac{1}{2})$; an exact convergent series for β_{curv} and its exact asymptotic constant; a profile class with pointwise cubic cancellation, strictly larger than v1's; the n-probe constant with universal bound 2.

What the package refuses (unchanged). No quantum coefficient is admitted. No Host C is created and no

smooth filling is adopted. No Host-B stress is evaluated for I-D's settled profile; the Host-B transfer stays report-only. No physical calibration, traceability, Einstein dynamics, Page curve, or spacetime emergence is claimed. Benchmark-level necessary conditions are not theorems about the inherited characteristic coefficient. O.1 stays NOT_CLOSED; XVI-N is not discharged; XV-B is not opened; H2/I3/J2 stay unresolved; Res02-A Q1–Q4 and A1–A2 stay open; the last reading bars stay open.

Label and locator audit (v3)

Generated by build$_v$3.py. External labels are checked against read-only fetches from https://enter.grok.me/api/manuscript/<ID> made on 2026-10-22 (v3/sources), the supplied v1 inputs, or the local FourSheets v7 deliverables. Internal: 104 labels and 65 reference targets. External: 16 label citations, 16 found, 0 not found. Plan-only locators (endpoint 404; nothing is asserted about their content): EntPhil, XIV-K (endpoint), Res04-A (endpoint), I-B-G-Q (endpoint), V-DST-Host (endpoint), V-DST-Host-B (endpoint), V-DST-G (endpoint), V-DST-G-B (endpoint). toprule Source Label Kind sha256 (12) Status

midrule endhead I-B lem:nonidentifications textbackslash loc 068bd093528f found

I-B prop:nonunique textbackslash loc 068bd093528f found

I-B thm:locality textbackslash loc 068bd093528f found

I-B-VP thm:hadamard textbackslash loc 30e2d54465ee found

I-C thm:A textbackslash loc 6684c95253a6 found

I-D def:host-A textbackslash loc 4337d1e9b19c found

I-D thm:main textbackslash loc 4337d1e9b19c found

IV-DST thm:efficient textbackslash loc a8c8a4ecc523 found

V-DST eq:qubit-keep textbackslash loc 30461089079d found

V-DST eq:qubit-record textbackslash loc 30461089079d found

V-DST thm:qubit textbackslash loc 30461089079d found

V-DST-Host thm:hostc textbackslash loc d30d0b6ddcf9 found

V-DST-Host thm:transfer textbackslash loc d30d0b6ddcf9 found

V-DST-Host-B prop:noidentification textbackslash loc 980b64cf29bd found

V-DST-Host-B thm:ground textbackslash loc 980b64cf29bd found

V-DST-Host-B thm:stress textbackslash loc 980b64cf29bd found

bottomrule

Artifacts and sha256 values (v3)

Paths are relative to /workspace/FiveSheets unless absolute. toprule Artifact sha256

midrule endhead v2 base (read only) newline deliver/V-DST-Host-B-v2.tex

e687890e85955d3d2332d32bf14cb671aab69d122174ed7609ffe1ce3e5fa8e2

v3 front newline v3/work/V-DST-Host-B/front3.tex

088c5fdd77ee858019ac2e46b2a32be2d30c16dde4ded32fafffa22dded604db

v3 new results newline v3/work/V-DST-Host-B/new3.tex

601fb285cab0309230e0b2a20c576d1c40856f823161e286c4410bc444d7e428

v3 back matter newline v3/work/V-DST-Host-B/back3.tex

010c26b99966fdcd475fcb6b26117192cdb33f1b3eecc81ca121703ba75dba7c

common preamble newline v3/work/common/preamble3.tex

d4adc73a1f18b54df93eccf9595a5a7068505e563dacd33d3e6f6944026237a5

common ledger newline v3/work/common/ledger3.tex

72c8ba689271ef0cf97d2f40736dda21714e0102fc40694b84b7c3a7bdda3253

common package appendix newline v3/work/common/package3.tex

10f88301d5c1ab0d27f6530b5b525139a3b73b84a04ec669cee65b1223867b9e

common bibliography newline v3/work/common/bib3.tex

daac7ad9885491b3f5422e7fa3aa8948138838e6fcad866e0608cf43217de0b7

build script newline v3/code/build_v3.py

3ed2e17221c3d7fdd9151cd422b932799928c6d9c05daee72b5729bb2df1cfd2

checks script newline v3/code/checks_v3.py

ba3144a4fee4243b6ea7a4b7c72c0cd39e48bce2b5fe1de354ea36acc5bc05b8

checks log newline v3/logs/checks_v3.json

5a37f31694873c5b67f28a509a737edbebcb495806c47426d5a0bbf2b2db2e80

fetch script newline v3/code/fetch_v3.sh

2024b3e89f3bc0d6c2fa0dc36f31d0bbd7cb281e85f5adb2b9e799034df1cc52

fetch log newline v3/logs/fetch_v3.txt

017370294bf35be2143a0d6c064fac978a683b1025e4603d08c80ee9a1a1b3b0

frozen check before newline v3/logs/frozen_before.txt

28d815f6feb67cf5badcbf547c483330a2b0e0545fa84c2c00032975be090185

v2 input hashes newline v3/logs/inputs_v2.sha256

492359fb44ad3367be161d8668057205d3de5ef2557583b42654ced253bb7e90

source I-B newline v3/sources/I-B.tex

068bd093528f745e4604672993c922f8be8bd73f1924f31c01638c7bd8c24b0b

source I-B-VP newline v3/sources/I-B-VP.tex

30e2d54465ee3c8403ce241512d195f07fc158aaa960b74ba95cd53445bd45d5

source I-C newline v3/sources/I-C.tex

6684c95253a6b61d5690ad3374c6a38779c11d569fcc5d4c45a6bea639c5d187

source I-D newline v3/sources/I-D.tex

4337d1e9b19c8ea2cd22c7a4ac8a5f8121ea830c6006dbc2cb1a72d17ab2216f

source IV-DST newline v3/sources/IV-DST.tex

a8c8a4ecc523ddb4200bb695706aa301a4e0104561624c2a16234b6bcf76b2d0

source V-DST newline v3/sources/V-DST.tex

30461089079d614ba8d43c34cdf0c9e390cc969acc50aca51d0f87203ad4646c

source V-DST-Host newline inputs/V-DST-Host.tex

d30d0b6ddcf90ce1d98ae98a68db4b296a93eddffcc21322bbf95d7f46aa0ac3

source V-DST-Host-B newline inputs/V-DST-Host-B.tex

980b64cf29bd7ddc1f26813ffe6638f71d0932cb712e17b7847da38269ad990e

bottomrule

0section^(′)v4app.section

Open table (v4)

toprule Item Status after v4

midrule endhead Certification that I-D's settled profile satisfies Hypothesis Open.

Collar stress for a nonconstant profile Open. Excluded for analytic profiles and homogeneous covers (Proposition); a certified spectral computation is not supplied.

Abscissa asymptotics in the mode count Monotone limit exists for nested families. An explicit formula is given for a declared rank-one family only. **[v5]** Kernel families: Theorem . The continuum limit for Host-B modes is open.

Report-transfer upgrade Not supplied; the Host-B transfer stays report-only.

Domain of *T*; the five obligations; gates Q0–Q7 Open.

Host C; de Sitter reference; semiclassical Einstein equation Not created / not constructed / not posed.

U6-sel; last reading bar; Res02-A Q1–Q4, A1–A2; O.1/XVI-N/XV-B/H2/I3/J2 Unchanged.

bottomrule

Separation table (v4)

toprule Companion Relation (separation only)

midrule endhead V-DST-Host-v4 Its exact threshold concerns smooth or integrable fillings of the cone. The profiles here have no apex, and the report transfer there does not use the stress here.

V-DST-G-B-v4 Its profile classification concerns conformal factors on flat space, not the warped profile P.

I-B-G-Q-v4 Its benchmark is on an auxiliary $\mathbb{R}^4$ and is not a Host-B stress.

FourSheets v7 Unchanged.

bottomrule

Plan corrections (v4)

• "Generalize beyond the image-method class to find or exclude a second collar instance". Exclusion is proved for two broader method classes. The remaining route, certified numerics, is identified and not taken.

• "Sharpen θ_{ex} bounds into an asymptotic formula in mode count". θ_{ex} depends on the whole matrix pair (Λ, M), so no universal formula in N exists. A monotonicity theorem, a perturbative formula, and an explicit asymptotic for a declared family are supplied instead.

Errors and imprecisions found in v3

No mathematical error was found in the v3 additions. The instance values of Theorem are reproduced by a different method.

• (P1) Remark attributes the obstruction to global flatness of the image construction. The obstruction is wider,

since it also covers analytic and locally homogeneous slices (Proposition).

Computer-assisted checks (v4)

All entries were produced by code/checks$_v$4.py (log logs/checks$_v$4.json), with exact computer algebra (sympy), multi-precision arithmetic (mpmath) or double-precision floating point (numpy/scipy), as stated per row. Rows whose id begins with reverify re-derive a v3 claim by a method different from v3. These are computer-assisted checks, not machine-checked proofs. This sheet: 4 checks, 4 passed. The whole package: 34 checks, 34 passed. toprule Id Method Result OK

midrule endhead reverify-theta-ex-v3-instances scipy brentq on min eigenvalue of e{-theta Lam} -+ M (different from v3 bisection/determinant scan) theta*/theta_ex: 0.0476/0.0517, 1.0433/1.4222, 0.3202/0.3369, 0.0543/0.0746, 0.0986/0.1226, 0.1616/0.2206 yes tabularnewline abscissa-monotone-upper-firstorder numpy (200 random nested instances; perturbative family) monotone=True, theta_ex<=theta_up=True; |theta_ex-first order|/eps2 = [np.float64(0.0331), np.float64(0.0336), np.float64(0.0337)] yes tabularnewline rank-one-family-asymptotic scipy brentq m=0.5: x*=1.25643121; N theta_N for N=10,100,1000,10000: [1.16039886, 1.24608636, 1.25538865, 1.25632687] yes tabularnewline rank-one-norm-identity numpy 0.850732527397 vs 0.850732527397 yes tabularnewline bottomrule

Status ledger (v4)

The standing programme status is unchanged by this v4. Each line is a routing declaration, not a theorem about omitted constructions.

• O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3 and J2 stay unresolved.

• Host A and Host B of I-D stay separate. Host C is not created. Where a Host-C candidate class is tested (V-DST-Host def:hostcclass and its v3/v4 widenings), it is rejected. The v4 exact-threshold statements construct comparison connections only, and none is adopted as a host.

• The Host-B transfer is report-only; no dynamical or quantum-output transfer is supplied. The domain of the

source map T is not supplied.

• Res02-A Q1–Q4 and A1–A2 remain open. The last reading bars remain open on every problem; declaredPath remains null; U6-sel remains open.

• No quantum coefficient is admitted.

• Cited inputs, including the sibling sheets (v3 and v4) and the FourSheets v7 sheets, are documentary comparisons and never premises. OpenAI catalogue families are documentary only.

• Registration and app paragraphs are kept as text only. Nothing has been registered, pushed, or written to any site or index. No new network fetch was made for v4. The label audit reuses the read-only GET copies of 2026-10-22 in v3/sources.

• No compilation claim is made in the mathematical sense. The v4 PDF was typeset in a working environment; this is not a proof check, an independent verification, or a claim about any other compilation. No machine-checked proof is claimed. Computer-assisted checks are listed with their scripts and logs. No independent review was performed.

• The author name Ngo Cheung is retained from the supplied v1. Retention and citation do not assign authorship or approval.

Package-level summary (v4): what the five v4 sheets prove and refuse

Placement (unchanged from v2). All five sheets sit inside three documentary frames:

• the I-B prescribed-cone locality frame (I-B thm:locality);

• the I-C shredder interface (I-C thm:A);

• the I-D separation of Host A and Host B (I-D thm:main, I-D def:host-A). These are placements, not premises. Conservation is not sourcing, a Ward identity is not a normalization, and a separator is not a host.

What v4 adds. Each item is computer-assisted where stated and carries its non-claims.

• **I-B-G-Q-v4.**

• The running of $|x|^{-d-2k}$ in every dimension and even order, $c_{d,k}\Delta^k\delta$. Odd orders do not run.

• The conserved covariant ambiguity has dimension j at order j.

• The normal form $\mathbb{R}^4 \times \mathrm{cone}\,(S^2 \times [0,1])$ at the rank-6 corner, with local homology $\mathbb{Z}$ in degree 7.

• Sufficient benchmark-level data for every gate Q0–Q7.

• **V-DST-Host-v4.**

• An angular displacement lemma that closes the v3 bracket: the exact separator threshold is $\min(\mu, 2\pi - \mu)$ for all $\mathfrak{gl}(4,\mathbb{R})$ connections and inner-product norms, attained.

• The optimal radius $\widehat{\mu}/(MC)$.

• A bracket for general norms.

• The exact Gram optimum over field-amplitude-normalized TT solutions, attained by a circular pair.

• The sharp budget constant.

• **V-DST-Host-B-v4.**

• The abscissa is monotone under adding modes, with explicit two-sided bounds and a first-order formula.

• Exact $1/N$ asymptotics for the rank-one family.

• A second collar instance is excluded for analytic profiles and for locally homogeneous stress. The transfer stays report-only.

• **V-DST-G-v4.**

• The record-only floor for binary interfaces does not decay with n.

• The exact minimax infimum over the perturbation ball and a two-sided finite-n bracket.

• The exact selection crossover $\delta_c = \eta/2$, attained by a controlled rotation.

• A correction of an interpretive sentence in v3.

• **V-DST-G-B-v4.**

• Harmonic eikonal profiles are exactly those with nilpotent Hessian. There are three types, and a new rotating family realizes type [3].

• $\kappa_S > 5/3$ for every design, with infimum 5/3 and $n = 4$ closed.

What the package refuses (unchanged).

• No quantum coefficient is admitted.

• No Host C is created and no smooth filling is adopted.

• No Host-B stress is evaluated for I-D's settled profile; the Host-B transfer stays report-only.

• No physical calibration, traceability, Einstein dynamics, Page curve, or spacetime emergence is claimed.

• Benchmark-level conditions are not theorems about the inherited characteristic coefficient.

• O.1 stays NOT_CLOSED; XVI-N is not discharged; XV-B is not opened; H2/I3/J2 stay unresolved; Res02-A Q1–Q4 and A1–A2 stay open; the last reading bars stay open.

Label and locator audit (v4)

Generated by build$_v$4.py. External labels are checked against read-only fetches from https://enter.grok.me/api/manuscript/<ID> made on 2026-10-22 for v3 (v3/sources); v4 made no new network fetch, the supplied v1 inputs, or the local FourSheets v7 deliverables. Internal: 116 labels and 69 reference targets. External: 16 label citations, 16 found, 0 not found. Plan-only locators (endpoint 404; nothing is asserted about their content): EntPhil, XIV-K (endpoint), Res04-A (endpoint), I-B-G-Q (endpoint), V-DST-Host (endpoint), V-DST-Host-B (endpoint), V-DST-G (endpoint), V-DST-G-B (endpoint). toprule Source Label Kind sha256 (12) Status

midrule endhead I-B lem:nonidentifications textbackslash loc 068bd093528f found

I-B prop:nonunique textbackslash loc 068bd093528f found

I-B thm:locality textbackslash loc 068bd093528f found

I-B-VP thm:hadamard textbackslash loc 30e2d54465ee found

I-C thm:A textbackslash loc 6684c95253a6 found

I-D def:host-A textbackslash loc 4337d1e9b19c found

I-D thm:main textbackslash loc 4337d1e9b19c found

IV-DST thm:efficient textbackslash loc a8c8a4ecc523 found

V-DST eq:qubit-keep textbackslash loc 30461089079d found

V-DST eq:qubit-record textbackslash loc 30461089079d found

V-DST thm:qubit textbackslash loc 30461089079d found

V-DST-Host thm:hostc textbackslash loc d30d0b6ddcf9 found

V-DST-Host thm:transfer textbackslash loc d30d0b6ddcf9 found

V-DST-Host-B prop:noidentification textbackslash loc 980b64cf29bd found

V-DST-Host-B thm:ground textbackslash loc 980b64cf29bd found

V-DST-Host-B thm:stress textbackslash loc 980b64cf29bd found

bottomrule

Artifacts and sha256 values (v4)

Paths are relative to /workspace/FiveSheets unless absolute. toprule Artifact sha256

midrule endhead v3 base (read only) newline deliver/V-DST-Host-B-v3.tex

e80c96e4f94bd09d13271baef8ab8b57ecac265f4b388e1786adf32abb09a704

v4 front newline v4/work/V-DST-Host-B/front4.tex

2a85ff5b7c4f711ceed1b98602dbb42e08d8eac0ed11e1186673b68edd58be05

v4 new results newline v4/work/V-DST-Host-B/new4.tex

c97674deffd792079fa8b0c4725cfe7bc5910ea0cde8f6f2fc643a44dac003fc

v4 back matter newline v4/work/V-DST-Host-B/back4.tex

4778f558a722c77befefc0f34b48788e2810143a4f2df1944809bc1a3a7f6eea

common preamble newline v4/work/common/preamble4.tex

bd7d7fbc407e4c24433d1b62c28bada38b521749da62f0f95920619408bb2341

common ledger newline v4/work/common/ledger4.tex

3aa74897f815425156119556809a31586b8e428c0c61b320a3d9608db2f6e6ba

common package appendix newline v4/work/common/package4.tex

4d5f93e56f816d902525dde15a7d9589b27562ba43a0251bfe695ad226238ef6

common bibliography newline v4/work/common/bib4.tex

5161efc2476c2cfcdb6f06ccbd942ae2477d61b8db0039df869ef71a1acaef15

build script newline v4/code/build_v4.py

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checks script newline v4/code/checks_v4.py

e7bdec4f933402adaddf875613a32995ae82dd99464164d3bed59cbf0f1c0b9b

checks log newline v4/logs/checks_v4.json

59cd9fd4baed2bc26642af3a0959252c681940b9acf7165e60a4a67622f01ea1

frozen check before newline v4/logs/frozen_before.txt

28d815f6feb67cf5badcbf547c483330a2b0e0545fa84c2c00032975be090185

v3 input hashes newline v4/logs/inputs_v3.sha256

3e73abb51bd4910b48b128898d08d38e3faada2fb1638e0027413c2ac941673b

source I-B newline v3/sources/I-B.tex

068bd093528f745e4604672993c922f8be8bd73f1924f31c01638c7bd8c24b0b

source I-B-VP newline v3/sources/I-B-VP.tex

30e2d54465ee3c8403ce241512d195f07fc158aaa960b74ba95cd53445bd45d5

source I-C newline v3/sources/I-C.tex

6684c95253a6b61d5690ad3374c6a38779c11d569fcc5d4c45a6bea639c5d187

source I-D newline v3/sources/I-D.tex

4337d1e9b19c8ea2cd22c7a4ac8a5f8121ea830c6006dbc2cb1a72d17ab2216f

source IV-DST newline v3/sources/IV-DST.tex

a8c8a4ecc523ddb4200bb695706aa301a4e0104561624c2a16234b6bcf76b2d0

source V-DST newline v3/sources/V-DST.tex

30461089079d614ba8d43c34cdf0c9e390cc969acc50aca51d0f87203ad4646c

source V-DST-Host newline inputs/V-DST-Host.tex

d30d0b6ddcf90ce1d98ae98a68db4b296a93eddffcc21322bbf95d7f46aa0ac3

source V-DST-Host-B newline inputs/V-DST-Host-B.tex

980b64cf29bd7ddc1f26813ffe6638f71d0932cb712e17b7847da38269ad990e

bottomrule

0section^(″)v5app.section

Open table (v5)

toprule Item Status after v5

midrule endhead Second explicit collar instance (non-analytic *P*) Not supplied, for a precise reason. Proposition excludes analytic *P* and homogeneous slices, so any second instance needs the renormalized mode sum over the

Sturm–Liouville family $-P^{-1}\partial_x(P\partial_x) + k^2/P^2 + k_z^2 + m^2$ for a non-analytic P. A certified value requires three things: validated eigenvalue and Green-function enclosures for each angular momentum k; a tail bound uniform in k and k_z that is compatible with the point-splitting subtraction; and an error budget for the combination. None of these is implemented.

Exclusion for non-analytic P Not supplied. No smooth-class invariant was found that forces P constant without analyticity. The family of Example shows that smooth non-constant members exist.

Dependence of θ_{ex} on (Λ, M) Variational formula and monotonicity (Theorem); kernel asymptotics (Theorem). Closed forms beyond $N = 2$ and rank one are not available.

Native Host-B response; same-host transfer Open; the transfer stays report-only.

O.1; XVI-N; XV-B; H2/I3/J2; Res02-A; domain of T; last bars O.1 NOT_CLOSED; XVI-N not discharged; XV-B not opened; H2/I3/J2 unresolved; Res02-A Q1–Q4, A1–A2 open; domain of T unsupplied; last bars open.

bottomrule

Separation table (v5)

toprule Companion Relation (separation only)

midrule endhead V-DST-Host-v5 Host A material; separate. Its cylinder lemma and trace threshold concern Host-A comparison connections only.

V-DST-G-B-v5 Its conformal profiles are not the warped profile P.

I-B-G-Q-v5 No shared premise.

Host C Rejected; not created.

bottomrule

Plan corrections (v5)

• "Second collar instance or exclusion for non-analytic P via certified numerics or a smooth-class argument". Neither is supplied. The certified route needs uniform tail bounds that are not available, and no smooth-class exclusion exists, because smooth non-constant members satisfy every stated hypothesis.

• "Dependence of θ_{ex} beyond rank one". This is supplied as a variational characterization and as kernel asymptotics, not as a closed formula.

Errors and imprecisions found in v4

No mathematical error was found in the v4 additions.

• (P1) Theorem (d) is stated for a declared family, but its proof applies to every rank-one $M = m\,uu^{\mathrm{T}}$ with $\|M_\theta\| = m\sum_i u_i^2 e^{\theta\lambda_i}$. Theorem records the general statement.

Audit of the new user sheets (v5)

Four user-supplied sheets were added during the v5 run. Read-only copies, named by their sha256, are in v5/inputs. They are cited inputs and separations only, never premises. They were not edited. Every label named below was checked to exist in the copy (generated table). Errors and possible overclaims are reported, not corrected. toprule Sheet sha256 Labels checked

midrule endhead XIV-K-ST-v8 be24a0c8c443368bbece73e4241e2a673ded5bcda16b560c75edf429e5e9db23 prop:residue, thm:selection, prop:massivescale, thm:Wext, prop:GH, thm:shredder (all found)

XVI-N-RouteB-Exclusion-v8 3192339847afa4e841ad91e36fd71c06795777b542e70b77d709886e7222c711 lem:polar, prop:shelldiagonal, prop:ident, lem:chiprime, thm:analytic-window, thm:shredder (all found)

Res04-A-v8 5c58895148172a0a33f2571b55e9f2ffd7243d68bfb2a5eda0998ec81d4601c5 thm:finitepart, prop:profile, prop:hosts, thm:asymptotics (all found)

Res05-A-v8 cc125d1cc6017a5184259f402ea0c5b05c75a07507b66a737e07da1f4e526701 thm:support, prop:running, thm:width, thm:shredder (all found)

bottomrule **Use in this sheet (V-DST-Host-B-v5). Not used for the second collar instance.** Res04-A-v8 thm:finitepart is a profile-independent renormalized finite part with an exact logarithmic subtraction. It is computed on a power-law Einstein–scalar background with a spatial regulator class, which is not the warped collar profile *P*. It supplies neither certified Sturm–Liouville enclosures nor a uniform tail bound, and these are the missing items recorded in Appendix . Its prop:profile is recorded as a caution: any future Host-B mode sum must carry the full logarithmic subtraction, not a bare logarithm. Res05-A-v8 thm:support has no Host-B object.

Use elsewhere in the package. The comparison uses in I-B-G-Q-v5 are listed there. No new sheet is used in V-DST-Host-v5, V-DST-Host-B-v5, V-DST-G-v5 or V-DST-G-B-v5, for the reasons stated in each.

Spot checks. The script code/check?ewsheets.py spot-checked elementary claims; its log is logs/check?ewsheets.json. These checks are not a review of the sheets. toprule Sheet Id Result OK

midrule endhead XVI-N-RouteB-Exclusion-v8 chiprime-sup max on grid 2.0, chi'(1/2)=2.0 yes tabularnewline XVI-N-RouteB-Exclusion-v8 shell-diagonal-example P0 phi = 0 for general d'Alembert solution, so diagonal value vanishes yes tabularnewline XIV-K-ST-v8 frullani-scale radial identity -1/2 log(mu'/mu) reproduced (Gaussian profile, 3 scale pairs) yes tabularnewline XIV-K-ST-v8 residue-arithmetic -1/(16 beta2) * pi = -pi/(16 beta2) yes tabularnewline Res04-A-v8 profile-dilation-shift shift -0.027828174363 vs -0.027828174363 yes tabularnewline Res05-A-v8 running-example-traceless eta{mu nu} S_{mu nu} = -3+3 = 0 yes tabularnewline bottomrule **Errors and possible overclaims found (not corrected in the sheets).**

• (C1, typesetting) As delivered, Res05-A-v8 and XVI-N-RouteB-Exclusion-v8 do not compile with pdflatex. The macro verb | src | is defined as verb |#1| and is used inside a math array in the locator tables, which gives the fatal error "Command $ invalid in math mode". In a temporary copy where verb | src | is wrapped in verb ||, both compile, with 0 undefined references. XIV-K-ST-v8 and Res04-A-v8 compile as delivered. The originals were not modified.

• (C2, scope) The spot-checked items (lem:chiprime, prop:shelldiagonal, thm:selection's radial identity, the arithmetic of prop:residue, prop:profile's dilation shift, and the tracelessness in prop:running) are correct. The remaining analytic content was not re-derived, including the Gaussian line bounds of Res05-A-v8, the mass windows of XVI-N-RouteB-Exclusion-v8, and the positivity of $\int \chi B^{\Pi}$ in Res04-A-v8 thm:finitepart. Statements resting on them are recorded as the sheets' own claims.

• (C3, wording) The mass windows in XVI-N-RouteB-Exclusion-v8 are explicitly conditional on a cited massless lower bound and an envelope estimate, and its abstract says so. No overclaim was found there. No sheet claims a quantum coefficient, a discharge of XVI-N, or the opening of XV-B. Compile log: logs/newsheets_(c)ompile.txt.

Computer-assisted checks (v5)

All entries were produced by code/checks$_{v}$5.py (log logs/checks$_{v}$5.json), with exact computer algebra (sympy), multi-precision arithmetic (mpmath) or double-precision floating point (numpy/scipy), as stated per row. Rows whose id begins with reverify re-derive a v4 claim by a method different from v4. Linear programs and grid searches are evidence, not proofs. These are computer-assisted checks, not machine-checked proofs. This sheet: 4 checks, 4 passed. The whole package: 36 checks, 36 passed. toprule Id Method Result OK

midrule endhead variational-formula scipy (Nelder-Mead over v, 60 random instances N=2..4) vs determinant root max relative gap 4.18e-12 yes tabularnewline kernel-asymptotics numpy determinant-root (Loewner) for N=50..800 and N=3200 surrogate N theta_ex: 1.67975, 1.69192, 1.69805, 1.70113, 1.70268; x*1.70383; N*|diff| = 1.204, 1.191, 1.156, 1.080, 0.927 yes tabularnewline kernel-rank-one-consistency numpy k=m: N theta_ex(N=1000)=1.25539, x*=1.25643 yes tabularnewline reverify-rank-one-second-order mpmath 40-digit closed-form geometric sum roots (different from v4 float) N=100: N2(theta-x*/N)=-1.0344852; N=1000: N2(theta-x*/N)=-1.04256; N=10000: N2(theta-x*/N)=-1.0433747; N=100000: N2(theta-x*/N)=-1.0434562; predicted -x*2/(2(m ex*-1))=-1.0434653 yes tabularnewline bottomrule

Status ledger (v5)

The standing programme status is unchanged by this v5. Each line is a routing declaration, not a theorem about omitted constructions.

• O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. H2, I3 and J2 stay unresolved.

• Host A and Host B of I-D stay separate. Host C is not created. Where a Host-C candidate class is tested (V-DST-Host def:hostcclass and its v3–v5 widenings), it is rejected. The v4 and v5 threshold statements construct comparison connections only, and none is adopted as a host.

• The Host-B transfer is report-only; no dynamical or quantum-output transfer is supplied. The domain of the source map T is not supplied.

• Res02-A Q1–Q4 and A1–A2 remain open. The last reading bars remain open on every problem; declaredPath remains null; U6-sel remains open.

• No quantum coefficient is admitted.

• Cited inputs, including the sibling sheets (v3, v4 and v5), the four new user sheets (XIV-K-ST-v8, XVI-N-RouteB-Exclusion-v8, Res04-A-v8, Res05-A-v8) and the FourSheets v7 sheets, are documentary comparisons and never premises. OpenAI catalogue families are documentary only.

• Registration and app paragraphs are kept as text only. Nothing has been registered, pushed, or written to any site or index. No new network fetch was made for v5. The label audit reuses the read-only GET copies of 2026-10-22 in v3/sources.

• No compilation claim is made in the mathematical sense. The v5 PDF was typeset in a working environment; this is not a proof check, an independent verification, or a claim about any other compilation. No machine-checked proof is claimed. Computer-assisted checks are listed with their scripts and logs. No independent review was performed.

• The author name Ngo Cheung is retained from the supplied v1. Retention and citation do not assign authorship

or approval.

Package-level summary (v5): what the five v5 sheets prove and refuse

Placement (unchanged from v2). The I-B prescribed-cone locality frame (I-B thm:locality), the I-C shredder interface (I-C thm:A) and the I-D separation of Host A and Host B (I-D thm:main, I-D def:host-A) are placements, not premises.

What v5 adds. Each item carries its non-claims.

• **I-B-G-Q-v5.**

• Across a codimension-two worldsheet the minimal-degree extension datum is a distribution on $\mathscr{W}$. This is a sharp conditional obstruction to scalar sufficiency, with benchmark running $2\pi\delta_{W}$.

• The conserved ambiguity is a free $\mathbb{R}$[Box]-module in every $d \geq 2$, with no parity-odd terms.

• The flat incidence closure is globally $\mathbb{R}^{4} \times C$ and is contractible.

• **V-DST-Host-v5.**

• A cylinder lemma.

• The exact trace-only threshold $x_{\mathrm{tr}} = m^{-1}(\cos^{2}\frac{\mu}{2} + \frac{\eta}{4})$, attained.

• A joint ℓ^{p} bracket via Riesz–Thorin.

• The normalized Gram optimum over all TT solutions under field-strength normalization; it is unbounded under potential normalization.

• **V-DST-Host-B-v5.**

• A variational formula and monotonicity for θ_{ex}.

• Kernel asymptotics $x_{*}/N + O(N^{-2})$, and the explicit second-order coefficient for rank one.

• The second collar instance is not supplied, for a recorded reason. The transfer stays report-only.

• **V-DST-G-v5.**

• The exact finite-n binary minimax as a dichotomy in $|v|$gtrless $2|v_{\perp}|$.

• The d-outcome floor and its (in)stability.

• The interior t, decided for $\delta \geq \sin(\frac{1}{2}\arcsin\eta)$.

• **V-DST-G-B-v5.**

• A local classification of harmonic eikonal profiles as envelopes over null curves or null ruled surfaces.

• No balanced 5-design exists; the octahedron is the unique 6-probe optimum; a Jackson rate holds.

What the package refuses (unchanged).

• No quantum coefficient is admitted.

• No Host C is created and no smooth filling is adopted.

• No Host-B stress is evaluated for I-D's settled profile; the Host-B transfer stays report-only.

• No physical calibration, traceability, Einstein dynamics, Page curve, or spacetime emergence is claimed.

• Benchmark-level conditions are not theorems about the inherited characteristic coefficient.

• O.1 stays NOT_CLOSED; XVI-N is not discharged; XV-B is not opened; H2/I3/J2 stay unresolved; Res02-A Q1–Q4 and A1–A2 stay open; the domain of T is unsupplied; the last reading bars stay open.

Label and locator audit (v5)

Generated by build$_v$5.py. External labels are checked against the read-only fetches of 2026-10-22 from https://enter.grok.me/api/manuscript/<ID> made for v3 (v3/sources), the supplied v1 inputs, the local FourSheets v7 deliverables, and the four new user sheets (v5/inputs). No new network fetch was made for v5. Internal: 129 labels and 73 reference targets. External: 36 label citations, 36 found, 0 not found. Plan-only locators (endpoint 404; nothing is asserted about their content): EntPhil, XIV-K (endpoint), Res04-A (endpoint), I-B-G-Q (endpoint),

V-DST-Host (endpoint), V-DST-Host-B (endpoint), V-DST-G (endpoint), V-DST-G-B (endpoint). toprule Source Label Kind sha256 (12) Status

midrule endhead I-B lem:nonidentifications textbackslash loc 068bd093528f found tabularnewline I-B prop:nonunique textbackslash loc 068bd093528f found tabularnewline I-B thm:locality textbackslash loc 068bd093528f found tabularnewline I-B-VP thm:hadamard textbackslash loc 30e2d54465ee found tabularnewline I-C thm:A textbackslash loc 6684c95253a6 found tabularnewline I-D def:host-A textbackslash loc 4337d1e9b19c found tabularnewline I-D thm:main textbackslash loc 4337d1e9b19c found tabularnewline IV-DST thm:efficient textbackslash loc a8c8a4ecc523 found tabularnewline V-DST eq:qubit-keep textbackslash loc 30461089079d found tabularnewline V-DST eq:qubit-record textbackslash loc 30461089079d found tabularnewline V-DST thm:qubit textbackslash loc 30461089079d found tabularnewline V-DST-Host thm:hostc textbackslash loc d30d0b6ddcf9 found tabularnewline V-DST-Host thm:transfer textbackslash loc d30d0b6ddcf9 found tabularnewline V-DST-Host-B prop:noidentification textbackslash loc 980b64cf29bd found tabularnewline V-DST-Host-B thm:ground textbackslash loc 980b64cf29bd found tabularnewline V-DST-Host-B thm:stress textbackslash loc 980b64cf29bd found tabularnewline XIV-K-ST-v8 prop:residue new-sheet citation be24a0c8c443 found tabularnewline XIV-K-ST-v8 thm:selection new-sheet citation be24a0c8c443 found tabularnewline XIV-K-ST-v8 prop:massivescale new-sheet citation be24a0c8c443 found tabularnewline XIV-K-ST-v8 thm:Wext new-sheet citation be24a0c8c443 found tabularnewline XIV-K-ST-v8 prop:GH new-sheet citation be24a0c8c443 found tabularnewline XIV-K-ST-v8 thm:shredder new-sheet citation be24a0c8c443 found tabularnewline XVI-N-RouteB-Exclusion-v8 lem:polar new-sheet citation 3192339847af found tabularnewline XVI-N-RouteB-Exclusion-v8 prop:shelldiagonal new-sheet citation 3192339847af found tabularnewline XVI-N-RouteB-Exclusion-v8 prop:ident new-sheet citation 3192339847af found tabularnewline XVI-N-RouteB-Exclusion-v8 lem:chiprime new-sheet citation 3192339847af found tabularnewline XVI-N-RouteB-Exclusion-v8 thm:analytic-window new-sheet citation 3192339847af found tabularnewline XVI-N-RouteB-Exclusion-v8 thm:shredder new-sheet citation 3192339847af found tabularnewline Res04-A-v8 thm:finitepart new-sheet citation 5c5889514817 found tabularnewline Res04-A-v8 prop:profile new-sheet citation

5c5889514817 found tabularnewline Res04-A-v8 prop:hosts new-sheet citation 5c5889514817 found tabularnewline Res04-A-v8 thm:asymptotics new-sheet citation 5c5889514817 found tabularnewline Res05-A-v8 thm:support new-sheet citation cc125d1cc601 found tabularnewline Res05-A-v8 prop:running new-sheet citation cc125d1cc601 found tabularnewline Res05-A-v8 thm:width new-sheet citation cc125d1cc601 found tabularnewline Res05-A-v8 thm:shredder new-sheet citation cc125d1cc601 found tabularnewline bottomrule

Artifacts and sha256 values (v5)

Paths are relative to /workspace/FiveSheets unless absolute. toprule Artifact sha256

midrule endhead v4 base (read only) newline deliver/V-DST-Host-B-v4.tex

c18d04644960596effa6be435156207abe27086d545b5ffcfaa7ee15b328e3cd

v5 front newline v5/work/V-DST-Host-B/front5.tex

02a040814b2abe6c6f040667ba504d489b4617668ecf911a3a7c695a9b12ba98

v5 new results newline v5/work/V-DST-Host-B/new5.tex

407e1604724b7830e8b13bfec6d31df53561bddc0f684046a7e63ee86e544327

v5 back matter newline v5/work/V-DST-Host-B/back5.tex

1c8dc8682880623a4077f0616a2c97a6b0dd706bb2fc70b711e085ce7a790527

common preamble newline v5/work/common/preamble5.tex

ebf5cd242924c1252be9a28fad1fae0793334bf3151d8d063d82c63c0b95ce5c

common ledger newline v5/work/common/ledger5.tex

d7c8e55f4c98179cfd1d4d6bc19fd06593fa00e2430b3afdcc477db1a283e047

common package appendix newline v5/work/common/package5.tex

ea776e09845e05098ec838a9b6f5d9c41b4aca629772419e1b5751b1d9e6c44e

common bibliography newline v5/work/common/bib5.tex

bbb16a5c723e73212e18e75ee0d43928099073d92cfb850a9346b19800309e97

build script newline v5/code/build_v5.py

670e212b523652b9ecc8d9dcd02cd5db3b0ad1178717bdb59de1bb215240341b

checks script newline v5/code/checks_v5.py

4e56f6de723f8603acb58297a5c1563badc528f2c9d7b004a0d1515f8f125612

checks log newline v5/logs/checks_v5.json

f471008f43a5d6f5699f8a0ed065eec99a371cdd89f9c9f85019790650d0ac27

new-sheet spot checks newline v5/code/check_newsheets.py

1aa4f7c1cec17dc705dc0eb7db93d7c1c1f7d497f651cbb87ec2d7cb1ad861e4

new-sheet spot-check log newline v5/logs/check_newsheets.json

34ce0a2dddd3fbb384d76cf51c0b2bdf17de6d7bc151f7fddb0f68b8a5a7a8b0

new-sheet compile log newline v5/logs/newsheets_compile.txt

61b5ffeb690d29ac28e478924f8f89f3a335c6f176dfd9b89c30121a437c6ce3

frozen check before newline v5/logs/frozen_before.txt

28d815f6feb67cf5badcbf547c483330a2b0e0545fa84c2c00032975be090185

v4 input hashes newline v5/logs/inputs_v4.sha256

8a7876b26cc44f7e12a5e40ec2f062cd953967e068cdf384b59000580e3c57fe

new-sheet input hashes newline v5/logs/inputs_newsheets.sha256

5d7dd384f3c5a423a9f0dffc72e73847056e022ffccc46fe9e40bea3e7b94514

source I-B newline v3/sources/I-B.tex

068bd093528f745e4604672993c922f8be8bd73f1924f31c01638c7bd8c24b0b

source I-B-VP newline v3/sources/I-B-VP.tex

30e2d54465ee3c8403ce241512d195f07fc158aaa960b74ba95cd53445bd45d5

source I-C newline v3/sources/I-C.tex

6684c95253a6b61d5690ad3374c6a38779c11d569fcc5d4c45a6bea639c5d187

source I-D newline v3/sources/I-D.tex

4337d1e9b19c8ea2cd22c7a4ac8a5f8121ea830c6006dbc2cb1a72d17ab2216f

source IV-DST newline v3/sources/IV-DST.tex

a8c8a4ecc523ddb4200bb695706aa301a4e0104561624c2a16234b6bcf76b2d0

source Res04-A-v8 newline v5/inputs/Res04-A-v8.tex

5c58895148172a0a33f2571b55e9f2ffd7243d68bfb2a5eda0998ec81d4601c5

source Res05-A-v8 newline v5/inputs/Res05-A-v8.tex

cc125d1cc6017a5184259f402ea0c5b05c75a07507b66a737e07da1f4e526701

source V-DST newline v3/sources/V-DST.tex

30461089079d614ba8d43c34cdf0c9e390cc969acc50aca51d0f87203ad4646c

source V-DST-Host newline inputs/V-DST-Host.tex

d30d0b6ddcf90ce1d98ae98a68db4b296a93eddffcc21322bbf95d7f46aa0ac3

source V-DST-Host-B newline inputs/V-DST-Host-B.tex

980b64cf29bd7ddc1f26813ffe6638f71d0932cb712e17b7847da38269ad990e

source XIV-K-ST-v8 newline v5/inputs/XIV-K-ST-v8.tex

be24a0c8c443368bbece73e4241e2a673ded5bcda16b560c75edf429e5e9db23

source XVI-N-RouteB-Exclusion-v8 newline v5/inputs/XVI-N-RouteB-Exclusion-v8.tex

3192339847afa4e841ad91e36fd71c06795777b542e70b77d709886e7222c711

bottomrule

Report-only transfer (book restatement)

New restatement for the book deposit. Of the three transfer levels, only the *report transfer* is constructed. The

dynamical transfer and the quantum-output transfer are *not supplied*. Open item U6-sel is *not* Dom (*T*). The Host-B probe of the companion sheet is *not* promoted to linearized gravity. Settled Host B of I-D is not identified with any de Sitter host. Cite ID-v5 at p. 128 [39] (indexed title; not a TeX filename).

Standing ledger. Host A and Host B stay separate. Host C is not created. O.1 stays NOT_CLOSED. XVI-N is not discharged. XV-B is not opened. No quantum coefficient is admitted. Dom (*T*) remains undetermined; J2 remains unresolved. Problems 6, 7, and 9 are named, not solved. Gate 0 and ST4b stay NOT_SUPPLIED. No Einstein dynamics, derived metric, spacetime emergence, Page curve, island, bounce, vacuum-energy selection, or de Sitter state is claimed as an Enter theorem. The shredder is not Gibbons–Hawking. Cited sheets are source records, not premises. wired=false.

References

[1] N. Cheung, I-B-G-Q-v4; V-DST-Host-v4; V-DST-Host-B-v4; V-DST-G-v4; V-DST-G-B-v4 (each a separate sheet; listed together only as a documentary package key). Cheung Ngo Medical Limited (2026). Source record; not a premise. No proof transfer.

[2] A. W. van der Vaart, *Asymptotic Statistics*, Cambridge University Press, 1998, Chapter 8 (local asymptotic minimax theorem).

[3] D. Jackson, *The Theory of Approximation*, AMS Colloquium Publications 11, 1930; see also T. J. Rivlin, *An Introduction to the Approximation of Functions*, Dover, 1981, Chapter 1 (Jackson's theorem for Lipschitz functions).

[4] Y. Mimura, A construction of spherical 2-designs, *Graphs Combin.* 6 (1990) 369–372 (spherical 2-designs on S^2 exist exactly for $N = 4$ and $N \geq 6$).

[5] T. Kato, *Perturbation Theory for Linear Operators*, Springer, 1995, Chapters II and VII (analytic perturbation of isolated eigenvalues; Rellich).

[6] J. Bergh and J. Löfström, *Interpolation Spaces*, Springer, 1976, Chapter 1 (Riesz–Thorin theorem).

[7] N. Cheung, *XIV-K-ST-v8*, *XVI-N-RouteB-Exclusion-v8*, *Res04-A-v8*, *Res05-A-v8* (user-supplied local files, 21 October 2026; read-only copies in v5/inputs). Cited inputs only; see the new-sheets audit appendix.

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. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[8] N. Cheung, I-B-G-Q-v3; V-DST-Host-v3; V-DST-Host-B-v3; V-DST-G-v3; V-DST-G-B-v3 (each a separate sheet; listed together only as a documentary package key). Cheung Ngo Medical Limited (2026). Source record; not a premise. No proof transfer.

[9] J. Watrous, *The Theory of Quantum Information*, Cambridge University Press, 2018, Chapter 3 (the completely bounded trace norm and its semidefinite program).

[10] M. R. Herman, Sur la conjugaison différentiable des difféomorphismes du cercle à des rotations, *Publ. Math. IHÉS* 49 (1979) 5–233 (rotation number of circle homeomorphisms).

[11] P. Delsarte, J. M. Goethals and J. J. Seidel, Spherical codes and designs, *Geom. Dedicata* 6 (1977) 363–388 (spherical *t*-designs).

[12] P. D. Seymour and T. Zaslavsky, Averaging sets: a generalization of mean values and spherical designs, *Adv. Math.* 52 (1984) 213–240 (existence of spherical *t*-designs for every *t*).

[13] B. O'Neill, *Semi-Riemannian Geometry*, Academic Press, 1983, Chapter 9 (self-adjoint operators on Lorentzian spaces).

[14] A. Hatcher, *Algebraic Topology*, Cambridge University Press, 2002, Section 2.1 and Section 3.3 (local homology of manifolds).

[15] N. Cheung, I-B-G-Q-v2; V-DST-Host-v2; V-DST-Host-B-v2; V-DST-G-v2; V-DST-G-B-v2 (each a separate sheet; listed together only as a documentary package key). Cheung Ngo Medical Limited (2026). Source record; not a premise. No proof transfer.

[16] D. V. Widder, *The Laplace Transform*, Princeton University Press, 1941, Chapter II (abscissa of convergence and tail exponent).

[17] E. M. Stein, *Singular Integrals and Differentiability Properties of Functions*, Princeton University Press, 1970, Chapter III (Fourier transforms of homogeneous kernels; Funk–Hecke).

[18] L. Hörmander, *The Analysis of Linear Partial Differential Operators I*, Springer, 1983, Theorems 2.3.4 and 8.2.10 (point-supported distributions; products and wavefront sets).

[19] R. Brunetti and K. Fredenhagen, Microlocal analysis and interacting quantum field theories, *Commun. Math. Phys.* 208 (2000) 623–661 (scaling degree and extension of distributions).

[20] D. G. Luenberger, *Optimization by Vector Space Methods*, Wiley, 1969, Section 5.8 (minimum-norm problems and duality).

[21] R. T. Rockafellar, *Convex Analysis*, Princeton University Press, 1970, Theorem 16.4 (support function of a sum; infimal convolution).

[22] L. Le Cam, *Asymptotic Methods in Statistical Decision Theory*, Springer, 1986 (two-point bounds; Hellinger affinity).

[23] G. N. Watson, *A Treatise on the Theory of Bessel Functions*, 2nd ed., Cambridge University Press, 1944 (Weber–Schafheitlin integrals; K_ν recurrences).

[24] N. Cheung, I-B-v1: A Finite Enter Spacetime: Calibrated Destructive Time Readout on a Prescribed Conical Product, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), pp. 78–98. Source record; not a premise.

[25] N. Cheung, IC-v2: The Shredder Interface, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), p. 99. Source record; not a premise.

[26] N. Cheung, ID-v5 Dynamical Spacetime Enter over Two Prescribed Hosts, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), p. 128. Source record; not a premise.

[27] N. Cheung, IBG: Intrinsic and holonomy-twisted Green operators on a prescribed conical spacetime, in *Green Operators and Finite Instruments on a Prescribed Conical Spacetime*, Cheung Ngo Medical Limited (2026). Source record; not a premise.

[28] N. Cheung, IBGS: Intrinsic spin-1 and spin-2 Green operators on the prescribed conical spacetime, in *Green Operators and Finite Instruments on a Prescribed Conical Spacetime*, Cheung Ngo Medical Limited (2026). Source record; not a premise.

[29] N. Cheung, *I-B-VP*, version 3 (thm:hadamard). Documentary.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[30] N. Cheung, *Res03-A*, version 1 (fetched 2026-10-21; lem:fibres). Documentary.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[31] N. Cheung, *V-DST* (fetched 2026-10-21; thm:qubit). Documentary.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[32] N. Cheung, *IV-DST* (fetched 2026-10-21; thm:efficient). Documentary.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[33] N. Cheung, I-B-G-Q-v2; V-DST-Host-v2; V-DST-Host-B-v2; V-DST-G-v2; V-DST-G-B-v2 (each a separate sheet; listed together only as a documentary package key). Cheung Ngo Medical Limited (2026). Source record; not a premise. No proof transfer.

[34] FourSheets v7: *Res04-A-v7*, *XIV-K-v7*, *Prob03-A-v7*, *XVI-N-RouteB-Exclusion-v7* (local deliverables, not registered; the endpoint returns 404 for Res04-A and XIV-K). Separations only.

[35] N. Cheung, *V-DST-Host: Access-Sensitive Audit of Host-B Interface Transfer and a Scoped Host-C Decision* , version 1, supplied manuscript V-DST-Host-v1.tex. Parent report-functional construction and scoped holonomy decision.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

[36] N. Cheung, The Philosophy of Enter: Destructive Readout, Quantum Recovery, and the Refusal of Identification, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), p. 6. Source record; not a premise.

[37] N. Cheung, I-B-v1: A Finite Enter Spacetime: Calibrated Destructive Time Readout on a Prescribed Conical Product, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), pp. 78–98. Source record; not a premise.

[38] N. Cheung, IC-v2: The Shredder Interface, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), p. 99. Source record; not a premise.

[39] N. Cheung, ID-v5 Dynamical Spacetime Enter over Two Prescribed Hosts, in *The Philosophy of Enter*, Cheung Ngo Medical Limited (2026), p. 128. Source record; not a premise.

[40] N. Cheung, *V: Admissible Currents and First Retarded Corrections for a Fixed-Time Scalar Response*, version 1, Enter Calculus Companion, manuscript. Curvature-current and finite-dual constructions.

. Cheung Ngo Medical Limited (2026). Source record; not a premise.

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Release

par **V-DST-Host-B-v5 release.** V-DST-Host-B-v5 supplies the v4 results; the variational formula and monotonicity for the abscissa; kernel-family asymptotics $x_*/N + O(N^{-2})$; and the second-order rank-one coefficient. A second collar instance is not supplied, for a recorded reason. The transfer stays report-only. Every new v5 result ends with its non-claim sentence. Status: O.1 stays NOT_CLOSED; XVI-N is not discharged; XV-B is not opened; H2, I3, J2 stay unresolved; Host A and Host B stay separate; Host C is not created; the Host-B transfer is report-only; the domain of T is unsupplied; the last reading bars stay open; Res02-A Q1–Q4 and A1–A2 stay open; cited inputs, including the four new user sheets, are not premises; OpenAI families are documentary only. No quantum coefficient is admitted. No compilation claim is made. There was no independent review. Nothing was registered, pushed or written to a site. Author: Ngo Cheung. par