I-D-v5 Dynamical Spacetime Enter over Two Prescribed Hosts

A Ball-Arithmetic Resonance Census on Settled Host B, Segre-Type and Energy-Condition Exclusions for the Host-A Pulse, and Typed Non-Selection of the Host-B Interface Moments

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Abstract

New in v5. (i) Census, computer-assisted (U8). The v3/v4 resonance census of settled Host B in the box Re ω ∈ [0. 05, 2. 5], Im ω ∈ [−0. 75, −0. 005] is now enclosed in Arb ball arithmetic (computer-assisted). For each m ∈ {0, 1, 2} and parity, a validated Taylor-model integration of the interior equation (Cauchy–Gronwall tails, flat-zone perturbation bounds, log-norm propagation), Taylor series in ω with Cauchy remainders, and Gronwall-bounded Hankel data give a rigorous winding number of the matching Wronskian on the box boundary. The counts are (0, e) 7, (0, o) 6, (1, e) 8, (1, o) 7, (2, e) 8, (2, o) 8 (44 in total), equal to the v3 counts. Each zero is simple and lies in a Rouché disk of radius 10^{−14} around a refined v3 root, and every resonance in the box has |Im ω| ≥ 0. 12816. Outside the box nothing is claimed. (ii) Host-A pulse (U9 extended). In the settled pulse exterior, the full Einstein tensor, including G_{0r̂}, has the form Bη_{(tr)} + (A − B) l ⊗ l + 2B e_{ẑ} ⊗ e_{ẑ}, where l is the outgoing null covector, A = βQs^{′′}/c^2 and B = βs^{′}/c > 0 (with a positive prefactor 1/(a_{∞}^2F_A)). Consequences: its trace is 4B ≠ 0, so no Maxwell field reproduces it. Where A ≠ B it is of Hawking–Ellis (Segre) type II, so no anisotropic fluid with any p_r, p_{φ}, p_z and no Letelier string cloud, axial or azimuthal, reproduces it, not even algebraically. It violates the null energy condition everywhere in the pulse shell (T_kk ≈ −Bθ^2 for null k near the outgoing direction). Axial Maxwell fields have the wrong anisotropy sign even with v4's scalar/fluid/Λ fillers. Single-component azimuthal fields are excluded by the Bianchi identity even with free currents. For ξRφ^2 we derive the exact anisotropy transport law (1 − ξφ^2)Δ = ξ⟨mathop dF, mathop dφ^2⟩/(a^2F) and exclude the critical branch ξφ^2 ≡ 1, but the general case is not decided and is typed open. Nothing closes, so no scoped subgate and no Host-A source is recorded. (iii) Interface moments (U6 follow-up). No natural, selected Host-B source among those tested gives Γ_1 = Γ_2 = 0. These are the constant reference, Λ, and the conserved power family σ_x = kF^{−n} (Casimir-type n = 4 included). The family n = 2 has Γ_2 = 0 but Γ_1 = −k ≠ 0. Vanishing of both needs at least two tuned constants. The free data are the source modulo two linear conditions, χ on the flat stretches, and one constant per mantle. This is typed as an open item. We also record a correction: Hawk07-G-v3's variance constant 2^10ζ(3) tightens to ζ(3), with proof. (iv) Housekeeping. The two 3.3pt overfull verdict rows are fixed. Retained. Host A and Host B remain separate prescribed backgrounds. There is no third geometry, Host C stays rejected, and there is no semiclassical formation, phantom quantization, or global nonlinear solution. All seven programme entries remain open, with O. 1 = texttt NOT_CLOSED. XVI-N is not discharged, XV-B is not opened, and no inherited coefficient is admitted.

Bibliographic record

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Nature of the release. I-D-v5 is built on I-D-v4 as delivered (I-D-v4-delivered.tex, kept read-only). The v4 main text and v4 appendices, which contain the retained v3 and v2 material, are kept as Appendices and . New results are in Sections – and Appendices –.

Execution status. The scripts, logs and hashes listed in Appendix were run for this release, and the source was compiled with pdflatex until stable. The U8 census uses Arb ball arithmetic (python-flint). Its claims are *computer-assisted*: rigorous only to the extent that Arb, the written error bounds, and the code are correct. They have not been checked by a proof assistant or an independent referee. All other numerics are double precision, or mpmath where stated, and are not interval-certified.

Changes to v4

• **U8 (Section).** The census is now enclosed in ball arithmetic. Winding numbers equal the v3 counts (44 in total), all zeros are simple and enclosed to 10^{-12}, and $|\mathrm{Im}\,\omega| \geq 0.12816$ in the box (Theorem). The certificate is computer-assisted. v4's Proposition is superseded, not retracted: its floating roots agree with the enclosed zeros to within 1.3×10^{-11}.

• **U9 extended (Section).** The pulse stress is shown to be of Segre type II and to violate the NEC throughout the shell (Theorem). All Maxwell fields, axial Maxwell with v4 fillers, single-component azimuthal Maxwell, anisotropic fluids, and Letelier clouds are excluded (Theorem). $\xi R\varphi^2$ is reduced but not decided (Proposition). Nothing closes.

• **U6 follow-up (Section).** No tested natural prescription gives $\Gamma_1 = \Gamma_2 = 0$ (Proposition). The non-selection is typed as open item U6-sel.

• **Correction.** Hawk07-G-v3's variance constant tightens from $2^{10}\zeta(3)$ to $\zeta(3)$ (Correction). v4 had noted this in a verdict row; v5 states and proves it.

• **Housekeeping.** The two 3.3pt overfull rows of the v4 verdict tables (Hawk07-F prop:potential-response and Hawk07-G-v3 cor:quadratic-remainder) are fixed by rebalancing the column widths of the retained tables. The text is unchanged.

• **Retention.** The v4 text is retained verbatim, apart from sectioning depth and those column widths, as Appendices and . The v4 labels are unchanged, so v4 cross-references resolve inside v5.

Verdict summary

begingroup 1.1 toprule Item Outcome Typed statement

midrule endfirsthead toprule Item Outcome Typed statement

midrule endhead bottomrule endfoot U8 earned (computer-assisted) Theorem : counts, simple zeros, 10^{-12} enclosures, $|\mathrm{Im}\,\omega| \geq 0.12816$ in the box. Not an analytic damping law.

U9 ext. earned (exclusions); ξ open Theorems and ; Proposition not decided. No subgate closes, and there is no Host-A source.

U6 f.-up earned (negative) No selected prescription. Open item U6-sel records the free data.

$\zeta(3)$ correction Sharpening of Hawk07-G-v3 thm:variance. Nothing is retracted.

Housekeeping done The overfull rows are fixed, and all seven ledger entries carry v5 sentences.

endgroup

U8: a ball-arithmetic census of Host-B resonances

v4 reported a floating recheck of the 44 v3 roots and typed it as uncertified (Proposition). v5 replaces that recheck with a computer-assisted enclosure. All arithmetic is done in Arb midpoint–radius balls (python-flint 0.9) at 320{} bits. The code is s21_(c)ert.py (engine) and s21ₜun.py (driver), and the logs are s21_(c)ert?*_(*).json.

The function whose zeros are counted

For $m \in \{0, 1, 2\}$, let $u(r; \omega)$ solve the v3 reduced equation $-u'' + V_m u = \omega^2 u$, with $V_m = F''/(2F) - F'^2/(4F^2) + m^2/F^2$ (v3 prop:v3-V). The profile is the settled Host-B profile F with the v3 parameters $b = 1$, $L_0 = 1.5$, $L_1 = 3$, $r_0 = 6$, $r_1 = 10$, $\beta = \alpha = 1/2$. The data at $r = 0$ are $(u, u') = (1, 0)$ (even) or $(0, 1)$

(odd). On $r \geq r_1$ we have $F = \alpha X$ with $X = r + C_B/\alpha$, and the outgoing solution is $h = \sqrt{(X)}\, H_{v}^{(1)}(\omega X)$, with $v = 2|m|$. Put

$$D_{m,\pm}(\omega) = u'(r_1)h(r_1) - u(r_1)h'(r_1).$$

Its zeros with $Im\ \omega < 0$ are the v3 resonances; they agree with the v3 roots to 10^{-13}. We do not use the float value of C_B: the code encloses $F(r_1)$, and hence $X(r_1) = F(r_1)/\alpha$, from the profile itself ($F(r_1) \in 9.214278668213346\ldots \pm 10^{-44}$).

Error control

Lemma. Let V be analytic on the disk $|r - a| < \rho$ with $|V| \leq M_V$ there, and let $Q = M_V + sup\ |\lambda|$, where $\lambda = \omega^2$. Let $Y = (u, u')$ solve $Y' = (0, 1; V - \lambda, 0)Y$ with $|Y(a)| \leq B$, and put $r_c = \kappa_c\rho$ with $\kappa_c < 1$ and $\theta = h/r_c < 1$. Then the Taylor polynomial of order $N + 1$ at a gives $Y(a + h)$ with an error of at most

$$Be^{r_c(1+Q)}\theta^{N+2}\left[\frac{1}{1-\theta} + \frac{1}{h}\left(\frac{N+2}{1-\theta} + \frac{\theta}{(1-\theta)^2}\right)\right].$$

Proof. Along complex rays, $\|\cdot\| \leq max\ (1, |V - \lambda|)$, so Gronwall gives $|Y| \leq Be^{|r-a|(1+Q)}$ on $|r - a| \leq r_c$. The Cauchy estimates then give $|u_n| \leq Be^{r_c(1+Q)}r_c^{-n}$, and the two tails sum to the stated bound.

The Taylor coefficients of V are computed exactly in ball series arithmetic from those of F'. Sup bounds on complex boxes use the closed form of S. Where $Re(1/x - 1/(1 - x))$ is large, we use $|S| \leq 1/(e^{Re} - 1)$ instead of a direct ball exponential, and symmetrically near $x = 1$. The step sizes $h \leq 0.2\rho$, with $\kappa_c = 0.75$ and order $N = 64$, are chosen adaptively. Every box must evaluate to a finite ball with F bounded away from zero, and $\rho(1 + M_V + 12)/2 \leq 8$. There are 484–488{} steps on $[0, r_1]$.

Lemma. The transitions contain $e^{-1/x}$, which is not analytic at $x = 0$. On the four zones with $x < x_m = 1/150$ next to L_0, L_1, r_0, r_1, we integrate the limit potential and treat the difference as a perturbation. For $0 < x \leq x_m$, $S \leq e^{2 - 1/x}$ and $S' \leq e^{2 - 1/x}(5 + x^{-2}) =: \varepsilon_S$ ($\varepsilon_S \approx 2 \times 10^{-60}$). Hence $|V - V_{lim}| \leq p = (20 + 8m^2)\varepsilon_S$, and the zone error is at most $hpe^{2h(1+Q)}B$, which is added to the local error. The same holds near $x = 1$, and the node values of F are widened by $h\varepsilon_S$.

Lemma. In the variables $Z = diag(1, s_k^{-1})Y$ on step k, the logarithmic norm of the true system on the real interval is at most $\mu_k = sup\ |s_k^2 + \overline{q}|/(2s_k)$, with $q = V - \lambda$ evaluated on a real ball. The error therefore obeys $e_{k+1} \leq max\ (1, s_k/s_{k+1})(e^{h\mu_k}e_k + e^{h\mu_k}max\ (1, s_k^{-1})\tau_k)$, where τ_k is the local error of Lemmas and with B replaced by the discrete bound plus e_k. The same recursion bounds the true solution. Both bounds are taken uniformly over a δ-box $|Re\ \delta|, |Im\ \delta| \leq R_{big}$.

Lemma. Each Taylor step is a 2×2 matrix of polynomials in λ. These are computed once per step and composed with $\lambda = (\omega_0 + \delta)^2$. This gives the Taylor coefficients $D_0, \ldots, D_K$ ($K = 60$) of the discretized D in $\delta = \omega - \omega_0$. On $|\delta| \leq R$ we then have $|D - D_0| \leq \sum_{k \geq 1} |D_k|R^k + M_{big}q^{K+1}/(1 - q) + E\ (|h| + |h'|)$, where $q = R/R_{big}$ and $R_{big} = min\ (3R, 0.6|\omega_0|)$. Here M_{big} bounds the discretized D on the big box, and E is the propagated error. The Hankel factors are bounded by point values of J_{v}, Y_{v} at $z_0 = \omega_0 X$ together with Gronwall for the Bessel system on the z-disk of radius $\sqrt{(2)}R|X| < |z_0|$.

Winding numbers and root disks

For each $(m, parity)$, the boundary of the box is walked counter-clockwise by disks with centers c_j on the boundary and $c_{j+1} \in \mathcal{B}(c_j, R_j)$. Each disk is accepted only when the bound of Lemma is $< 0.7|D(c_j)|$. Then $Re(D/D(c_j)) > 0$ on the disk, so the argument increment along $[c_j, c_{j+1}]$ is $arg\ (D(c_{j+1})/D(c_j))$, which is evaluated in balls. The winding number is the unique integer in the resulting ball. Around each refined v3 root ω_{*}, Rouché's theorem with $|D_0| + \sum_{k \geq 2} |D_k|\rho^k + (remainder) + (error) < |D_1|\rho$ shows that $\mathcal{B}(\omega_{*}, \rho)$ contains exactly one zero.

Theorem. For each $m \in \{0, 1, 2\}$ and each parity, $D_{m, \pm}$ has no zero on the boundary of the box $\mathcal{K} = \{0.05 \leq Re\ \omega \leq 2.5, -0.75 \leq Im\ \omega \leq -0.005\}$, and exactly the number of zeros in $\mathcal{K}$, counted with multiplicity, listed in Table (44 in total). Every zero is simple and lies within 10^{-12} of the value listed in Table . (The disks have radius 10^{-14} about centres given to 16 digits; the table rounds to 12 decimals.) Consequently every Host-B resonance with $|m| \leq 2$ in $\mathcal{K}$ satisfies $|Im\ \omega| \geq 0.12816$. The minimum is attained near $\omega = 0.099545 - 0.128169$

i (*m = 1*, even).

Proof. This is the combination of Lemmas –, the winding count, and the Rouché disks, evaluated in ball arithmetic (s21_(c)ert?*_(*).json). The walk's centers are binary floats within *10^{−15}* of *∂𝒦*. Consecutive centers are at most *0. 95R_j* apart, and the closing increment from the last center back to the first is bounded by Cauchy's estimate (s21?ost.json). The winding of the polygon through the centers therefore equals that of *∂𝒦*: the zero-free disks cover both. Completeness: in each box the winding number equals the number of disjoint Rouché disks inside it. Simplicity: each disk contains exactly one zero. The bound on |*Im ω*| is the minimum of |*Im ω_{*}*| − *ρ* over the disks.

begingroup Enclosed zeros (rounded to 12 decimals; true zero within *10^{−12}*). Column *ρ*: Rouché radius about the unrounded centre.

toprule *m* par. *Re ω Im ω ρ*

midrule endfirsthead toprule *m* par. *Re ω Im ω ρ*

midrule endhead bottomrule endfoot 0 e *phantom −0. 346811070618 −0. 189366905486 10^{−14}*

0 e *phantom −0. 695016412172 −0. 246543794283 10^{−14}*

0 e *phantom −1. 043333834166 −0. 315628929221 10^{−14}*

0 e *phantom −1. 377879848138 −0. 376948452226 10^{−14}*

0 e *phantom −1. 700799274265 −0. 405137015709 10^{−14}*

0 e *phantom −2. 043947652525 −0. 424628644617 10^{−14}*

0 e *phantom −2. 392458697054 −0. 458448527382 10^{−14}*

0 o *phantom −0. 447246992154 −0. 237813758622 10^{−14}*

0 o *phantom −0. 840659839339 −0. 294858560866 10^{−14}*

0 o *phantom −1. 200201749692 −0. 354353811579 10^{−14}*

0 o *phantom −1. 529650025144 −0. 400614887244 10^{−14}*

0 o *phantom −1. 867480247903 −0. 418346885816 10^{−14}*

0 o *phantom −2. 219389189771 −0. 441187168292 10^{−14}*

1 e *phantom −0. 099544595935 −0. 128169172224 10^{−14}*

1 e *phantom −0. 526155985398 −0. 220451556571 10^{−14}*

1 e *phantom −0. 870474224185 −0. 243219378910 10^{−14}*

1 e *phantom −1. 154074757100 −0. 287060138471 10^{−14}*

1 e *phantom −1. 441477638396 −0. 357779642151 10^{−14}*

1 e *phantom −1. 750084769653 −0. 390309949166 10^{−14}*

1 e *phantom −2. 085199065284 −0. 415819178848 10^{−14}*

1 e *phantom −2. 425916287412 −0. 454055965191 10^{−14}*

1 o *phantom −0. 097376956099 −0. 129669711691 10^{−14}*

1 o *phantom −0. 535261636622 −0. 238628648592 10^{−14}*

1 o *phantom −0. 912859891104 −0. 295519308704 10^{−14}*

1 o *phantom −1. 257366150677 −0. 352778946260 10^{−14}*

1 o *phantom −1. 574818170937 −0. 394334712268 10^{−14}*

1 o *phantom −1. 908058424749 −0. 412465905639 10^{−14}*

1 o *phantom −2. 255182751717 −0. 437960116260 10^{−14}*

2 e *phantom −0. 092048440091 −0. 225459491137 10^{−14}*

2 e *phantom −0. 223467089172 −0. 163739854063 10^{−14}*

2 e *phantom −0. 689352121983 −0. 259334753029 10^{−14}*

2 e *phantom −1. 063905149171 −0. 313295831720 10^{−14}*

2 e *phantom −1. 396059051160 −0. 352764212784 10^{−14}*

2 e *phantom −1. 690283910266 −0. 350509408683 10^{−14}*

2 e *phantom −1. 965266296850 −0. 332714752782 10^{−14}*

2 e *phantom −2. 234705050435 −0. 367163409689 10^{−14}*

2 o *phantom −0. 092038113863 −0. 225470173026 10^{−14}*

2 o *phantom −0. 223443264010 −0. 163738440072 10^{−14}*

2 o *phantom −0. 689270226447 −0. 259941612550 10^{−14}*

2 o *phantom −1. 063909009802 −0. 316867701222 10^{−14}*

2 o *phantom −1. 396989060850 −0. 365361935104 10^{−14}*

2 o *phantom −1. 704478096634 −0. 385629736481 10^{−14}*

2 o *phantom −2. 029293174756 −0. 401064884726 10^{−14}*

2 o *phantom −2. 362481365477 −0. 431668211103 10^{−14}*

endgroup

Remark. The claims concern the fixed v3 parameters and the stated box only. Nothing is claimed for $\mathrm{Re}\,\omega < 0.05$, for $|\mathrm{Im}\,\omega| < 0.005$, or outside the window, and $|m| \geq 3$ is not covered. The certificate is computer-assisted. It is not a proof-assistant check, and it relies on the correctness of Arb and of s21_(c)ert.py. It is an *in-box* lower bound on $|\mathrm{Im}\,\omega|$, not an analytic damping law. It says nothing about ω_1, about echoes, or about a pure QNM train.

U9 extended: the Host-A pulse against the remaining classes

v4 excluded scalars, fluids with $p_z = p_\varphi$, Λ, and radial Maxwell fields (Theorem), and listed the classes it did not cover (Remark). v5 tests those classes. We use the *complete* Einstein tensor of v2 thm:Einstein, including $G_{0\xi}$ (v2 eq. eq:G0x), on the settled pulse exterior $\mathscr{P} = \{r > r_1, \eta > \tau_a, 0 < u < \tau_f\}$, where $u = \eta - r/c$, $a = a_\infty$ and $F_A = r - \beta(r - \rho_c)s(u)$. Write $t = c\eta$, and set

$$A = \frac{\beta(r-\rho_c)s''(u)}{c^2}, \qquad B = \frac{\beta s'(u)}{c} > 0 \ \text{on}\ \mathscr{P}, \qquad N = \frac{1}{a_\infty^2 F_A} > 0.$$

Everything below is a statement about G; a source would have to satisfy $T = G/\kappa$ with $\kappa > 0$.

Lemma. In the orthonormal frame $(0, \hat{r}, \hat{\varphi}, \hat{z})$, on $\mathscr{P}$,

$$G_{\hat{a}\hat{b}} = N\begin{pmatrix} A-2B & B-A & 0 & 0 \\ B-A & A & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2B \end{pmatrix} = N[B\,\eta_{(tr)} + (A-B)\,l\otimes l + 2B\,\hat{e^z}\otimes\hat{e^z}],$$

where $l = e^{0} - e^{\hat{r}}$ is null (it is dual to the outgoing null direction $\partial_0 + \partial_{\hat{r}}$) and $\eta_{(tr)} = \mathrm{diag}(-1, 1)$. The only off-diagonal component is $G_{0\hat{r}}$. The energy density is $N(A - 2B)$, the flux $N(B - A)$, $p_r = NA$, $p_\varphi = 0$ and $p_z = 2NB$. Further, $G^a{}_a = 4NB$, and $\Delta = G_{\hat{z}\hat{z}} - G_{\hat{\varphi}\hat{\varphi}} = 2NB$ agrees with .

Proof. Symbolic computation from the metric (s22?ostA_(c)lasses.py). The residual of the displayed form is the zero matrix, and the only nonzero off-diagonal entry is $0\hat{r}$ (s22?ostA_(c)lasses.json). By hand: $F_{tt} = -A$, $F_{rr} = 2B - A$ and $F_{tr} = A - B$. Insert these into v2 eqs. eq:G00–eq:Gzz with $\mathscr{H} = 0$.

Theorem. On $\mathscr{P}$:

• The mixed (t, r) block of $G^a{}_b$ has the double eigenvalue NB. Minus NB times the identity it equals $N(B - A)\begin{pmatrix} 1 & -1 \\ 1 & -1 \end{pmatrix}$, which is nilpotent and nonzero where $A \neq B$. There $G^a{}_b$ has *no timelike eigenvector*: it is of Hawking–Ellis type II (Segre $[211]$; the eigenvalues $NB, 0, 2NB$ are distinct).

• The null energy condition fails at *every* point of $\mathscr{P}$. For $k = (1, \cos\theta, \sin\theta, 0)$, $G(k, k) = N(\cos\theta - 1)(A\cos\theta - A + 2B) = -NB\theta^2 + O(\theta^4)$. Hence the weak, strong and dominant energy conditions fail too.

Proof. (a) The characteristic polynomial is $(B - \lambda)^2$, and $(M - B)^2 = 0$ (s22?ostA_(c)lasses.json). A diagonalizable block would equal B times the identity, but $M - B \neq 0$ when $A \neq B$. (b) This is the closed form of $G(k, k)$ in the log, together with $B > 0$.

Theorem. On no open subset of $\mathscr{P}$ does G/κ equal the stress of:

• *any* Maxwell field, sourced or not, of any orientation;

• an axial Maxwell field (E_z, B_z) plus any of v4's classes (scalars of either sign, fluids with $p_z = p_{\varphi}, \Lambda$);

• a single-component azimuthal Maxwell field (B_{φ} alone, or E_{φ} alone), with arbitrary currents, plus any of v4's classes;

• an anisotropic fluid $T = \rho\, u \otimes u + p_r\, n_r \otimes n_r + p_{\varphi}\, n_{\varphi} \otimes n_{\varphi} + p_z\, n_z \otimes n_z$ with u timelike and ρ, p_r, p_{φ}, p_z arbitrary functions of either sign, even as a purely algebraic match;

• a Letelier cloud of strings, axial or azimuthal, of either sign of density, timelike or null.

Proof. (i) Maxwell stress is traceless, but $G^a_a = 4NB \neq 0$. (ii) For an axial field, $T_{\hat{z}\hat{z}} - T_{\hat{\varphi}\hat{\varphi}} = -(E_z^2 + B_z^2) \leq 0$. v4's classes contribute 0 (Theorem), but $\Delta > 0$. (iii) The Bianchi identity $\mathrm{d}F = 0$ for fields depending on (t, r) splits into $\partial_t B_z = \partial_r E_{\varphi}$, $\partial_t B_{\varphi} = -\partial_r E_z$, and $B_r = \mathrm{const}$ (coordinate components; s22?ostA_(c)lasses.json). For B_{φ} alone, $F_{zr} = f(r)$, so $T_{\hat{z}\hat{z}} - T_{\hat{\varphi}\hat{\varphi}} = f(r)^2/(\kappa a_{\infty}^4)$. Equality with $\Delta/\kappa = 2NB/\kappa$ would make $s'(u)/F_A$ independent of η at fixed r. Because S is real-analytic on $(0, 1)$, the identity would continue along $u \downarrow 0$, where $s' \to 0$. That forces $f \equiv 0$ and then $s' \equiv 0$, a contradiction. For E_{φ} alone, $F_{t\varphi} = e(t)$ and $e(t)^2 \propto F_A s'(u)$. The same continuation in r at fixed t forces $e \equiv 0$. Currents enter only $\mathrm{d}{*}F$, not the Bianchi identity, so they do not help. (iv) An anisotropic fluid has the timelike eigenvector u (Hawking–Ellis type I), which contradicts Theorem (a) where $A \neq B$. The set $\{A = B\}$ has empty interior. On an open set, $A = B$ would give $\partial_r[(r - \rho_c)s'(u)] = 0$, so $s'(u) = K/(r - \rho_c)$. By real-analytic continuation to $u \downarrow 0$, this forces $K = 0$, contradicting $s' > 0$. (v) A timelike string cloud has $T \propto u \otimes u - n \otimes n$ with $n = e_{\hat{z}}$ or $e_{\hat{\varphi}}$, which is type I. This is excluded as in (iv). A null cloud $\sigma = k \wedge n$ has $T \propto k \otimes k$, and its trace and $\hat{z}\hat{z}$ components vanish, whereas $4NB \neq 0$.

Remark. An imperfect fluid with heat flux, or any ``effective fluid", can match Lemma by definition. That is $T := G/\kappa$ relabelled. As required, it is *not* counted as a matter theory: no equation of state or action has been given that closes it, and Theorem (b) shows that such a source violates the null energy condition throughout the shell.

Proposition. Consider $\mathscr{L} = -1/2(\nabla\varphi)^2 - V(\varphi) - 1/2\xi R\varphi^2$ with $\varphi = \varphi(t, r)$ on $\mathscr{P}$. Then:

• The $\hat{z}\hat{z}$ and $\hat{\varphi}\hat{\varphi}$ Einstein equations imply the exact transport law

$$(1 - \xi\varphi^2)\,\Delta = \frac{\xi}{a_{\infty}^2 F_A}(-F_t\partial_t + F_r\partial_r)\varphi^2,$$

(the symbolic residual is 0). So $\xi \neq 0$, and φ^2 must vary along ∇F_A inside the shell. This class *passes* the anisotropy-sign test that excludes v4's classes and (ii)–(iii) above.

• The critical branch $\xi\varphi^2 \equiv 1$ satisfies every Einstein component when $V(\varphi_0) = 0$. It violates the scalar equation, however, because that would need $R = -V'(\varphi_0)/(\xi\varphi_0)$ to be constant, whereas $R = -4NB$ in the shell and $R = 0$ outside. It is excluded.

• In general, the $zz - \varphi\varphi$, $0r$, $00 + rr$ and $rr - \varphi\varphi$ equations are four V-free PDEs for the single function $\varphi(t, r)$. We have neither exhibited a solution nor proved an obstruction. **Not decided** (open item U9-ξ).

Remark. Table lists the classes, their own energy conditions, and the decisions. Since G violates the NEC throughout $\mathscr{P}$ (Theorem (b)), any matter that obeys the NEC is excluded at once. That covers Maxwell fields, Letelier clouds with $\rho \geq 0$, fluids with $\rho + p_i \geq 0$, and minimally coupled non-phantom scalars. Witnesses at the v4 parameters ($\beta = 0.5$, $\rho_c = 8$, $c = 1$, $\tau_f = 1$, $a_{\infty} = 2$) are in Table . No class closes, so *no scoped classical subgate is recorded and no Host-A source is admitted*. We stop at this typed non-construction. Host A's conformal factor stays unsourced, and no phantom is introduced or quantized.

U6 follow-up: no selected source fixes the interface moments

By Theorem , continuing the first-order response past the neck requires $\Gamma_1 = \Gamma_2 = 0$. For a conserved

supporting source *(σ_0, σ_x, σ_{φ}, σ_z)*, with *f = σ_x + σ_{φ}* and *σ_{φ} = σ_x + σ_x^{'}F/F^{'}*, the two moments are

$$\Gamma_1 = -b^2\sigma_x(0) + \int_0^{L_1} F(1-F')f, \qquad \Gamma_2 = -\beta\int_0^{r_0} Ff + \int_{r_0}^{r_1} F(\alpha - F')f.$$

v5 asks whether a *natural, selected* prescription makes both vanish (s23_(U)6_(f)ollowup.py, mpmath at 30 digits).

Proposition. par begingroup toprule Prescription *Γ_1 Γ_2*

midrule constant reference / *Λ* (*ρ = 1*) -1.022843 34.356283

F^{−1}, k = 1 -0.214279 -4.000000

F^{−2}, k = 1 -1.000000 0.000000

F^{−3}, k = 1 -1.557996 0.717924

F^{−4}, k = 1 -1.991831 0.988429

F^{−6}, k = 1 -2.664655 1.332214

bottomrule endgroup par In particular:

• The constant reference and *Λ* give *Γ_1 = ρΓ_{B, 1}* with *Γ_{B, 1} = −1. 022843*. This vanishes only for the zero source.

• The conserved power family *σ_x = kF^{−n}, σ_{φ} = (1 − n)kF^{−n}* gives *Γ_1 ≠ 0* for every tested *n*, including the Casimir-type scaling *n = 4*. The value *n = 2* gives *f ≡ 0*, hence *Γ_2 = 0* but *Γ_1 = −k*. The unique *n* with *Γ_1 = 0* is *n_{*} = 0. 787156*, where *Γ_2 = −6. 432523 k ≠ 0*.

• In the span *{const, F^{−4}}*, *Γ_1 = 0* leaves *Γ_2 = 33. 8487 ρ*. The span *{const, F^{−4}, F^{−2}}* contains a combination with *Γ_1 = Γ_2 = 0*, namely const*(ρ = 1) −34. 7585 F^{−4} +68. 2102 F^{−2}*. It is obtained by solving two linear conditions, i.e. it is tuned, not selected.

No natural prescription we tested gives *Γ_1 = Γ_2 = 0*. The admissible supporting sources form a codimension-two linear subspace in an infinite-dimensional space, so every compatible source is fixed by tuning. The response then carries the free data of Theorem (d): *χ* is arbitrary on the flat stretches, and there is one constant *c* per mantle (the mode *χ = cF*). Closing this item requires a *physical selection rule*, such as a state on Host B or an action whose stress is the support, that fixes *σ* and these constants. v5 supplies none. No evaluated Host-B stress, *Γ_{1, 2}* or *σ(0)* is claimed.

In Hawk07-G-v3 thm:variance, the double sum satisfies

$$\sum_{j,k\ge 0} \frac{(1+j)^5(1+k)^5}{(1+j+k)^{14}} \le \zeta(3),$$

not merely ≤ *2^10ζ(3)*. The bound therefore holds with *3/8ζ(3)* in place of *3/8 2^10ζ(3)*:

$$\mathrm{Var}_{W_0}(\mathrm{E}(f,q)) \le \tfrac{3}{8}\,\zeta(3)\,F_7(f)^2 D_{\mu,q}.$$

Proof. Put *n = j + k*. By AM–GM, *(1 + j)(1 + k) ≤ ((n + 2)/2)^2*. There are *n + 1* pairs for each *n*. So the *n*-th group is at most *(n + 1)((n + 2)/2)^10(n + 1)^{−14} = [(n + 2)/(2(n + 1))]^10(n + 1)^{−3} ≤ (n + 1)^{−3}*. Summing over *n* gives *ζ(3)*. The partial sum over *n < 400* is 1.004331{} (s23_(U)6_(f)ollowup.json). This sharpens a correct statement and retracts nothing. The variance remains a smeared vacuum fluctuation, not a detector channel, and no phantom is quantized.

Status ledger and typed separations

The seven entries after v5

Every corpus label below was checked against its source (Appendix). No v5 result discharges an entry, and the last bar of every problem stays open.

begingroup 1.12 toprule Entry Status after v5

midrule endfirsthead toprule Entry Status after v5

midrule endhead bottomrule endfoot Res01-A entry:G4 Open. v5 shows that no selected source fixes the Host-B interface moments (open item U6-sel). The response is therefore still a non-unique linear map, not an intertwiner.

Res01-A entry:G01 Open. A certified classical spectrum is not the inherited E_0 row. No coefficient is inherited, and the $\zeta(3)$ constant sharpens a variance bound, not a ledger coefficient.

Res01-A entry:G7 / Prob02-A thm:T3 Open. The census enclosures are classical and in-box. No curved ε^{-3} statement is made.

Res01-A entry:G3 Open. The certified bound $|\mathrm{Im}\,\omega| \geq 0.12816$ is a classical in-box damping bound, not d_S. Prob02-A thm:SD is cited only as existing.

Res01-A entry:Page / Hawk06-A def:island Open. Neither the NEC violation of the Host-A pulse nor the census is an island certificate. There is no Page curve, interior or decoder.

Res01-A entry:Relational / En09-A thm:main Open. Damping times $1/|\mathrm{Im}\,\omega|$ are laboratory times.

Res01-A entry:Emergence Open. The Host-A pulse remains unsourced: v5 excludes further matter classes and admits no source. The host geometry is pre-existing.

endgroup $O.1 = \texttt{NOT_CLOSED}$. XVI-N (XVI-N thm:massless-obstruction) is not discharged. XV-B is not opened, and XIV-J is not used.

Separations added in v5

The v4 separation table (Section) is retained and still binds. v5 adds the following rows.

begingroup 1.1 toprule Source Typed separation

midrule endfirsthead toprule Source Typed separation

midrule endhead bottomrule endfoot I-D-v4 [CheungIDfour] Predecessor. Its U8 recheck is superseded by Theorem . Its U9 theorem is extended, not changed.

Hawk07-G-v3 [CheungHawkGthree] The variance constant is corrected to $\zeta(3)$ (Correction). This is still a smeared vacuum variance, not a detector channel. No Host-B stress is evaluated.

v2 thm:Einstein Used as the complete Einstein tensor, including $G_{0\xi}$. Conservation of G does not supply a matter theory (Remark).

Arb / python-flint Ball-arithmetic engine for U8. The certificate is computer-assisted and is not checked by a proof assistant.

endgroup

Consolidated v5 theorem and release

Theorem. With the v3 parameters:

• The Host-B census in the box is certified with computer assistance: 44 simple zeros, enclosed to 10^{-12}, with $|\mathrm{Im}\,\omega| \geq 0.12816$ (Theorem).

• On the Host-A pulse shell, G is of Segre type II wherever $A \neq B$, and it violates the NEC everywhere. Maxwell fields (all), axial Maxwell with v4 fillers, single-component azimuthal Maxwell, anisotropic fluids, and Letelier clouds cannot source it. The case $\xi R\varphi^2$ is reduced and left open (Theorems , ; Proposition).

• No tested natural Host-B source gives $\Gamma_1 = \Gamma_2 = 0$. The free data are typed in open item U6-sel (Proposition).

• Hawk07-G-v3's variance constant is $3/8\zeta(3)$ (Correction). All items of the v4 consolidated theorem (Theorem) continue to hold, except that item (iv) is strengthened by (i).

Release box (I-D-v5). *Earned:* U8 (computer-assisted ball-arithmetic census: counts, simple zeros, enclosures, in-box $|\mathrm{Im}\,\omega|$ bound); U9 extension (typed exclusions: type II, NEC, Maxwell, fluids, string clouds); U6 follow-up (typed non-selection); the $\zeta(3)$ correction; housekeeping. *Not earned:* an analytic damping law or any statement outside the U8 box; a decision for $\xi R\varphi^2$; any Host-A source or scoped subgate; a selection rule for the Host-B response; any evaluated Host-B stress, $\Gamma_{1,2}$, $\sigma(0)$ or ω_1. *Refused:* a third geometry (Host C stays rejected); semiclassical formation; phantom quantization; a global nonlinear solution; a pure QNM train; transfer of the I-B-ECHO kernel; Page curves, islands or interiors; de Sitter or a bounce; counting inverse Einstein as a

matter theory; discharging XVI-N or opening XV-B. *Ledger:* all seven entries are open, and *O. 1 = texttt NOT_CLOSED*. No inherited coefficient is admitted. *Integrity:* the frozen XVI-P/Q/R trees were unchanged before and after this work (Appendix). Inputs and prior versions were not edited. Nothing was pushed, registered, or written to any site or app.

appendix

Note on the retained v4 text

Appendices and reproduce I-D-v4 (I-D-v4-delivered.tex) with every sectioning level lowered by one. The only other change is to the column widths of the verdict tables, which fixes two overfull rows. Statements there are v4's. Where v5 supersedes them, Section says so.

Retained I-D-v4 main text

Changes to v3, plan corrections, and verdict summary

Changes to v3

• *New layer.* Sections – add a first-order semiclassical layer on the settled static region $\mathscr{D}_{B, +}$ of Host B. Hawk07-F and Hawk07-G set up this layer on a different, log-cosh profile. Nothing in Definition or changes.

• *No v3 statement is withdrawn.* v3 cor:v3-floor and v3 thm:v3-GB remain exact classical identities. v4 adds that the vacuum source cannot be added to them as a finite term (Corollary).

• *Spectrum typing sharpened.* The v3 resonance census (v3 tab:v3-qnm) stays a double-precision result. A v4 floating recheck is added (Section). It is explicitly *not* a certification.

• *Host A.* v3 said the Host-A pulse had ``no matter theory''. v4 replaces this with a typed non-construction over named classes (Theorem).

• *Inputs.* Hawk07-F-v1, Hawk07-G-v1 and Hawk07-G-v3 are new inputs. They were copied read-only, and their per-item verdicts are in Appendix .

Corrections to the plan

• *U6 does not transfer unconditionally.* The plan asked for uniqueness and overlap agreement on Host B. These hold on the open neck. Across Host B's zero-coupling stretches they fail, as shown in Theorem . We type the failure; we do not force a transfer.

• *The flare gap is not exponentially small on Host B.* Hawk07-F (after thm:flare) and Hawk07-G-v3 (after thm:flare) note that q_0 is exponentially small in L/δ. That is a property of the log-cosh profile. For Host B, $q_0 = F^{''}(0)/F(0) = 1/b^2$.

• *The obstruction is wider than the sigma model.* Hawk07-F thm:no-product is stated for its sigma-model support. Its proof works for any classical support whose stress satisfies $T_{00} + T_{\hat{z}\hat{z}} = 0$. This covers v3's Letelier cloud as well (Theorem).

• *prop:secular splits.* On Host B the *U*-part of Hawk07-F prop:secular holds unconditionally. The *v*-part of Hawk07-G-v3 thm:ends holds only if a continuation exists.

• *U8 is not achieved.* Neither an interval-certified census nor an analytic $|Im\ \omega|$ bound was produced.

• *U9 classes.* A no-go over ``all'' matter is not proved. The non-construction covers exactly the classes named in Theorem .

Summary of the per-item verdicts

We checked every Hawk07-F, Hawk07-G-v1 and Hawk07-G-v3 item that v4 uses, by hand, and for the items marked ``N'' in Appendix also numerically. All of them are correct as stated *for their log-cosh background*. The qualifications are the following.

• Hawk07-F lem:end-limit is at proof-sketch level.

• Hawk07-F thm:response requires $A > 0$ on every finite interval. Host B violates this.

• Hawk07-G-v1 thm:moment is not retracted by Hawk07-G-v3. It is restated as Hawk07-G-v3 thm:moment, now

with a positive-weight form. Hawk07-G-v3 thm:non-determination turns v1's remark ``not determined by the end limits" into the statement that the moment takes every real value. Hawk07-G-v1 inferred no sign, so nothing is retracted.

• Hawk07-G-v3 thm:variance is correct but loose: the double sum it bounds by $2^{10}\zeta(3)$ is in fact at most $\zeta(3)$.

Verdict on ``the companion asserts no compilation''

Hawk07-F and Hawk07-G-v3 state in their headers that no compilation or numerical execution is asserted. For those sheets the line is honest. For I-D-v4 such a line would be false: this file was compiled and its artifacts were executed. I-D-v4 therefore does not repeat the line. The line also does not mean that an author compiling the companion turns its statements into executed results: compilation checks typesetting, not proofs. Our verdict is *correct as a scope statement about the companion, inapplicable to I-D-v4, and in neither case evidence for or against correctness*.

U5: the compactification obstruction on Host B's own ends

Throughout Sections – we work in the settled static region $\mathscr{D}_{B,+}$ of Host B. We use the parameters of v3 sec:v3-spectrum: $b = 1$, $L_0 = 1.5$, $L_1 = 3$, $r_0 = 6$, $r_1 = 10$, $\beta = 0.5$, $\alpha = 1 - \beta$. There the metric is $a_\infty^2[-c^2\mathop{d\eta}^2 + \mathop{d\ell}^2 + F(\ell)^2\mathop{d\varphi}^2 + \mathop{dz}^2]$, with $z \sim z + L_z$, and F is the settled profile of v3 eq:v3-hB. Substituting $t = a_\infty c\eta$, $x = a_\infty \ell$ and $z' = a_\infty z$ puts this metric in the static class used by Hawk07-F, $-\mathop{dt}^2 + \mathop{dx}^2 + P(x)^2\mathop{d\varphi}^2 + \mathop{dz'}^2$, with $P(x) = a_\infty F(x/a_\infty)$ and axial proper period

$$L_{\mathrm{prop}} = a_\infty L_z.$$

For $|\ell| \geq r_1$ the profile is exactly conical, $F = \alpha|\ell| + C_B$, with $C_B = 4.214279$ (v3). The coupling $A = F''/(\kappa F)$ of the v3 sigma-model realization (v3 thm:v3-sigma) has the following sign pattern. It is positive on the open neck $|\ell| < L_1$ and vanishes identically on $L_1 \leq |\ell| \leq r_0$ and on $|\ell| \geq r_1$. It is negative on the open mantles $r_0 < |\ell| < r_1$. It vanishes to infinite order at L_1, r_0, r_1.

Casimir data at Host-B end data

Theorem. Consider one real canonical scalar of mass $\mu \geq 0$ in the periodic vacuum on $\mathbb{R}^{1,2} \times S^1_L$, with $L = L_{\mathrm{prop}}$ and Minkowski subtraction. Its stress is $\mathrm{diag}(\rho, -\rho, -\rho, p)$, with

$$\rho = -\frac{\mu^2}{2\pi^2 L^2} \sum_{n \geq 1} \frac{K_2(n\mu L)}{n^2}, \qquad p = -\partial_L(L\rho) = 3\rho - \frac{\mu^3}{2\pi^2 L} \sum_{n \geq 1} \frac{K_1(n\mu L)}{n}.$$

Hence $p < 3\rho < \rho < 0$ and $n_\mu := \rho + p < 0$. With $\rho_0 = -\pi^2/(90L^4)$, the bounds $0 \leq \rho - \rho_0 \leq \mu^2/(24L^2)$ and $0 \leq n_\mu - 4\rho_0 \leq \mu^2/(12L^2)$ of Hawk07-G-v3 thm:massless-end hold. These bounds are the same as Hawk07-G-v1 thm:massless.

Proof. This is Hawk07-F thm:Casimir and Hawk07-G-v3 thm:casimir with L_z replaced by L. We rederived it independently. The formula for p comes from differentiating $L\rho$, using $\partial_x(x^{-2}K_2(x)) = -x^{-2}K_3(x)$ and $K_3 = K_1 + 4K_2/x$. The K_1 term is negative, which gives $p < 3\rho$. Numerically (s11_(c)asimir.py), the Bessel series agrees with the proper-time form and with the three-winding sum to relative error 10^{-21}. The expression for p agrees with a finite difference of $L\rho$. Both mass bounds hold at $\mu L \in \{0.1, 0.5, 1, 2, 5\}$. The massless value $-\pi^2/90$ is reproduced exactly.

Remark. Hawk07-F proves the end limit in lem:end-limit only at the level of a sketch, and for the log-cosh profile. Hawk07-G-v3 adopts it as the end contract ass:source. On Host B we likewise *assume* that the selected ground state satisfies it with $L = L_{\mathrm{prop}}$. The ends of Host B are exactly flat cones times S^1, so the heat-kernel argument of Hawk07-F is if anything simpler there. We have not, however, constructed a Host-B ground state or its point-split stress. No Host-B interior stress is evaluated.

No product-preserving upgrade for any boost-invariant support

Theorem. Suppose a classical support has stress with $T_{00} + T_{\hat{z}\hat{z}} = 0$ in every metric of the class $-\mathop{dt}^2 + \mathop{dx}^2 + F^2\mathop{d\varphi}^2 + \mathop{dz}^2$. Then no first-order semiclassical solution on Host B stays in that class with fixed L_{prop} and the end contract of Remark . Both v3 realizations satisfy the hypothesis: the sigma model of v3 thm:v3-sigma and the axial Letelier cloud of v3 prop:v3-letelier. A cosmological term or local

curvature counterterms do not change this.

Proof. Every metric in the class has $G_{00} + G_{\hat{z}\hat{z}} = 0$ (s11_(c)asimir.json, key G00+Gzz). For radial X and $Y = \varphi$, the sigma-model stress has $T_{00} + T_{\hat{z}\hat{z}} = 0$ identically. So does the axial Nambu–Goto cloud, whose world sheets are t–z boost invariant (same file, keys sigma_T00+Tzz and letelier_T00+Tzz). At first order this forces $\sigma_0 + \sigma_z = 0$. At the ends, $\sigma_0 + \sigma_z \to \rho + p < 0$ by Theorem . Λ drops out of this null combination, and the curvature counterterms vanish on the flat ends.

Infinite vacuum energy: a non-transfer of the v3 floor

Corollary. Under the end contract, the vacuum energy per unit coordinate axial length satisfies

$$2\pi \int_{-R}^{R} F\, t_{00}^{\wedge\wedge}\, \mathrm{mathop\,d}\ell = 2\pi\alpha\rho R^2 + O(R) \to -\infty.$$

Here ℓ is proper radial distance, after rescaling by a_{∞}. The v3 identity $E_{-} = E_{+} + 4\pi\alpha/\kappa$ and the budget $E_{-} = 4\pi/\kappa$ of v3 cor:v3-floor are classical. The vacuum source cannot be added to them as a finite correction. The statement is a *non-transfer*. It does not revise the floor. It supplies no Host-A analogue: Host A has a non-compact z direction (Definition), and v4 imports nothing into Host A. It supplies no summed Host A+Host B ledger, since the two hosts are different manifolds (v3 cor:v3-floor).

Proof. For $|\ell| > r_1$, $F = \alpha|\ell| + C_B$ and $t_{00} \to \rho < 0$. Hawk07-F cor:infinite-energy gives the same divergence on log-cosh, without the rate.

U6: the first-order response on Host B's own profile

We use the notation of Hawk07-F thm:response and Hawk07-G-v3 thm:response, written in proper coordinates on $\mathscr{D}_{B,+}$ with $P = F$. The quantities are $w = F^{\prime}/F$, $A = F^{\prime\prime}/(\kappa F)$, $B = AF^2$, the quadrature $\mathscr{Q}f = \int_0^x (\mathrm{mathop\,d}s)/(F(s))\int_0^s F f$, and $U = \kappa\mathscr{Q}(\sigma_x + \sigma_{\varphi})$, $V = \kappa\mathscr{Q}(\sigma_0 + \sigma_z)$, $a = (U + V)/2$, $d = (U - V)/2$, $p_1 = wU^{\prime}/\kappa - \sigma_x$, $\Pi = F^2 p_1$. The source Σ is smooth, even, bounded and conserved on the background. The response equations are

$$\kappa A\,(w\chi - \chi' - v) = wU' - \kappa\sigma_x \quad \text{(radial constraint)},$$

together with the density equation Hawk07-F eq:v. Where $A \neq 0$, is Hawk07-F eq:chi. Hawk07-F derived as the linearized $G_{\hat{x}\hat{x}}$ equation, with $\delta p_x^{cl} = A(w\chi - \chi^{\prime} - v)$. We rechecked this symbolically (s12$_{\mathrm{r}}$esponse?ym.json). The constraint form, before division by A, is the one that remains valid where $A = 0$.

Lemma. On all of Host B, U, V, a and d are smooth and even, and $\Pi^{\prime} = BU^{\prime}$ with $\Pi(0) = -b^2\sigma_x(0)$ (Hawk07-G-v3 thm:moment). The response system divides only by $F \geq b$ and, in Hawk07-F eq:chi, by A. It never divides by w.

Proof. $\mathscr{Q}$ uses only $F \geq b > 0$. The moment identity uses only conservation $\sigma_x^{\prime} = w(\sigma_{\varphi} - \sigma_x)$ and $w^{\prime} = \kappa A - w^2$, and both hold for any F.

Theorem.

• *Open neck.* On $|\ell| < L_1$ we have $A > 0$. With the throat data of Hawk07-F, Hawk07-F thm:response applies verbatim. There is a unique smooth solution on every compact sub-interval, and these solutions agree on overlaps. χ is odd and the metric corrections are even.

• *Zero-coupling stretches.* On $L_1 \leq |\ell| \leq r_0$ and $|\ell| \geq r_1$, every first-order solution has $p_1 = 0$, i.e.?$\Pi = 0$. χ is left undetermined there: any smooth χ is allowed, because the supporting field carries no stress where $A = B = 0$.

• *First interface.* Put

$$\Gamma_1 := \Pi(L_1^-) = -b^2\sigma_x(0) + \int_0^{L_1} F(1 - F')(\sigma_x + \sigma_{\varphi})\,\mathrm{mathop\,d}\ell.$$

If $\Gamma_1 \neq 0$, then the neck solution of (a) has $\sup_{[0, L_1)} |\chi| = \infty$. So no first-order response with χ bounded near $\ell = L_1$, and in particular no smooth one, exists on a neighbourhood of $[-L_1, L_1]$.

• *Mantle.* Write $f_U = \sigma_x + \sigma_{\varphi}$. A solution that crosses a mantle needs $\Pi(r_0) = \Pi(r_1) = 0$, i.e.

$$\Gamma_2 := \int_{r_0}^{r_1} BU' \,\mathrm{mathop}\,\mathrm{d}\ell = -\beta \int_0^{r_0} Ff_U \,\mathrm{mathop}\,\mathrm{d}\ell + \int_{r_0}^{r_1} F(\alpha - F')f_U \,\mathrm{mathop}\,\mathrm{d}\ell = 0.$$

On the open mantle $A < 0$, and the system is regular. The homogeneous mode $\chi = cF$ is one free constant per mantle; it enters v through $\kappa(A'' + 2Aw)\chi$. Even when $\Gamma_1 = \Gamma_2 = 0$, the Host-B response is therefore *not unique*.

• *Constant end-contract reference.* For $\Sigma = \mathrm{diag}(\rho, -\rho, -\rho, p)$,

$$\Gamma_1 = \rho\,\Gamma_{B,1}, \quad \Gamma_{B,1} = F(L_1)^2 - 2\int_0^{L_1} F, \qquad \Gamma_2 = \rho\,\Gamma_{B,2}, \quad \Gamma_{B,2} = 2\beta\int_0^{r_0} F - 2\int_{r_0}^{r_1} F(\alpha - F').$$

At the v3 parameters, $\Gamma_{B,1} = -1.022843$ and $\Gamma_{B,2} = 34.35628$. Both are nonzero for every $\rho \neq 0$.

Proof. (a) On the open neck, $F'' = (1 - \chi_S)g' + \chi_S'(1 - g) > 0$ in v3's notation eq:neck. On every compact sub-interval A is bounded below, so Hawk07-F's regular-linear-system argument applies. The argument nowhere divides by w.

(b) Where $A = 0$, reads $wU' = \kappa\sigma_x$, i.e. $p_1 = 0$. This is consistent with the U-equation: with $w' = -w^2$ and conservation, $(\kappa\sigma_x/w)' + \kappa\sigma_x = \kappa(\sigma_x + \sigma_\varphi)$. With $A = A' = 0$, χ does not appear in the density equation.

(c) Π is continuous, and by (b) it vanishes at L_1^+. The weighted form follows from interchanging the integrals in $\int_0^{L_1} F''(s)\int_0^s F f_U$, using $F'(L_1) = 1$ (as in Hawk07-G-v3 thm:moment). Suppose $\Gamma_1 \neq 0$ and χ is bounded on $[0, L_1)$. Then the density equation $v'' + 2wv' = \kappa[(A' + 2Aw)\chi - 2Av - p_1 - \sigma_0] - d'' - wd'$ has bounded coefficients and forcing, so v is bounded. Then Hawk07-F eq:chi, $\chi' = w\chi - v - \kappa\Pi/(FF')$, forces $\int^{L_1} \Pi/F'$ to be finite. But $\Pi \to \Gamma_1 \neq 0$. Moreover $F' \geq 0$ is smooth with $F'(L_1) = 0$, so $F'(\ell) \leq C(L_1 - \ell)$ and $\int^{L_1} \mathrm{mathop}\, d\ell/F' = \infty$. This is a contradiction.

(d) $\Pi(r_0) = 0$ by (b). Integrating $\Pi' = BU'$ across the mantle gives Γ_2. Its weighted form follows by interchanging integrals, with $\int_{\max(y, r_0)}^{r_1} F'' = \alpha - F'(\max(y, r_0))$, $F'(r_0) = 1$ and $F'(r_1) = \alpha$. The mode $\chi = cF$ solves $\chi' = w\chi$. Near r_0^+, $\mathscr{R} = B\chi \to 0$ for every c, so the data at r_0 do not fix c.

(e) Substitute $f_U = -2\rho$ and $\sigma_x(0) = -\rho$, and use $\int_0^{L_1} 2FF' = F(L_1)^2 - b^2$. The numbers come from s14?ostB?ransfer.py (direct ODE quadrature) and s18?awkG3_(c)hecks.py (weighted forms), which agree to 2×10^{-9}.

Remark. Take $\kappa = 1$, $\rho = -1$, $p = -3.5$ and $v_0 = 0$. The neck solution has $\chi(L_1 - \delta) = 4.46, 1.91, -411.7, -5.69 \times 10^4$ and -7.45×10^7 for $\delta = 0.8, 0.2, 0.1, 0.07, 0.05$. Add the compact conserved neck bump of Hawk07-G-v3 thm:non-determination type with amplitude $c_* = -6.968$, which makes $\Gamma_1 = -1.7 \times 10^{-13}$. Then χ stays between 6.5 and 10.7 on $[0, L_1 - 0.07]$. (At $\delta = 0.05$, $F'' \sim 10^{-11}$ and floating cancellation dominates.) For that compatible source $\Gamma_2 = -33.84 \neq 0$ still. A second, mantle-supported bump would be needed. We do not claim that the metric component v blows up. Statement (c) concerns the field response χ, i.e. the breakdown of the expansion $X_\varepsilon = x + \varepsilon\chi$ at a *finite* radius. It is the Host-B, finite-distance counterpart of the exponential alternative in Hawk07-G-v3 thm:chi-ends. It is not a nonlinear singularity theorem.

Proposition. Hold the end limits, σ_0 and σ_z fixed, and let $f \geq 0$ be smooth with compact support in $(0, \infty)$. Put $\Delta\sigma_x = tf$ and $\Delta\sigma_\varphi = t(f + f'/w)$, extended evenly. This perturbation is conserved, and it is allowed because $F' \geq \alpha > 0$ for $\ell > 0$. Write $k_f = \int F^2F''f/F'^2$. Then:

• If *supp* f lies in the neck, then $\Delta\Gamma_1 = t\,k_f$ with $k_f > 0$, and $\Delta\Gamma_2 = -\beta t\,k_f$.

• If *supp* f lies in a mantle, then $\Delta\Gamma_1 = 0$ and $\Delta\Gamma_2 = \alpha t\,k_f$ with $k_f < 0$.

• If *supp* f lies in a flat stretch, then $\Delta\Gamma_1 = \Delta\Gamma_2 = 0$. Since the (Γ_1, Γ_2) map is onto $\mathbb{R}^2$, the end contract fixes neither the sign nor the vanishing of either interface moment. For the selected Host-B vacuum, both remain uncomputed.

Proof. Integration by parts gives $\int F(2f + Ff'/F') = \int F^2F''f/F'^2$. Insert this into the weighted forms of Theorem (c),(d), and use $\int_y^{L_1} F'' = 1 - F'(y)$ and $\int_y^{r_1} F'' = \alpha - F'(y)$. This is the computation of Hawk07-G-v3, with local weights. Numerically (s18?awkG3_(c)hecks.json), F^2F''/F'^2

lies in *[0. 714, 4. 472]* on *[0. 5, 2]*, vanishes on the flat stretch *[3. 2, 5. 8]*, and lies in *[−43. 7, −0. 387]* on *[6. 5, 9. 5]*. The determinant of the two directions is *t_1t_2 αk_f_1k_f_2 ≠ 0*.

Proposition. Under the end contract, unconditionally, *U = −(κρ)/2x^2 + o(x^2)*, *a = a_2x^2 + o(x^2)* and *d = d_2x^2 + o(x^2)*, with the Hawk07-G-v3 thm:ends coefficients (Table). On *|ℓ| ≥ r_1* moreover *U^{'} = κσ_x/w* exactly. Hawk07-F prop:secular therefore holds on Host B. If a first-order response continues to the end (which requires *Γ_1 = Γ_2 = 0*), then *v = v_2x^2 + o(x^2)* as well.

Proof. The *U, V* part is the quadrature limit of Hawk07-G-v3 thm:ends. It needs only *F ∼ αx*. On the exterior *A ≡ 0*, so *p_1 = 0* gives *U^{'} = κσ_xF/F^{'} ∼ −κρx*, consistent with the quadrature. For *v*, the exterior density equation is *v^{''} + 2wv^{'} = −κσ_0 − d^{''} − wd^{'} → κ(ρ + p)/2*, and integrating gives *v_2*.

Verdict on U6. On Host B the transfer is *earned on the open neck*. It is *conditional* on *Γ_1 = Γ_2 = 0* beyond the neck, and it is *non-unique* even then. The constant end-contract reference violates both conditions. The stress stays symbolic. *X* and *Y* are not quantized.

U7: warped energy, flare, and latency on Host B

Warped energy identity; v3 is the case D = 0

For *g = −N^2mathop dt^2 + mathop dx^2 + F^2mathop dφ^2 + Z^2mathop dz^2* with *D = log Z*, let *𝒰_R = 2π∫_{−R}^R FZ G_{00}/κ*. Hawk07-F thm:energy and Hawk07-G-v3 thm:warpedenergy give

$$\mathscr{U}_R = -\frac{2\pi}{\kappa}[Z(F' + FD')]_{-R}^{R} + \frac{2\pi}{\kappa}\int_{-R}^{R} ZF'D'.$$

We rechecked this by hand. It follows from *κFZρ = −[Z(F^{'} + FD^{'})]^{'} + ZF^{'}D^{'}* with *Z^{'} = ZD^{'}*. At *D = 0* it becomes *−(2π)/κ[F^{'}]_{−R}^R*, which is the v3 identity thm:v3-GB. For *R > r_1* this equals *−4πα/κ* exactly. The warp *D* adds a bulk term *∫ ZF^{'}D^{'}*. This term is not fixed by topology.

Proposition. Suppose a first-order response exists on *[−R, R]* with *R > r_1*. By Theorem , this requires *Γ_1 = Γ_2 = 0*. Then Hawk07-G-v3 thm:energysplit gives

$$\dot{\mathscr{U}}_R = 2\pi\int_{-R}^{R} F\sigma_0 \,\mathrm{mathop\,d}\ell - 2\pi\int_{|\ell|<r_1} FAd\,\mathrm{mathop\,d}\ell.$$

On Host B the boundary term *−2π[FQ]*, with *Q = Aχ*, *vanishes exactly* for *R > r_1*, and the *Ad* term has compact support. Under the end contract, *𝒰_R = 2παρR^2 + O(R)*. In the language of Hawk07-G-v3 thm:threepart, the finite part is *2π∫ F(σ_0 − ρ) − 2π∫ FAd*. Here we need the extra tail hypothesis ass:energytail, but *no* boundary error *ℰ_R* from *ℛ*.

Proof. Hawk07-G-v3 writes *δρ^cl = −Q^{'} − wQ + Av* and adds the volume term *−A(v + d)*. We rechecked this by hand from the Hawk07-F expressions *u_1 = A^{'}χ + 2Aχ^{'}* and *b_1 = (A^{'} + 2Aw)χ − 2Av*. On *|ℓ| ≥ r_1, A ≡ 0*.

Flare: Hawk07-F thm:flare on Host B

Proposition. On Host B, *q_0 = F^{''}(0)/F(0) = 1/b^2*. By Hawk07-G-v3 thm:flare,

$$q_\varepsilon = q_0 + \varepsilon q, \qquad \dot{q} = \kappa[\sigma_x(0) - \sigma_0(0)] - 2q_0 v_0,$$

which makes explicit Hawk07-F's *v^{''}(0) + d^{''}(0)* (eq:flare-shift). This is local at the throat and needs only the neck part of Theorem (a). For *v_0 = 0*, the condition *|ε|κ|σ_x(0) − σ_0(0)| < 1/b^2* suffices for strict throat stability and static null flare-out. For the constant reference, *q̇ = −2κρ > 0*, so flare-out is strengthened. *σ(0)* for the actual Host-B state is not evaluated.

Proof. At *ℓ = 0, w = 0, χ = 0* and *p_1 = −σ_x(0)*. The density equation gives *v^{''}(0) = κ[σ_x(0) − σ_0(0)] − 2q_0v_0 − d^{''}(0)*. We confirmed this numerically to machine precision on the log-cosh comparison (s13$_r$esponse?um.json: *2. 0, 2. 1, 2. 098027*).

By contrast, for log-cosh, *q_0 = (α/(bδ))sech^2 (L/δ)*. This is *0. 21, 4. 9 × 10^{−3}, 9. 1 × 10^{−5}, 4. 1 × 10^{−9}* and *8. 5 × 10^{−18}* at *L/δ = 1, 3, 5, 10, 20* (*b = δ = 1, α = 0. 5*). The ``exponentially small gap" caution of Hawk07-F and Hawk07-G-v3 applies to that comparison profile, not to Host B.

Latency: a first-order correction on top of v3 thm:v3-gateway

Theorem. Take the response metric *g_{ε} = −e^{2εa}mathop dt^2 + mathop dx^2 + F^2e^{2εv}mathop dφ^2 + e^{2εd}mathop dz^2* on *𝒟_{B, +}*, with stations at *x = −D_s* and *x = D_r*.

• The earliest radial coordinate time is *T_rad = D_s + D_r − ε∫_{−D_s}^D_r a + O(ε^2)*. This uses only *a = (U + V)/2*, which is unconditional (Lemma). If *D_s, D_r > r_1*, the end law gives *−ε∫ a = −εa_2(D_s^3 + D_r^3)/3 + ε o(D^3)*, with *D = max (D_s, D_r)*. Since *a_2 < 0*, this is a delay that grows like the cube of the station radius.

• Let a compact route region *K* contain all competing routes. Every route avoiding the gateway *𝒢* of v3 thm:v3-gateway then satisfies the exact inequality

$$T_{\text{avoid}} \geq ?\exp\left(\varepsilon[\min_{K}\min\left(0, v, d\right) - \max_{K} a]\right)[\sqrt{D_s^2 + \rho_0^2} + \sqrt{D_r^2 + \rho_0^2}].$$

To first order, the v3 bound is multiplied by *1 + ε[min_K min (0, v, d) − max_K a]*.

• If *K ⊂ {|ℓ| < L_1}*, then (b) holds for any source by Theorem (a). If *K* reaches past *L_1*, (b) needs a first-order response on *K*, i.e. *Γ_1 = 0*, and also *Γ_2 = 0* if *K* meets a mantle. All times are laboratory coordinate or static proper times. This is *not* the relational clock of En09-A thm:main.

Proof. (a) Hawk07-F thm:latency. (b) On *K*, *h_{ε} ≥ e^{2εmin_K min (0, v, d)}(mathop dx^2 + b^2mathop dφ^2 + mathop dz^2)* because *F ≥ b*. Also *N_{ε} ≤ e^{εmax_K a}*. Then apply the splitting argument of v3 thm:v3-gateway, i.e.?Hawk07-F prop:gateway with these constants. (c) Theorem .

U8: the resonance census, rechecked but not certified

The plan asked for one of two things: an interval-certified version of the v3 census (v3 tab:v3-qnm), or an analytic lower bound on *|Im ω|*. **Neither was produced.**

A certified census would need three ingredients. First, a validated enclosure of the interior transfer matrix on *[0, r_1]* for ball arguments *ω*. The profile contains the flat functions *e^{−1/x}*, and the integration path has length *10*. Second, validated Hankel boundary data at *X = r_1 + C_B/α*, with *ν = 2|m|*. Third, a winding count on ball covers of each cell boundary. We judged that we could not complete and audit the first ingredient within this release, so we do not report a partial enclosure as if it were one. We also have no analytic *|Im ω|* bound. Host B's reduced potential changes sign: the mantles are a well for *m = 0* (v3 prop:v3-V). Nonnegativity of the Friedrichs operator, from the same proposition, gives *Im ω < 0* but no quantitative bound. We do not import Hawk07-E thm:long-neck as a Host-B law.

Proposition. We recomputed the normalized Wronskian of v3 at all 44 roots of the box *Re ω ∈ [0. 05, 2. 5]*, *Im ω ∈ [−0. 75, −0. 005]*, using DOP853 with *rtol = 10^{−13}* and mpmath Hankel functions. The counts per *(m, parity)* are *(0, e) 7, (0, o) 6, (1, e) 8, (1, o) 7, (2, e) 8, (2, o) 8*. The largest residual at a root is *3. 1 × 10^{−13}*. On circles of radius *10^{−3}* around each root, the smallest value of *|D|* is *1. 25 × 10^{−6}*. The least-damped census root is *ω = 0. 099545 − 0. 128169 i* (*m = 1*, even), so *min |Im ω| = 0. 12817* over the census (s15_(c)ensus‚echeck.json). These are floating-point consistency checks. They are *not* enclosures. They certify neither completeness nor the absence of roots near the box edges.

Resonance shifts: formula only. Hawk07-F thm:resonance-shift and Hawk07-G-v3 thm:resonance give *ω_1* as a ratio of overlap and impedance-variation terms. On Host B the *unperturbed* exterior is exactly conical. Its impedance *Z_{+} = f'{'}/f*, with *f = √(X)H_{2|m|}^{(1)}(ωX)*, is therefore genuine Host-B data. This is the setting of Hawk07-G-v3 thm:evaluated-model. We rechecked its identity *𝔅^{'} = V_0^{'}f^2* and its Hankel form of *𝔅* (s18?awkG3_(c)hecks.json, errors *3 × 10^{−17}* and *10^{−15}*). The perturbation in that theorem, however, is a declared translated slab *γV_0^{'}1_{[A, B]}*. The Host-B semiclassical exterior perturbation is instead secular and non-compact (Proposition), and its interior part is not even unique (Theorem). So no Host-B impedance variation is supplied, and **no *ω_1* is computed**. An ``evaluated exterior sensitivity" with model impedances is not a Host-B echo number. Hawk07-G-v3 thm:smoothing bounds the slab-versus-smooth-layer difference analytically. That bound concerns the model only. No pure QNM sum is used, and the I-B-ECHO kernel is not transferred (I-B-ECHO thm:gtd).

U9: the Host-A pulse stress against the no-go classes

v3 thm:v3-nogo excluded finite sums of scalars, single-component Maxwell fields, null-energy-respecting fluids and Λ as sources of Host B's convex neck. Here we ask the same question for the Host-A pulse. Host A's effective stress is G/κ for $g_A = a(\eta)^2[-c^2\mathrm{d}\eta^2 + \mathrm{d}r^2 + F_A^2\mathrm{d}\varphi^2 + \mathrm{d}z^2]$, with $F_A = r - \beta Q(r)s(\eta - r/c)$ (Definition).

Lemma. For any smooth $a(\eta) > 0$ and $F(\eta, r) > 0$, the only nonzero off-diagonal component is $G_{\eta r} = -F_{,\eta r}/F$. With $t = c\eta$, $H = a_{,t}/a$ and $J = F_{,t}/F$,

$$\Delta := G^{\wedge\wedge}_{zz} - G^{\wedge\wedge}_{\varphi\varphi} = a^{-2}\left[\frac{F_{,rr} - F_{,tt}}{F} - 2HJ\right].$$

In the settled pulse exterior $\mathscr{P} = \{r > r_1, \eta > \tau_a, 0 < u < \tau_f\}$, with $u = \eta - r/c$ and $a = a_\infty$,

$$\Delta = \frac{2\beta s'(u)}{c\, a_\infty^2 F_A} > 0.$$

Proof. Symbolic computation from the metric (s16?ostA.py). The residuals Delta_minus_claim and Delta_exterior_minus_... are both 0 (s16?ostA.json). On $r > r_1$, $Q = r - \rho_c$, and $s^{'} > 0$ on $(0, \tau_f)$.

Theorem. On no open subset of $\mathscr{P}$ is G/κ the stress tensor of a finite sum of the following:

- minimally coupled scalars $\varphi_k(\eta, r)$ with kinetic terms of either sign and an arbitrary potential;
- perfect fluids of any sign of ρ and p, or anisotropic fluids with $p_z = p_\varphi$;
- a cosmological term;
- Maxwell fields whose only components are radial, E_r and B_r.

Proof. For each class, $T_{\hat{z}\hat{z}} = T_{\hat{\varphi}\hat{\varphi}}$ on the (η, r)-symmetric sector. For (i), $T_{\hat{t}\hat{t}}$ in these two transverse directions equals $\mp\frac{1}{2}(\nabla\varphi)^2 - V$ in both cases. For (ii) and (iii) this holds by assumption. For (iv), $T_{\hat{t}\hat{t}} = \frac{1}{2}(E^2 + B^2) - E_i^2 - B_i^2$, which is the same for $i = z$ and $i = \varphi$. But requires $T_{\hat{z}\hat{z}} - T_{\hat{\varphi}\hat{\varphi}} = \Delta/\kappa > 0$.

Remark. Witness. With $\beta = 0.5$, $\rho_c = 8$, $c = 1$, $\tau_f = 1$, $a_\infty = 2$ and $u = \tau_f/2$, we find $\Delta = 0.02941$ at $r = 20$ and 0.01266 at $r = 50$. In the same setting $\partial_\eta\partial_r \log F_A = 0.4706$ and 1.1255 (s16?ostA.json). The pulse therefore also requires a nonzero radial energy flux $G_{\eta r} \neq 0$.

Scope. The classes *not* covered are axial or azimuthal electromagnetic fields, anisotropic fluids with $p_z \neq p_\varphi$, string clouds, and non-minimal couplings. The pulse stress is outside classes (i)–(iv). Following the plan, we *stop* at this typed non-construction. We construct no exotic source for the pulse, introduce no phantom scalar, and leave Host A's conformal factor $a(\eta)$ unsourced. As v3 noted, conservation does not derive a matter theory (v3 prop:not-source of the retained v2 text).

Status ledger and typed separations

The seven entries after v4

Every corpus label below was checked against its source (Appendix). No v4 result discharges an entry. The last bar of every problem stays open.

begingroup 1.12 toprule Entry Status after v4

midrule endfirsthead toprule Entry Status after v4

midrule endhead bottomrule endfoot Res01-A entry:G4 Open. The first-order response is a linear map from sources to metric coefficients, and on Host B it is not even unique (Theorem (d)). It is not an intertwiner between source presentations.

Res01-A entry:G01 Open. The Casimir tensor and the ghost or sigma-model stress are not the inherited E_0 row. No coefficient is inherited, and Theorem forbids a product upgrade.

Res01-A entry:G7 / Prob02-A thm:T3 Open. No curved ε^{-3} statement is made. The Casimir bounds of Theorem are flat end data.

Res01-A entry:G3 Open. The resonance tails and the secular growth x^2 are classical exponents, not d_S.

Prob02-A thm:SD is cited only as existing.

Res01-A entry:Page / Hawk06-A def:island Open. A torus together with a Casimir end is not an island certificate. No decoder or diamond bound is provided, and no Page curve or interior is claimed.

Res01-A entry:Relational / En09-A thm:main Open. The latency corrections of Theorem are in laboratory time.

Res01-A entry:Emergence Open. The domain of T is not constructed. Hawk07-F prop:Enter is a conditional instrument statement, and the host geometry is pre-existing.

endgroup *O. 1 = texttt NOT_CLOSED*. XVI-N (XVI-N thm:massless-obstruction) is not discharged. XV-B is not opened, and XIV-J is not used.

Corpus separation table

Each row records a separation: *what the source provides* versus *what v4 does not take from it*.

begingroup 1.1 toprule Source Typed separation

midrule endfirsthead toprule Source Typed separation

midrule endhead bottomrule endfoot Hawk07-G-v3 [CheungHawkGthree] Log-cosh background with a classical phantom sigma model and one quantized massive probe. Its moment, Lipschitz, weighted and variance theorems need $A > 0$ everywhere or $\int \ell\hat{}3A < \infty$ with $A > 0$. They *fail* on Host B across $A = 0$ stretches (Theorem). Only statements local to a region with $A > 0$, the quadratures, and the Casimir end data transfer. Its bounds are not an evaluated Host-B stress. Its evaluated exterior model uses a model slab, not Host-B impedances. Its variance bound (Hawk07-G-v3 thm:variance) is a smeared vacuum fluctuation, not a detector channel.

Hawk07-G-v1 [CheungHawkG] Where the two overlap, Hawk07-G-v1 is superseded by the successor sheet. Hawk07-G-v1 thm:moment is restated there, not retracted. The Hawk07-G-v1 labels thm:energy-split, thm:impedance, thm:report-floor and thm:massless are renamed in the successor (see Appendix). The same Host-B limits apply.

Hawk07-F [CheungHawkF] Compactification obstruction and constructive response on log-cosh. Transferred only as stated in Sections –. No ground state on Host B is constructed.

Hawk07-E [CheungHawkE] Convex comparison profile and sigma model. Hawk07-E thm:long-neck is not a Host-B law.

Hawk07-D, Hawk07-C-Dyn [CheungHawkD,CheungCDyn] Predecessor families. Host A remains a member of the C-Dyn family. Nothing new is imported.

I-B, I-B-G, I-B-G-S [CheungIB] Finite instrument and channel layer. The geometry does not identify the channel (v3 prop:v3-nonid).

I-B-VP, I-B-VP-CR, I-B-VP-8-Ex1 Conical-host Hadamard and recovery statements (I-B-VP thm:hadamard; I-B-VP-CR thm:main). The conical state of I-B-VP is not identified with a Host-B throat vacuum. No massless Host-B state is constructed.

I-B-ECHO [CheungEcho] Echo kernel and readout (I-B-ECHO thm:gtd). The kernel is not transferred, and no pure QNM train is used.

I-C, I-C-Th [CheungIC,CheungICThermal] Complete-access and thermal identities (I-C-Th thm:thermal). Casimir energy is not reservoir heat.

Em03-F Packet recovery $(3 - d_h)/4$ (Em03-F thm:recovery). Not the classical-only floor $1 - 1/n$.

Em02-E / Res02-A [CheungLapse] Classical relational lapse (Em02-E thm:lapse). Its quantum residual stays open. Our lapse $e\hat{}\{\varepsilon a\}$ is a semiclassical response, not that lapse.

En05-A, En07-B Cone causality (En05-A thm:cone) and complete-output restoration (En07-B thm:exact). Different access hypotheses.

En09-A [CheungEn09] Relational clock (En09-A thm:main). Latency remains laboratory time.

Prob02-A Problem bars; thm:T3 and thm:SD are cited as existing only.

Res01-A/B [CheungRes01] Ledger entries. None are discharged.

Hawk06-A / Oai265-A Island definition (Hawk06-A def:island) and area-law record (Oai265-A rec:AL). A torus is not an island. No Page curve.

XVI-P/Q (qds remark) Frozen trees, hashed before and after this work and unchanged. No label rem:qds was found in the frozen trees. They are cited by name only, and nothing is taken from them.

XVI-N / XV-B / XIV-J XVI-N thm:massless-obstruction is not discharged. XV-B is not opened, and XIV-J is not used.

OpenAI families [OpenAICatalogue] Documentary only (OpenAI rem:not-premise). No OpenAI family supplies a Casimir stress, a phantom quantization, a wormhole metric, or a semiclassical response.

endgroup

Consolidated v4 theorem and release

Theorem. On the settled static region of Host B with the v3 parameters:

• No product-preserving first-order semiclassical upgrade exists for any *t–z* boost-invariant classical support. The vacuum energy per axial length diverges like $2\pi\alpha\rho R^2$. This is a non-transfer of v3 cor:v3-floor (Theorems and , Corollary).

• Hawk07-F's response transfers uniquely on the open neck only. Continuation needs $\Gamma_1 = \Gamma_2 = 0$, it is non-unique, and end data cannot decide $\Gamma_{1, 2}$ (Theorem , Proposition). The quadratic growth of *a* and *d* is unconditional (Proposition).

• The warped energy has no first-order boundary term beyond r_1. Host B's flare gap is $q_0 = 1/b^2$. The v3 gateway bound acquires an exact factor $\exp(\varepsilon[\min_K \min(0, v, d) - \max_K a])$ (Propositions , , Theorem).

• The v3 census was rechecked in floating point but is not certified (Proposition). No ω_1 is computed.

• The Host-A pulse is outside the scalar, fluid ($p_z = p_\varphi$), Λ and radial-Maxwell classes (Theorem).

Release box (I-D-v4). *Earned:* U5 (with the end contract assumed); U6 on the open neck, with the interface obstruction and non-uniqueness typed; U7 (energy, flare, latency, conditional where marked); U9 (typed non-construction). *Not earned:* U8 (no certified census and no $|\mathrm{Im}\,\omega|$ bound); a global Host-B response; any evaluated Host-B stress, $\Gamma_{1, 2}$, $\sigma(0)$ or ω_1. *Refused:* a third geometry; semiclassical formation; phantom quantization; a global nonlinear solution; a pure QNM train; transfer of the I-B-ECHO kernel; Page curves, islands or interiors; de Sitter or a bounce; discharging XVI-N or opening XV-B. *Ledger:* all seven entries are open, and $O.1 = \texttt{NOT_CLOSED}$. No inherited coefficient is admitted. *Integrity:* the frozen XVI-P/Q/R trees were unchanged before and after this work. Nothing was pushed or written to any site or app. I-D is not registered anywhere.

Retained I-D-v4 appendices, including the I-D-v3 and I-D-v2 material

Note on the retained v3 text

Appendices and reproduce the I-D-v3 source [CheungIDthree] with sectioning demoted by one level. Its labels are unchanged, so cross-references such as v3 thm:v3-gateway resolve inside this file. The v3 verdicts and statements are retained unchanged, except as qualified in Section .

Retained I-D-v3 main text

Purpose, retained two-host definitions, and corrections

Changes to v2.

begingroup 1.12 toprule v2 statement or gap v3 change

midrule endfirsthead toprule v2 statement or gap v3 change

midrule endhead bottomrule endfoot ``No independent matter theory'' (abstract, Declarations) Refined. Settled static Host B now has two exact engineered matter realizations (Theorem , Proposition). A no-go (Theorem) excludes the standard classes. Host A and both pulse regions still have no matter theory.

thm:energy (signed ledgers) Retained. It is now explained as a Gauss–Bonnet identity with profile-independent neck value (Theorem). Hawk07-E's negative-energy floor is added, and Host B's excess over it is quantified

(Corollary).

thm:routing (radial latency) Retained. Three coordinate-free witnesses are added (Theorems , ,), together with a non-discrimination result for zero-momentum radial time of flight (Proposition).

open:throat-echo (``no evaluated B kernel") Partially discharged for the static scalar sector. The late-source reduction to the settled static operator is proved (Theorem). Resonances, echo delays, and tails are computed for explicit parameters (Section). No detector, field-to-register map, or quantum state is supplied; those parts stay open.

thm:main item (x), ``no evaluated B echo theorem" Superseded by Theorem and the numerical spectrum. Item (x) is otherwise retained.

thm:minimal holonomy classes Completed: the elliptic, parabolic, and hyperbolic regions are given explicitly in the *(r, T)* plane, and the parabolic set is shown to be a smooth measure-zero curve (Proposition).

Seven entries A host-relative ledger is added, with every corpus label verified in its fetched source (Section).

Execution status (``no compilation asserted") v3 reports executed scripts and a stable compilation (Appendix). The v2 sentence is retained only as a historical statement in Appendix .

v2 mathematical content No mathematical error was found in the v2 items rechecked (Appendix). The remaining issues concern scope and provenance only.

endgroup

Necessary corrections to the v3 plan.

The binding v3 plan (I-D-v3-plan-user.md) contains the following false or unsupported claims. They are *not* stated as results anywhere in this paper.

• *Phantom scalar source.* The plan proposes $(\varphi^{'})^2 = F^{''}/F$ for a massless phantom radial scalar sourcing the settled product metric. This is false. The scalar has $T_{\ell\ell} = T_{\hat{\varphi}\hat{\varphi}} \neq 0$, whereas $G_{\ell\ell} = G_{\hat{\varphi}\hat{\varphi}} = 0$. The proposal also needs $F^{''} \geq 0$, which fails on the mantles. Theorem proves a much stronger exclusion. The claimed persistence of throat theorems is geometric and independent of any source.

• *Energy inequality.* ``$\int T_{00}\, dA \leq -2\pi\beta/\kappa$, equality only in the thin-string limit" is wrong. Gauss–Bonnet gives the *equality* $-4\pi\alpha/\kappa$. The comparison $-4\pi\alpha \leq -2\pi\beta$ holds iff $\beta \leq 2/3$, with equality at $\beta = 2/3$ and not in any thin-string limit. The meaningful inequality bounds the negative-energy budget (Corollary).

• ``*Host A cannot cancel the B floor."* This is a category error. The two ledgers are integrals on different manifolds, so no addition is defined. v2's thm:energy already records non-transfer.

• *Neck-avoiding latency.* Every curve from $\ell < 0$ to $\ell > 0$ meets $\ell = 0$, so ``causal curves avoiding the neck" do not exist. The bound $(2\min(|\ell_s|, |\ell_r|) + 2r_1)/c$ has no source. Section replaces it with correct witnesses.

• *Wave potential.* The plan's $V = F^{''}/F + m^2/F^2 + k^2$ is the spherical-type expression. The correct cylindrical reduction is $V = F^{''}/(2F) - F^{'2}/(4F^2) + m^2/F^2 + k^2$. Its neck value is $1/(2b^2) + m^2/b^2 + k^2$, not $1/b^2$. On the mantles the $m = 0$ potential is a *well*, not a second barrier.

• *Echo delay and damping.* ``Echo delay $\approx 2L_1/c$" is unsupported. The computed mantle-echo delay is $\approx 14.8 \in [2r_0, 2r_1]/c$, set by the mantle position and not by $L_1$. ``Damping $\sim \exp(-\int \sqrt{(V)})$" presumes a trapping cavity. The settled Host-B profile has none: all resonances found have quality factor of order one (Section).

• *Thermal diamond error.* ``Diamond error $(3 - d)/4$" with d a dimension is a misreading of Em03-F thm:recovery. There $d_h \in [0, 1)$ is a trace distance between two output states, and the optimal error is $(3 - d_h)/4 \in (1/2, 3/4]$ for a qubit message (Section). A dimension $d \geq 3$ would make the expression nonpositive.

• *Prob02-A* ε^{-3}. ``Host B curvature does not cancel the ε^{-3} term" is unproved. cor:G2v8 and thm:G2obstruction are flat-model statements. We assert neither cancellation nor persistence on Host B.

• *Settling and de Sitter*. The plan's clock item is correct in substance. Settling is not de Sitter: $a \to a_\infty$ is constant, whereas de Sitter has $R = 12H^2 \neq 0$. A nonzero-Hubble patch is not a static cone (retained v1 correction).

Verdict summary for the supplied predecessors.

I-D-v2. All rechecked theorems are mathematically correct as stated, including the Einstein components, neck derivatives, spatial and null throat theorems, NEC/ANEC, energy ledgers, global hyperbolicity, routing, nonstationarity, holonomy, and the late-source comparison. Its provenance sentences are now superseded: the file compiles, which our scratch copy confirmed at 36 pages with 0 errors, and its corpus labels are now audited (Appendix).

Hawk07-E. The rechecked items are correct (Appendix). Two caveats apply. First, thm:matter is not specific to convex profiles: the same couplings solve every Euler–Lagrange equation for any positive profile, with target-metric signature set by *sign F^{''}*. Second, at *L/ρ = 20* the leading damping coefficient of thm:long-neck overestimates *|Im k|* by about *30%*. This is within the theorem's stated error order, which converges only logarithmically.

The retained v2 framework. The rest of this section retains v2's purpose discussion, its nine v1 corrections, and its host definitions unchanged.

Two prescribed geometries, one operational discipline.

I-B supplies a finite operational interface on a prescribed static conical product [CheungIB]. I-D-v1 extends that discipline to a retarded axis-filled dynamical host [CheungID1]. The supplied Hawk07-D construction instead has a signed radial coordinate and a compact toroidal neck [CheungHawkD].

The present question is not whether the first spacetime can be renamed as the second. It cannot. The question is whether a precisely stated finite Enter interface can be placed on both, while keeping the geometric, channel, field-theoretic, and physical implementation claims separate.

toprule Host Spatial topology Role

midrule A $\mathbb{R}^3$, axis included Retarded smooth-core conical formation; one spatial end; no compact spatial minimal throat on the stated slices.

B $\mathbb{R}_{\ell} \times T^2$ Pre-existing two-ended bridge; compact minimal torus and, under a stated bound, two strong dynamical null throats.

C $(0, \infty) \times S^1 \times \mathbb{R}$ Homogeneous time-dependent opening, audited and rejected as the formation host.

bottomrule

Enter, spacetime Enter, and the Shredder philosophy.

Cheung's Enter calculus treats runtime quantum names as access rights and distinguishes the concrete Born-channel semantics from an operational characterization within a specified strategy class [CheungEnter]. This paper assumes the finite Born-channel formalism. It does not rederive that characterization.

The philosophical account [CheungPhil] organizes four distinctions:

• destructive readout is not coherent quantum return;

• a classical record is not a quantum-return decoder;

• an input–output channel is not a thermal implementation;

• an analogy is not a proved physical identification. Here a consumed name is absent from the declared quantum output. This is not annihilation of every microscopic implementing degree of freedom.

Spacetime Enter adds laboratory events, locations, causal routes, accessible algebras, and clock calibration to that finite interface [CheungIB]. The metric is an external classical field even when its components depend on time. Keeping that field fixed as model data does not make it stationary.

The Shredder interface asks what the decoder can actually access [CheungIC]. A long classical history can contain useful information without returning an arbitrary unknown quantum code. An additional accessible quantum memory changes the task. Neither readout nor a decoder supplies an Einstein source map.

The nine corrections retained from v1.

The following corrections retain the mathematical content of v1 while removing unsupported transfers of its audit status.

The metric with a common *α(T)* at all radii does not have axis-supported stress. Its off-axis stress, singular axis,

and simultaneous change are calculated in Theorem . It is Host C, not an adopted host.

During evolution a coordinate-circle holonomy is generally radius-dependent and need not be elliptic. A single instantaneous number $2\pi(1 - \alpha(T))$ is not its general Lorentz holonomy.

The label prop:nonGH is not used as an I-B theorem. The punctured-cone obstruction documented in I-B-G and Res01 does not transfer to either adopted full host: both are globally hyperbolic.

The sharp classical-output floor and append-only entropy identity do not need a settled patch. A complete implementation deviation weakens the floor additively, not by a geometric multiplier.

Apex-diffracted static-cone kernels require their own global operator realization. They do not follow by restricting either adopted host to a locally conical exterior.

An expanding spatially flat FLRW patch with nonzero Hubble rate is not locally isometric to a flat static cone. Exact exterior settling below uses an explicitly constant late scale factor.

The adopted switches are C^{∞}. There is no distributional shock or matching shell. Settled-domain inequalities replace informal distance-from-shock conditions.

OpenAI catalogue entries and family numbers are documentary comparisons, not premises or independently verified results of this paper. No additional ``family" of labels is claimed audited.

The release box is stated for the two hosts and their declared interfaces. A recorded classical subgate is not completion of a quantum, emergence, or gravitational endpoint problem.

Additional v2 corrections.

• A positive minimum on $r \geq 0$ does not create a second side. Host B uses $\ell \in \mathbb{R}$.

• A circumference minimum is not by itself a compact two-surface throat. Host B uses periodic z and full torus area.

• Spatial minimality and null flare-out are distinct theorems. The latter is proved only under the stated slow-expansion bound.

• Host B's periodic axial exterior is a quotient of the noncompact-axial conical product, not globally the same product.

• A constant early $\alpha_{-} \neq 1$ in Host C gives an early cone, not Minkowski space. The early flat case requires $\alpha_{-} = 1$.

• The erroneous intermediate expression for early scalar curvature in the supplied Hawk07-D nonstationarity proof is replaced by $R = -2v^{'}/W$.

• Host A's terminal string energy is not Host B's total signed transverse integral.

• No explicit throat Green kernel or echo calculation is constructed. This must not be confused with denying the standard existence theorem for a separately specified normally hyperbolic operator on a globally hyperbolic spacetime.

• Technical results in a manuscript named XV-B do not mean that the downstream quantum-admission exit called XV-B has opened.

Definitions of the two adopted dynamical hosts
Shared notation.

Define

$$B(x) = \begin{cases} e^{-1/x}, & x > 0, \\ 0, & x \leq 0, \end{cases} \qquad S(x) = \frac{B(x)}{B(x) + B(1 - x)}.$$

Then $S \in C^{\infty}(\mathbb{R})$,

$$S = 0 \ (x \leq 0), \quad S = 1 \ (x \geq 1), \quad S' > 0 \ (0 < x < 1),$$

and $S(1 - x) = 1 - S(x)$, so $S^{''}(1/2) = 0$.

Fix

$$0 < r_0 < r_1, \quad 0 < \beta < 1, \quad \alpha = 1 - \beta, \quad \lambda, \tau_a, \tau_f, c > 0.$$

Set

$$q(r) = S\left(\frac{r - r_0}{r_1 - r_0}\right), \; Q(r) = \int_0^r q(s)\,\mathrm{mathop\,ds},$$
$$\rho_c = r_1 - Q(r_1), \quad a(\eta) = 1 + \lambda S(\eta/\tau_a),$$
$$a_\infty = 1 + \lambda, \qquad s(u) = S(u/\tau_f).$$

Thus $Q = 0$ on $r \le r_0$, $0 \le Q \le r$, and $Q(r) = r - \rho_c$ for $r \ge r_1$.

The same parameter symbols may be used for the two examples, but their events and coordinate functions belong to different manifolds. There is no assertion of a common physical evolution.

Definition. Let

$$M_A = \mathbb{R}_\eta \times \mathbb{R}^2_{x,y} \times \mathbb{R}_z, \qquad x = r\cos\varphi, \quad y = r\sin\varphi.$$

Include the regular axis and prescribe

$$F_A(\eta, r) = r - \beta Q(r) s(\eta - r/c),$$
$$g_A = a(\eta)^2\left[-c^2\,\mathrm{mathop\,d}\eta^2 + \mathrm{mathop\,d}r^2 + F_A^2\,\mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2\right].$$

This is an explicit member of the retained I-D-v1 / Hawk07-C-Dyn family [CheungID1,CheungCDyn]. For the v1 core parametrization one may take $(r_0, r_1) = (\rho, 2\rho)$ and $t = c\eta$.

Host A is kept. Nothing in Host B's construction changes Definition .

The neck profile for Host B.

Choose in addition

$$0 < b < L_0 < L_1 < r_0, \qquad L_z > 0,$$

and define for $r \ge 0$

$$\chi(r) = S\left(\frac{r - L_0}{L_1 - L_0}\right),$$
$$v(r) = (1 - \chi(r))\frac{r}{\sqrt{r^2 + b^2}} + \chi(r),$$
$$W(r) = b + \int_0^r v(t)\,\mathrm{mathop\,d}t, \qquad d_0 = W(L_1) - L_1.$$

Lemma. The function $W(|\ell|)$ is smooth on $\mathbb{R}$, and

$$W(r) = \sqrt{r^2 + b^2} \quad (r \le L_0), \qquad W(r) = r + d_0 \quad (r \ge L_1).$$

Moreover,

$$\sqrt{r^2 + b^2} \le W(r) \le b + r, \quad d_0 > 0,$$
$$v(0) = 0, \quad v'(0) = 1/b, \quad 0 < v(r) \le 1 \; (r > 0), \quad v'(r) \ge 0.$$

Proof. For $g(r) = r/\sqrt{(r\hat{}2 + b\hat{}2)}$,

$$v' = (1 - \chi)g' + \chi'(1 - g) \ge 0, \qquad g \le v \le 1.$$

Integration proves the bounds. Near zero, $W = \sqrt{(r\hat{}2 + b\hat{}2)}$, which has a smooth even extension. For $r \ge L_1$, $v = 1$. Finally $W(L_1) \ge \sqrt{(L_1\hat{}2 + b\hat{}2)} > L_1$.

Definition. Let

$$M_B = \mathbb{R}_\eta \times \mathbb{R}_\ell \times S^1_\varphi \times S^1_z, \qquad \varphi \sim \varphi + 2\pi, \quad z \sim z + L_z.$$

Use the signed radial coordinate ℓ, put $r = |\ell|$, and prescribe

$$F_B(\eta, \ell) = W(|\ell|) - \beta Q(|\ell|) s(\eta - |\ell|/c),$$

$$g_B = a(\eta)^2\big[-c^2\mathrm{mathop\,d}\eta^2 + \mathrm{mathop\,d}\ell^2 + F_B^2\mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2\big].$$

This is the attributed Hawk07-D host [CheungHawkD]; its needed properties are proved here.

Remark. The spatial manifolds $\mathbb{R}\text{^}3$ and $\mathbb{R} \times T\text{^}2$ have different fundamental groups and different end structure. The spacetime manifolds likewise have different fundamental groups. Thus Host B is not a global coordinate chart of Host A. Its bridge topology is present on every time slice. No topology change from a Minkowski Cauchy surface is claimed. This is consistent with the smooth Cauchy-splitting framework [BernalSanchez].

Proposition. Both adopted metrics are smooth Lorentzian metrics with no distributional junction shell. Their profiles satisfy

$$\alpha r \le F_A \le r, \qquad \alpha W \le F_B \le W.$$

For $r > 0$,

$$\partial_r F_A = 1 - \beta q s + \frac{\beta Q}{c} s' \ge \alpha,$$

and on either radial side of Host B,

$$\partial_r F_B = v - \beta q s + \frac{\beta Q}{c} s' > 0.$$

In particular $F_B(\eta, 0) = b$ is the unique coordinate radial minimum.

The conical deformation has support only where $\eta - r/c > 0$. The hypersurfaces $\eta - r/c = \mathit{constant}$ are radial null hypersurfaces away from the polar axis of A and the signed-coordinate center of B. For $\eta \le 0$, Host A is Minkowski space, whereas Host B is the static bridge with profile W. The spatial manifold of B has two topological ends.

Proof. For A, $F_A = r$ on $r \le r_0$, so polar coordinates extend smoothly across the axis in Cartesian form. For B, $Q = 0$ near $\ell = 0$, where $F_B = \sqrt{(b\text{^}2 + \ell\text{^}2)}$; the potentially nonsmooth $|\ell|$ therefore causes no singularity. The flat endpoints of the switches give smooth joins.

The profile bounds follow from $0 \le Q \le r$, $0 \le s \le 1$, and $r \le W$. The displayed derivatives prove monotonicity for A. For B they equal $v > 0$ below r_0; above $r_0 > L_1$ one has $v = 1$, so they are at least α.

The support property follows from $s = 0$ at nonpositive argument. On either regular radial side,

$$g^{-1}(\mathrm{mathop\,d}(\eta - r/c), \mathrm{mathop\,d}(\eta - r/c)) = a^{-2}(-c^{-2} + c^{-2}) = 0.$$

The early metrics follow from the switches. Finally $\mathbb{R} \times T\text{^}2$ has two ends because $T\text{^}2$ is compact.

Host A is FLRW outside the radial front. Host B outside the front is the conformal bridge, not globally FLRW; on $r \ge L_1$ it is locally a spatially flat FLRW patch after shifting the radial coordinate. The scale-factor evolution is prescribed separately from the retarded conical deformation.

Matter for the settled Host-B neck and the Gauss–Bonnet ledger
The settled static region.

Let $F_{\infty}(\ell) = W(|\ell|) - \beta Q(|\ell|)$. On

$$\mathscr{D}_{B,+} = \{\eta > \tau_a,\ \eta - |\ell|/c > \tau_f\}$$

Host B's metric equals the static comparison metric

$$h_B = a_\infty^2\big[-c^2\mathrm{mathop\,d}\eta^2 + \mathrm{mathop\,d}\ell^2 + F_\infty^2\mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2\big].$$

This is h_B on all of M_B, not a new host. It is the analogue of v2's h_A in sec:echo. Write $e_{\hat{\mu}}$ for its static orthonormal frame. We have

$$F_\infty'' = v' \ (|\ell| < r_0), \qquad F_\infty'' = -\beta q' \ (r_0 \le |\ell| \le r_1), \qquad F_\infty'' = 0 \ (|\ell| \ge r_1),$$

with $v\text{^}\{'\} > 0$ on $[0, L_1)$, $v\text{^}\{'\} = 0$ on $[L_1, r_0]$, and $-\beta q\text{^}\{'\} < 0$ on (r_0, r_1).

Lemma. For h_B,

$$G^{\wedge\wedge}_{\mu\nu} = \frac{F''_\infty}{a_\infty^2 F_\infty}\mathrm{diag}\,(-1,0,0,1).$$

Proof. This is a direct computation (s3?ymbolic.py, log line G$_o$n diag). It is the static limit of v2's –.

A cone no-go for the standard matter classes.

In the frame *e_{û}*, the following single-component sources have diagonal orthonormal stress tensors *(T_{00}, T_{ℓℓ}, T_{φ̂φ̂}, T_{ẑẑ})*. Each was computed from its field in s3?ymbolic.py. toprule Source orthonormal diagonal midrule radial scalar *ψ(ℓ)*, kinetic sign *ε = ±1 λ(1, 1, −1, −1), λ = εψ^{'}^2/(2a_{∞}^2) ∈ ℝ*

potential or cosmological term *V* (either sign) *V(1, −1, −1, −1)*

radial *E* or radial *B c_3(1, −1, 1, 1), c_3 ≥ 0*

azimuthal *E* or *B c_4(1, 1, −1, 1), c_4 ≥ 0*

axial *E* or *B c_5(1, 1, 1, −1), c_5 ≥ 0*

perfect fluid at rest *(ρ_f, p_f, p_f, p_f)*

bottomrule Distinct Maxwell fields are independent *U(1)* fields, so their stresses add.

Theorem. Let the source of *h_B* at a point be a finite sum of terms from the table above. Allow any number of scalars of either kinetic sign, any potentials, and fluids with *ρ_f + p_f ≥ 0* (including stiff fluids). If *G = κT* holds at that point, then *F_{∞}^{''} ≤ 0* there. More precisely, every radial and azimuthal Maxwell coefficient vanishes, the net scalar kinetic coefficient vanishes, every fluid has *ρ_f = −p_f*, and

$$\frac{F''_\infty}{a_\infty^2 F_\infty} = -2\kappa c_5.$$

Consequently:

• no such source supports any point of the neck region *|ℓ| < L_1*. This includes phantom scalars with arbitrary potentials, any cosmological constant, and stiff fluids;

• the mantles *r_0 < |ℓ| < r_1* cannot be supported by these classes with source-free Maxwell fields.

Proof. Sum the patterns with total kinetic coefficient *λ*, Maxwell coefficients *c_3*, *c_4*, *c_5*, fluid sums *ρ_f*, *p_f*, and potential sum *V*. By Lemma , put *f = F_{∞}^{''}/(κa_{∞}^2F_{∞})*. The equations *κT = G* become

$$\begin{aligned}
\lambda + c_3 + c_4 + c_5 + \rho_f + V &= -f,\\
\lambda - c_3 + c_4 + c_5 + p_f - V &= 0,\\
-\lambda + c_3 - c_4 + c_5 + p_f - V &= 0,\\
-\lambda + c_3 + c_4 - c_5 + p_f - V &= f.
\end{aligned}$$

The general solution (s3?ymbolic.py, cone solution) is *V = c_5 + p_f*, *λ = c_3 − c_4*, and *2c_3 + 2c_4 + (ρ_f + p_f) = 0*. The last equation is the sum of the first and fourth. With *c_3*, *c_4 ≥ 0* and *ρ_f + p_f ≥ 0*, it forces *c_3 = c_4 = 0*, *ρ_f + p_f = 0*, and *λ = 0*. Then *f = −2c_5 ≤ 0*. This proves (a), since *F_{∞}^{''} > 0* on *|ℓ| < L_1*.

For (b), on *(r_0, r_1)* the only remaining Maxwell content is axial. An axial magnetic field is *F = B a_{∞}^2F_{∞} mathop dℓ ∧ mathop dφ*, with *⋆F = ±B a_{∞}^2c mathop dη ∧ mathop dz*. Source-free Maxwell gives *mathop d ⋆ F = ±B^{'}a_{∞}^2c mathop dℓ ∧ mathop dη ∧ mathop dz = 0*, so *B* is constant. For the axial electric field, *F = E a_{∞}^2c mathop dη ∧ mathop dz*, and *mathop dF = 0* makes *E* constant. Hence *c_5* is constant on the interval, and so is *F_{∞}^{''}/F_{∞}*. This contradicts *F_{∞}^{''} < 0* inside the interval together with *F_{∞}^{''} → 0* at both endpoints, where *q^{'}* vanishes to infinite order.

Remark. A perfect fluid with *ρ_f + p_f < 0* does reopen the algebraic solution set. For example, take *c_4 = −(ρ_f + p_f)/2 > 0* together with a phantom scalar and a potential. That class is not among the plan's proposals, and its field equations are not examined here. Nonminimal couplings, charged currents, and anisotropic or nonlinear models are likewise outside the theorem. The result also agrees with Bronnikov–Lemos [BronnikovLemos]. Their Proposition 1 says that a static cylindrical wormhole with two regular asymptotics needs negative energy density somewhere. Their scalar-type no-go, for sources with *T_2^2 = T_3^3*, is the special case *c_3 = c_4 = c_5 = 0* of

the computation above.

What does realize the settled metric.

Theorem. Use proper coordinates $t = a_{\infty}\eta$, $x = a_{\infty}\ell$, $\zeta = a_{\infty}z$, and set $P(x) = a_{\infty}F_{\infty}(x/a_{\infty})$. Then $h_B = -c^2\mathop{dt}^2 + \mathop{dx}^2 + P^2\mathop{d\varphi}^2 + \mathop{d\zeta}^2$. Take the action eq:action of [CheungHawkE] with couplings

$$\mathrm{A}(X) = \frac{P''(X)}{\kappa P(X)}, \qquad \mathrm{B}(X) = \frac{P(X)P''(X)}{\kappa}.$$

The fields $X = x$, $Y = \varphi$, and $\Psi = 0$ solve every Euler–Lagrange equation, including Einstein's equation. The proof uses only $P > 0$, not convexity. For Host B's profile:

• $A > 0$ for $|x| < a_{\infty}L_1$. Here the two fields carry phantom kinetic sign.

• $A < 0$ for $a_{\infty}r_0 < |x| < a_{\infty}r_1$. Here the kinetic sign is ordinary.

• $A \equiv B \equiv 0$ on $a_{\infty}L_1 \le |x| \le a_{\infty}r_0$ and on $|x| \ge a_{\infty}r_1$. There the target metric is degenerate and the X-equation is vacuous, so $X = x$ is not dynamically determined.

Proof. Use the stress tensor eq:stress-action. With $B = AP^2$ it gives $T_{\hat{\mu}\hat{\nu}} = A\,\mathrm{diag}(-1, 0, 0, 1)$, which equals G/κ by Lemma . The Y-equation is a φ-derivative of a φ-independent quantity. In the X-equation, substitute $\Box X = P'/P$, $(\nabla X)^2 = 1$, $(\nabla Y)^2 = P^{-2}$, and $B' = A'P^2 + 2APP'$. This gives $AP'/P + A'/2 - B'/(2P^2) = 0$ identically. s7?awkE?ym.py derives the stress tensor by metric variation and the Euler–Lagrange equations from $\sqrt{-g}L$, for arbitrary A, B, F. It confirms vanishing Einstein residuals. It also confirms vanishing X-equation residuals for three test profiles, one of them non-convex. The signs follow from .

Proposition. Let $u = (a_{\infty}c)^{-1}\partial_{\eta}$ and $\hat{z} = a_{\infty}^{-1}\partial_z$. For every smooth $\rho_s(\ell)$, the tensor $T^{ab} = \rho_s(u^a u^b - \hat{z}^a\hat{z}^b)$ is conserved. Each worldsheet $\{\ell, \varphi\ \mathrm{fixed}\}$ is totally geodesic, hence a Nambu–Goto string. Einstein's equation for h_B holds iff

$$\rho_s = -\frac{F_{\infty}''}{\kappa a_{\infty}^2 F_{\infty}}.$$

For this density:

• NEC fails exactly where $F_{\infty}'' > 0$, that is for $|\ell| < L_1$, with minimum $\rho_s = -1/(\kappa a_{\infty}^2 b^2)$ at $\ell = 0$;

• on the mantles NEC, WEC, and DEC hold, and SEC is marginal.

Proof. Both u and $\hat{z}$ are unit Killing fields with constant norm. Hence both are geodesic and divergence-free, and ρ_s is constant along them. s3?ymbolic.py verifies $\nabla_a T^{ab} = 0$, vanishing second fundamental form (WS Gammas), and the Einstein match with zero residual. For a null vector $k = e_0 + n$ with spatial unit n, $T(k, k) = \rho_s(1 - n_{\hat{z}}^2)$. This is negative for some k iff $\rho_s < 0$. On the mantles $\rho_s = \beta q'/(\kappa a_{\infty}^2 F) > 0$ and $|p_{\hat{z}}| = \rho_s$. The neck value follows from $F_{\infty}''(0)/F_{\infty}(0) = 1/b^2$.

Remark. Both realizations are engineered, and neither is a microscopic model. In Proposition , the density of non-interacting string dust is a free function. Einstein's equation selects it, and it is negative (negative tension) in the neck. In Theorem , the couplings are fixed functions in a Lagrangian whose field equations are genuinely checked. But for Host B's profile the target metric is sign-indefinite and degenerate on open sets. For Hawk07-E's convex profile P_{δ}, by contrast, it is positive definite, so there the kinetic sign is uniformly phantom. In neither case is there a well-posed evolution theorem, positive energy, or stability. Neither applies to Host B's pulse region. That region has $G_{0\ell} \neq 0$ (v2), whereas both static ansätze give $T_{0\ell} = 0$. Host A's pulse and conformal factor receive no matter theory. The inverse-Einstein disclaimer of v2 prop:not-source is retained there.

Remark. The static metric g_{δ} of [CheungHawkE] lies in the same topological class $\mathbb{R} \times T^2$ with two α-conical ends. It has no positive mantles and no formation pulse. v3 does not replace Host B's settled profile by P_{δ}. Host B's definition fixes its late profile, and a different profile is a different spacetime. We record g_{δ} only as a cited static comparison. Facts proved for g_{δ} transfer to Host B only where a separate argument is given here. This is why it is not a third adopted geometry.

Remark. Their symmetric phantom-plus-Λ solution, eq. (34) of [BronnikovLemos], can be written in signature $(-$

+ + +) as $-\mathscr{A}^2\mathrm{d}t^2 + \mathrm{d}l^2 + \mathscr{A}^2(\mathrm{d}\varphi^2 + \mathrm{d}z^2)$, with $\mathscr{A} = ((h/\lambda)\cosh(l/\lambda))^{1/3}$. We verified that it solves Einstein's equation with $\kappa\varphi'^2/2 = \operatorname{sech}^2(l/\lambda)/(3\lambda^2)$ and $\Lambda = -1/(3\lambda^2)$, with zero residuals in s3?ymbolic.py. It belongs to a different warped family (g_{tt} is not constant) and is not asymptotically conical. It is recorded only as a separation.

The Gauss–Bonnet ledger.

Theorem. Let $\mathscr{U} = \int \rho\, \mathrm{d}A$ be the settled static transverse energy per unit proper axial length. Then

$$\kappa\, \mathscr{U}_{A,\infty} = 2\pi\chi(\mathbb{R}^2) - 2\pi\alpha = 2\pi\beta, \qquad \kappa\, \mathscr{U}_{B,\infty} = 2\pi\chi(\mathbb{R}\times S^1) - 4\pi\alpha = -4\pi\alpha.$$

For every $\ell_1 < \ell_2$, $\kappa\int_{\ell_1 < \ell < \ell_2} \rho\, \mathrm{d}A = -2\pi(F_{\infty}'(\ell_2) - F_{\infty}'(\ell_1))$. Hence:

• the neck $|\ell| < L_1$ contributes exactly $-4\pi/\kappa$ for every admissible (b, L_0, L_1);

• the two mantles contribute $+4\pi\beta/\kappa$;

• the intervals $[L_1, r_0]$ and $|\ell| \geq r_1$ contribute nothing. At finite $\eta \geq \tau_a$, the whole-transverse integral of Host B is $-4\pi/\kappa$, because both outer slopes are still ± 1. This agrees with v2's thm:energy.

Proof. With a constant, $\kappa\rho = G_{00} = K$, the Gaussian curvature of $\mathrm{d}\ell^2 + F^2\mathrm{d}\varphi^2$ scaled by a_{∞}^{-2}. Moreover $K\,\mathrm{d}A = -F''\,\mathrm{d}\ell\,\mathrm{d}\varphi$, so integration gives the interval formula. The cases follow from $F' = 0$ at $\ell = 0$, $F' = 1$ on $[L_1, r_0]$, $F' = \alpha$ beyond r_1, and $F' = \pm 1$ beyond the front at finite time. This is the boundary-angle form of Gauss–Bonnet, as in Hawk07-E thm:GB. The disk case has Euler characteristic 1. Numerically, $\int F''$ over the neck equals 2.000000 and over the mantles -1.000000 for the parameters of Section (s6?rofile?umbers.json).

Corollary. In the equal-angle two-ended product class, $E_- = E_+ + 4\pi\alpha/\kappa \geq 4\pi\alpha/\kappa$ (Hawk07-E cor:energy-floor). Host B has $E_- = 4\pi/\kappa$ and $E_+ = 4\pi\beta/\kappa$. Its exotic budget is therefore $1/\alpha$ times the sharp floor, which Hawk07-E's P_δ saturates. The identity depends on topology *and* end angles. It bounds the magnitude of negative energy, not the signed energy. The Host A and Host B ledgers are not addable.

Remark. The Gauss–Bonnet ledger is classical transverse matter energy. It is not horizon entropy, not a Page-curve statement, and not the documentary area-law record Oai265-A rec:AL.

Coordinate-free classical transit witnesses

All statements in this section are classical route statements about the prescribed metrics. Throughout, the quantum channel stays blind to them (v2 prop:nonidentification).

Proposition. On every slice of Host B, every continuous path from $\ell < 0$ to $\ell > 0$ meets the torus $\ell = 0$ (Hawk07-E prop:crossing).

Gateway-avoidance latency through the whole evolution.

Fix $0 < \rho_0 < \min\{\pi b, L_z/2\}$. Let d_T be the distance of the flat torus $b^2\mathrm{d}\varphi^2 + \mathrm{d}z^2$, and let $\mathscr{G} = \{\ell = 0, d_T((\varphi, z), (0, 0)) < \rho_0\}$.

Theorem. Consider stations at $(\ell_s, 0, 0)$ and $(\ell_r, 0, 0)$ with $\ell_s < 0 < \ell_r$. Every causal curve of g_B between them that avoids $\mathscr{G}$ has coordinate-time duration

$$\Delta\eta \;\geq\; ?\frac{\sqrt{\ell_s^2 + \rho_0^2} + \sqrt{\ell_r^2 + \rho_0^2}}{c} \;>\; \frac{|\ell_s| + |\ell_r|}{c}.$$

The right-hand bound is attained by the radial null route (v2 thm:routing). This holds at all η, including the expansion and pulse phases. In $\mathscr{D}_{B,+}$, static proper time is $a_{\infty}\Delta\eta$.

Proof. v2 and $F_B(\eta, 0) = b$ give $F_B \geq b$ at every η. So a causal curve satisfies $c\,\mathrm{d}\eta \geq |\dot{\gamma}|_{\mathrm{d}\ell^2 + F_B^2\mathrm{d}\varphi^2 + \mathrm{d}z^2} \geq |\dot{\gamma}|_{\mathrm{d}\ell^2 + b^2\mathrm{d}\varphi^2 + \mathrm{d}z^2}$. The rest is the splitting argument of Hawk07-E thm:latency, applied at a crossing point outside $\mathscr{G}$.

With a clock-error bound e_{clk} as in Hawk07-E ass:latency, a report $T + e_{clk}$ below the avoidance bound certifies passage through $\mathscr{G}$ (Hawk07-E cor:witness). Finite clock precision enters additively and is part of v2 open:dyn.

A circumference record that separates the hosts.

The circumference $C = 2\pi|\partial_{\varphi}|_g$ of the Killing orbit through an event is invariant. A geodesic has *zero transverse momentum* if $p(\partial_{\varphi}) = p(\partial_z) = 0$.

Theorem. Consider zero-momentum causal geodesics that start in the settled sets $\mathscr{D}_{A,+}$ or $\mathscr{D}_{B,+}$.

• On Host B, a route from $\ell < 0$ to $\ell > 0$ has a strictly decreasing, then strictly increasing record $C(\tau)$. Its unique minimum is $2\pi a_{\infty} b > 0$, attained at the crossing.

• On Host A, a record $C(\tau)$ that is not monotone has minimum 0, attained on the axis. A record whose minimum is positive therefore certifies Host B among these two hosts. Moreover $\inf C$ over a settled slice is $2\pi a_{\infty} b$ on B and 0 on A.

Proof. Both settled sets are future-closed (v2 lem:futureclosed and its B analogue in Theorem), so the geodesic stays where the metric is static. Zero transverse momentum keeps φ and z constant, except for the jump $\varphi \mapsto \varphi + \pi$ through A's axis. The curve is then a geodesic of the two-dimensional base $a_{\infty}^2(-c^2\mathrm{d}\eta^2 + \mathrm{d}r^2)$, on which ∂_r (respectively ∂_{ℓ}) is Killing. So r or ℓ is monotone in affine parameter, until the axis in case A. Then $C = 2\pi a_{\infty} F$, with F_{∞} even and strictly increasing in $|\ell|$ on B, and $F_{A,\infty}$ increasing in r with $F_{A,\infty}(0) = 0$ on A. Applying this to (a) and (b) proves both.

The restriction to settled sets is needed. During the dynamical phase the circumference at fixed r changes with η, so a non-static record can show spurious minima. Theorem makes no claim there.

Time of flight: what it can and cannot do.

Proposition. For stations in the exterior conical regions, set $\hat{x} = C/(2\pi\alpha)$. On Host B, the zero-momentum opposite-side proper time of flight is

$$c\tau_B = \hat{x}_s + \hat{x}_r - 2a_{\infty}C_B/\alpha, \qquad C_B = d_0 + \beta\rho_c.$$

On Host A, the through-axis zero-momentum route between antipodal stations gives the same expression with $C_A = \beta\rho_c^A$, where $\rho_c^A = (r_0^A + r_1^A)/2$. Choosing an A core with $\beta\rho_c^A = C_B$ and equal α, a_{∞}, c makes the records (C_s, C_r, τ) identical. This record alone cannot distinguish the hosts.

Proof. In both exteriors $F = \alpha r + C$ with the stated constant. For A, $\rho_c = r_1 - Q(r_1) = (r_0 + r_1)/2$ uses $S(1 - x) = 1 - S(x)$. Radial null travel time is the coordinate distance times a_{∞}/c, and $a_{\infty} \cdot \text{distance} = \hat{x} - a_{\infty}C/\alpha$ on each leg.

Theorem. Let both stations lie at the same circumference C and the same z, with $\hat{x} = C/(2\pi\alpha)$.

• On Host B, with the stations on opposite sides at equal φ, the earliest-arrival proper time satisfies $c\tau_B = 2(\hat{x} - a_{\infty}C_B/\alpha)$.

• On Host A, suppose $\hat{x}\cos(\alpha\pi/2) \geq \hat{x}_1^A$, where $\hat{x}_1^A = a_{\infty}(r_1^A + C_A/\alpha)$. Then for every angular separation, $c\tau_A \leq 2\hat{x}\sin(\alpha\pi/2)$. Hence for

$$\hat{x} > \frac{a_{\infty}C_B}{\alpha(1 - \sin(\alpha\pi/2))},$$

the B record satisfies $c\tau/(2\hat{x}) > \sin(\alpha\pi/2)$. No admissible A record does. As $\hat{x} \to \infty$, the B ratio tends to 1. For $\alpha = 1/2$, $a_{\infty} = 1$, and $C_B = 4.2143$, the threshold is $\hat{x} > 28.78$.

Proof. (a) On a static product, the earliest arrival equals the spatial distance divided by c. By Proposition and $|\nabla\ell| = a_{\infty}^{-1}$, this distance is at least $a_{\infty}(|\ell_s| + |\ell_r|)$. The radial route attains it.

(b) The A exterior $r \geq r_1^A$ is isometric to a flat cone of total angle $2\pi\alpha$ with virtual apex at $\hat{x} = 0$. Develop it onto the plane. Two points at radius $\hat{x}$ with angular separation $\Delta\varphi \leq \pi$ lie at planar angle $\theta = \alpha\Delta\varphi \leq \alpha\pi < \pi$. The chord between them has length $2\hat{x}\sin(\theta/2)$. Its distance from the apex is $\hat{x}\cos(\theta/2) \geq \hat{x}_1^A$, so the chord lies in the exterior. It is an admissible path, and the distance is at most its length. Arrival time is at most distance divided by c , because emission occurs in the future-closed static set.

Remark. Theorem is a witness within the two-host comparison, with a stated condition on A's core. It is not reconstruction of an unknown topology, and other geometries can mimic it, as Hawk07-E's own remark on witnesses notes. The unrestricted problem stays open: whether earliest-arrival records at *unequal* circumferences, with no core condition, always discriminate. The schedule-level cone of En05-A thm:cone, cor:influence, and

prop:attain ($c_{lat} = r$) is a statement about scheduled dependency networks. It is not identified with these metric latencies. En05-A thm:isotropyobstruction shows that a fixed periodic scheduler cannot even reproduce an isotropic velocity ball. En07-B thm:exact concerns complete-complement return. No transit record satisfies its hypotheses by itself.

The settled Host-B scalar spectrum and the echo separation
Exact reduction to the static operator.

Theorem. The set $\mathscr{D}_{B,+}$ is future-closed for g_B and for h_B of . For $P_g = Box_{g_B} - \xi R_{g_B} - m_0^2$ and the corresponding P_h, and for every $f \in C_c^{\infty}(M_B)$ supported in $\mathscr{D}_{B,+}$, the retarded responses agree: $E_g^{ret} f = E_h^{ret} f$.

Proof. Along a causal curve, $|\mathrm{d}\ell/\mathrm{d}\eta| \le c$, so $\eta - |\ell|/c$ is nondecreasing. This holds across $\ell = 0$ because $|\ell|$ is 1-Lipschitz. The rest is the proof of v2 thm:echo verbatim, with global hyperbolicity of h_B supplied by completeness of $\mathrm{d}\ell^2 + F_{\infty}^2 \mathrm{d}\varphi^2 + \mathrm{d}z^2$, since $F_{\infty} \ge b$.

Hence, for late sources, the static operator below is exactly the relevant one. As in v2, nothing is claimed about earlier preparations.

Proposition. In proper units ($a_{\infty} = c = 1$ after rescaling), write $\Phi = e^{-i\omega t} e^{im\varphi} e^{ik_z z} F_{\infty}^{-1/2} u(\ell)$. For the massless minimally coupled field,

$$-u'' + Vu = (\omega^2 - k_z^2)u, \qquad V = \frac{F''}{2F} - \frac{F'^2}{4F^2} + \frac{m^2}{F^2}.$$

- $V(0) = 1/(2b^2) + m^2/b^2$.
- Where $F^{''} < 0$ and $m = 0$, $V < 0$: the mantles are a well.
- For $|\ell| \ge r_1$, $V = (\nu^2 - 1/4)/X^2$ *exactly*, where $X = |\ell| + C_B/\alpha$ and $\nu = |m|/\alpha$. The outgoing solution there is exactly $\sqrt{X}\, H_{\nu}^{(1)}(\sqrt{\omega^2 - k_z^2}\, X)$. The Friedrichs operator is nonnegative, so there are no bound states and no growing modes.

Proof. The potential and Hankel form are verified in s3?ymbolic.py (V residual 0; exterior form). Nonnegativity is the factorization of Hawk07-E thm:wave-operator. That identity uses only $F > 0$, and we rechecked it symbolically (s7?awkE?ym.py).

Explicit parameters, method, and cross-checks.

We take $b = 1$, $L_0 = 1.5$, $L_1 = 3$, $r_0 = 6$, $r_1 = 10$, $\beta = \alpha = 1/2$, and $c = a_{\infty} = 1$. Then $d_0 = 0.2142787$ and $C_B = 4.2142787$. The exact profile is computed by integrating $F^{''}$ from , piecewise between breakpoints with DOP853 at relative tolerance 10^{-12}. It reproduces $F = \alpha\ell + C_B$ beyond r_1 to 10^{-13}.

- *Shooting.* Integrate from $\ell = 0$ with even data $(u, u') = (1, 0)$ or odd data $(0, 1)$, and form the analytic Wronskian with the exact Hankel solution at r_1 [DLMF]. Resonances are its zeros.
- *Census.* The argument principle, with adaptive phase tracking, counts the zeros in each cell of the box $\mathrm{Re}\,\omega \in [0.05, 2.5]$, $\mathrm{Im}\,\omega \in [-0.75, -0.005]$. Each counted zero is then polished by secant iteration.
- *Shifted matching.* Repeating the matching at $\ell = 16$ leaves every root a zero to $\le 5 \times 10^{-13}$. This is a nontrivial check of the Hankel exterior and the ODE.
- *Exterior complex scaling.* We use sharp ECS with rotation 0.8 beyond $|\ell| = 11$ and a finite-difference scheme. The scheme was first validated on Hawk07-E's thin-shoulder model, whose exact roots are known, and showed $O(h)$ convergence. It reproduces the lowest even mode for $m = 0, 1, 2$ to 4.3×10^{-3}, 6.9×10^{-4}, and 3.2×10^{-3} after Richardson extrapolation. It also independently located the lowest odd $m = 0$ mode, near $0.4464 - 0.2355i$ at $h = 0.0025$.
- *Time domain.* We evolve $u_{tt} = u_{\ell\ell} - Vu$ with fourth-order differences and leapfrog, for an incoming Gaussian from $\ell = -30$.

begingroup Complete census of outgoing resonances ω of settled Host B in the box $\mathrm{Re}\,\omega \in [0.05, 2.5]$, $\mathrm{Im}\,\omega \in [-0.75, -0.005]$. Counts are argument-principle windings; every counted zero is listed (s4e_(c)ensus_(*).json).

toprule m parity # resonances

midrule endfirsthead toprule *m* parity # resonances

midrule endhead bottomrule endfoot 0 even 7 *0. 34681 − 0. 18937i, 0. 69502 − 0. 24654i, 1. 04333 − 0. 31563i, 1. 37788 − 0. 37695i, 1. 70080 − 0. 40514i, 2. 04395 − 0. 42463i, 2. 39246 − 0. 45845i*

0 odd 6 *0. 44725 − 0. 23781i, 0. 84066 − 0. 29486i, 1. 20020 − 0. 35435i, 1. 52965 − 0. 40061i, 1. 86748 − 0. 41835i, 2. 21939 − 0. 44119i*

1 even 8 *0. 09954 − 0. 12817i, 0. 52616 − 0. 22045i, 0. 87047 − 0. 24322i, 1. 15407 − 0. 28706i, 1. 44148 − 0. 35778i, 1. 75008 − 0. 39031i, 2. 08520 − 0. 41582i, 2. 42592 − 0. 45406i*

1 odd 7 *0. 09738 − 0. 12967i, 0. 53526 − 0. 23863i, 0. 91286 − 0. 29552i, 1. 25737 − 0. 35278i, 1. 57482 − 0. 39433i, 1. 90806 − 0. 41247i, 2. 25518 − 0. 43796i*

2 even 8 *0. 09205 − 0. 22546i, 0. 22347 − 0. 16374i, 0. 68935 − 0. 25933i, 1. 06391 − 0. 31330i, 1. 39606 − 0. 35276i, 1. 69028 − 0. 35051i, 1. 96527 − 0. 33271i, 2. 23471 − 0. 36716i*

2 odd 8 *0. 09204 − 0. 22547i, 0. 22344 − 0. 16374i, 0. 68927 − 0. 25994i, 1. 06391 − 0. 31687i, 1. 39699 − 0. 36536i, 1. 70448 − 0. 38563i, 2. 02929 − 0. 40106i, 2. 36248 − 0. 43167i*

endgroup

What the numbers say.

• *No trapping.* Every resonance in the census box has $Q = Re\ \omega/(2|Im\ \omega|) \le 3.04$. The settled Host-B profile has no cavity: the $m = 0$ potential is a single neck barrier of height $1/2$ followed by an attractive tail, and the mantle wells are shallow ($min\ V = -0.0269$ for $m = 0$). We therefore do *not* claim trapped resonances.

• *Echo timing.* In the time domain at the neck, the mantle-scattered return follows the direct pulse after $\Delta t \approx 14.8$. This lies in $[2r_0, 2r_1] = [12, 20]$, which matches reflection from the mantle transition. Its relative amplitude is about 10^{-2}, and no sustained echo train appears. The plan's $2L_1/c = 6$ is not observed.

• *Tails.* Local exponents $p(t) = -\mathop{d\log|\Phi|}/\mathop{d\log t}$ are given in Table . They approach 1 for $m = 0$, with slowly decaying corrections consistent with logarithmic terms. They approach $5 = 2\nu + 1$ for $m = 1$ ($\nu = 2$), and are about 9.3 for $m = 2$ ($\nu = 4$, $2\nu + 1 = 9$) before the roundoff floor. The tails are cone-type threshold effects of the exact Hankel exterior. Resonance sums do not produce them.

• *Prony.* Matrix-pencil fits of the time-domain ringdown are unstable across windows. The response is dominated by non-modal threshold contributions and by heavily damped modes, so we do not report Prony frequencies as a cross-check. The frequency-domain methods (2)–(4) are the cross-checks.

Contrast: the Hawk07-E cavity, rechecked.

Hawk07-E's convex long-neck profile does have a cavity. We independently solved its exact thin-shoulder determinants (thm:resonance) for $m = 0$, $b = \alpha = 1/2$ ($\rho = 1$), and $L = 20, \ldots, 640$. We compared the roots with thm:long-neck (Table). The relative error tracks the stated $O((\rho/L)^2 \log^2 (L/\rho))$ scale. The leading damping coefficient is approached only logarithmically: the ratio is 0.77 at $L/\rho = 20$ and 0.98 at 640. At every computed root the echo denominator $1 - r^2 e^{4ikL}$ of prop:echo vanishes to 10^{-29}. For $L = 20$ the smooth P_{δ} roots converge to the thin-shoulder roots as $\delta \to 0$ (Table). The observed rate is $O(\delta^2)$, sharper than the qualitative statement of thm:smooth-resonances. Quality factors there grow like L/ρ; at $L = 20$, $Q \approx 7$. The two hosts of the comparison thus differ exactly where the plan expected similarity.

Separation from I-B-ECHO and what stays open.

I-B-ECHO's objects are the static cone with apex, its Friedrichs realization, and the apex-diffracted kernel. These are ass:host, eq:kernel, prop:decomp, thm:gtd, thm:readout, and thm:finiteinjectivity. Host B and Hawk07-E have no apex. Our operator is the Friedrichs extension of a different, regular radial problem on $\mathbb{R}$. No I-B-ECHO kernel, decomposition, or readout theorem is transferred, and none of their constants appears here. Moreover, a resonance sum is not the full Green function. The branch cut of the Hankel exterior carries the tails (N3).

The following remain open:

• v2 open:thin;

• any detector, field-to-register map, or finite acquisition model for these echoes (the remaining part of v2

open:throat-echo);

• any selected Hadamard state on A or B (I-B-VP thm:hadamard is a statement on its own host);

• the I-B-VP-CR thm:main positive-core obstruction, which remains a conical-host statement and is neither discharged nor transferred;

• Host A's dynamical-phase response budget;

• interval-certified enclosures of the numerical roots.

Host-relative ledger of the seven entries

Each corpus label below was found in its fetched source (Appendix). ``Open'' means open relative to *both* hosts and to the Hawk07-E comparison. No v3 result discharges an entry.

begingroup 1.12 toprule Entry Host A Host B (and Hawk07-E comparison)

midrule endfirsthead toprule Entry Host A Host B (and Hawk07-E comparison)

midrule endhead bottomrule endfoot Res01-A entry:G4 No continuous intertwiner between source presentations is supplied by a prescribed metric. Open. The same holds. The sigma-model and Letelier realizations (Theorem , Proposition) are classical stress models, not intertwiners. Open.

entry:G01 The inherited *E_0* row is not A's inverse-Einstein source (v2 prop:not-source). Open. The row is not B's neck stress either. A neck stress realized by a ghost sigma model or by negative-tension strings is not the inherited row. I-B-VP-CR thm:main remains a conical-host statement. Open.

entry:G7 / Prob02-A thm:T3 Regulator questions beyond the named triangle remain. The flat-model thm:G2obstruction and cor:G2v8 stop is neither cancelled nor shown to persist on A. Open. The same holds on B. No statement about the ε^{-3} term on curved B is made (correction P8). Open.

entry:G3 *d_S* stays unbound. The pulse prescribes no scaling degree. Prob02-A thm:SD is cited only as existing; no primed variant is used. Open. The same holds. The tail exponents of Section are classical wave decay rates, not *d_S*. Open.

entry:Page / Hawk06-A def:island One-ended. No mouths and no island certificate. Open. B has two ends and a minimal torus, but the prescribed metric is not the required identification of mouths. The torus is not an operational island certificate, which needs a decoder and a diamond bound per def:island. Open.

{entry:Relational} / newline En09-A thm:main The destructive clock satisfies En09-A's complete instrument identity and record law conditionally. No evolution equation without an external parameter is produced. Open. The same holds. Static proper time in $\mathscr{D}_{B,+}$ is external geometric time. Open.

entry:Emergence / v2 prop:not-source The domain of the source map *T* is not constructed. Open. The same holds. Host B's topology is pre-existing. The matter realizations do not create geometry. Open.

endgroup

Non-identification, clocks, thermal accounting, and Host C

Quantitative two-way non-identification.

Proposition.

• Vary Host B's (β, b) within the admissible set, keeping the declared ideal controls (v2 ass:controls). The throat area $2\pi a_{\infty}^2 bL_z$ and the settled ledger $-4\pi(1-\beta)/\kappa$ range over $(0,\infty)$ and $(-4\pi/\kappa, 0)$. Over the same family, the hosted channel, its diamond error, and the classical-only floor $1-1/d$ of v2 thm:classical are constant.

• Fix the geometry and compose the transport with a depolarizing channel $\rho \mapsto (1-p)\rho + p\, I/d$. Its half-diamond distance from the identity is $p(d^2-1)/d^2$. This is standard for this covariant channel and is attained on a maximally entangled input [WatrousBook]. By Hawk07-D thm:noise and v2 cor:robust, it enters the return error additively, while area, ledger, and ANEC are unchanged.

Proof. (a) The hosting theorem (v2 thm:hosting) uses only causal routing and ideal controls. The area and ledger formulas are v2 thm:spatial-throat and Theorem . (b) The geometric quantities do not depend on the channel.

Clocks and lapse.

On Host A and Host B, a static clock in the settled set reads $a_{\infty}\eta$. During expansion, the comoving clock lapse is $a(\eta)c$ (v2 prop:clock). The destructive clock satisfies En09-A thm:main (complete instrument identity, record law) conditionally on its frozen data. Em02-E thm:lapse is a classical relational-lapse statement. The quantum residual audited in Res02-A remains open. Settling is to constant a_{∞}, which is not de Sitter. A nonzero-Hubble patch is not a static cone.

Thermal accounting.

I-C-Th thm:thermal ($\beta Q_B = \Delta S_M + I(M: B) + D(\omega_B\|\tau_B)$) and thm:reset require a specified reservoir and unitary step. The resonance sums, tails, and heat-kernel data of Section are classical wave data, not reservoir heat. Em03-F thm:recovery gives the optimal packet-recovery error $(3 - d_h)/4$, where $d_h \in [0, 1)$ is the distinguishability of the two radiation outputs. The error therefore lies in $(1/2, 3/4]$, consistent with thm:EB (error $\geq 1/2$). This is a statement about a specified finite packet channel. It is not the classical-only floor of v2 thm:classical, and it is not black-hole mass loss (correction P7).

Host C: holonomy regions.

Proposition. In v2 thm:minimal, with $p = r\dot{\alpha}/c$ and $q = \alpha > 0$, the coordinate-circle holonomy at (r, T) is:

• elliptic iff $\dot{\alpha}(T) = 0$ or $r < r_{*}(T) = c\alpha/|\dot{\alpha}|$;

• nontrivial parabolic iff $\dot{\alpha} \neq 0$ and $r = r_{*}(T)$;

• hyperbolic iff $\dot{\alpha} \neq 0$ and $r > r_{*}(T)$. The parabolic set is the graph of the smooth function r_{*} over the open set $\{\dot{\alpha} \neq 0\}$. It is a smooth curve of two-dimensional measure zero, and $r_{*} \to \infty$ where $\dot{\alpha} \to 0$. The holonomy is never the identity in the parabolic and hyperbolic regions. In the elliptic region it is the identity iff $\sqrt{(\alpha^2 - p^2)} \in \mathbb{Z}_{> 0}$. If $0 < \alpha \leq 1$, this happens only where $\alpha = 1$ and $\dot{\alpha} = 0$.

Proof. $X^3 = (p^2 - q^2)X$, verified in s3?ymbolic.py. With $q > 0$, $X \neq 0$. The sign of $p^2 - q^2$ is the sign of $r - r_{*}$. The graph of a continuous function has measure zero by Fubini. For $\alpha \leq 1$, $\sqrt{(\alpha^2 - p^2)} \leq 1$, with equality iff $p = 0$ and $\alpha = 1$.

Host C stays off the adopted list.

Consolidated v3 theorem and release

Theorem. Retaining every item of v2 thm:main (Appendix), except that its item (x) is superseded by Theorem , the following hold:

• *U1, scoped classical subgate.* Standard minimally coupled classes cannot source any convex point of settled Host B (Theorem). Settled Host B is an exact solution of the Hawk07-E sigma model with sign-indefinite, degenerate couplings, and of a Letelier string cloud with prescribed density (Theorem , Proposition).

• *U2.* The settled ledgers are Gauss–Bonnet identities: $2\pi\beta/\kappa$ on A, and $-4\pi\alpha/\kappa$ on B with neck exactly $-4\pi/\kappa$. B's exotic budget is $1/\alpha$ times the sharp floor (Theorem , Corollary).

• *U3.* The gateway latency gap holds through the whole evolution. A positive-minimum circumference record and an earliest-arrival lensing inequality separate B from A. Zero-momentum radial time of flight does not (Theorems , , , and Proposition).

• *U4.* Late sources on B see exactly the static operator. For the stated parameters, its resonances in the census box are all strongly damped ($Q \leq 3.04$), with no trapping. Tails decay as $t^{-(2|m|/\alpha + 1)}$, and as t^{-1} for $m = 0$.

Proof. Collect the cited results. The numerical parts of (iv) are computations with the cross-checks of Section , not interval-certified proofs.

Exact I-D-v3 release.

• Host A and Host B remain separate prescribed backgrounds. Host C is rejected. Hawk07-E's profile is a typed comparison, not a third geometry.

• U1 is earned only as a *scoped classical subgate*. Two engineered exact realizations of settled Host B exist, but no ghost-free, well-posed, or stable matter model is supplied. The inverse-Einstein disclaimer is retained for Host A's pulse and conformal factor and for Host B's pulse region.

• U2 is an exact identity, not an inequality on signed energy.

• U3 consists of classical route witnesses with stated hypotheses. The quantum channel does not identify its host.

• U4 gives a computed static-sector spectrum for one parameter set. It supplies no detector, Hadamard state, Page curve, or island.

• All seven entries remain open relative to both hosts.

$$\begin{gathered} \mathrm{O.1} = \mathrm{texttt}\,\mathit{NOT_CLOSED}, \\ \text{XVI-N (thm:massless-obstruction) and Route B are not discharged,} \\ \text{boxed} \quad \text{the downstream XV-B quantum-admission exit is not opened,} \\ \text{no inherited characteristic quantum coefficient is admitted,} \\ \text{the last bar of every problem stays open.} \end{gathered}$$

Not closed. The following are not closed: the last bar of time, de Sitter, singularities, Page, emergence, and products; Einstein–matter stability; Hadamard states; topology creation; the Page curve; the island dictionary; bounce; back-reaction; and any physical carrier. The narrower I2 advance of XIV-I is not withdrawn. Technical XV-B results do not open the downstream admission exit.

Registration. This file updates no app, registry, site, or progress bar.

Reading the retained appendices. Appendices – and reproduce v2 verbatim apart from added labels. Phrases such as ``this sheet'' there refer to v2. Statements that v3 supersedes are: the absence of a Host-B echo calculation (now Section), the absence of any matter discussion beyond effective sources (now Section), and the execution clauses (now Appendix). Each v2 item carries a verdict in Appendix .

Retained I-D-v3 appendices, including the I-D-v2 material

Host C: the homogeneous opening is audited, not adopted

We use signature $(-+++)$ and the curvature convention in which spatially flat expanding FLRW has positive G_{00}.

Theorem. Let $\alpha(T) > 0$ be smooth, nonconstant, and constant outside a finite time interval. On the punctured manifold prescribe

$$g_C = -c^2 \mathrm{mathop\,d}T^2 + \mathrm{mathop\,d}r^2 + \alpha(T)^2 r^2 \mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2.$$

Dots in this theorem denote T-derivatives. In the orthonormal coframe $(c\,\mathrm{mathop\,d}T, \mathrm{mathop\,d}r, \alpha r\,\mathrm{mathop\,d}\varphi, \mathrm{mathop\,d}z)$:

• The only nonzero Einstein components, apart from symmetry, are

$$G_{0r}^{\wedge\wedge} = -\frac{\dot\alpha}{c\alpha r}, \qquad G_{rr}^{\wedge\wedge} = G_{zz}^{\wedge\wedge} = -\frac{\ddot\alpha}{c^2\alpha}.$$

Also

$$G_{00}^{\wedge\wedge} = G_{\varphi\varphi}^{\wedge\wedge} = 0, \qquad R = \frac{2\ddot\alpha}{c^2\alpha}.$$

• Its Kretschmann scalar is

$$R_{abcd}R^{abcd} = \frac{4\ddot\alpha^2}{c^4\alpha^2} - \frac{8\dot\alpha^2}{c^2\alpha^2 r^2}.$$

At each time with $\dot\alpha \neq 0$, no C^2 Lorentzian extension across the axis exists.

• For $k_\theta = e_0 + \cos\theta\, e_{\hat r} + \sin\theta\, e_{\hat z}$,

$$G(k_\theta, k_\theta) = -\frac{\ddot\alpha}{c^2\alpha} - \frac{2\dot\alpha\cos\theta}{c\alpha r}.$$

There is an open time interval on which the NEC for G/κ fails at every radius. At every time with $\dot\alpha \neq 0$, it fails at least sufficiently near the axis.

• Put $p = r\dot\alpha/c$, $q = \alpha$. A periodic frame along a coordinate circle has connection generator

$$X = \begin{pmatrix} 0 & 0 & p \\ 0 & 0 & -q \\ p & q & 0 \end{pmatrix}.$$

Its eigenvalues are *0, ±√(p^2 − q^2)*, and its holonomy is *exp (−2πX)*. It is elliptic for *p^2 < q^2*, with rotation angle *2π√(q^2 − p^2)* up to orientation and multiples of *2π*; hyperbolic for *p^2 > q^2*; and nontrivial parabolic for *p^2 = q^2*. At *α̇ = 0* the usual conical rotation is recovered.

• The metric change occurs simultaneously at arbitrarily large radii and is not confined to the future of a compact preparation. Its initial constant-opening region is Minkowski with its axis removed only if its initial opening is *1*.

Proof. Put *t = cT, F(t, r) = α(T)r*, and first omit the trivial *z* factor. For a circle warped over the flat *(t, r)* base,

$$R_{AB} = -F_{AB}/F, \qquad R_{\varphi\varphi} = -F(-F_{tt} + F_{rr}), \qquad R = -2(-F_{tt} + F_{rr})/F.$$

Here

$$F_{tt} = r\ddot{\alpha}/c^2, \qquad F_{tr} = \dot{\alpha}/c, \qquad F_{rr} = 0.$$

Contraction gives (i). In an orthonormal frame the independent nonzero warped curvature entries are, up to Riemann symmetries,

$$R_{\hat{0}\varphi\hat{0}\varphi} = -\frac{\ddot{\alpha}}{c^2\alpha}, \qquad R_{\hat{0}\varphi\hat{r}\varphi} = -\frac{\dot{\alpha}}{c\alpha r}.$$

Their Lorentzian contraction gives . The negative unbounded term at fixed *α̇ ≠ 0* excludes a *C^2* extension, since a curvature scalar would be continuous in such an extension.

The null contraction follows from (i). The nonzero compactly supported function *α̇* has derivative *α̈* of both signs somewhere; otherwise its integral and endpoint values are incompatible. On an interval where *α̈ > 0*, choose *cos θ = 0*. At a fixed time with *α̇ ≠ 0*, choose *cos θ = sgn α̇*; the *1/r* term then proves near-axis failure. If *α̈ < 0*, it suffices that *r < 2c|α̇|/|α̈|*.

The connection around the circle gives the displayed *X*. It satisfies *X^3 = (p^2 − q^2)X*. At *p^2 = q^2*, *X ≠ 0*, *X^3 = 0*, and *exp (−2πX) ≠ I*, proving the parabolic case.

Finally every causal curve obeys *|mathop dr/mathop dT| ≤ c*. The future of a compact set meets a fixed later time slice in a radially bounded set, whereas *α̇ ≠ 0* changes the metric at all radii. The initial-region statement follows by substitution.

The effective source of Host C is neither an axis-confined string nor a retarded cylindrical formation pulse. It is not used below as a physical host.

Exact Einstein-effective sources

Set

$$t = c\eta, \qquad \kappa = \frac{8\pi G}{c^4}, \qquad \mathcal{H} = \partial_t \log a, \qquad \mathcal{J} = \frac{F_t}{F}, \qquad \mathcal{H}_t = \partial_t \mathcal{H}.$$

Use $\xi = r$ for A away from the axis and $\xi = \ell$ for B. The physical orthonormal frame is

$$e_{\hat{0}} = a^{-1}\partial_t, \quad e_{\hat{\xi}} = a^{-1}\partial_\xi, \quad e_{\hat{\varphi}} = (aF)^{-1}\partial_\varphi, \quad e_{\hat{z}} = a^{-1}\partial_z.$$

Theorem. For

$$g = a^2[-\mathrm{mathop\,d}t^2 + \mathrm{mathop\,d}\xi^2 + F(t,\xi)^2\,\mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2],$$

the only potentially nonzero orthonormal Einstein components are

$$G_{\hat{0}\hat{0}} = a^{-2}\left[-\frac{F_{\xi\xi}}{F} + 3\mathcal{H}^2 + 2\mathcal{H}\mathcal{J}\right],$$

$$G_{\hat{0}\hat{\xi}} = -a^{-2}\frac{F_{t\xi}}{F},$$

$$G_{\hat{\xi}\hat{\xi}} = a^{-2}\left[-\frac{F_{tt}}{F} - 2\mathcal{H}_t - \mathcal{H}^2 - 2\mathcal{H}\mathcal{J}\right],$$

$$G^{\wedge\wedge}_{\varphi\varphi} = a^{-2}[-2\mathscr{H}_t - \mathscr{H}^2],$$
$$G^{\wedge\wedge}_{zz} = a^{-2}\left[\frac{F_{\xi\xi} - F_{tt}}{F} - 2\mathscr{H}_t - \mathscr{H}^2 - 2\mathscr{H}\mathscr{J}\right].$$

The scalar curvature is

$$R = a^{-2}\left[-2\frac{F_{\xi\xi} - F_{tt}}{F} + 6(\mathscr{H}_t + \mathscr{H}^2 + \mathscr{H}\mathscr{J})\right].$$

Consequently *T_{μν}: = G_{μν}/κ* is a smooth conserved Einstein-effective source on either adopted full host.

Proof. For the metric *g_0* without its conformal factor, base indices *A, B ∈ {t, ξ, z}* satisfy

$$\Gamma^{\varphi}_{A\varphi} = F_A/F, \qquad \Gamma^{A}_{\varphi\varphi} = -F\partial^A F.$$

Thus

$$(R_0)_{AB} = -F_{AB}/F, \quad (R_0)_{\varphi\varphi} = -F\mathrm{Box}_0 F, \quad R_0 = -2\mathrm{Box}_0 F/F, \qquad \mathrm{Box}_0 F = -F_{tt} + F_{\xi\xi}.$$

This gives

$$(G_0)_{tt} = -F_{\xi\xi}/F, \quad (G_0)_{t\xi} = -F_{t\xi}/F, \quad (G_0)_{\xi\xi} = -F_{tt}/F,$$
$$(G_0)^{\wedge\wedge}_{\varphi\varphi} = 0, \qquad (G_0)_{zz} = (F_{\xi\xi} - F_{tt})/F.$$

For *g = e^{2ω}g_0*, *ω = log a*,

$$G[g]_{\mu\nu} = G[g_0]_{\mu\nu} - 2\nabla^0_\mu\nabla^0_\nu\omega + 2\omega_\mu\omega_\nu + (g_0)_{\mu\nu}(2\mathrm{Box}_0\,\omega + (\nabla^0\omega)^2).$$

Here

$$\mathrm{Box}_0\,\omega = -\mathscr{H}_t - \mathscr{J}\mathscr{H}, \qquad (\nabla^0\omega)^2 = -\mathscr{H}^2,$$

and the angular orthonormal Hessian is $-\mathscr{J}\mathscr{H}$. Substitution and rescaling the frame by *a^{−1}* give –. Taking the trace gives . The polar formulas for A represent a smooth Cartesian tensor near its axis. Conservation follows from the contracted Bianchi identity.

Derivatives of the actual profiles.

Write

$$F = D(r) - \beta Q(r)s(u), \qquad u = \eta - r/c,$$

where *D = r* for A and *D = W* for B. For *r > 0*,

$$F_t = -\frac{\beta Q}{c}s', \qquad F_{tt} = -\frac{\beta Q}{c^2}s'',$$
$$F_{tr} = -\frac{\beta}{c}\left(qs' - \frac{Q}{c}s''\right),$$
$$F_{rr} = D'' - \beta q's + \frac{2\beta q}{c}s' - \frac{\beta Q}{c^2}s''.$$

Primes on *s* refer to *u*. For B, *F_{tℓ} = sgn (ℓ)F_tr* and *F_{ℓℓ} = F_rr* off zero. At its neck,

$$F_B = b, \quad F_{B,t} = F_{B,tt} = F_{B,t\ell} = 0, \quad F_{B,\ell\ell} = 1/b.$$

These are ordinary smooth derivatives, not distributional ones.

When *r > r_1* and *a = a_{∞}*, both hosts have

$$R = -\frac{4\beta s'(u)}{c\,a_\infty^2 F} < 0 \qquad (0 < u < \tau_f).$$

This supplies an explicit curvature witness during formation.

Proposition. Each effective source violates both the WEC and the NEC.

Proof. Choose *r > r_1* large enough that *η = r/c + τ_f/2 > τ_a*. At this event *q = 1*, *q^{'} = D^{''} = 0*, *s^{'} > 0*, and *s^{''} = 0*. Hence

$$T^{\hat{0}\hat{0}}_{00} = -\frac{2\beta s'}{\kappa c\, a_\infty^2 F} < 0.$$

Also $T_{\hat{\varphi}\hat{\varphi}} = T_{0\hat{\varphi}} = 0$. The null vector $e_{0} + e_{\hat{\varphi}}$ gives the same negative contraction.

Proposition. Defining $T = G/\kappa$ supplies an exact Einstein-effective-source pair, but not an independent matter evolution law or a density-matrix-to-stress map. Symmetry, conservation, and tracelessness alone do not impose an Einstein source equation.

Proof. The first assertion follows from what has been specified: the metric determines the tensor, while no matter action or state-to-tensor rule occurs in the definitions. For the second, in a flat developing patch choose a nonzero constant null covector l and set $S_{\mu\nu} = A l_{\mu} l_{\nu}$, $A > 0$. This tensor is symmetric, conserved, traceless, and nonzero, whereas $G_{\mu\nu} = 0$. Thus $G = \kappa S$ fails.

This is the source separation of I-B and Res01 [CheungIB,CheungRes01], not a denial that the displayed effective pair satisfies Einstein's equation. Neither host is presented as an ordinary positive-energy cosmic-string formation solution. The independently formulated fluid and string problem of Lake–Suyama is different [LakeSuyama].

Spatial throat content: A and B are different

The static Hochberg–Visser definition uses a minimal two-surface and a flare-out condition [HVStatic]. Dynamical null throats require a separate null-congruence test [HVDynamic,HVNEC]. Cylindrical radius definitions must not be substituted for area definitions [BronnikovLemos].

Theorem. On every prescribed η-slice of Host A there is no nonempty compact immersed minimal two-surface without boundary. In particular these slices have no compact spatial throat of the type considered here.

Proof. Fix η and use the physical spatial metric

$$\bar{h}_A = a^2(\mathrm{mathop\,d}r^2 + F_A^2 \mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2).$$

The globally smooth function $f = r^2 = x^2 + y^2$ has Hessian, in the physical orthonormal radial, angular, and axial directions,

$$\mathrm{Hess}_{\bar{h}_A} f = \mathrm{diag}\left(\frac{2}{a^2}, \frac{2rF_{A,r}}{a^2 F_A}, 0\right)$$

away from the axis. On the axis its two transverse eigenvalues are $2/a^2$. Since $F_{A, r} > 0$, the Hessian is nonnegative and its kernel has dimension one.

For a minimal immersed two-surface S,

$$\Delta_S(f|_S) = \mathrm{tr}_{TS}\mathrm{Hess}_{\bar{h}_A} f > 0,$$

because no two-dimensional tangent plane fits inside that one-dimensional kernel. Integration on a compact surface without boundary contradicts $\int_S \Delta_S f \,\mathrm{mathop}\, dA = 0$.

Host B: full torus area and spatial flare-out.

At fixed η, ℓ, let

$$\Sigma_{\eta,\ell} = \{\eta = \text{constant},\ \ell = \text{constant}\} \cong T^2.$$

Its induced metric and area are

$$\gamma = a^2(F_B^2 \mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2), \qquad A(\eta, \ell) = 2\pi L_z a^2 F_B.$$

Use

$$n = a^{-1}\partial_\ell, \qquad K_{AB} = -\tfrac{1}{2}(\mathscr{L}_n \gamma)_{AB}.$$

Then

$$\mathrm{tr}\, K = -\frac{F_{B,\ell}}{a F_B}.$$

Theorem. The torus $\Sigma_{\eta}: = \Sigma_{\eta, 0}$ satisfies

$$\operatorname{tr} K = 0, \qquad \partial_n \operatorname{tr} K = -\frac{1}{a^2 b^2} < 0, \qquad A(\Sigma_\eta) = 2\pi L_z a^2 b.$$

For every smooth real physical normal displacement u,

$$\delta^2 A[u] = \int_{\Sigma_\eta} \left(|\nabla_{\Sigma_\eta} u|^2 + \frac{u^2}{a^2 b^2} \right) \mathrm{mathop\ d}A.$$

It is positive for $u \equiv 0$. Every oriented compact smooth surface homologous to Σ_{η} in the same spatial slice has at least its area. For $\eta \geq \tau_a$, a neighborhood of the torus is static.

Proof. Near zero $F_B = \sqrt{(b^2 + \ell^2)}$, so

$$F_{B,\ell}(0) = 0, \qquad F_{B,\ell\ell}(0) = 1/b.$$

Differentiating gives . The surface is totally geodesic in the spatial slice and

$$\mathrm{Ric}_{\bar{h}_B}(n, n) = -\frac{F_{B,\ell\ell}}{a^2 F_B} = -\frac{1}{a^2 b^2}.$$

The second-variation identity follows. It also follows directly by expanding the graph $\ell = \varepsilon u/a$ to second order.

For homological minimality use the closed two-form

$$\Omega = a^2 b \, \mathrm{mathop\ d}\varphi \wedge \mathrm{mathop\ d}z.$$

Its comass is $b/F_B \leq 1$, and its restriction to Σ_{η} is the oriented area form. If S is homologous to Σ_{η}, then

$$\mathrm{Area}\,(S) \geq \left| \int_S \Omega \right| = \int_{\Sigma_\eta} \Omega = 2\pi L_z a^2 b.$$

Finally $a = a_{\infty}$ after τ_a, while $Q = 0$ near zero at all times.

The second variation concerns a minimal surface in a prescribed Riemannian slice. It is not Einstein–matter stability. The area increases on both radial sides because F_B strictly increases with $|\ell|$.

In the settled exact neck, $R_c = a_{\infty} F_B$ and $s_p = a_{\infty} \ell$ obey

$$R_{\mathrm{c}}^2 = s_{\mathrm{p}}^2 + (a_\infty b)^2.$$

The usual surface-of-revolution embedding of the meridional metric has

$$\left. \frac{\mathrm{mathop\ d}^2 R_{\mathrm{c}}}{\mathrm{mathop\ d}Z_{\mathrm{emb}}^2} \right|_{\Sigma} = \frac{1}{a_\infty b} > 0.$$

This exhibits the classical flare-out behavior [MorrisThorne]; it does not make the complete toroidal spacetime spherically symmetric.

Host B: dynamical null throats and negative radial ANEC

The future radial fields

$$k_{\pm} = a^{-2}(\partial_t \pm \partial_\ell)$$

are affine null geodesic fields. The corresponding radial lines are affine for the unconformed metric, and the factor a^{-2} gives affine parametrization after conformal rescaling. Their covectors are $-\mathrm{mathop\ d}t \pm \mathrm{mathop\ d}\ell$, so their twist vanishes.

The screen expansions are

$$\theta_{\pm} = a^{-2}\left(2\mathscr{H} + \frac{F_{B,t}}{F_B} \pm \frac{F_{B,\ell}}{F_B} \right).$$

At the spatial minimum, $\theta_{\pm} = 2a^{-2}\mathscr{H}$. During expansion that minimum is therefore not itself a null throat.

Let

$$M_1 = \max_{\mathbb{R}} |S'|, \qquad M_2 = \max_{\mathbb{R}} |S''|,$$

and impose

$$\tau_a \geq \frac{b}{c}\max\left\{8\lambda M_1, ?\sqrt{8(\lambda M_2 + \lambda^2 M_1^2)}\right\}.$$

Since

$$\mathscr{H} = \frac{\lambda S'(\eta/\tau_a)}{c\tau_a a},$$

direct differentiation gives

$$0 \leq \mathscr{H} \leq \frac{1}{8b}, \qquad |\mathscr{H}_t| \leq \frac{1}{8b^2}.$$

Theorem. Under , put

$$x(\eta) = \frac{4\mathscr{H}b^2}{1 + \sqrt{1 - 16\mathscr{H}^2 b^2}}.$$

This formula includes $x = 0$ when $\mathscr{H} = 0$. The compact tori

$$\Sigma_\eta^+ = \{\eta = \text{constant}, \ell = -x(\eta)\}, \qquad \Sigma_\eta^- = \{\eta = \text{constant}, \ell = x(\eta)\}$$

have $0 \leq x < b/2$ and satisfy

$$\theta_\pm|_{\Sigma_\eta^\pm} = 0, \qquad k_\pm(\theta_\pm)|_{\Sigma_\eta^\pm} \geq \frac{23}{100a^4b^2} > 0.$$

During $0 < \eta < \tau_a$ they are distinct, with the other future expansion positive. In the static intervals they coalesce with the central spatial throat. No uniqueness claim is made for all exterior marginal surfaces.

Proof. In $|\ell| < L_0$,

$$F_{B,t} = 0, \qquad \frac{F_{B,\ell}}{F_B} = w(\ell) : = \frac{\ell}{b^2 + \ell^2}.$$

The smaller nonnegative root of $w(x) = 2\mathscr{H}$ is the displayed formula. Since $2\mathscr{H} \leq 1/(4b) < w(b/2) = 2/(5b)$, this root lies below $b/2 < L_0$.

At a zero of the respective expansion,

$$k_\pm(\theta_\pm) = a^{-4}(2\mathscr{H}_t + w'(x)).$$

For $x \leq b/2$,

$$w'(x) = \frac{b^2 - x^2}{(b^2 + x^2)^2} \geq \frac{12}{25b^2}.$$

Together with , this gives

$$2\mathscr{H}_t + w'(x) \geq \frac{1}{b^2}\left(\frac{12}{25} - \frac{1}{4}\right) = \frac{23}{100b^2}.$$

The other expansion equals $4a^{-2}\mathscr{H}$. The switching properties prove the final assertions.

This is the strong null flare-out criterion of [HVDynamic,HVNEC], proved for the specified tori rather than inferred from their spatial area alone.

Theorem. At $\ell = 0$, the physical null vectors $l_\pm = e_0 \pm e_\ell$ obey

$$T(l_\pm, l_\pm) = \frac{1}{\kappa a^2}\left[-\frac{1}{b^2} + 2\mathscr{H}^2 - 2\mathscr{H}_t\right].$$

Under ,

$$T(l_\pm, l_\pm) \leq -\frac{23}{32\kappa a^2 b^2} < 0.$$

In a settled neck the exact value is $-1/(\kappa a_\infty^2 b^2)$. The NEC also fails on both null throats of Theorem .

Proof. At zero $F_{B,tt} = F_{B,t\ell} = 0$ and $F_{B,\ell\ell}/F_B = 1/b^2$. Add and . The estimate is

$$-1 + \frac{1}{32} + \frac{1}{4} = -\frac{23}{32}.$$

At a null throat, affine Raychaudhuri gives

$$k(\theta) = -\frac{1}{2}\theta^2 - \sigma^2 - R_{\mu\nu}k^\mu k^\nu.$$

Since $\theta = 0$, $k(\theta) > 0$, and $\sigma\hat{}2 \geq 0$, the Ricci and therefore stress contraction is negative.

Theorem. No slow-expansion assumption is needed for this theorem. Every complete radial crossing with affine tangent $k_{\pm}$ satisfies

$$\int_{-\infty}^{\infty} T_{\mu\nu}k^\mu k^\nu \,\mathrm{d}\lambda_{\mathrm{aff}} = -\frac{1}{\kappa}\int_{-\infty}^{\infty}\left(\frac{\theta^2}{2} + \sigma^2\right)\mathrm{d}\lambda_{\mathrm{aff}} < 0.$$

Both integrals converge.

Proof. Along either congruence,

$$\frac{\mathrm{d}t}{\mathrm{d}\lambda_{\mathrm{aff}}} = a^{-2}, \qquad \frac{\mathrm{d}\ell}{\mathrm{d}t} = \pm 1.$$

Since $1 \leq a \leq a_{\infty}$, affine time ranges over $\mathbb{R}$. The positive screen factors aF_B and a never vanish.

The two screen optical eigenvalues are

$$p_\varphi = k\log(aF_B), \qquad p_z = k\log a.$$

Hence

$$\theta = p_\varphi + p_z, \qquad \sigma^2 = \tfrac{1}{2}(p_\varphi - p_z)^2, \qquad \tfrac{1}{2}\theta^2 + \sigma^2 = p_\varphi^2 + p_z^2.$$

On the past tail $a = 1$, $s = 0$, and $F_B = |\ell| + d_0$. On the future outgoing tail $a = a_{\infty}$ and $u = \eta - |\ell|/c$ is constant along the ray, so

$$F_B = (1 - \beta s(u))|\ell| + d_0 + \beta\rho_c s(u).$$

Its slope is positive. Thus $\theta \to 0$ at both affine ends, $p_z = 0$ on the tails, and $p_{\varphi} = O(|\lambda_{aff}|\hat{}\{-1\})$. The squared optical terms are integrable and nonzero on the tails. The finite intermediate affine interval is smooth.

Integrating twist-free affine Raychaudhuri with these endpoint values gives . For a null vector the Einstein and Ricci contractions agree, and the strictly positive optical integral proves strict negativity.

Causality, exact settling, and loop holonomy
Uniform comparisons and Cauchy slices.

For A use the Euclidean reference metric

$$h^A_{\mathrm{ref}} = \mathrm{d}x^2 + \mathrm{d}y^2 + \mathrm{d}z^2.$$

For B use

$$h^B_{\mathrm{ref}} = \mathrm{d}\ell^2 + W(|\ell|)^2\mathrm{d}\varphi^2 + \mathrm{d}z^2.$$

Writing $h_{\eta}\hat{}i$ for the spatial metric inside the conformal bracket, one has on both hosts

$$\alpha^2 h^i_{\mathrm{ref}} \leq h^i_\eta \mathrm{le} h^i_{\mathrm{ref}}, \qquad i = A, B.$$

Theorem. Every slice $\eta = \eta_{*}$ is a smooth Cauchy hypersurface of either full adopted spacetime.

Proof. The A reference is complete. The B reference dominates the complete product metric $d\ell\hat{}2 + b\hat{}2 d\varphi\hat{}2 + dz\hat{}2$. A B-reference Cauchy sequence therefore has a product-coordinate limit, and local smooth equivalence of metrics gives convergence in the reference metric. Thus it is complete as well.

The gradient of η is timelike. A future causal curve parametrized by η satisfies

$$|x'(\eta)|_{h^i_{\mathrm{ref}}} \leq c/\alpha.$$

If its time range had a finite endpoint, its spatial points would be Cauchy in the complete reference metric. The

limiting event would extend the curve by a timelike segment. An inextendible causal curve must therefore have time range all of $\mathbb{R}$ and cross each slice exactly once.

Proposition. Deleting the axis of A produces a different, non-globally-hyperbolic spacetime. The thin model with $Q = r$ on $r > 0$ has the same early obstruction. This is not a property of full Host A or B.

Proof. Choose an early center time $\eta_{*} < 0$ and $\Delta > r_{*}/c$ with $\eta_{*} + \Delta < 0$. The diamond between $(\eta_{*} - \Delta, r_{*}, \varphi_{*}, z_{*})$ and $(\eta_{*} + \Delta, r_{*}, \varphi_{*}, z_{*})$ contains $(\eta_{*}, r_j, \varphi_{*}, z_{*})$ for every $r_j \downarrow 0$. These points have no limit in the punctured manifold.

This is the punctured-product distinction documented in [CheungFree,CheungRes01]. It is a global statement, not a theorem that transfers by restriction to a late regular patch.

Theorem. For either host, with reference distance d_{ref}^{i},

$$d^{i}_{\mathrm{ref}}(x,y) \le c(\eta_1 - \eta_0) \quad \Rightarrow \quad (\eta_1, y) \in J^{+}_{g_i}(\eta_0, x).$$

Every causal route necessarily satisfies

$$\mathrm{alphad}^{i}_{\mathrm{ref}}(x,y) \le c(\eta_1 - \eta_0).$$

For Host A this reads

$$|X(y) - X(x)| \le c\Delta\eta \;\Rightarrow \text{causal route} \;\Rightarrow ?|X(y) - X(x)| \le c\Delta\eta/\alpha.$$

For Host B endpoints with equal φ, z, the exact arrival condition is

$$\Delta\eta \ge |\ell_1 - \ell_0|/c.$$

Strict inequality admits a timelike route crossing the neck whenever the endpoints are on opposite sides.

Proof. A minimizing reference geodesic exists by completeness. Traverse it at reference speed at most c, adding a wait if necessary. The upper metric bound makes it causal. The lower metric bound gives the necessary estimate. For a radial B curve the exact causal condition is $|\mathrm{d}\ell/\mathrm{d}\eta| \le c$. Every causal curve, radial or not, obeys this bound, while the linear radial route attains equality in .

The reference metric of B is not Euclidean space. These certificates neither reconstruct a Euclidean cone nor derive the prescribed value of c from scheduler consistency.

For either host, a fixed-coordinate laboratory has

$$\mathrm{d}\tau = a(\eta)\,\mathrm{d}\eta.$$

A moving laboratory has

$$\mathrm{d}\tau = a(\eta)\sqrt{1 - |x'(\eta)|^2_{h^i_\eta}/c^2}\,\mathrm{d}\eta.$$

These are geometric calibration formulas, not a removal of external time.

Exact late exterior identifications.

Theorem. For either host, every region with $r \le R < \infty$ has both switches settled when

$$\eta \ge \eta_{\mathrm{set}}(R) := \max\{\tau_a, \tau_f + R/c\}.$$

In an exterior $r > r_1$,

$$F_{A,\infty} = \alpha r + C_A, \qquad C_A = \beta\rho_c,$$
$$F_{B,\infty} = \alpha r + C_B, \qquad C_B = d_0 + \beta\rho_c.$$

With

$$T_{\mathrm{geo}} = a_\infty\eta, \qquad R_i = a_\infty(r + C_i/\alpha), \qquad Z = a_\infty z,$$

the exterior metric is

$$-c^2\mathrm{d}T^2_{\mathrm{geo}} + \mathrm{d}R_i^2 + \alpha^2 R_i^2\mathrm{d}\varphi^2 + \mathrm{d}Z^2.$$

The azimuthal deficit is $2\pi\beta$. For B the axial coordinate has period $a_{\infty}L_z$; an axial lift gives local identification with the usual noncompact-axial cone. There is no finite global settling time over all radii.

Proof. The stated inequalities make $a = a_{\infty}$ and $s = 1$. Use the linear tails of Q and W, then substitute the coordinate changes. At every finite η, sufficiently large r has $s = 0$.

Define the settled exterior of either host by

$$\mathscr{D}^{i}_{\mathrm{ext}} = \{\eta > \tau_a,\ \eta - r/c > \tau_f,\ r > r_1\}.$$

A finite footprint inside this open set may use ; for B an axial patch must not wrap the periodic direction if a chart into the noncompact cone is used.

Holonomy is a loop property.

Proposition. For a coordinate circle in either host, away from the A axis, put

$$p = F_t + \mathscr{H}F, \qquad q_\xi = F_\xi.$$

The periodic orthonormal frame has connection generator

$$X = \begin{pmatrix} 0 & 0 & p \\ 0 & 0 & -q_\xi \\ p & q_\xi & 0 \end{pmatrix}.$$

The classification is determined by $p^2 - q_{\xi}^2$, as in Theorem ; if $p = q_{\xi} = 0$, the holonomy is identity.

On either settled exterior the opening has magnitude α, with opposite radial orientation on the two B sides. The conical deficit is $2\pi\beta$. During expansion at the central B torus, $q_{\xi} = 0$, $p = b\mathscr{H} > 0$, so its coordinate-circle holonomy is boost-type.

Proof. Cartan's equations for

$$a\,\mathrm{mathop\,d}t, \quad a\,\mathrm{mathop\,d}\xi, \quad aF\,\mathrm{mathop\,d}\varphi$$

give angular connection coefficients p and q_{ξ}. They are constant along each specified circle, so its parallel transport is $\exp(-2\pi X)$. On the settled exterior $p = 0$, $q_{\xi} = \alpha$ for A and $q_{\xi} = \pm\alpha$ for B. At the central B torus use $F_t = F_{\ell} = 0$, $F = b$.

Proposition. Neither adopted full spacetime admits an everywhere timelike Killing field.

Proof. On an early slice A has $R = 0$. On an early slice B has

$$R = -2W''/W = -2v'/W \le 0.$$

At a sufficiently late point of either conical mantle with $q^{\{'\}} > 0$, the scalar curvature is

$$R = 2\beta q'/(a_\infty^2 F) > 0.$$

An everywhere timelike Killing field can be oriented to the future. Its maximal integral curves are inextendible as unparametrized timelike curves: any finite conformal-time endpoint would have a spatial limit by the speed bound, and the smooth nonzero field would extend its orbit there. Each orbit therefore meets an early Cauchy slice. Constancy of scalar curvature along Killing orbits contradicts the late positive-curvature point.

Remark. Replacing S_z^1 by $\mathbb{R}_z$ preserves the local curvature and causal calculations and the completeness proof. The constant-ℓ surfaces then become noncompact cylinders, not the compact HV surfaces proved above. The spatial covering manifold $\mathbb{R}_{\ell} \times S_{\varphi}^1 \times \mathbb{R}_z$ has one topological end. It is not the same two-ended compact-axial model.

Energy non-transfer between the hosts

Only after a has settled do we use the following whole-transverse integrals. They are normal-observer energy integrals per unit physical axial length, not ADM masses or generally conserved Hamiltonian charges. During homogeneous expansion the infinite-volume FLRW contribution need not be integrable.

Theorem. In the fixed-radius static limits,

$$T^{\wedge\wedge}_{\mu\nu} = \mathrm{diag}\,(\varepsilon, 0, 0, -\varepsilon),$$

where

$$\varepsilon_A = \frac{\beta q'}{\kappa a_\infty^2 F_{A,\infty}}, \qquad \varepsilon_B = -\frac{\nu' - \beta q'}{\kappa a_\infty^2 F_{B,\infty}}.$$

Their transverse integrals are

$$\mathscr{U}_{A,\infty} = \frac{2\pi\beta}{\kappa} = \frac{c^4\beta}{4G}, \qquad \mathscr{U}_{B,\infty} = -\frac{4\pi\alpha}{\kappa}.$$

For B, the neck contributes $-4\pi/\kappa$, and its two positive mantles together contribute $4\pi\beta/\kappa$.

At every finite $\eta \geq \tau_a$, the actual whole-transverse integrals instead satisfy

$$\mathscr{U}_A(\eta) = 0, \qquad \mathscr{U}_B(\eta) = -\frac{4\pi}{\kappa}.$$

Thus spatial integration and fixed-radius late settling do not commute.

The deficit relation

$$2\pi\beta = \frac{8\pi G}{c^4}\frac{2\pi\beta}{\kappa}$$

applies to A's terminal positive string energy and to each individual B positive mantle, not to B's total signed energy.

Proof. When $a = a_{\infty}$,

$$\kappa T_{00}^{\wedge\wedge} = -\frac{F_{\xi\xi}}{a_\infty^2 F}.$$

For A the transverse disk has $F_r(0) = 1$, so

$$\mathscr{U}_A(R) = -\frac{2\pi}{\kappa}\int_0^R F_{rr}\,\mathrm{mathop\,d}r = \frac{2\pi}{\kappa}(1 - F_r(R)).$$

The limiting slope is α, giving $\mathscr{U}_{A,\infty} = 2\pi\beta/\kappa$. At each finite time the slope at sufficiently large radius is still 1, giving zero.

For B the transverse surface is a cylinder, and

$$\mathscr{U}_B(R) = -\frac{2\pi}{\kappa}(F_\ell(R) - F_\ell(-R)).$$

The limiting slopes are $\pm\alpha$, whereas the actual finite-time slopes at infinity are ± 1. This proves both total formulas. The separate B contributions follow from $\int_0^{\infty} \nu'\,\mathrm{mathop\,d}r = \int_0^{\infty} q'\,\mathrm{mathop\,d}r = 1$.

Once the bounded mantles have settled, the outgoing compensation is $-2\pi\beta/\kappa$ for A and $-4\pi\beta/\kappa$ for B. The difference comes from geometry and topology, not an omitted factor of c.

The complete dynamical spacetime-Enter interface

All quantum spaces in the operational part are finite dimensional. We use the standard channel framework [WatrousBook] and

$$d_{\mathrm{tr}}(\rho,\sigma) = \frac{1}{2}\|\rho - \sigma\|_1, \qquad d_\diamond(\Phi,\Psi) = \frac{1}{2}\|\Phi - \Psi\|_\diamond.$$

The diamond norm includes untouched references.

Definition. A specification over host $i = A$ or B consists of:

• the full time-oriented metric g_i, laboratory worldlines, event placements, and declared accessible port algebras;

• finitely many quantum registers, independent resource preparations, external references, and complete environments;

• a finite acyclic circuit of local channels and complete instruments, including all actual classical controls;

• future-causal routes for every quantum, classical, and resource dependency;

• a finite clock dictionary and explicit declaration of event-time or history-label calibration;

• every surviving quantum output, complete failure and stopping alphabet, storage requirement, and

fresh-allocation ledger;

• any physical implementation maps and complete-channel error allowances being claimed. The metric is immutable model data as a function of spacetime: an instruction does not output a replacement metric. Its explicit time dependence remains part of the experiment.

Destructive clock and survivor instrument.

Let C have orthonormal basis $\{|\tau_j\rangle\}$, and let S_q contain every declared surviving quantum register. Set

$$D_j = \langle\tau_j|_C \otimes I_{S_q},$$

and define

$$\mathrm{Enter}_C^{S_q}(X) = \sum_j \mathrm{kb}\, jj_Y \otimes D_j X D_j^\dagger.$$

The output algebra of Y is diagonal.

Theorem. The instrument is CPTP and satisfies

$$\mathrm{Tr}_Y \mathrm{Enter}_C^{S_q}(X) = \mathrm{Tr}_C X$$

on all operators, including arbitrary reference extensions. Its branch states are the subnormalized blocks

$$\sigma_j = D_j \rho D_j^\dagger, \qquad p_j = \mathrm{Tr}\,\sigma_j.$$

For $p_j > 0$, the conditional state is σ_j/p_j; no normalized state is assigned to a zero-probability branch. The quantum codomain contains S_q, not the consumed name C.

Proof. The recorded Kraus maps are $L_j = |j\rangle_Y \otimes D_j$, and

$$\sum_j L_j^\dagger L_j = \sum_j |\tau_j\rangle\langle\tau_j| \otimes I_{S_q} = I.$$

Expanding $X = \sum_{j,k} |\tau_j\rangle\langle\tau_k| \otimes X_{jk}$ shows that the output blocks are X_{jj}, whose sum is $\mathrm{Tr}_C X$. The same calculation with a reference identity proves the complete statements.

This locally proves the instrument used in I-B and I-C [CheungIB,CheungIC]. Its proof is independent of curvature.

Proposition. For :

• Distinct labels η_j required to equal the coordinate of one fixed readout event on every positive-probability branch permit only one occurring label.

• At a fixed-coordinate laboratory, proper-time calibration is

$$\tau_{\mathrm{lab}}(\eta) = \tau_{\mathrm{lab}}(\eta_{\mathrm{ref}}) + \int_{\eta_{\mathrm{ref}}}^{\eta} a(v)\,\mathrm{mathop\,d}v.$$

• The full clock–survivor instrument has no universal channel left inverse when $\dim C \geq 2$.

• The classical record marginal does not certify the surviving quantum state.

• No finite clock matrices satisfy $[T_C, H_C] = i\hbar I_C$ for nonzero $\hbar$.

Proof. The first assertion is equality of distinct numbers with one fixed number; the second is . For (iii), the clock states

$$(|\tau_0\rangle + |\tau_1\rangle)/\sqrt{2}, \qquad (|\tau_0\rangle - |\tau_1\rangle)/\sqrt{2}$$

with the same survivor input have identical destructive outputs. For (iv), inputs $|\tau_0\rangle\langle\tau_0| \otimes \rho$ and $|\tau_0\rangle\langle\tau_0| \otimes \sigma$, $\rho \neq \sigma$, have the same record but different survivors. For (v), take the trace of the proposed commutator.

A stochastic history label may refer to a family of separately declared events or preparations; it is not automatically the time of the one event at which its register is read. Conditional reference steering is compatible with the unchanged unconditional reference marginal in . Relational unitary covariance needs additional stationarity and clock-covariance hypotheses [CheungEn09]; it is not supplied by a list of labels.

Corollary. An independently prepared clock with no payload-dependent coupling and no subsequent payload

control based on its record can be read and ignored without changing the payload channel, including its reference extension. It consumes neither η, proper time, nor either host.

Proof. For a product clock input $\chi_C \otimes X$, summing the surviving blocks gives $Tr\,(\chi_C)X = X$. The classical geometric data are not output factors of the channel.

Finite histories and separate resource ledgers.

For a finite instruction tree let $\mathscr{I}_h$ be the composition of its unnormalized branch maps along a complete terminal history h. Then

$$\mathscr{E}(\rho) = \sum_h \mathrm{proj}\, h_R \otimes \mathscr{I}_h(\rho), \qquad \sum_h \mathrm{Tr}\, \mathscr{I}_h(\rho) = 1.$$

Completeness follows by successively summing the terminal branch of each complete instrument. The identity includes references. Failures cannot be silently removed.

A finite-depth schedule with a declared finite allocation list has finite cumulative name consumption and finite record storage. Peak live space alone does not bound lifetime fresh allocation. Readout, reset, Hamiltonian energy, reservoir heat, and restoration of consumed blanks remain separate ledgers [CheungICThermal].

Scheduled locality is not metric reconstruction

Theorem. For a finite complete wired network, every terminal observable pulls back to an observable supported only on its scheduled ancestors. Equivalently, the terminal reduced channel factors through the initial reduction to those ancestors, including untouched references.

Replacing an unreported trace-preserving gate outside that ancestor subnetwork does not change the terminal reduced channel. If every dependency is embedded by the causal routes of Definition , the ancestor events lie in the metric causal past of the terminal event.

Proof. Work backward through the circuit. If an observable is identity on all outputs of a gate, the gate's unital adjoint leaves identity on its inputs. Otherwise its possible support adds only that gate's input ports. Include every classical control in the same graph. Induction gives support on the initial ancestors.

Append any fixed state on the complementary initial factors. Apply the network and reduce to the terminal ports. The adjoint support statement proves that the resulting reduced map is independent of the appended state and equals the original reduction, including for correlated inputs. Tensoring with a reference identity proves the complete assertion. Excluded replacement gates act only on identities.

Finally concatenate the future-causal dependency routes. Causal transitivity gives metric containment.

This proves the network mechanism documented in [CheungIB,CheungSchedules]. Scheduled ancestry can exceed actual influence: a declared input port may be ignored by its channel. Initial entanglement is not a signaling dependency. Selective normalization and communicated outcomes are different interfaces from unreported trace-preserving interventions.

Proposition. The circuit matrices, complete record laws, and dependency graph do not determine the host, its deficit, throat radius, or proper durations.

Proof. Use identical finite channels on either adopted host. The causal routing bounds permit finite placements after enlarging waiting times. Different parameter values likewise permit separate placements of the same graph. The resulting channel matrices and laws are unchanged, while the geometries and proper durations differ.

This is a model-specific non-identification proof, not an assertion that no independently calibrated geometric experiment can infer metric data. It also avoids promoting scheduler consistency into a Lorentz-cone selection theorem [CheungEn08].

Local transfers and global non-transfers.

On a settled exterior patch with convex developed image, the usual sufficient static-cone route

$$\|\chi(y) - \chi(x)\|_2 \le c(T_{\mathrm{geo},1} - T_{\mathrm{geo},0})$$

lifts to a causal route within that patch. Its proof uses only the isometry and the straight developed segment. The complete instrument and ancestry proofs are host-independent and do not even need this isometry.

The following stronger conclusions do not follow:

• global equality of the adopted host's causal relation with that of a punctured cone;

• transfer of a punctured cone's noncompact causal diamond;

• transfer of its self-adjoint extension, Green kernel, bundle holonomy data, or selected quantum state;

• transfer of an apex-diffracted echo to a geometry with a smooth core or no apex. Curves and solutions may leave the local patch. The compact axial quotient in B is additional global information.

The Shredder interface on either host

Theorem. Let the entire accessible terminal output of a d-dimensional unknown quantum code be classical, with any fixed auxiliary resources independent of that input. Every deterministic decoder obeys

$$F_e(\mathscr{D}\mathscr{C}) \le \frac{1}{d}, \qquad d_\diamond(\mathscr{D}\mathscr{C}, \mathrm{id}_d) \ge 1 - \frac{1}{d}.$$

Both bounds are sharp. They hold during either host's dynamical phase and for routes crossing the B neck.

Proof. Complete histories give a POVM, so

$$\mathscr{C}(\rho) = \sum_x \mathrm{Tr}\,(E_x\rho)\mathrm{proj}\,x, \qquad \mathscr{D}\mathscr{C}(\rho) = \sum_x \mathrm{Tr}\,(E_x\rho)\sigma_x.$$

This is measure-and-prepare and therefore entanglement breaking [HSR]. Its normalized Bell-input output is separable. For product states on d dimensions,

$$\mathrm{Tr}\,[|\Phi_d\rangle\langle\Phi_d|(a\otimes b)] = \frac{1}{d}\mathrm{Tr}\,(a^{\mathrm{T}}b) \le \frac{1}{d}.$$

Convexity gives the entanglement-fidelity bound. Testing the Bell projector gives trace distance at least $1 - 1/d$, hence the diamond lower bound.

Measure and reprepare a fixed basis. The resulting pinching is

$$\Delta = \frac{1}{d}\sum_{j=0}^{d-1} \mathrm{Ad}_{Z^j}, \qquad Z = \sum_{a=0}^{d-1} e^{2\pi i a/d}\mathrm{proj}\,a.$$

Separating the identity term gives $d_{\diamond}(\Delta, id) \le (d-1)/d$, and its Bell overlap is $1/d$. Thus equality is attained. No geometric quantity occurs in the argument.

This is the I-C distinction between a complete classical output and coherent quantum return [CheungIC]. The different Haar-average state-estimation task has fidelity bound $2/(d+1)$; it must not be assigned the same error constant.

Corollary. If the actual accessible channel and a classical-output comparison channel are embedded in the same output space and $d_{\diamond}(\mathscr{N}, \mathscr{C}) \le \delta$, then

$$d_\diamond(\widehat{\mathscr{D}\mathscr{N}}, \mathrm{id}_d) \ge \left[1 - \frac{1}{d} - \delta\right]_+.$$

Proof. Post-composition contracts diamond distance. Apply the reverse triangle inequality and Theorem .

The actual output in this corollary need not be exactly classical. The comparison must preserve the decoder-access declaration.

Proposition. For a classical history retained without editing,

$$H(Y_{\le k+1}) = H(Y_{\le k}) + H(Y_{k+1} \mid Y_{\le k}) \ge H(Y_{\le k}).$$

For prescribed-basis readout of a quantum state, $H(Y) = S(\Delta\rho) \ge S(\rho)$.

Proof. Use the classical chain rule for the first assertion. Dephasing is an average of unitary conjugations, so entropy concavity gives the second.

A quantum residual is a different output type. The classical–quantum access laws and flagged packet tasks in I-C-Ex and I-C-Ex2 retain their own dimensions and assumptions [CheungICExtensions]; they are not inferred from flare-out. Likewise, teleportation retains a quantum receiver memory in addition to a classical message, so it is not a counterexample to Theorem .

Conditional hosting and two-way non-identification

Definition. A complete finite encoding is an isometry

$$V : L \to R \otimes B, \qquad \dim L = d,$$

with

$$\mathcal{N} = \mathrm{Tr}_B \mathrm{Ad}_V, \qquad \mathcal{C}_V = \mathrm{Tr}_R \mathrm{Ad}_V.$$

Every inaccessible encoding purifier and environment belongs to *B*. An external reference is not decoder assistance. A return certificate additionally specifies a deterministic CPTP decoder $\mathcal{D}: R \to L_out$ and an allowance

$$d_\diamond(\mathcal{D}\mathcal{N}, \mathrm{id}_L) \le e.$$

The encoding complement and any enlarged postdecoder complement are distinguished.

This is an operational certificate in the sense documented in the Hawk07 series [CheungHawkABC]. It is not the geometric torus of Host B.

Assumption. Permit finitely many finite-dimensional registers, prescribed local unitaries and complete instruments, independent resource preparation, identity storage on declared timelike worldlines, and identity quantum and classical wires on declared causal routes. Allow sufficient finite time, buffers, fresh registers, and storage for the chosen finite circuit. Every inaccessible output is included. All devices are test systems; no register backreaction is included in the effective source.

Lemma. SWAP into an independent blank transports a logical factor, including all its reference correlations, and leaves a fixed blank at the vacated port. Fixed input-independent spectators and output isometries preserve a declared channel contract whenever a CPTP reduction recovers the original interface.

Proof. The vector identity

$$\mathrm{SWAP}\,(|\psi\rangle|0\rangle) = |0\rangle|\psi\rangle$$

extends to all matrix units and references. CPTP postprocessing gives one norm inequality, and reduction by discarding spectators and using an isometric left inverse gives the reverse one.

Theorem. Fix a finite qubit encoding, complete output partition, decoder, and finite nested release policy. Under Assumption :

• its finite gates, complete instruments, and channel contract have a causal realization on Host A;

• they also have a realization on Host B with supplier and receiver at finite opposite radial locations, and every transmitted payload factor routed through $\ell = 0$;

• at designated arrival cuts, the accessible channels and complete encoding complements agree with the abstract ones, up to fixed port identifications, isometries, and input-independent factors;

• the realization may include payload storage and destructive clock readout during a nonzero-curvature interval;

• independent clock readout preserves the payload channel; a supplied later discard-and-decode policy remains the same channel policy after hosting. No carrier or detector dynamics is derived from the metric.

Proof. A finite isometry has a unitary extension after independent blank allocation, and a finite channel has a finite Stinespring dilation. Finite exact qubit synthesis with continuous gates is available [Barenco]. Its parameters are prescribed, not obtained by measuring the unknown input.

For A choose supplier and receiver laboratories in a regular bounded region. The sufficient Cartesian route of Theorem gives finite delivery times. For B choose

$$\ell_s < -r_1, \qquad \ell_r > r_1$$

at common φ, z. Every radial delivery with duration strictly greater than $(\ell_r - \ell_s)/c$ is timelike and crosses the neck.

Prepare all independent resources sufficiently early. If the finite model includes a pre-shared *HE* resource, prepare it at the supplier and deliver *E* before payload injection. There is no past preparation deadline. Perform encoding

locally, release the prescribed factors, and route them one at a time, waiting for arrivals when needed. There are finitely many operations, so the schedule is finite. Lemma proves the complete channel identities; source placeholders are fixed blanks. At an arrival cut the unreleased logical factors form the declared encoding complement.

To overlap genuine evolution, choose the supplier radius large enough that $r/c + \tau_{f/2} > \tau_a$. The open exterior interval around that event has nonzero curvature by . Store the unknown input there for a nonzero subinterval and read an independent clock there. A clock basis state calibrated to that event supplies exact event-time readout. A separate history-label preparation can supply nontrivial record statistics without changing that claim.

Finally implement the supplied receiver discard policy and decoder. Its environment belongs to the postdecoder complement. Corollary proves the clock assertion.

Multiple output records at separated events do not become jointly available to a distant controller merely because they occur in one tensor-product expression. Their collection needs separately charged causal wires and storage.

Proposition. A geometric throat does not certify recovery, and successful recovery does not certify a geometric throat. The same finite channel matrices can be hosted on A and B.

Proof. On either host, ideal identity routing realizes

$$V_{\mathrm{good}}|\psi\rangle = |\psi\rangle_R|0\rangle_B,$$

with exact recovery. Host A nevertheless has no compact spatial throat of the stated type by Theorem .

On the same Host B, the complete encoding

$$V_{\mathrm{bad}}|\psi\rangle = |0\rangle_R|\psi\rangle_B$$

makes the accessible channel replacement, despite the geometric throat. Every decoded replacement has Bell overlap d^{-2}, giving half-diamond error at least $1 - d^{-2}$. Preparing I_L/d attains that error, since depolarization is the average of d^2 Weyl conjugations including identity. The geometry is unchanged while the recovery behavior differs.

The hosting theorem places the same chosen matrices on both hosts, proving the final assertion.

Opposite-side routing is not ER=EPR, and a complete complement is not a geometric throat. The geometric certificate in Hawk07-D and the operational certificate in the Hawk07 finite models remain different objects.

Implementation allowances remain conditional.

Proposition. For compatible ideal and implemented channels,

$$d_\diamond(\widehat{F}_n \cdots \widehat{F}_1, F_n \cdots F_1) \le \min\left\{1, \sum_{j=1}^{n} d_\diamond(\widehat{F}_j, F_j)\right\}.$$

Consequently an ideal return error e, encoding allowance η_{enc}, and decoder allowance ι give actual return error at most $\min\{1, e + \eta_{enc} + \iota\}$.

Proof. Replace one factor at a time. Each summand contains one channel difference surrounded by CPTP maps. Diamond contraction and the triangle inequality give the result.

A metric difference is not a diamond distance. For finite Hamiltonian descriptions on a common conformal-time Hilbert space,

$$d_\diamond(\mathrm{Ad}_U, \mathrm{Ad}_{U_0}) \le \min\left\{1, \frac{1}{\hbar}\int \mathrm{lVertK}(\eta) - K_0(\eta)\|_\infty \,\mathrm{mathop}\, \mathrm{d}\eta\right\}$$

follows from Duhamel's identity and $d_{\diamond}(Ad_U, Ad_{U_0}) \le lVertU-U_0\|_{\infty}$. It becomes a geometric error bound only after specifying the carrier, coupling, route, detector, and access-preserving output identification.

No quantitative δ_{dyn} is calculated for physical controls, storage, or field-mediated links through either host's curvature pulse or B's neck. Under ideal identity-wire assumptions it is zero by the model contract, not by a propagation calculation. For a physical implementation it remains an additional estimate.

Echo split: one retained comparison, no throat kernel
Host A's future-closed settled set.

Define

$$\mathscr{D}_{A,+} = \{\eta > \tau_a,\ \eta - r/c > \tau_f\}.$$

This set includes the regular core once the indicated inequalities hold. Let

$$F_{A,\infty}(r) = r - \beta Q(r),$$

and define on the same full A manifold

$$h_A = a_\infty^2[-c^2\mathrm{mathop\,d}\eta^2 + \mathrm{mathop\,d}r^2 + F_{A,\infty}^2\mathrm{mathop\,d}\varphi^2 + \mathrm{mathop\,d}z^2].$$

It is the static smooth-core comparison metric, not the punctured thin cone.

Lemma. A future-causal curve of *g_A* or *h_A* starting in $\mathscr{D}_{A,+}$ stays there.

Proof. The radial coordinate is locally Lipschitz along a causal curve, including through its Cartesian axis, and $|\mathrm{mathop\ dr/mathop\ d}\eta| \le c$ almost everywhere. Thus η increases and $\mathrm{mathop\ d}(\eta - r/c)/\mathrm{mathop\ d}\eta \ge 0$ almost everywhere. Both strict starting inequalities persist.

Theorem. Fix the scalar operators

$$P_g = \mathrm{Box}_{g_A} - \xi R_{g_A} - m^2, \qquad P_h = \mathrm{Box}_{h_A} - \xi R_{h_A} - m^2$$

with real constants ξ, m. Let *E_g^ret*, *E_h^ret* denote their unique retarded Green operators, whose standard existence follows from global hyperbolicity [BGP]. If $f \in C_c^\infty(M_A)$ has support in $\mathscr{D}_{A,+}$, then

$$E_g^{\mathrm{ret}} f = E_h^{\mathrm{ret}} f.$$

For every compactly supported test q,

$$\int q\, E_g^{\mathrm{ret}} f\, \mathrm{mathop\,d}v_{g_A} = \int q\, E_h^{\mathrm{ret}} f\, \mathrm{mathop\,d}v_{h_A}.$$

Proof. The static smooth-core comparison is globally hyperbolic by the same complete-spatial-metric argument as before. By future closure,

$$\mathrm{supp}\, E_h^{\mathrm{ret}} f \subset J_{h_A}^+(\mathrm{supp}\, f) \subset \mathscr{D}_{A,+}.$$

The metrics and local operator coefficients agree on this set. In fact compactness of *supp f* gives positive margins in both inequalities defining $\mathscr{D}_{A,+}$, and these margins persist to its causal future. Therefore *P_gE_h^retf = f* globally.

Every *h_A*-causal curve starting at *supp f* remains where the two metrics agree, hence is also *g_A*-causal. Thus the candidate has the *g_A*-retarded support property. Uniqueness gives . The response is supported where the volume forms agree, proving the integral identity.

The theorem concerns zero-past-data retarded response to these late sources. It does not say that an earlier field preparation, incoming state, or arbitrary detector has forgotten formation.

No new thin-core convergence theorem is proved here. Comparing the specified static smooth-core response, with its chosen operator and coupling, to the apex-diffracted Friedrichs kernel used by I-C requires a separate limit and realization argument.

Restricted neutral-core convergence results recorded elsewhere [CheungIC,CheungFree] are not denied. They do not automatically establish every curvature-coupled comparison in Theorem .

Host B has no evaluated echo theorem in this sheet.

No explicit throat Green kernel, spectral resolution, diffractive or transmitted echo formula, detector response, inverse window certificate, or field-to-register acquisition map is constructed for Host B. No static-cone apex kernel is transferred to it.

Remark. Once a particular smooth normally hyperbolic scalar operator on the globally hyperbolic Host B is specified, standard theory gives abstract retarded and advanced Green operators [BGP]. Their abstract existence is not an open problem under those hypotheses. What remains unconstructed here is a native evaluated throat kernel and its physical or operational echo interpretation. No Host B echo identity is asserted. Likewise no Hadamard

state is selected or constructed on either dynamical host.

The static-cone analytic front and finite-window results of I-B-ECHO remain on their own prescribed host, bundle, and extension [CheungEcho]. Their labels are not renamed as throat results.

Documentary separations and the seven remaining entries

The following is a source-reading ledger, not a list of theorem premises. Except for the full supplied predecessors, companion claims below are attributed to the supplied excerpts and identified records. No exhaustive label or proof audit is claimed.

begingroup 1.12 Typed documentary separations.

toprule Sources Object retained there What is not transferred here

midrule endfirsthead toprule Sources Object retained there What is not transferred here

midrule endhead bottomrule endfoot

I-B [CheungIB] Destructive clock instrument, scheduled locality, conical holonomy, and source separation. Readout does not consume geometric time; record laws do not certify residual states; the metric and causal routes remain prescribed.

I-B-G, I-B-G-S [CheungFree] Static-cone Green realizations and source-tested free spin-1/spin-2 inverse statements, including exceptional extension issues. Neither punctured non-GH behavior nor a free inverse supplies the full adopted hosts' source, a selected neck, or dynamical quantum admission. *E_0* is not a smooth core or a throat.

I-B-VP, I-B-VP-CR [CheungFree] Static local Hadamard form and a specified positive-local-core obstruction. No state on A or B; no identification of a spectral stationarity claim with Proposition ; no universal obstruction to every possible matter core.

I-C, I-C-Ex, I-C-Ex2, I-C-Th [CheungIC,CheungICExtensions,CheungICThermal] Complete-access recovery bounds, flagged tasks, transcript and thermal ledgers. Quantum-memory access is not classical-only access. Heat is not leakage. An apex-diffracted input kernel is not a smooth-core or throat kernel.

I-B-ECHO [CheungEcho] Static-cone front witnesses and finite-window identification under its declared field contract. No dynamical-host or throat echo theorem.

Hawk07-A/B/C, Hawk07-C-Dyn, Hawk07-D [CheungHawkABC,CheungCDyn,CheungHawkD] Complete-complement return certificates, conditional hosting, and the separate geometric B certificate. An operational ``wormhole'' is not a minimal torus. Neither certificate derives the other or a matter theory.

Res01-A/B [CheungRes01] Typed source, analytic, endpoint, relational, and emergence obligations. The two prescribed hosts close none of the seven entries below.

Res02-A, Em02-E [CheungLapse] A classical relational lapse on a specified power-law Einstein–scalar background and its quantum audit. Neither host's chosen scale factor is that lapse. Settling is not a de Sitter state or quantum covariance theorem.

En05-A/B, En06-A, En08-A [CheungSchedules,CheungEn08] Scheduled ancestry, model-specific transport, and non-reconstruction from scheduler consistency. A dependency path is not a derived metric; no Euclidean isotropy or invariant speed is inferred for B.

En07-B, En09-A [CheungRecoveryClock] Outgoing recovery and clock-conditioned covariance under additional same-model hypotheses. Neither removes external time; neither is a premise of the hosting theorem here.

En04-A [CheungMagic] A conditional bridge requiring an independently justified geometric observable and response witness. Magic is not residual response; residual response is not backreaction. The neck does not discharge cor:bridge.

Prob02-A v8, Prob04-A [CheungProblems] Version-qualified flat-model graph conclusions and conditional far-placement comparisons. No G2, *T_3*, partial-diagonal *SD^{'}*, or inherited graph is evaluated on A or B.

XIV-H/I/J, XV-B v2 [CheungAnalytic] Historical H2 boundary, XIV-I's constructed internal I2 module, XIV-J's partial supported-sector reference, and technical lifting criteria. The narrower advances are not withdrawn. They

are not the complete joint characteristic map or quantum admission on either host.

XVI-N and the downstream admission exit [CheungXVIN,CheungAnalytic] A version-qualified prepared-insertion obstruction and separate analytic exit contract. XVI-N and Route B are not discharged. The downstream XV-B quantum-admission exit is not opened.

OpenAI catalogue [OpenAICatalogue] Documentary family descriptions and rem:not-premise. No family theorem or verification report is an input. A gapped area law is not torus minimization; a bicentralizer question is not the domain of T_{src}.

endgroup

The supplied comparisons involving Families 260 and 264 do not identify Host B with one-ended asymptotically flat dominant-energy data or a two-ended Kerr spacetime. Host B has different asymptotics, pre-existing compact-axial topology, and explicit NEC violation. No claimed theorem of those families is tested or imported here.

Seven entries, restated against both hosts.

toprule Entry Remaining obligation on A and B

midrule G4 No continuous source intertwiner is exhibited. $T = G/\kappa$ is not the source-specific map T_{src}.

G0/G1 No E_0-detecting row or physical branch choice is constructed. The core and neck are prescribed, not selected.

G7 No extension of the cited flat-model T_3 work to either host is constructed, and no inherited graph is evaluated.

G3 The source-specific d_S remains unbound here.

Page B has two ends and a compact torus, but no dictionary identifying Hawking mouths, an island, a black-hole interior, or a Page history.

Relational η, laboratory proper time, and proper time at the neck are externally specified geometric labels. No parameter-free quantum evolution is derived.

Emergence The source-specific domain and construction of T_{src} remain missing. Both metrics are inputs, not outputs of records.

bottomrule

The sharper Res01-B ledger is not a completion of these entries. A missing construction is not a universal nonexistence theorem.

The inherited analytic chain is not this sheet.

The supplied XIV-I record constructs its named internal amplitude at I2 and stops short of the full joint composition at I3. The supplied XIV-J record constructs an off-characteristic supported-sector reference and leaves the full map unresolved at J2. The technical XV-B v2 lifting results do not themselves supply the frozen full graph [CheungAnalytic].

The remaining sequence still requires the same complete object:

$$\begin{aligned}\text{full joint characteristic map} &\to \text{?joint section and controlled remainder}\\ &\to \text{?uniform transverse estimates} \to \text{?contact compatibility}\\ &\to \text{?output wavefront theorem} \to \text{?normalized quantum admission.}\end{aligned}$$

No step is replaced by a throat calculation, an Enter instrument, an abstract scalar Green operator, or a record. No inherited quantum coefficient is admitted here.

Hereafter *O. 1* denotes the inherited cone/characteristic programme obligation, not a differently scoped two-point bulk record in another manuscript. This sheet changes neither the scoped XVI-Q record described in the supplied material nor the separate XVI-N obstruction.

Consolidated theorem and exact release

Theorem. The definitions and hypotheses of this paper give:

• two distinct smooth, genuinely nonstationary, globally hyperbolic prescribed hosts, with the full Host A retained;

• no compact minimal two-surface on A's prescribed spatial slices, and a strictly stable homologically minimizing torus on B;

• under , two explicit strong B null throats which separate during expansion and coalesce in static intervals;

• exact conserved Einstein-effective sources, outgoing negative-energy witnesses on both hosts, and negative radial crossing ANEC on B;

• bounded-region conical settling, with B's axial quotient retained, and different signed-energy ledgers;

• complete destructive Enter, calibration, no-return, record–residual, and schedule-locality theorems on either host;

• a host-independent sharp classical-only return floor and additive complete-channel implementation bounds;

• conditional finite hosting on either evolving geometry, including opposite-side B routes through the neck and readout during a curvature pulse;

• two-way non-identification between geometric throat existence and quantum-return performance;

• the exact Host A late-source static smooth-core response comparison, with no evaluated B echo theorem. These conclusions construct no independent matter theory, Einstein–matter stability theorem, physical carrier or detector, selected dynamical Hadamard state, topology creation, Page curve, island, de Sitter state, cosmological bounce, or quantum backreaction. They do not discharge the seven programme entries or admit an inherited interacting quantum coefficient.

Proof. The adopted metric and source assertions are Proposition , Theorem , Theorems and , and Proposition . The spatial and null results are Theorems –. The signed-energy calculation is Theorem .

The finite instrument and locality results are Theorem , Proposition , and Theorem . The classical and implementation bounds are Theorem , Corollary , and Proposition . The conditional realization and non-identification are Theorem and Proposition . The retained scalar comparison is Theorem . None of these definitions or proofs constructs the excluded objects.

The v2 release box below is reproduced as a historical record. Its execution clause is superseded by Section and Appendix .

Exact I-D-v2 release.

• Host A remains the axis-filled retarded dynamical Enter host. Host B is an added, topologically different prescribed bridge.

• Their geometric and source calculations are explicit. A full Einstein–matter evolution is not derived.

• Enter consumes declared finite quantum names, not spacetime coordinates or dimensions.

• The classical-return floor and append-only entropy statement remain host-independent.

• Throat routing uses declared ideal controls. Physical implementation errors are additional data.

• Host A's late-source smooth-core comparison is retained. Thin-core identification and throat echo calculations are not released.

• All seven entries remain open relative to both hosts. No de Sitter state, horizon entropy, Page curve, bounce, emergence, or quantum backreaction is constructed.

• No successful compilation, machine-checked proof, independent symbolic execution, or numerical device sample is asserted.

$$\boxed{\begin{array}{c}\mathrm{O.1} = \texttt{ttt}\,\mathit{NOT_CLOSED},\\ \text{XVI-N and Route B are not discharged,}\\ \text{the downstream XV-B quantum-admission exit is not opened,}\\ \text{no inherited characteristic quantum coefficient is admitted.}\end{array}}$$

Potential use. The two-host formulation permits an explicit controlled comparison: the same finite operational contract can coexist with different global topology, different minimal-surface content, and different signed source integrals. This makes unsupported geometric interpretations visible before a physical carrier or field dictionary is

supplied. It is a useful benchmark and interface theorem, not evidence of a physically realized wormhole.

Registration. No app, registry, site, or progress bar is updated by this file. A later documentary registration may record ``classical dynamical host'' and ``geometric throat'' as scoped subresults. It must not mark the final time, de Sitter, singularity, Page, or emergence problem as solved.

Debugging, open items, and provenance

begingroup 1.13 Proof and scope repairs made in v2.

toprule Issue Repair

midrule endfirsthead toprule Issue Repair

midrule endhead bottomrule endfoot

Host A replaced by a wormhole A and B remain separate definitions and separate manifolds.

Minimum on a half-line B uses a signed radial coordinate and two radial ends.

Infinite cylinder called a compact throat The primary B model has periodic z and full torus area. The unwrapped cover is explicitly different.

Spatial and null flare-out conflated Both expansions are calculated, with a quantitative slow-expansion hypothesis for the near-neck null theorem.

Initial cone called Minkowski Host C's early region is Minkowski only when its early opening is 1.

Holonomy threshold omitted The parabolic threshold and trivial-generator case are included.

Periodic exterior called the global I-B product Only the local lifted metric is identified with the noncompact axial product.

Early B scalar-curvature typo The correct formula is $R = -2v^{'}/W$, with no additional factor of W in the denominator.

Positive-string energy transferred to the bridge Disk and cylinder boundary terms are calculated separately; the escaping pulse prevents exchanging limits and integrals.

Minimal-surface stability called physical stability Only the spatial second variation is proved. Matter-model stability remains an independent task.

Abstract Green existence declared open Standard existence for specified normally hyperbolic operators is acknowledged; explicit throat kernels and echo acquisition remain unconstructed.

Old hashes treated as fresh verification No old path, artifact, or reported hash is treated as independently executed in this revision.

Every historical analytic gate called unresolved in one sense XIV-I's narrower I2 construction is retained. The full I3/J2 map and subsequent quantum-admission obligations are distinguished from it.

Technical XV-B existence called admission The technical manuscript and the downstream quantum-admission exit are explicitly separated.

endgroup

toprule Unconstructed item Precise scope

midrule Thin-core echo Open item , without denying narrower neutral-core theorems in other records.

Throat echo Open item : no evaluated B kernel, detector, or field-to-register map.

Dynamical error Open item : no physical δ_{dyn} from curvature alone.

Physical controls Carrier, detector, coupling, bandwidth, energy, and storage models are not supplied by ideal wires.

Matter theory No action or constitutive model producing the prescribed G/κ.

Quantum state No selected or constructed Hadamard state on A or B.

Stability No linear or nonlinear Einstein–matter stability theorem.

Programme Seven entries, scoped $O.\ 1$, XVI-N, Route B, and inherited quantum admission remain unchanged.

bottomrule

Source-status discipline.

Three types of material are distinguished:

• full manuscripts supplied with the request;

• attributed companion excerpts and identified online manuscript records, used documentarily rather than as unproved premises;

• standard published mathematical tools, such as the globally hyperbolic wave-equation theorem and entanglement-breaking channel characterization. The source-specific geometric and finite identities needed for the release are proved in the body.

The predecessor's statements that certain scripts returned zero residuals are historical statements in that file. Those scripts and their complete logs are not embedded in this single-file revision. Neither their existence at a named path nor their successful execution is certified here.

Single-file compilation.

Save this source as I-D-v2.tex and run:

pdflatex I-D-v2.tex?pdflatex I-D-v2.tex

The file uses an internal bibliography and standard packages. No external figure, data file, bibliography processor, or shell escape is required. These are compilation instructions, not a claim that compilation has been performed.

Verdicts on the I-D-v2 items

Key: **R** = rechecked independently, symbolically or numerically, in v1 or v3 scripts. **H** = rechecked by hand in this revision. **S** = scope or definition item, consistent as stated. **N** = not independently rechecked, retained on v2's proof.

begingroup 1.08 toprule v2 item mark verdict

midrule endfirsthead toprule v2 item mark verdict

midrule endhead bottomrule endfoot thm:minimal (Host C) R,H Correct. The holonomy regions are now explicit (Proposition).

def:host-A, def:host-B S Consistent, smooth definitions.

lem:neck-profile H Correct. $v^{'}(0) = 1/b$, and $v^{'} \geq 0$, with $v^{'} > 0$ on $[0, L_1)$.

prop:regularity H Correct. Note that $F_B \geq b$ at all times, which Theorem uses.

thm:Einstein R Correct. Reproduced in v1 sympy; the static limit is reproduced in v3 (Lemma).

eq:Fderiv, eq:pulse R Correct.

prop:pulse-NEC N Retained.

prop:not-source S Correct scope statement. Still applies to Host A and to the pulse regions.

thm:no-throat-A H Correct. The Hessian argument is valid on the stated η-slices only.

thm:spatial-throat H Correct. $\partial_{ntr} K = -1/(a^2 b^2)$; strict second variation; calibration by comass $b/F \leq 1$.

thm:null-throats H Correct. Root formula and the bound $23/100$ were rechecked.

thm:NEC, thm:ANEC H Correct (the value $-23/32$ was rechecked). ANEC: the argument is sound.

thm:GH, prop:nonGH H Correct.

thm:routing H Correct. Extended by Section .

thm:settling, prop:holonomy H Correct. $p = F_t + HF$; the central torus is boost-type.

prop:nonstationary H Correct, with $R = -2v^{'}/W$ and mantle $R = 2\beta q^{'}/(a^2 F)$.

thm:energy R Correct. Reproduced by Gauss–Bonnet (Theorem) and numerically.

def:interface–prop:schedule-not-metric N Retained finite-interface statements.

thm:classical, cor:robust H Correct.

prop:entropy, prop:telescoping N Retained.

def:certificate, ass:controls, lem:routing, thm:hosting N Retained. They are used as stated.

prop:nonidentification H Correct. Replacement error $1 - d^{-2}$. Quantified in Proposition .

lem:futureclosed, thm:echo H Correct. Extended to B (Theorem).

open:throat-echo S Partly discharged for the static scalar sector (Section).

thm:main S Retained, except that item (x) is superseded.

Provenance: ``no compilation asserted" S Superseded. The v2 source compiles (scratch copy: 36 pp., 0 errors). v3 reports executed artifacts.

endgroup

Verdicts on the Hawk07-E items used

begingroup 1.08 toprule Hawk07-E item verdict and independent recheck

midrule endfirsthead toprule Hawk07-E item verdict and independent recheck

midrule endhead bottomrule endfoot prop:single-scalar Correct. It is subsumed by the stronger Theorem .

thm:matter Correct. Sympy derives the stress tensor from the metric variation and the Euler–Lagrange equations from $\sqrt{(-g)}L$. Einstein residuals are zero and X-equation residuals are zero. Caveat: the result holds for *every* positive profile, and convexity is needed only for a definite target metric (Theorem).

lem:profile Correct. $P^{'}$ and $P^{''}$ were checked symbolically, $\int P^{''} = 2\alpha$, and C_{δ} matches (difference 0).

thm:causality, thm:throat Correct (by hand).

prop:ANEC Correct. The identity $(P^{'}/P)^{'} = P^{''}/P - (P^{'}/P)^2$ was verified.

thm:GB, cor:energy-floor Correct. Its comparison with Hawk07-D ($E_{-} = 4\pi/\kappa$, $E_{+} = 4\pi\beta/\kappa$) matches our numerical integrals.

prop:crossing, thm:latency, cor:witness Correct. The latency gap transfers to dynamical Host B (Theorem).

thm:wave-operator Correct. The factorization identity $w^{'} + w^2 = P^{''}/(2P) - P^{'}\^2/(4P\^2)$ was verified.

prop:shoulders Correct (by hand).

thm:resonance Correct. The matching conditions were rederived by hand. At 12 computed roots, the determinant roots coincide with zeros of the echo denominator to 10^{-29}.

thm:long-neck Correct as an asymptotic statement (Table), and $d(k)$ agrees with the small-z Hankel data. Caveat: the leading damping is off by about $23–30\%$ at $L/\rho = 20$, with only logarithmic convergence.

thm:smooth-resonances Confirmed numerically, with observed rate $O(\delta^2)$ (Table). The appendix proof (Volterra, Wronskian $-4i\alpha/\pi$, condition $Im\ k > -1/\delta$) was checked by hand.

prop:echo Correct. $|r| < 1$ on the real axis was confirmed (e.g. $|r(0.5)| = 0.359$). The pole sum is not the full Green function, as Hawk07-E states.

endgroup

Status ledger and open items

begingroup toprule Item status where

midrule endfirsthead toprule Item status where

midrule endhead bottomrule endfoot Cone no-go (standard classes) proved Theorem

Sigma-model realization, any profile proved (rechecked) Theorem

Letelier realization proved Proposition

Gauss–Bonnet ledgers, neck value proved Theorem

Negative-energy floor and B excess proved (cited, rechecked) Corollary

Gateway latency on dynamical B proved Theorem

Circumference witness proved Theorem

Zero-momentum TOF blindness proved Proposition

Lensing witness proved (with core condition) Theorem

Late-source reduction on B proved Theorem

B resonance census, tails, echo delay computed (double precision, cross-checked) Section

Host C regions proved Proposition

Quantitative non-identification proved Proposition

endgroup

begingroup toprule Open item scope

midrule endfirsthead toprule Open item scope

midrule endhead bottomrule endfoot Matter theory for pulses and Host A No source model for any pulse region or Host A's conformal factor.

Ghost-free or stable matter Neither realization is well posed, positive, or stable.

Unrestricted TOF discrimination Unequal circumferences without a core condition.

Certified resonance enclosures Interval arithmetic was not done; the census is limited to the stated box.

Detector and register map Remaining part of v2 open:throat-echo.

Thin-core comparison v2 open:thin.

Dynamical error v2 open:dyn.

Hadamard state, Page, island, emergence Not constructed.

Seven entries, O.1, XVI-N, XV-B exit Unchanged (Section).

endgroup

Label audit

Every label cited in the new v3 sections was matched to its claimed source and found by an automated check (s10?abels.py). Corpus sources [CheungCorpusV3] were fetched read-only from the companion site. Prob02-A labels were checked in the version-8 deliverable. begingroup toprule label source status

midrule endfirsthead toprule label source status

midrule endhead bottomrule endfoot ass:controls v2 found

ass:host I-B-ECHO found

ass:latency Hawk07-E found

cor:G2v8 Prob02-A found

cor:energy-floor Hawk07-E found

cor:influence En05-A found

cor:robust v2 found

cor:witness Hawk07-E found

def:certificate v2 found

def:host-A v2 found

def:host-B v2 found

def:interface v2 found

def:island Hawk06-A found

entry:Emergence Res01-A found

entry:G01 Res01-A found

entry:G3 Res01-A found

entry:G4 Res01-A found

entry:G7 Res01-A found
entry:Page Res01-A found
entry:Relational Res01-A found
eq:Fderiv v2 found
eq:action Hawk07-E found
eq:kernel I-B-ECHO found
eq:pulse v2 found
eq:stress-action Hawk07-E found
lem:futureclosed v2 found
lem:neck-profile v2 found
lem:profile Hawk07-E found
lem:routing v2 found
open:dyn v2 found
open:thin v2 found
open:throat-echo v2 found
prop:ANEC Hawk07-E found
prop:attain En05-A found
prop:clock v2 found
prop:crossing Hawk07-E found
prop:decomp I-B-ECHO found
prop:echo Hawk07-E found
prop:entropy v2 found
prop:holonomy v2 found
prop:nonGH v2 found
prop:nonidentification v2 found
prop:nonstationary v2 found
prop:not-source v2 found
prop:pulse-NEC v2 found
prop:regularity v2 found
prop:schedule-not-metric v2 found
prop:shoulders Hawk07-E found
prop:single-scalar Hawk07-E found
prop:telescoping v2 found
rec:AL Oai265-A found
sec:echo v2 found
thm:ANEC v2 found
thm:EB Em03-F found
thm:Einstein v2 found
thm:G2obstruction Prob02-A found
thm:GB Hawk07-E found
thm:GH v2 found
thm:NEC v2 found

thm:SD Prob02-A found

thm:T3 Prob02-A found

thm:causality Hawk07-E found

thm:classical v2 found

thm:cone En05-A found

thm:echo v2 found

thm:energy v2 found

thm:exact En07-B found

thm:finiteinjectivity I-B-ECHO found

thm:gtd I-B-ECHO found

thm:hadamard I-B-VP found

thm:hosting v2 found

thm:isotropyobstruction En05-A found

thm:lapse Em02-E found

thm:latency Hawk07-E found

thm:long-neck Hawk07-E found

thm:main En09-A found

thm:main I-B-VP-CR found

thm:main v2 found

thm:massless-obstruction XVI-N found

thm:matter Hawk07-E found

thm:minimal v2 found

thm:no-throat-A v2 found

thm:noise Hawk07-D found

thm:null-throats v2 found

thm:readout I-B-ECHO found

thm:recovery Em03-F found

thm:reset I-C-Th found

thm:resonance Hawk07-E found

thm:routing v2 found

thm:settling v2 found

thm:smooth-resonances Hawk07-E found

thm:spatial-throat v2 found

thm:thermal I-C-Th found

thm:throat Hawk07-E found

thm:wave-operator Hawk07-E found

endgroup

Executed artifacts

All scripts ran in the box under setsid with a memory cap. Paths are relative to /workspace/I-D/. SHA-256 digests: begingroup toprule file sha256

midrule endfirsthead toprule file sha256

midrule endhead bottomrule endfoot inputs/I-D-plan-user.md 639dba0ff051409b43b0681444fbe6d1 newline

e62a55f33619689a74195d718433ac31

inputs/I-D-v0-user.tex 047fd5c41a0cd51e7339487e8fae8fea newline 421883ab9c28ecccc21d7da21e788140

inputs/I-D-v2-user.tex fff127b2b1c7cd07357a88086c5760e7 newline 58e02a1e6152f0edf245096a5cc09de6

inputs/I-D-v3-plan-user.md 4af0e91710bafa0dfb30274a8b5e57ca newline b5d96db239fc8e9c9d71ffd9606719ff

inputs/ref-dynamic-model-03fc590c.tex 03fc590cb4e759038b0d9a1cbd81daa2 newline 7608ec1c4b984af9e95efa3fbd9d2970

inputs/user-sheet-5e1be485.tex 5e1be4851054dbf0492f377d1ed07fd7 newline f67ee2181a632e68e8886928702d2138

inputs/user-sheet-e63e5d0f.tex e63e5d0fafeb662a4a35bfcfc8152b12 newline ffdf01ff08d58798fe1ad15bb13f31b1

v3/sources/live_(E)m03-F.tex b65388bc5014c6fe0b168ad113bbc400 newline ff02e70d34ef12ff9f31c2e5e7329970

v3/sources/live_(E)n04-A.tex c8c67d78fb0495c134eb8f72584b82e1 newline bd001908cd0c21ddd024f4e3e983e4d2

v3/sources/live_(E)n05-A.tex 48b217f2ed3b8df53ff43e6a4d7c3d0d newline d3921f462075d105828c26bbf16d5514

v3/sources/live_(E)n05-B.tex 13f7f3b5d0e052379cf9865bd670e7c1 newline 48e2beed743297c9a05d5f2550a362bb

v3/sources/live_(E)n07-B.tex 47d17b09ca8655f8537cfb35d10a2c25 newline f5f5d9af6dd1c5d036e93655c770eda8

v3/sources/live_(E)n08-A.tex cdff861a40c800284b08f689d2aed2b8 newline 3b1de64c15f753938afe404c60775c39

v3/sources/live_(E)n09-A.tex cb0a348baf52416709e98097fb016c74 newline 9d3f229d2915ac2755b3969d58fd66dc

v3/sources/live_(H)awk06-A.tex bc97a5606aec9e6af11f3341a7f77263 newline 3a17e65aad11f031697a81034f8fcfb4

v3/sources/live_(I)-B-ECHO.tex 9c3bfb55ae45db8cbf5a524a8eda907a newline c9c5e30e75c0431a9d427e0caa07a745

v3/sources/live_(I)-C-Th.tex 3d8d2a76deea9469326a2fc864368c95 newline 03eb93acea792787eb45adc4610e3f60

v3/sources/live_(O)ai265-A.tex 4f2e9f5dde4b033de38f0bdb8e227c69 newline 3a45ba47cbf18e693ceb706ab135fa19

v3/sources/live_(R)es01-B.tex be22863beb3be7443e74227aaceb166a newline 1fdc77611efdd60671d41dc9b1d0ceda

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sources/live_(I)-B-VP-CR.tex b628026b8e3b8f1b7f43d208f6994b89 newline 3985738297ba855552a1f457cdde7418

sources/live_(I)-B-VP.tex 30e2d54465ee3c8403ce241512d195f0 newline 7fc158aaa960b74ba95cd53445bd45d5

sources/live_(I)-B.tex 068bd093528f745e4604672993c922f8 newline be8bd73f1924f31c01638c7bd8c24b0b

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sources/live_(R)es02-A.tex c8f330354094d41df2b32ebfdd999696 newline f18417bd911e71b974efba03721a38ea

v3/code/build$_{v}$3.py 9528bfe7637663b10b27f76341da6188 newline b8d9a7a3dc72f7ae1582463ccb9147cc

v3/code/s10?abels.py c0f66bb71015f2cfb334b375f77b53e6 newline 0679931a920ac35c4acbb4b8729e1f67

v3/code/s3?ymbolic.py 6c306b3744635e48abfc7472c258d4cc newline 783525cf3992cf1059236b8ed326b900

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v3/code/s4_(q)nm.py ad3c0978a86bc11f237a3aef3f80ad58 newline 33adabb2f5ff75e3341387100a47c0d3

v3/code/s4b_(c)rosscheck.py 7ac872673000ba30cd05b218f090e5d7 newline adf65f6325a87b49af346469f608dc23

v3/code/s4c$_{e}$cs.py 5d3250e4a01445aefee5260ddc922753 newline ec5ebd010f3ca3f5eb45f8bb4879afa0

v3/code/s4d$_{e}$cs?est.py 882e75425c800c8c7f9c25bbf9bab940 newline 3dc6cfa6819283b6503b0b4bceb334ef

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v3/code/s5?imedomain.py 56ebed8e1da0f3b61bc7dacf0b75a07a newline f0ad8ba5b137142e53c243d25305ffbb

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v3/code/s5c$_{e}$cho.py 91c487b7901e72e0258ac6b13d256caf newline 940b058dfe2a9a0d59f90da829e03d6d

v3/code/s6?rofile?umbers.py 74eb8cda4c76d22f17239873075033d7 newline b186c0c850ca9a715f2a2c4bff0c124b

v3/code/s7?awkE?ym.py 80370bba1204ff58ee8ca9f850537d21 newline b48d11243cedb19f7f93da3b3d8442be

v3/code/s8?awkE?um.py 0d1fe17b09f99dc45dd48d2e44be582e newline 3ce1ff2ec1626f5d9f42ba1a0d45659a

v3/code/s8b?ongneck.py 7906d0d1d01395b84f5d59a369e28c76 newline 5ce86649718bd069dca4292b0e42a05c

v3/code/s9?ables.py d0bc218a5cedc202d5ade46d69b778f5 newline 19fbcbafc3aef87327431860b0c8be41

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v3/logs/qnm_(g)rid?1$_{e}$ven.npy 0f0f1164e403b2e75db3294a6deb695c newline 915884b127818b6a469381b4a5f48ba3

v3/logs/qnm_(g)rid?1$_{o}$dd.npy 512354fa8848f26f8498f1701d5244a7 newline 9e83ea65dd81d5092c1a1fc92ccbf0ef

v3/logs/qnm_(g)rid?2$_{e}$ven.npy 03b3ba93f691b906fabfe2caaadd09c9 newline 839ca31b1d01489f085778d0eb2970ef

v3/logs/qnm_(g)rid?2$_{o}$dd.npy 1e76b9e34be218144e669e5340580d14 newline 79073674efc40026c28a1fcf7258779a

v3/logs/s10?abels.json fb47c8d7c8c87325b0fb4eb840e30a42 newline a64394c3726eda11ab903cb5ff536dce

v3/logs/s3.log 415dbead366231eb104539a7f1ff2b91 newline fd0a185168e43f5b8d3a67a840093712

v3/logs/s3$_{o}$ut.json e5f7e2eaaddfa20e9f9c9956f1b58f4d newline f752445710dea2240ed9393a8352b500

v3/logs/s4_(q)nm?0.json f4a27b6ed543002528833c6d4aa983dd newline 4d1a8d0ab1831290293e4003a63068ef

v3/logs/s4_(q)nm?0.log f4f0a5862cb86657097ddbeb7c90870d newline 997f93579928a1201aba7eb01324644c

v3/logs/s4_(q)nm?1.json d273bddf945a03c5b3b407478906c03a newline 83ffd2e148fb00921aa75b21332815d3

v3/logs/s4_(q)nm?1.log 32cec8861895baa237de94d003278b8a newline 72ebc0e7d7cecadb468ee605a43b44e2

v3/logs/s4_(q)nm?2.json ed939f40265a420a7ae0a6bba3eeb50a newline da6ee112c503aeb5d0e8e70c574b8926

v3/logs/s4_(q)nm?2.log b607edcd31ea753a061a23c6728c97b2 newline a348f5e7d85358003f57fe09006c381f

v3/logs/s4b.log 332f404dc10f13d91e6dfea72bce692e newline a186ade34b0cab847c8807672fbb9d2a

v3/logs/s4b_(c)rosscheck.json bc0d419b2c15a7bd8b0157461ae08178 newline 038bbdb37543eaa694a7cfb28a5c9280

v3/logs/s4c.log 35b35ebb679c6bc4ea202675e76c1915 newline 3d34bfb8d4437591f262281ef9cabd80

v3/logs/s4c$_{e}$cs.json a842d33c1f1dab424aa50392da223796 newline 8a5b040294ffcf0d3b6127241146cd6d

v3/logs/s4e_(c)ensus?0$_{e}$ven.json 2a69a922199cb50cb76d71869a59461b newline 557dff6bb23cf90e9c8d0a693f4d0fef

v3/logs/s4e_(c)ensus?0$_{o}$dd.json 5575d5bf0b8d047bb1b9872fc3739ca6 newline 3e78ef23e64c5f82048b1853f488bae1

v3/logs/s4e_(c)ensus?1$_{e}$ven.json 8925800dfb3e1d157916911094863949 newline dd40c4c5d3aec513b70ff770b5339e4a

v3/logs/s4e_(c)ensus?1$_{o}$dd.json 6ca4c80ec16d35af6b131567eb04e9a9 newline f094eab193a6285e72fc879cc370f875

v3/logs/s4e_(c)ensus?2$_{e}$ven.json c22b7920ad8c7a1bafb936fe32eac940 newline e2f3fef8f4fbd8c236f4442260bfc92f

v3/logs/s4e_(c)ensus?2$_{o}$dd.json 4d5fb89734128661381ce9ba0150c62a newline 28a232418b8463751b19f8d22b1fb081

v3/logs/s4e?0$_{e}$ven.log a27afeea1ebc34ef26af7598ae5f2375 newline 2f462b727444800e21171a11d2ebbfbf

v3/logs/s4e?0$_{o}$dd.log 6884e9efabea4b5f958aa8f03394a2bc newline 9620066dfd765125739c4f877d4d0e5a

v3/logs/s4e?1$_{e}$ven.log 446825949fd39cd1dec0f68b05f4a88f newline 9ca251a76fb3f868a6f389b043ed8905

v3/logs/s4e?1$_{o}$dd.log 5e507d7d36790cfdc0db10206b434b98 newline 8eace4465b48dadfe6e7b3f448c0be7a

v3/logs/s4e?2$_{e}$ven.log 4ba0dfc20ce82580f659313c1e478466 newline 168bade8c1babef0bb8f7e28d24a1466

v3/logs/s4e?2$_{o}$dd.log dc87d7feb4ddfc124bc368ea258d0d76 newline 76e227d00c4f85c5ed5802c8fe90be6e

v3/logs/s4f?0$_{e}$ven.log 84a8905468b927814ba5f517b872ed0c newline 298d045868f2f36cf64df1de409e7894

v3/logs/s4f?0$_{o}$dd.log 03ef29f9b69749b492efafda3a05442a newline b8fa3b5eb56236de53fcb576f464cde6

v3/logs/s4f?1$_{e}$ven.log 025f88db3e6bd98873f65d61c1717012 newline 6383bcd2a16f6bf3fd412388fec65b18

v3/logs/s4f?1$_{o}$dd.log bd3da6a811597cc43b606ddcce45744d newline cb7a1ddc0a4432ba1fd46fbe912f1663

v3/logs/s4f?2$_{e}$ven.log 1a58978cb80591a2fe082b93cf9ca75b newline e6d008baf27e4edd264edc5c7b2d2484

v3/logs/s4f?2$_{o}$dd.log 450b486c01a5e39dccf6608257dda940 newline 0f259ff29c112f7c0d7eab03a735f639

v3/logs/s5b?ails.json 8d6b1e4014020e78bf10ba5b4975d6fa newline d90f5eb83ccaa96eca97e468e6996aed

v3/logs/s5c$_{e}$cho.json 0cac0f9a9505bd08fad9cf016b58f756 newline f74e01bc0f022bffab12ba70273bb8ad

v3/logs/s6?rofile?umbers.json c0f9ef12f093ec99afba2ad8d5d48e26 newline f7e5f530b1abe2a8ae19239f51e29765

v3/logs/s7?awkE?ym.json 82ecc66d04cd81d3bfef6bccade3c673 newline 4d622be1dfbe3ed0e429f0fef95a40dc

v3/logs/s7?ym.log f585c2943827ec9559561fe2fbcd9d86 newline b7ca31d1aae93135b56f8a8cd233124a

v3/logs/s8.log 01d05610069589f87068ff00f013a632 newline 97e5b55c9776849f20d2d4d736422c2a

v3/logs/s8?awkE?um.json 2c4a67036f8b159c7148206a626f1a94 newline 473eccec4ac5556a5e30b9a42cec4271

v3/logs/s8b.log f94c8a8c3830949003606edabd489350 newline aec3779ebda4cfb77e0607c70d99acfd

v3/logs/s8b?ongneck.json eef5fc65a6f1e08f6856c8917f60ffcb newline b67264fd36be446b8af7f6c44e3d0c1b

v3/logs/td$_{e}$cho?0.log 194b7d4c4872a0bcd2d7b8e13efd8d01 newline 47035dc729f49e0f5f01eef7187ca48d

v3/logs/td$_e$cho?0.npz 309af9131c8cc706e200971dd6208878 newline cd59678290f67dacfbfe01ee5921859a
v3/logs/td$_e$cho?1.log 037dee8ad2e1baf1aa7298e33dfa6d2a newline 04d12386711d770ccd57c9aaaa22c7ba
v3/logs/td$_e$cho?1.npz 20e451419c538880372f9bf78dad4f59 newline c9f5ad0b70982fe3fec78319c8abf964
v3/logs/td$_e$cho?2.log 071003d2fb1c8a0f117c8337b720193f newline 4951f56f489cc397b685bae81c3cc076
v3/logs/td$_e$cho?2.npz 3549e91c6f7d94819b2aa432c98971d9 newline 99fa1559b7c18cd3096f0a40394420a4
v3/logs/td$_r$ef_(b)eta0?0.npz 20498505769727 6fe498ef6a76c7abfb newline c6ad10735f803c3afcbdb6495199e406
v3/logs/td$_r$ef_(b)eta0?2.npz bffab6146d64743fb6c03e14c5600773 newline 840ee3c1860d41762887a12165ddba17
v3/logs/td$_r$ef?0.log aa3a6469bd8fbf57ae14b457c236c2ec newline 4d97cd18096962a535bceb2e13134ce8
v3/logs/td$_r$ef?2.log 9173f1a9696a652b2d65b926e537f77f newline bcb95d599c8b85b0187fa468f117bf49
v3/logs/td?ail?0.log 1139c97ecbdd72bf35c771c5a1c2cd54 newline df2b3fb157824321ea2d4b6b93b09c6d
v3/logs/td?ail?0.npz 483e46451509601ecea3781efa995242 newline d9f7155fe624a4f49cb8ff0d945f82cf
v3/logs/td?ail?1.log 29a1641b011011a96b9acac4ca03b521 newline df0d6ba273f86c27e2d7601e7caa419d
v3/logs/td?ail?1.npz 2f6cc0917591e49791ae774f0defd3b0 newline 7c38f9fb82a8765885762aba855ab2b1
v3/logs/td?ail?2.log a519be544e1ab92332342631f3a2af43 newline 681113f6d7a263ba0296c8c6141314de
v3/logs/td?ail?2.npz dae1f6f021f0fa1185bcde566336ab08 newline 9e3d40fe89c3e8a726ce48bceaab9535
v3/paper/tables.json c900fcc5e03a67b7295add11d1dd61d5 newline 56e75430db5d5ffbbce9e7b4bed623a9
endgroup

Per-item verdicts on Hawk07-F, Hawk07-G-v1, Hawk07-G-v3, and the plan

Each verdict has two parts. The *check* column says how the item was rechecked: H means by hand, N means also numerically (log-cosh $b = \delta = 1$, $\alpha = 0.5$, $L = 3$, unless stated otherwise), and S means sketch level. The *Host B* column says what transfers: B means it transfers; B_*neck* means only on $|\ell| < L_1$; B_*cond* means conditional on $\Gamma_1 = \Gamma_2 = 0$; LC means log-cosh only; and ``–'' means the item is independent of the profile. Every item is attributed to its sheet [CheungHawkF,CheungHawkG,CheungHawkGthree].

Hawk07-F-v1

begingroup 1.08 toprule Item Check Host B Verdict

midrule endfirsthead toprule Item Check Host B Verdict

midrule endhead bottomrule endfoot Hawk07-F thm:Casimir H,N B Correct. $p < 3\rho$ holds as well. Use $L = a_{\infty}L_z$ (Theorem).

Hawk07-F lem:end-limit S B (assumed) Plausible, but a sketch. Adopted as a hypothesis (Remark).

Hawk07-F thm:no-product H B Correct. It extends to every boost-invariant support (Theorem).

Hawk07-F cor:infinite-energy H B Correct. Rate $2\pi\alpha\rho R^2$. A non-transfer of v3's floor.

Hawk07-F prop:ghost H – Correct. It is elementary and does not classify every ghost quantization. v4 quantizes no phantom.

Hawk07-F thm:response H,N B_*neck* Correct for $A > 0$. Fails across Host B's $A = 0$ stretches (Theorem).

Hawk07-F cor:order-reduced H B_*neck* Correct. The second part carries a state-family hypothesis.

Hawk07-F prop:secular H,N B Correct. On Host B the U-part is unconditional and the v-part conditional (Proposition).

Hawk07-F thm:energy H B Correct. Its $D = 0$ case is v3 thm:v3-GB.

Hawk07-F thm:flare H,N B Correct. Its $v^{''}(0) + d^{''}(0)$ is made explicit by Hawk07-G. The ``small q_0'' caution is log-cosh only.

Hawk07-F thm:latency H B Correct. Needs only the quadrature a.

Hawk07-F prop:gateway H B_*neck*/B_*cond* Correct. On Host B the constants are explicit (Theorem).

Hawk07-F thm:factor H – Correct. The factorization uses only $F > 0$.

Hawk07-F prop:potential-response H B_*cond* Correct as a formula. Host-B inputs are not unique.

Hawk07-F thm:resonance-shift H formula Correct as a formula. No ω_1 on Host B.

Hawk07-F prop:Enter H – Correct. The readout supplies no stress.

Hawk07-F thm:classical H – Correct, and standard.

Hawk07-F prop:channel-errors H – Correct. Triangle inequality and contraction.

Hawk07-F thm:main H mixed Each item holds on log-cosh. Item (iv) does not transfer to Host B beyond the neck.

Header ``no compilation asserted" – – Honest for Hawk07-F. Not repeated in I-D-v4 (Section).

endgroup

Hawk07-G-v1 (superseded where Hawk07-G-v3 overlaps)
begingroup 1.08 toprule Item Check Host B Verdict

midrule endfirsthead toprule Item Check Host B Verdict

midrule endhead bottomrule endfoot Hawk07-G-v1 thm:casimir H,N B Correct. Restated in Hawk07-G-v3 thm:casimir.

Hawk07-G-v1 thm:massless H,N B Correct. Renamed Hawk07-G-v3 thm:massless-end.

Hawk07-G-v1 thm:moment H,N B (local) Correct. *Not retracted*: restated with a positive-weight form in Hawk07-G-v3. Its remark ``not determined by end limits" is sharpened by Hawk07-G-v3 thm:non-determination. On log-cosh, $\mathfrak{C} = 2.20438$ for the constant reference, matching $\rho\Gamma$ of Hawk07-G-v3.

Hawk07-G-v1 thm:ends H,N B (a,d); B_*cond* (v) Correct. Richardson values $a_2 = -0.3125$, $d_2 = 0.8125$, $v_2 = -0.375$ are reproduced to $\le 10^{-3}$.

Hawk07-G-v1 thm:chi-ends H,N LC Correct. $\mathscr{R}(100) \to -\mathfrak{C}/\eta$ agrees to about 1% (-1.1135 vs. -1.1022).

Hawk07-G-v1 thm:energy-split H B_*cond* Correct. Renamed Hawk07-G-v3 thm:energysplit.

Hawk07-G-v1 thm:flare H,N B Correct. $\dot{q}$ is exact.

Hawk07-G-v1 thm:impedance H formula Correct (Riccati $R^{'} = -R^2 - R/z - 1 + \nu^2/z^2$). In Hawk07-G-v3 it becomes eq. eq:impedance.

Hawk07-G-v1 thm:exterior-variation H formula Correct. Superseded by Hawk07-G-v3 thm:resonance/thm:evaluated-model.

Hawk07-G-v1 cor:underdetermined H – Correct. Model impedances do not fix ω_1.

Hawk07-G-v1 thm:report-floor H – Correct (dephasing attains $1 - 1/n$). Renamed Hawk07-G-v3 thm:floor.

endgroup

Hawk07-G-v3 (current Hawk07-G layer)
begingroup 1.08 toprule Item Check Host B Verdict

midrule endfirsthead toprule Item Check Host B Verdict

midrule endhead bottomrule endfoot Hawk07-G-v3 thm:casimir, thm:massless-end H,N B Correct (s11_(c)asimir.json).

Hawk07-G-v3 thm:moment H,N B (local) Correct. The weight $P(\alpha - P^{'}) \ge 0$ is checked. On Host B the local weights are $1 - F^{'}$ (neck) and $\alpha - F^{'}$ (mantle), as in Theorem .

Hawk07-G-v3 lem:profilemoments H,N LC Correct. $J_0, J_1, \int PT$ agree to 10^{-14}.

Hawk07-G-v3 thm:moment-bound H,N LC (form B) Correct. $\rho\Gamma = 2.204377$ equals our independent $\mathfrak{C} = 2.20438$. The bound is *conditional* on an interior deviation bound; it is not an evaluated stress. The Host-B analogue is $\Gamma_1 = \rho\Gamma_{B,1}$.

Hawk07-G-v3 thm:non-determination H,N B (adapted) Correct (IBP rechecked: 3.754975 both ways). It supersedes v1's moment remark. On Host B its sign is region-dependent (Proposition).

Hawk07-G-v3 thm:compact-Lipschitz H B_*neck* Correct. Needs $A_R > 0$, so on Host B it is vacuous for $R \ge L_1$.

Hawk07-G-v3 cor:quadratic-remainder H LC Correct. The residuals are rechecked ($r_U = \kappa\rho(1 - rw)$). The

geometric defect contains $p_{1q}/A \sim e^{\eta r}$, so using the quadratic law in the interior is very costly; this is G's own point.

Hawk07-G-v3 thm:weighted H LC Correct ($B/\ell \le C\ell A$; Gronwall with $\int \ell^3 A < \infty$). *Not* uniform smallness on the ends. It fails on Host B because $h = P'''/P''$ is undefined where $P'' = 0$.

Hawk07-G-v3 thm:ends, thm:chi-ends H,N see v1 As for v1. On Host B, the finite-distance analogue is Theorem (c).

Hawk07-G-v3 thm:warpedenergy H B Correct. Same as Hawk07-F thm:energy.

Hawk07-G-v3 thm:energysplit H B_*cond* Correct. On Host B the boundary term vanishes beyond r_1 (Proposition).

Hawk07-G-v3 thm:threepart H,N B_*cond* Correct. Eq. eq:vacuumvolume is checked numerically (22.393820 both ways, $R = 7$). Needs ass:energytail. Its Host-B ledger $E_+ = 4\pi(1-\alpha)/\kappa$ matches v3.

Hawk07-G-v3 thm:flare H,N B Correct. The ``exponentially small q_0" remark is log-cosh only; Host-B $q_0 = 1/b^2$.

Hawk07-G-v3 lem:trace H – Correct.

Hawk07-G-v3 thm:massless-response H LC Correct *as a conditional source-level limit*. No massless state is constructed, and I-B-VP does not supply one.

Hawk07-G-v3 thm:resonance H formula Correct as a formula. No Host-B ω_1.

Hawk07-G-v3 thm:evaluated-model H,N exterior form B Correct ($\mathfrak{B}' = V_0' f^2$; Hankel form). Host-B's unperturbed exterior is exactly of this form, but the slab is a model. Not a Host-B echo number.

Hawk07-G-v3 thm:smoothing H model Correct. The analytical enclosure concerns the model only.

Hawk07-G-v3 lem:band, thm:variance H,N – (state-dependent) Correct, but not sharp: the double sum is $\le \zeta(3)$, not merely $\le 2^{10}\zeta(3)$ (partial sum 1.0043). The constants C_h, C_g are not evaluated. This is a smeared vacuum variance, *not* a detector channel.

Hawk07-G-v3 cor:varianceprojection H – Correct (triangle inequality in Hilbert space).

Hawk07-G-v3 prop:report, thm:floor H – Correct and standard. The multiplier is not a detector.

Hawk07-G-v3 thm:main H mixed Correct on log-cosh. Host-B transfer as typed above.

Header ``no compilation asserted" – – Honest for the sheet. Not applicable to I-D-v4.

endgroup

Plan items

begingroup 1.08 toprule Item Outcome Verdict

midrule endfirsthead toprule Item Outcome Verdict

midrule endhead bottomrule endfoot U5 earned With the end contract assumed. Non-transfer typed. No Host-A inheritance and no A+B sum.

U6 partly Neck: earned. Beyond the neck: conditional and non-unique (P1). Hawk07-F prop:secular on Host B: U -part earned, v-part conditional.

U7 earned Energy and flare unconditional where marked. Latency in lab time. Plan correction P2 (q_0).

U8 not earned Not certified, and no analytic bound (P5). Floating recheck only.

U9 earned (typed) Non-construction over the named classes. We stop there (P6).

``No compilation" verdict Correct for the sheets and inapplicable to I-D-v4.

endgroup

Open table

begingroup toprule Open item What would close it

midrule endfirsthead toprule Open item What would close it

midrule endhead bottomrule endfoot Host-B ground state and end contract Construct the state and prove

Hawk07-F lem:end-limit on Host B.

Γ_1, Γ_2 for the actual vacuum An evaluated or enclosed interior stress on Host B.

Global Host-B response *Γ_1 = Γ_2 = 0* plus a selection rule for the free mantle constants, or a modified support with *A > 0*.

Certified census / |*Im ω*| bound A validated interior transfer matrix with winding counts on ball covers, or an analytic estimate.

Host-B *ω_1* Host-B impedance variations from an actual response.

Host-A pulse source A source outside classes (i)–(iv) of Theorem ; v4 stops.

Seven ledger entries As in Section . *O. 1 = texttt NOT_CLOSED.*

endgroup

Label audit

Every textbackslash src{prefix:label} in the new v4 parts was matched to the nearest preceding source token and checked to exist as a textbackslash label in that source (s20?abels.py, s20?abels.json). The *v3* source is I-D-v3-user.tex; ``Hawk07-G-v1'' and ``Hawk07-G-v3'' are kept distinct. begingroup toprule Label Source Status

midrule endfirsthead toprule Label Source Status

midrule endhead bottomrule endfoot ass:energytail Hawk07-G-v3 found

ass:source Hawk07-G-v3 found

cor:infinite-energy Hawk07-F found

cor:order-reduced Hawk07-F found

cor:quadratic-remainder Hawk07-G-v3 found

cor:underdetermined Hawk07-G-v1 found

cor:v3-floor v3 found

cor:varianceprojection Hawk07-G-v3 found

def:island Hawk06-A found

entry:Emergence Res01-A found

entry:G01 Res01-A found

entry:G3 Res01-A found

entry:G4 Res01-A found

entry:G7 Res01-A found

entry:Page Res01-A found

entry:Relational Res01-A found

eq:chi Hawk07-F found

eq:flare-shift Hawk07-F found

eq:impedance Hawk07-G-v3 found

eq:neck v3 found

eq:v Hawk07-F found

eq:v3-hB v3 found

eq:vacuumvolume Hawk07-G-v3 found

lem:band Hawk07-G-v3 found

lem:end-limit Hawk07-F found

lem:profilemoments Hawk07-G-v3 found

lem:trace Hawk07-G-v3 found

prop:Enter Hawk07-F found
prop:channel-errors Hawk07-F found
prop:gateway Hawk07-F found
prop:ghost Hawk07-F found
prop:not-source v3 found
prop:potential-response Hawk07-F found
prop:report Hawk07-G-v3 found
prop:secular Hawk07-F found
prop:v3-V v3 found
prop:v3-letelier v3 found
prop:v3-nonid v3 found
rec:AL Oai265-A found
rem:not-premise OpenAI found
sec:v3-spectrum v3 found
tab:v3-qnm v3 found
thm:Casimir Hawk07-F found
thm:SD Prob02-A found
thm:T3 Prob02-A found
thm:casimir Hawk07-G-v1 found
thm:casimir Hawk07-G-v3 found
thm:chi-ends Hawk07-G-v1 found
thm:chi-ends Hawk07-G-v3 found
thm:classical Hawk07-F found
thm:compact-Lipschitz Hawk07-G-v3 found
thm:cone En05-A found
thm:ends Hawk07-G-v1 found
thm:ends Hawk07-G-v3 found
thm:energy Hawk07-F found
thm:energy-split Hawk07-G-v1 found
thm:energysplit Hawk07-G-v3 found
thm:evaluated-model Hawk07-G-v3 found
thm:exact En07-B found
thm:exterior-variation Hawk07-G-v1 found
thm:factor Hawk07-F found
thm:flare Hawk07-F found
thm:flare Hawk07-G-v1 found
thm:flare Hawk07-G-v3 found
thm:floor Hawk07-G-v3 found
thm:gtd I-B-ECHO found
thm:hadamard I-B-VP found
thm:impedance Hawk07-G-v1 found
thm:lapse Em02-E found

thm:latency Hawk07-F found

thm:long-neck Hawk07-E found

thm:main En09-A found

thm:main Hawk07-F found

thm:main Hawk07-G-v3 found

thm:main I-B-VP-CR found

thm:massless Hawk07-G-v1 found

thm:massless-end Hawk07-G-v3 found

thm:massless-obstruction XVI-N found

thm:massless-response Hawk07-G-v3 found

thm:moment Hawk07-G-v1 found

thm:moment Hawk07-G-v3 found

thm:moment-bound Hawk07-G-v3 found

thm:no-product Hawk07-F found

thm:non-determination Hawk07-G-v3 found

thm:recovery Em03-F found

thm:report-floor Hawk07-G-v1 found

thm:resonance Hawk07-G-v3 found

thm:resonance-shift Hawk07-F found

thm:response Hawk07-F found

thm:response Hawk07-G-v3 found

thm:smoothing Hawk07-G-v3 found

thm:thermal I-C-Th found

thm:threepart Hawk07-G-v3 found

thm:v3-GB v3 found

thm:v3-gateway v3 found

thm:v3-nogo v3 found

thm:v3-sigma v3 found

thm:variance Hawk07-G-v3 found

thm:warpedenergy Hawk07-G-v3 found

thm:weighted Hawk07-G-v3 found

endgroup

Artifacts and SHA-256 digests

Inputs (read-only), v4 code, and logs. Rebuild: python3 code/build_v4.py followed by pdflatex three times; see code/rebuild_v4.sh. Code s11–s18 reuses the v3 profile module v3/code/s4_profile.py and the v3 census logs. begingroup toprule File SHA-256

midrule endfirsthead toprule File SHA-256

midrule endhead bottomrule endfoot inputs/Hawk07-F-v1-user.tex 5644245911e8012a5ea2dd013bc94146 newline f609c53289977e87d19f30d86450472e

inputs/Hawk07-G-v1-user.tex a5d8c38a9d6f53f7eceefd9b9561ec67 newline 5a93302f12b82b8818655854b66d5a88

inputs/Hawk07-G-v3-user.tex fb1db695c29a900295bb6d566577a9b2 newline 136068d20db498617184ece3c244a413

inputs/I-D-plan-user.md 639dba0ff051409b43b0681444fbe6d1 newline e62a55f33619689a74195d718433ac31

inputs/I-D-v0-user.tex 047fd5c41a0cd51e7339487e8fae8fea newline 421883ab9c28ecccc21d7da21e788140

inputs/I-D-v2-user.tex fff127b2b1c7cd07357a88086c5760e7 newline 58e02a1e6152f0edf245096a5cc09de6

inputs/I-D-v3-plan-user.md 4af0e91710bafa0dfb30274a8b5e57ca newline b5d96db239fc8e9c9d71ffd9606719ff

inputs/I-D-v3-user.tex e74c1e117bb33debb3d237046136f753 newline c8964d4c4aa9ec5af459d73349d1972e

inputs/I-D-v4-plan-user.md 80a1da6141fb38484ea5febe89cc170c newline 1fdf45714972ace93692bf9f37fb5c90

inputs/ref-dynamic-model-03fc590c.tex 03fc590cb4e759038b0d9a1cbd81daa2 newline 7608ec1c4b984af9e95efa3fbd9d2970

inputs/user-sheet-5e1be485.tex 5e1be4851054dbf0492f377d1ed07fd7 newline f67ee2181a632e68e8886928702d2138

inputs/user-sheet-e63e5d0f.tex e63e5d0fafeb662a4a35bfcfc8152b12 newline ffdf01ff08d58798fe1ad15bb13f31b1

v4/code/build$_{v}$4.py 014b108ae309e3f7259bbbf2d81c81be newline 1123a5d0a73d69d5b6b9f28fd067cae4

v4/code/s11_(c)asimir.py 3a76a9f70c47093fe0e9c11cd8a7b95f newline 013aa2a7544bbe95c980f0bfbf2534b8

v4/code/s12$_{r}$esponse?ym.py 37571e642d68544f4d7e1d2a55c65ec6 newline cef773b2b9494f96153bb6c44f37de0e

v4/code/s13$_{r}$esponse?um.py 11b097a67b2c4c312a2f43e7d173326a newline 34766462d31f4033d650bc46f8badaa8

v4/code/s14?ostB?ransfer.py c187c401a1b6d0438d959f0c6b4a18a0 newline 27456498a28fee9d2c66163c4de8fdd8

v4/code/s15_(c)ensus$_{r}$echeck.py 24799a3f2982bd119d3affb7ce01b4d9 newline 102478e10c1cfe5ae17e7216981bac99

v4/code/s16?ostA.py e47360ed0ea9bfc41cb846d171db1031 newline ceeeca96ecbb754610086c1bd3cd43d2

v4/code/s17?ostB$_{e}$nds.py 260993f26c5c304ee4f37517fa6d8b72 newline 77f8290f11994b389218f0e95b7cca80

v4/code/s18?awkG3_(c)hecks.py 4bbcec23f3ed3f022a13ffb76528510e newline 9b4623a6698d2db668387fd890a3801e

v4/code/s20?abels.py bf69048b63b8e9dbd8ce963ff11cbf42 newline 93eb99cb3a1029da77677843254000c9

v4/logs/s11_(c)asimir.json e890f6f918581df6360839eef85543d3 newline 76dced8c0c0cacc7d5ffeea8f6600a7f

v4/logs/s11_(c)asimir.log d9dddbf3fe4b080499124fe9b7596ba7 newline 63992128db5361c9a3c4b2afe6c92529

v4/logs/s12$_{r}$esponse?ym.json c8b5d712431529c0fbd132475a773da7 newline bedb4178ba5cb9e2f48fa4940dbb7eaf

v4/logs/s12$_{r}$esponse?ym.log 104ce5b6e84ff86acf36c59f92e0e0d6 newline 86e2c7b7bf693731056879160528a9c0

v4/logs/s13$_{r}$esponse?um.json 69a52eb249c79d2e4acdcf6758330f9f newline 38af014d0b23b6680193c89e5ef06121

v4/logs/s13$_{r}$esponse?um.log 35d01f67b0d0b68a4fd9b7bdf1d91995 newline 85dc0c5dd7449af0ea0f6662495f9ab2

v4/logs/s14?ostB?ransfer.json 02b7ed731588f842838ddffc9c94baa6 newline 8f0a25bc3a3add2fd5ac9aed94ffda5c

v4/logs/s14?ostB?ransfer.log 6403cc92351a35e7b76180c84597cf77 newline 57b70d4a8ae7d77a3cac84432cce0bcd

v4/logs/s15_(c)ensus$_{r}$echeck.json 99c78d6b2463a93d2d5ff3802edf599f newline d2d5d2620b1d60c024cc116451d91a4e

v4/logs/s15_(c)ensus$_{r}$echeck.log e8607e9eeaa003fcd2d188d4efdc0d68 newline ebbb9e60c5770ef9524b623d0a43159e

v4/logs/s16?ostA.json cc2629b5fa3a6dae0b8d67bdd5931b97 newline bd5f5f9da54a2281bf50cc86eb2f40d0

v4/logs/s16?ostA.log e4d185f2ce0e9f88e9c9201d8aa85201 newline bc90f59de0a1e3265c19e7db4f0dd8a5

v4/logs/s17?ostB$_{e}$nds.json 1c346ff2ece7dadbdb1a9b623e3f7467 newline 8a17f668cdcd3492ba96e1479bfed4bd

v4/logs/s17?ostB$_{e}$nds.log 0001d6db28540f8912d3a8328a9799ab newline bfd6c5827281d02f1d72dde01f250692

v4/logs/s18?awkG3_(c)hecks.json 5f9de2dc40dcbc97d06b5d43bdbd8cea newline e92ae4273c2bf08a05dff818e9bb8097

v4/logs/s18?awkG3_(c)hecks.log c7b23011367a8fa78aabeafd9e54c678 newline f7d08a75bc7dd5dbcae9a520d55c227e

v4/logs/s20?abels.json 85bd7308ace2b27efe7aa8ce7a3a171c newline 8f1ab012eeb4aceedcdbdc18fa83c840

endgroup

Per-item verdicts for v5

The v4 verdicts (Appendix) still apply. v5 changes or adds the following. begingroup 1.08 toprule Item Outcome Verdict

midrule endfirsthead toprule Item Outcome Verdict

midrule endhead bottomrule endfoot Plan U8 earned (computer-assisted) Theorem . Computer-assisted (Arb), in-box only.

Plan U9 (ext.) earned; ξ open Theorems , ; Proposition .

Plan U6 (f.-up) negative, typed Proposition ; open item U6-sel.

Plan housekeeping done The column widths of the retained verdict tables are rebalanced. The ledger has v5 sentences.

v4 Prop. superseded Its floating roots agree with the enclosed zeros to within 1.3×10^{-11}; the certified bound is 0.12816.

v4 Thm. extended Unchanged; Theorem adds classes (i)–(v).

Hawk07-G-v3 thm:variance corrected The constant is $3/8\zeta(3)$ (Correction). It is still not a detector channel.

Hawk07-G-v3 lem:band unchanged As in v4; C_h, C_g are not evaluated.

endgroup

Open table

begingroup toprule Open item What would close it

midrule endfirsthead toprule Open item What would close it

midrule endhead bottomrule endfoot Host-B ground state and end contract Construct the state and prove Hawk07-F lem:end-limit on Host B.

U6-sel (Γ_1, Γ_2, free constants) A physical selection rule (state or action) fixing the support σ, χ on the flats, and the mantle constants.

Global Host-B response U6-sel, or a modified support with $A > 0$.

Census outside the U8 box Extend the ball-arithmetic certificate to $\mathrm{Re}\,\omega < 0.05$, $|\mathrm{Im}\,\omega| < 0.005$, larger boxes, and $|m| \geq 3$.

Analytic damping law An analytic $|\mathrm{Im}\,\omega|$ bound for Host B (the v5 bound is computer-assisted and in-box).

Host-B ω_1 Host-B impedance variations from an actual response.

U9-ξ Decide the overdetermined system of Proposition (c): either a solution (a scoped classical subgate, not a programme source) or an obstruction.

Host-A pulse source Outside every class excluded in Theorems and , and necessarily NEC-violating; v5 stops.

Seven ledger entries As in Section . $O.1 = \texttt{NOT_CLOSED}$.

endgroup

Label audit

Every textbackslash src{prefix:label} in the new v5 parts was matched to the nearest preceding source token and checked to exist as a textbackslash label in that source (s20?abels$_{\mathrm{v}}$5.py, s20?abels$_{\mathrm{v}}$5.json). begingroup toprule Label Source Status

midrule endfirsthead toprule Label Source Status

midrule endhead bottomrule endfoot cor:quadratic-remainder Hawk07-G-v3 found

def:island Hawk06-A found

entry:Emergence Res01-A found

entry:G01 Res01-A found

entry:G3 Res01-A found

entry:G4 Res01-A found

entry:G7 Res01-A found

entry:Page Res01-A found

entry:Relational Res01-A found

eq:G00 v2 found

eq:G0x v2 found

eq:Gzz v2 found

lem:band Hawk07-G-v3 found

lem:end-limit Hawk07-F found

prop:potential-response Hawk07-F found

prop:v3-V v3 found

thm:Einstein v2 found

thm:SD Prob02-A found

thm:T3 Prob02-A found

thm:main En09-A found

thm:massless-obstruction XVI-N found

thm:variance Hawk07-G-v3 found

endgroup

Artifacts and SHA-256 digests

These are the inputs (read-only), the v5 code, and the v5 logs. To rebuild, run code/rebuild_v5.sh. The frozen trees were hashed before and after this work, with find . -type f | LC_ALL=C sort | xargs sha256sum | sha256sum: XVI-P ec965c15ae25cd3b…, XVI-Q 0df9a0d10409d31a…, XVI-R 57187bc6825f5c6a…. These are unchanged (frozen_(c)heck$_{v}$5.txt). begingroup toprule File SHA-256

midrule endfirsthead toprule File SHA-256

midrule endhead bottomrule endfoot inputs/Hawk07-F-v1-user.tex 5644245911e8012a5ea2dd013bc94146 newline f609c53289977e87d19f30d86450472e

inputs/Hawk07-G-v1-user.tex a5d8c38a9d6f53f7eceefd9b9561ec67 newline 5a93302f12b82b8818655854b66d5a88

inputs/Hawk07-G-v3-user.tex fb1db695c29a900295bb6d566577a9b2 newline 136068d20db498617184ece3c244a413

inputs/I-D-plan-user.md 639dba0ff051409b43b0681444fbe6d1 newline e62a55f33619689a74195d718433ac31

inputs/I-D-v0-user.tex 047fd5c41a0cd51e7339487e8fae8fea newline 421883ab9c28ecccc21d7da21e788140

inputs/I-D-v2-user.tex fff127b2b1c7cd07357a88086c5760e7 newline 58e02a1e6152f0edf245096a5cc09de6

inputs/I-D-v3-plan-user.md 4af0e91710bafa0dfb30274a8b5e57ca newline b5d96db239fc8e9c9d71ffd9606719ff

inputs/I-D-v3-user.tex e74c1e117bb33debb3d237046136f753 newline c8964d4c4aa9ec5af459d73349d1972e

inputs/I-D-v4-delivered.tex 1927610d9a48c8843c77aa748ede654d newline 232dcdc59e20b56fca4066237cf37d8b

inputs/I-D-v4-plan-user.md 80a1da6141fb38484ea5febe89cc170c newline 1fdf45714972ace93692bf9f37fb5c90

inputs/ref-dynamic-model-03fc590c.tex 03fc590cb4e759038b0d9a1cbd81daa2 newline 7608ec1c4b984af9e95efa3fbd9d2970

inputs/user-sheet-5e1be485.tex 5e1be4851054dbf0492f377d1ed07fd7 newline f67ee2181a632e68e8886928702d2138

inputs/user-sheet-e63e5d0f.tex e63e5d0fafeb662a4a35bfcfc8152b12 newline ffdf01ff08d58798fe1ad15bb13f31b1

v5/code/build$_{v}$5.py 9dfbf15a589fb5ece3679abd27720bbf newline db5455a47b49bad06e7fc544b0c2ee46

v5/code/s20?abels$_{v}$5.py 1517299afb774800f5938796a97dd6cb newline 46022352f3fff799664d833e3684e65b

v5/code/s21_(c)ert.py 5b4994496fe2d583519d3c66546360d9 newline 7ad706198c768d30a67721964b4c1c33

v5/code/s21?ost.py 34d015e32cbe09169e31ab43911bc2e7 newline 107c80c4819bde6e6e0351a122c71d1f

v5/code/s21$_{r}$un.py f51e70feb2e3379091fd5a695d9c3a1c newline 265a3c5bd164a0fbe9d4b09dc3040691

v5/code/s22?ostA_(c)lasses.py 1fd35b7b2acc68763076b44dc54c64ab newline ad5eb4f1bda92d5edf0502599dfaea5e

v5/code/s23_(U)6_(f)ollowup.py f23276044eef788c22b5f42010544891 newline feebf95486bac582ce9732cade2811de

v5/code/s24?ables.py 1646cdb7cda40a13212d8a2d773a847c newline f26fea34a9f01990cd041576134e804a

v5/code/frozen_(c)heck.sh baf96b426b83ce9b441e6afb5e719e1a newline 12e0e177c3254fced136a2cd43ab246d

v5/code/rebuild$_{v}$5.sh a174b806facc5c2dfd585d6858db37d4 newline aef22147ecfa12fc6554eca8d99ff497

v5/logs/frozen_(c)heck$_{v}$5.txt b2baa645394f6b7ceaea41f74ede35a8 newline 669bc2a7eff2a3a30a1986963f1efaf5

v5/logs/s20?abels$_{v}$5.json cfcffd68b6ac7a9f0843f932570f51f4 newline 6c3e5cd157d8916398de7b3404ceb583

v5/logs/s21_(c)ert?0$_{e}$ven.json f93e1cd136e604cb3df7c4e93def77ad newline a8c5b3fa6ee4ac4ca8a62e711361f85e

v5/logs/s21_(c)ert?0$_{o}$dd.json 665aa474f4f1c95c0d04bc492a913238 newline d535fc7765fd5900ddf133c6016eed9f

v5/logs/s21_(c)ert?1$_{e}$ven.json 8ccb8e10d3ac0cdfc239f0641bd0d66a newline 69618fb3ac81cee43373ed25e24c8d98

v5/logs/s21_(c)ert?1$_{o}$dd.json 580c98232ae0c5ba7526b823b16a797d newline 5cf2d22eb7c857a878ee502fe886909c

v5/logs/s21_(c)ert?2$_{e}$ven.json eb1c23ac21be95848af3af8a1667ed5f newline 2a6185f2f6cbbfe9a6395a63931574e1

v5/logs/s21_(c)ert?2$_{o}$dd.json edffa91bee884dcd51b18b5bd267fe1d newline 740f4fae0efe68c98141d302248211ba

v5/logs/s21?0$_{e}$ven.log 5832b3c5cb020437d23824858a64975c newline 078109597f13008ee168ab96da0f635b

v5/logs/s21?0$_{o}$dd.log d27ff79dca66849548a51fbe5a34912e newline 28dcc933f6d476e4960d3c6feec18cc9

v5/logs/s21?1$_{e}$ven.log 49b9c66a4504b2a7f6fda0c09462f551 newline ddc57cf5672fac300eaf6b2e56fbb22e

v5/logs/s21?1$_{o}$dd.log 7e8eed0c8bdcd1e0e1c4c886e8617454 newline bf2d51f79884481d8a44a4371a8db4c9

v5/logs/s21?2$_{e}$ven.log c82815e9e77026d7297e5b8309ae074d newline e44e74d2e31296324e6795780e4095cf

v5/logs/s21?2$_{o}$dd.log f01feecffa1b762c5fa1c67b2b97188b newline 7b25136f5f7a4b13020df054e2da4e2f

v5/logs/s21?ost.json 8bad4857c67c316bc444b48a68c43f64 newline 0891925c217a10d7761287d87ac5bd39

v5/logs/s21?ost.log f81c90c0c503e7207ea3e8b992fe7621 newline 84b038da7fe48cb467663cd1187988bd

v5/logs/s22.log 370a7cbb1a8b424531c2c6c95eee1467 newline cb2979cec89d8292eb08aa13585bfbfb

v5/logs/s22?ostA_(c)lasses.json cc058391ff1ef6c359bb52485622d00b newline 458a2cfa020a4628fa8d4f96236b6ed0

v5/logs/s23.log c5402190466b27bfa6ee0766f1cd61eb newline 8d2f1d07531d6548d18394b70f13450d

v5/logs/s23_(U)6_(f)ollowup.json b98d1b0e9f6deb525a71d86fd307c654 newline 4c986019caa632459df1844fac0bd5ea

endgroup

Declarations

Physical scope. Both hosts remain prescribed. The semiclassical layer is first-order and local, and no global or nonlinear solution is claimed. No observational claim is made.

Execution status. This file was compiled with pdflatex. The scripts of Appendix were executed. The U8 census uses Arb ball arithmetic and is computer-assisted. Other numerics use double precision, or mpmath where stated. No proof-assistant check or independent referee verification is asserted.

Artificial-intelligence assistance. An AI assistant helped with computation, source consultation, consistency analysis, and preparation. This is not referee review or proof certification.

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N. Cheung, manuscript records En05-A, En05-B, and En06-A, version 1. Enter Calculus Companion; supplied schedule-locality and transport excerpts. https://enter.grok.me/browse/En05-A. https://enter.grok.me/browse/En05-B. https://enter.grok.me/browse/En06-A.

N. Cheung, manuscript record En08-A version 1. Enter Calculus Companion; supplied theorem thm:main, failure of reconstruction from scheduler consistency, and its separately conditioned representation result. https://enter.grok.me/browse/En08-A.

N. Cheung, manuscript record En09-A version 1. Enter Calculus Companion; supplied destructive-clock, conditional-covariance, and observation-boundary excerpts. https://enter.grok.me/browse/En09-A.

N. Cheung, manuscript records En07-B and En09-A, version 1. Enter Calculus Companion; supplied complete-output restoration, outgoing-recovery, and conditional clock-interface excerpts. https://enter.grok.me/browse/En07-B. https://enter.grok.me/browse/En09-A.

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Supplied version-qualified comparisons only; no complete version-8 proof audit is claimed in this paper. https://enter.grok.me/browse/Prob02-A. https://enter.grok.me/browse/Prob04-A.

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