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I-B-G-Q-C-CERT: A Conical Coefficient Certificate for the Diagonal Slot of the Two-Current Product

Injectivity of the slot and exact two-point certificates; the flat running $-1/(24\pi^2)$ proved locally; contact differences, normalization and the scope of the Δ_4 statement; a conditional running constant, the total diagonal, and the dilated boundary value

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Abstract

This is version 7 (book edition t427u; file CERT-v2) of the standalone certificate sheet I-B-G-Q-C-CERT-v2. It contains version 5 (I-B-G-Q-C-CERT-v5, which contains versions 4, 3, 2 and 1; all stay untouched) and adds the items of request t268u (no plan was attached), superseding version 5 by addition; errors of earlier versions found in version 6 are recorded in Section . The parent sheet I-B-G-Q-C (latest version I-B-G-Q-C-v8) is cited as a source record only and is not revised.

On the prescribed cone with deficit parameter $0 < \alpha \leq 1$, take the parent's declared boundary value and the c-number two-current products that agree with it off the diagonal, satisfy the Ward identity in both arguments, are symmetric, and differ from one another by Lorentz-covariant constant-coefficient diagonal terms of order at most two. We prove that, once one such product T_0 is given, they are exactly $T_0 + c\,(\partial_a\partial_b - \eta_{ab}\mathrm{Box})\delta(x - x')$ with $c \in \mathbb{C}$: one slot. The slot maps affinely and injectively to the characteristic coefficient χ_F read by a fixed test tensor. No rule of the admitted conical data reproduces it for two slot values, and every such rule has infinite worst-case error. At order p the $\lfloor p/2 \rfloor$ slots map bijectively. The order-zero diagonal term is not a slot: the parent forces it to a function of α, so a certificate for it would be false. The boundary value stays declared new data. The four-current product stays off the total diagonal, and the certificate stays RG-open: in the flat Euclidean source the scale moves

along the slot. The inherited characteristic coefficient is not admitted.

New in version 2. (i) In the flat Euclidean model, the free-field product $\Pi^{(v)} = c_0 D^{\mathrm{E}} u_v$ satisfies descent and the Ward identity, and its scale derivative is exactly $-\frac{1}{24\pi^2} D^{\mathrm{E}} \delta_0$; the constant is derived here as $2\pi^2 c_0$ from $\mathrm{Vol}(S^3) = 2\pi^2$ and the declared off-diagonal datum, whose Wick derivation is taken from the source record. Every covariant conserved extension of order at most two is $\Pi^{(v)}$ for exactly one v, and a prescribed normalization holds for exactly one member. So, in that model, scale and slot are the same datum and the RG-open status is a theorem. (ii) The slot count $\lfloor p/2 \rfloor$ does not depend on α. (iii) On the cone, a prescribed value of χ_F holds for exactly one member: the plan's ``descent, Ward and normalization cannot hold together'' is false as stated; what holds is ``for exactly one member, never for two''. (iv) χ_F is a named coefficient of the declared data, not the inherited one. (v) No cosmological-type contact term is admitted, so the slot is not a vacuum-energy term. (vi) Under a declared record of the parent's four-current construction, no choice inside the admitted family completes it at Δ_4; this is a negative inside the family, not a permanent no-go.

New in version 3. (i) For two slot values the exact minimax error of a rule that omits the slot is $|c_1 - c_2|/2$, on a real interval half its length, on the real line infinite; changing the reference product only reparametrizes the slot. (ii) A smooth order-zero contact term $a(x)\eta_{ab}\delta(x - x')$ added to a Ward-satisfying product preserves the Ward identity only for $a \equiv 0$; this concerns differences and does not exclude an order-zero term forced inside a complete product, such as the parent's recorded representative. (iii) Under (H), (H4) and a supplied global difference, slot substitution transports extendability at Δ_4 but does not complete the recorded construction. (iv) Documentary comparisons with DS-OB-1-CERT, Red06-G-DSS-CERT, VC-OB-1-CERT, the Casimir CERT sheets, En08-ST-DSS-CERT and V-DST-DSS-CERT share only the omitted-parameter logic. No version-2 statement was found to be false.

New in version 4. (i) The slot direction D is transverse, symmetric and of pure order two, and a test-function pairing separates it from every vacuum-energy-type term $\rho\,\eta_{ab}\delta(x - x')$ without using the Ward identity; this re-proves and sharpens the version-2 statement that the slot is not a vacuum-energy term. (ii) Readings of DS-OB-1-CERT-v2, the Casimir certificates of Hawk07-F/G/H-CERT-v3, VC-OB-1-CERT-v2 and

Red06-G-DSS-CERT-v3; the plan's ``both concern differences'' is accurate only for the contact statement, and its line ``the hosts and the named quantities differ'' is false inside the de Sitter group. No version-3 error was found.

New in version 5. (i) Under a declared dilation-stability hypothesis (Hdil), the admitted family carries a unique running constant β_{α} with $S_{\lambda}T_{c} = T_{c+\beta_{\alpha}\log\lambda}$. The value of β_{α} is not derived, and (Hdil) is not verified for the parent. (ii) At the total diagonal Δ_{4}, a Ward-satisfying extension of the four-current product, if one exists, is never unique: there is an explicit conserved term of order eight. Among constant-coefficient differences at most one extension is dilation-invariant. Existence stays open. (iii) Readings of V-DST-DSS-CERT-v4, DS-OB-1-CERT-v3, VC-OB-1-CERT-v3 and Hawk07-F/G/H-CERT-v3. No version-4 error was found (Section).

New in version 6. (i) If the parent's boundary value commutes with dilations (declared hypothesis (BV)), then G_{α}^{bv} is homogeneous of degree -2 and $\mathrm{B}[G_{\alpha}^{\mathrm{bv}}]$ is dilation-invariant off the diagonal; (Hdil) then reduces to the constant-coefficient, order-two form of the diagonal remainder $S_{\lambda}T_{0} - T_{0}$, which stays open. (ii) A declared window $[c_{1}, c_{2}]$ for the slot value would give least worst-case error $(c_{2} - c_{1})/2$; no window is declared. (iii) Readings of the newly delivered companions. The value of β_{α} and existence at Δ_{4} stay open.

That some product satisfies the admission conditions is recorded in the parent; this sheet uses it as a declared hypothesis (H), not as an imported proof. The parent and the other cited sheets are source records, not premises. No quantum coefficient is admitted. Host C is not created; Host A and Host B stay separate. O.1 stays NOT_CLOSED. XVI-N is not discharged (N-Ins.4 unresolved), and there is no Route-B successor. XV-B is not opened. H2, I3 and T3 stay unresolved; J2 stays Unresolved. U6-sel is not moved. Res02-A Q1–Q4 and A1–A2 stay open. The last reading bars (quantized observable, no external clock) stay open. No Einstein dynamics, derived metric, spacetime emergence, external-clock removal or Page curve is claimed. Gate 0 stays NOT_SUPPLIED, and thm:J is not substituted. Continuum acquisition stays a negative certificate. No compilation is asserted. Citations identify source records only; no proof transfer. Authorship requires confirmation. Nothing is pushed or registered.

Bibliographic record

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I-B-G-Q-C-CERT-v2 (math v7): A Conical Coefficient Certificate for the Diagonal Slot of the Two-Current Product Injectivity of the slot and exact two-point certificates; the flat running $-1/(24\pi^2)$ proved locally; contact differences, normalization and the scope of the Δ_4 statement; a conditional running constant, the total diagonal, and the dilated boundary value Ngo Cheung (authorship requires confirmation)

Author note. The title page names Ngo Cheung. Authorship requires confirmation. No compilation is asserted. Not registered; nothing written to any site.

Book edition note (t427u)

Standing Enter refusals, scope vocabulary (proved here/supplied input/conditional/ not constructed/not claimed), the four-layer instrument box, and Scholar bibliography policy are frozen in the companion chapter *I-B-G Book Ledger* v1. O.1 remains NOT_CLOSED; XVI-N is not discharged; XV-B is not opened; no Host C, Page/island, or spacetime-emergence claim; no quantum coefficient is admitted; wired=false; SOURCE_DATE_EPOCH=1792627200. This sheet is a companion manuscript record and is *not* claimed to be

Google Scholar-indexed. The published Enter Calculus article is cited only for finite-instrument / operational interface discussions, never as a PDE premise.

Book expansion: separation table, slot/minimax pointer, missing box

toprule Landmark Relation Separation

midrule I-B-G-Q-C Admitted conical family / boundary value Parent is source record; not revised here

I-B-G-Q-B Flat running $-1/(24\pi^2)$ Local model; RG-open certificate

I-B-G-Q Gates Q0–Q7 No inherited-target gate passed

Enter Calculus (Frontiers) Interface only Never a PDE / coefficient premise

bottomrule

Slot injectivity and minimax error

The diagonal slot is affine-injective into the characteristic coefficient read by a fixed test tensor; every rule of the admitted conical data has infinite worst-case error across two distinct slot values. The flat running moves along the slot: the certificate remains RG-open. Order-zero diagonal terms forced by α are not slots.

Still missing. Inherited characteristic coefficient admission; RG-closed certificate; Host C; interacting Ward hierarchy; spacetime emergence / Page. Finite+conserved≠non-running. Standing ledger verbatim.

Parent, sources and scope

Version 2. I-B-G-Q-C-CERT-v2 (historical math v2) (sha256 fb6e4fa955adc3547f20dea37424bad2851bf3b7e29b956a8ab76bef35f3014d) is retained in Sections – and in its plan audits; Section was new in version 3. The file I-B-G-Q-C-CERT-v2 (historical math v2) itself is not edited.

Version 3. I-B-G-Q-C-CERT-v3 (sha256 faacaa71a86b9a434589253a3724c8b7c0341313b48030d94485ae97387cbbbe) is retained in the sections before

Section and in its plan audits; Section and the plan-t266u audit were new in version 4. The file I-B-G-Q-C-CERT-v3 itself is not edited.

Version 4. I-B-G-Q-C-CERT-v4 (sha256 137e7998a9a6187e30f0fcb2d5b3cc3d876073b1222a86f6469991572c39e50b) is retained in the sections before Section and in its plan audits; Section and Section were new in version 5. The file I-B-G-Q-C-CERT-v4 itself is not edited.

Version 5. I-B-G-Q-C-CERT-v5 (sha256 13c90e3216c5b7e0d776f7175f5a1938503d444cc6d344fff13b3f5117a73390) is retained in the sections before Section and in its plan audits; Section and Section are new. The file I-B-G-Q-C-CERT-v5 itself is not edited.

Previous version. I-B-G-Q-C-CERT-v1 (sha256 1e742a427a435c41d3bdcc67fee9230f0e8ceb69399f26ac8c0e691f2e5dbd81) is retained in Sections – and in the plan audit of plan t256u; the file itself is not edited.

Parent. The parent sheet is I-B-G-Q-C; its latest version, I-B-G-Q-C-v8 (sha256 e82a7a69c89670cf635b80d826f52921c78117c0fcad359c0e248c48113202d3), was read by read-only retrieval and is a source record. Used for context: the declared boundary value I-B-G-Q-C-v8 decl:bv; the globally conserved product and its forced order-zero term I-B-G-Q-C-v8 thm:product; symmetry I-B-G-Q-C-v8 thm:sym6; the classification of diagonal terms I-B-G-Q-C-v8 thm:two5; the four-current product off the total diagonal I-B-G-Q-C-v8 prop:T48. The parent stays untouched; this sheet is not a version of it.

Other source records. I-B-G-Q-B (sha256 200bdfcc78685cbc46bf9e960914fac313125da146dc12fa702f22de6ede8767): the slot count I-B-G-Q-B thm:Q-conecount and the flat Euclidean running I-B-G-Q-B thm:Q-run. New in version 2: I-B-G-Q-B thm:Q-product, I-B-G-Q-B thm:Q-four, I-B-G-Q-B lem:Q-offdiag; Red06-G-DSS version 8 (sha256 8d95cea813b26da9bfe78d763489e143d6c2385dfd1da5059edc183b579c72af); VC-OB-1 version 5 (sha256 c9d821b4db97cb384fa7c4e5d9a1d44791f989c61625d202586ab689e9091bc1). Big01-A version 5 (sha256

e1160613ea8e02b37fb45954fe677d89f5fa7cca90062d42b68973b03a2bff1d) is cited for context only. New in version 3 (sha256 of the delivered v2 files; the v1 files, and v3 of the DSS CERT sheets, were also checked and contain the cited labels): DS-OB-1-CERT-v2 748b382d5959123890ac320e22295c3d87609b3da73496cc85cdbfbabde2633f; Red06-G-DSS-CERT-v2 a20c6b869655a31cd36b24db7e6293f480247395eefe6bbb34fc15f57e3fe36f; VC-OB-1-CERT-v2 3d9d18420e3ef7c1d4a21e833b0e31d5f997aad8cb149d95653012a3055e3e94; Hawk07-F-CERT-v2 7616127ac2f9252868b1806ed0e961c82ea4c3468eb61eae7c4ce34398896e8a; Hawk07-G-CERT-v2 57b3f38ae38ff5d55ad05825d8271488d1e9a6291deb6d4a816dff20320b75cd; Hawk07-H-CERT-v2 19437ad64400b8c28e8bd5b6bcc6db900cb6c1f01a5a8a8766d0bd801b792f70; En08-ST-DSS-CERT-v2 40d0dfb5adda8e3279bdb814d8d7912c0e94be51965927a057a5c5f63ac0ebc2; V-DST-DSS-CERT-v2 fc5ffb8600cd54372df376e283c2da7eba6ea15187463d38fee5563f7beaf0da. None is a premise. New in version 4: Hawk07-F-CERT-v3 (2280220e1bddd21e787032d88903764932f23d06bc5100722b08891a9c536dd6), Hawk07-G-CERT-v3 (fa61bb7b1d8f583c9aa3f62936a3c0374ca8ecc5ea08da2536ab33c7b99f1ed1), Hawk07-H-CERT-v3 (1edfff7dc754b726af8f7b186066c45c37efc19764f6bc37ba7180e1352b1225), newest delivered, with thm:s2-cas unchanged from v2 (checked); they correct def:v2-H and the name ``conformal warp, which do not enter thm:s2-cas. Red06-G-DSS-CERT-v3 (b8b9ef6f7bca70f66fd8f96b1bd30ee8957939ac04b80205c997cfc3223522a7), the version named by the plan; v4 (574d8abfdcd620476e8054092bce4323652afd03740ceb917a165798bc653ebc) is newer with thm:RC-coef unchanged. DS-OB-1-CERT-v2 and VC-OB-1-CERT-v2 as above (only v2 delivered; their v3, in preparation elsewhere, was not read). None is a premise. New in version 5: V-DST-DSS-CERT-v4 (sha256 550372abe2117364ec4e3f62e8840d66570c8845ad27e842d6ed1b74b5321302), DS-OB-1-CERT-v3 (07b600a11b5ec1661b651f74d473d270aa6e114463da94f051c630dd7b1758ea), VC-OB-1-CERT-v3 (502f6e5ebcc9bbe8906026bc539b513afe9cff04efd1bd75aadc7141d868842d), Red06-G-DSS-CERT-v4 (574d8abfdcd620476e8054092bce4323652afd03740ceb917a165798bc653ebc), En08-ST-DSS-CERT-v4 (98c42ee7397263bc694ebed7d66c682b090df437a3230f294b3245f4bd01bee9), and Hawk07-F/G/H-CERT-v3 as

above; each is the newest delivered version of its sheet. Newer versions of Hawk07 CERT (version 4), of the OB CERT sheets (version 4) and of DSS CERT (version 5) are being built concurrently and were not read. None is a premise. New in version 6, each verified against its delivery manifest: VC-OB-1-CERT-v4 (sha256 f9802da66896159503132b736164016c1d06d2a6530bbbc06cb4ad3af0256387); DS-OB-1-CERT-v4 (sha256 0b5b86f87f91503ba9e96cf221b2ef96a4b4e96e3f27489336eb2b89848463c6); Hawk07-F-CERT-v4 (sha256 3b4eef32040e7f3aad9766523b6c5deff83c9679fcd5924d3b93f5b110221e63); Hawk07-H-CERT-v4 (sha256 acf36486626757388e96817cfd167003282523a596913262400b06f4d700ba7d); V-DST-DSS-CERT-v5 (sha256 4133961f566c059c22054b5922423d1ff94cb0d1c888ca353a7c143bba1541be); Red06-G-DSS-CERT-v5 (sha256 e4a1b02552c138b8f9f009f2e71e391825ad0014f717b43f96883c445605213a); En08-ST-DSS-CERT-v5 (sha256 9be4fe4fdd9cf1164a75f0218035f0ee3a4c340ed7f15787551de3997fe5af64). None is a premise. Second wave read in version 6: DS-, VC- and PG-OB-1-CERT-v5, Hawk07-A/F/H-CERT-v5 and En08-ST/Red06-G/V-DST-DSS-CERT-v6, verified against their manifests and cited by sha256 in Section as source records only.

Standing ledger (verbatim). No quantum coefficient is admitted. Host C is not created; Host A and Host B stay separate. O.1 stays NOT_CLOSED. XVI-N is not discharged (N-Ins.4 unresolved), and there is no Route-B successor. XV-B is not opened. H2, I3 and T3 stay unresolved; J2 stays Unresolved. U6-sel is not moved. Res02-A Q1–Q4 and A1–A2 stay open. The last reading bars (quantized observable, no external clock) stay open. No Einstein dynamics, derived metric, spacetime emergence, external-clock removal or Page curve is claimed. Gate 0 stays NOT_SUPPLIED, and thm:J is not substituted. Continuum acquisition stays a negative certificate. No compilation is asserted. Citations identify source records only; no proof transfer. Authorship requires confirmation. Nothing is pushed or registered.

Plan refusal lines. No quantum coefficient is admitted; the inherited characteristic coefficient is not admitted. Host stays prescribed, labels stay named. No finite Hilbert space, temperature, or Einstein dynamics derived. None imports Big01-A or any other sheet as a premise. No Einstein dynamics, derived metric, spacetime emergence or Page curve is claimed. The certificate is a documentary separation: it does not discharge O.1, Gate 0, XV-B, J2,

U6-sel or any standing gate, and it does not create Host C. This sheet revises no other sheet.

Authorship. The title page names Ngo Cheung. Authorship requires confirmation. No compilation is asserted.

Admitted conical data and the declared hypothesis

Throughout, M° is the off-axis part of the prescribed cone with deficit parameter $0 < \alpha \le 1$ (the cone metric of I-B-G-Q-C-v8 sec:ledger), $\eta = \mathrm{diag}(-1,1,1,1)$ in local Cartesian coordinates of regular balls, and all distributions live on $M^\circ \times M^\circ$.

Definition (Admitted conical data, admission conditions, characteristic coefficient). The *admitted conical data* $\mathfrak{C}_\alpha$ are: the cone metric with parameter α; the Friedrichs choice; the declared boundary value G^{bv}_α of I-B-G-Q-C-v8 decl:bv, which stays declared new data; the free complex field and its currents, with $\mathrm{B}[G^{\mathrm{bv}}_\alpha]$ the off-diagonal two-current distribution built from G^{bv}_α as in I-B-G-Q-C-v8 thm:product(a); a reference product T_0 of hypothesis (H) below; and the admission conditions on a c-number two-current distribution T: (A1) $T = \mathrm{B}[G^{\mathrm{bv}}_\alpha]$ off the diagonal; (A2) the Ward identity in x and in x'; (A3) symmetry under $(a,x) \leftrightarrow (b,x')$; (A4) $T - T_0 = \sum_\beta k^\beta_{ab}\, \partial^\beta_x \delta(x-x')$, a finite sum with constant complex coefficients, Lorentz-covariant in the sense of Lemma ; (A5) order at most $p = 2$ in (A4). Put $D_{ab} = (\partial_a\partial_b - \eta_{ab}\mathrm{Box})\delta(x-x')$ and $T_c = T_0 + c\,D$ for $c \in \mathbb{C}$ (the *slot value*; the real slots form the real subfamily). Fix a test tensor $F^{ab} \in C^\infty_c(M^\circ \times M^\circ)$ with $\langle D_{ab}, F^{ab}\rangle = 1$. The *characteristic coefficient read by F* is the linear functional $\chi_F(T) = \langle T_{ab}, F^{ab}\rangle$.

par *Does not imply*. The definition fixes names only. It does not imply that χ_F is the inherited characteristic coefficient, it does not select a slot value, and it does not include a scale v among the admitted conical data; Remark explains why. No quantum coefficient is admitted. par

Declaration (Hypothesis (H): a reference product exists). There is a c-number distribution T_0 satisfying (A1)–(A3). The parent records such a distribution, $T_0 = T^{\mathrm{bv}}_\alpha$, with (A1) and (A2) in I-B-G-Q-C-v8 thm:product(a),(b) and (A3) in I-B-G-Q-C-v8 thm:sym6. This sheet does not re-prove that record; it uses (H) as a

declared hypothesis. Every statement below that mentions T_0 is conditional on (H).

par *Does not imply.* The declaration is an input, not a result. It does not imply that the parent's proofs are transferred, that T_0 is the inherited product, or that T_0 is unique: (A1)–(A3) fix it only up to the slots of Theorem .

par

Local classification of the diagonal terms

Lemma (Lorentz-covariant conserved diagonal terms). *Let $K_{ab} = \sum_\beta k^\beta_{ab} \partial^\beta_x \delta(x - x')$ be a finite sum with constant complex coefficients, of order at most p, with symbol $P_{ab}(\xi) = \sum_\beta k^\beta_{ab} (\mathrm{i}\xi)^\beta$. Call K Lorentz-covariant if $P_{ab}(\Lambda\xi) = \Lambda_a{}^c \Lambda_b{}^d P_{cd}(\xi)$ for all proper orthochronous Lorentz Λ.*

1. *K satisfies the Ward identity in x iff $\xi^a P_{ab} = 0$, and in x' iff $P_{ab}\xi^b = 0$.*

2. *If K is Lorentz-covariant, every homogeneous part of P of odd degree vanishes, and the part of degree $2j$ is $A_j \xi_a \xi_b (\xi^2)^{j-1} + B_j \eta_{ab} (\xi^2)^j$ (with $\xi_a \xi_b (\xi^2)^{-1}$ omitted for $j = 0$).*

3. *If K is Lorentz-covariant and satisfies the Ward identity in x, then $K = \sum_{0 \le j < m} c_j D_{ab} \mathrm{Box}^j$ with $m = \lfloor p/2 \rfloor$ and $c_j \in \mathbb{C}$; such K satisfies the Ward identity in x' and the symmetry (A3). For $p = 2$: $K = c\,D$.*

Proof. (a) ∂^a_x multiplies the symbol by $\mathrm{i}\xi^a$; on $\delta(x - x')$, $\partial_{x'} = -\partial_x$, so $\partial^b_{x'}$ multiplies it by $-\mathrm{i}\xi^b$. A constant-coefficient diagonal distribution vanishes iff its symbol does. (b) A homogeneous covariant part of degree k is a polynomial map $\xi \mapsto P_{ab}(\xi)$ equivariant under the proper orthochronous group, hence (by Zariski density) under the complexified group $SO(4, \mathbb{C})$. By the first fundamental theorem of invariant theory for $SO(n)$ (Weyl), such a map is a linear combination of contractions of $\xi^{\otimes k}$ with products of η and at most one ε, leaving two free indices. A contraction with ε needs four distinct indices of which at most two are free, so at least two are contracted with the symmetric $\xi\xi$ and the term vanishes. Products of η alone have even rank, so $k + 2$ is even, and the only contractions are $\xi_a \xi_b (\xi^2)^{(k-2)/2}$ and $\eta_{ab} (\xi^2)^{k/2}$. (c) Apply (a) to each homogeneous part. Degree 0: $\xi^a B_0 \eta_{ab} = B_0 \xi_b$, so $B_0 = 0$. Degree $2j \ge 2$: $\xi^a (A_j \xi_a \xi_b (\xi^2)^{j-1} + B_j \eta_{ab} (\xi^2)^j) = (A_j + B_j) \xi_b (\xi^2)^j$, so $B_j = -A_j$ and the part is

$A_j(\xi_a\xi_b - \eta_{ab}\xi^2)(\xi^2)^{j-1}$, the symbol of $-A_j D\mathrm{Box}^{j-1}$ up to the factor i^{2j}. The order bound gives $2j \le p$. The symbol $\xi_a\xi_b - \eta_{ab}\xi^2$ is transverse in b as well and satisfies $P_{ab}(\xi) = P_{ba}(-\xi)$, which is (A3) for a diagonal term. (Check C2 verifies these identities and the forcing $B = -A$.)

par *Does not imply.* The lemma is a classification of constant-coefficient c-number terms only. It does not imply anything about non-covariant or position-dependent diagonal terms (the parent's order-zero term R_α is position-dependent), and it selects no coefficient. par

The certificate

Theorem (Conical coefficient certificate). *Fix* $0 < \alpha \le 1$ *and the admitted conical data* $\mathfrak{C}_\alpha$*; assume (H).*

1. *(Test tensors exist.)* $D \neq 0$*, so test tensors* F *with* $\langle D_{ab}, F^{ab}\rangle = 1$ *exist.*

2. *(The slot family is the admitted family.) A c-number distribution* T *satisfies (A1)–(A5) iff* $T = T_c$ *for some* $c \in \mathbb{C}$*.*

3. *(Injectivity.)* $c \mapsto \chi_F(T_c) = \chi_F(T_0) + c$ *is affine with slope* 1*, hence injective on* $\mathbb{C}$ *(and on the real subfamily), with range* $\mathbb{C}$*.*

4. *(Higher order.) With order at most* $p \ge 2$ *in (A5), the admitted family is* $T_0 + \sum_{j<m} c_j D\mathrm{Box}^j$*,* $(c_j) \in \mathbb{C}^m$*,* $m = \lfloor p/2 \rfloor$*, and there are test tensors* $F_0, \dots, F_{m-1}$ *such that* $(c_j) \mapsto (\chi_{F_i}(T))_i$ *is an affine bijection of* $\mathbb{C}^m$*.*

5. *(No admitted-data rule.) A rule of the admitted conical data alone assigns one number* r *to the whole family. It reproduces* $\chi_F(T_c)$ *for at most one slot value, so for no two slot values, and its worst-case error* $\sup_c |r - \chi_F(T_c)|$ *is infinite, already over real* c*.*

6. *(The coefficient as supplied input.) A rule* $R(\mathfrak{C}_\alpha, c)$ *that reproduces* χ_F *on the whole family is injective in* c*; it contains the slot value as a supplied input, which the ledger refuses to treat as derived.*

Proof. (a) In local Cartesian coordinates (t, x, y, z) of an off-axis regular ball take $F^{ab}(x, x') = n^a n^b \varphi(x)\varphi(x')$, $n = \partial_z$, φ real and supported in the ball. Integrating $\delta(x - x')$ against the second factor and by parts,

$$\langle D_{ab}, F^{ab}\rangle = \int \varphi\,(\partial_z^2 - \mathrm{Box})\varphi \; \mathrm{d}^4x = -\|\partial_t\varphi\|^2 + \|\partial_x\varphi\|^2 + \|\partial_y\varphi\|^2.$$

For $\varphi = a(t)b(x,y,z)$ with a slowly varying the right side is positive; normalize. (Check C1 evaluates a Gaussian instance to $7\pi^2/4$.) (b) T_0 satisfies (A1)–(A3) by (H), and (A4), (A5) trivially. If T satisfies (A1)–(A5), then $K = T - T_0$ vanishes off the diagonal by (A1), satisfies both Ward identities by (A2), and is of the form of Lemma with $p = 2$ by (A4), (A5); Lemma (c) gives $K = cD$. Conversely $T_0 + cD$ satisfies (A1)–(A5), since D is diagonal-supported and, by Lemma (c), conserved in both arguments and symmetric. (c) Linearity of χ_F and $\langle D, F\rangle = 1$. (d) As in (b), with Lemma (c) for general p. The symbols $(\xi_a\xi_b - \eta_{ab}\xi^2)(\xi^2)^j$ are homogeneous of distinct degrees and nonzero, hence linearly independent (check C3), so the distributions $D\mathrm{Box}^j$ are linearly independent. For finitely many linearly independent distributions the evaluation map $F \mapsto (\langle D\mathrm{Box}^j, F\rangle)_j$ is onto $\mathbb{C}^m$ (otherwise a nonzero combination would annihilate every test tensor), which gives F_i with $\langle D\mathrm{Box}^j, F_i\rangle = \delta_{ij}$. (e) The admitted data are the same for every c, so the rule takes one value r; by (c), $r = \chi_F(T_0) + c$ has exactly one solution, and $|r - \chi_F(T_0) - c| \to \infty$ as $|c| \to \infty$. (f) By (c), equal outputs for $c \neq c'$ are impossible.

par *Does not imply*. The certificate is a documentary separation inside this sheet's admitted family, conditional on (H). It does not imply that the slot is physically undetermined, that any slot value is the inherited one, or that χ_F is the inherited characteristic coefficient; the coefficients C^γ of the actual inherited lift stay uncomputed and not admitted. It does not close the four-current product, does not close RG, does not derive a scale, a temperature or a finite Hilbert space of the host, and does not discharge O.1, Gate 0, XV-B, J2 or U6-sel. No quantum coefficient is admitted. par

Remark (Scale and slot; RG stays open). The parent records that the scale derivative of its product is diagonal-supported and independent of α (I-B-G-Q-C-v8 thm:product(f)); in the flat Euclidean statement I-B-G-Q-B thm:Q-run(a) the scale derivative is a constant multiple of the slot operator, so there a change of scale moves along the slot. This is why the scale v, with the local normalization of the reference product at v, is not counted among the admitted conical data: counting it would fix the slot by fiat. No proof here uses this remark, and the Lorentzian constant is not recomputed. The certificate therefore stays RG-open: the slot, equivalently the scale, is a supplied input.

Remark (Four currents stay off the total diagonal). The parent's four-current product is constructed only off the total diagonal Δ_4 (I-B-G-Q-C-v8 prop:T48). Replacing T_0 by T_c in its current double edges changes only terms that factor through a two-current product in a pair of variables; the cycles that are undefined at Δ_4 contain no current double edge and are unchanged. This sheet constructs no four-current product on Δ_4 and states no Ward identity there; the four-current row stays partial.

Version 2: the running theorem, normalization, and readings

This section is new in version 2 (plan t258u). Sections – prove the flat Euclidean running locally, including its constant. Section adds statements about the conical admitted family of Definition . I-B-G-Q-B, Red06-G-DSS and VC-OB-1 are source records only.

The flat Euclidean model

On Euclidean $\mathbb{R}^4$ with $|x|$ the norm, $\Delta = \sum_\mu \partial_\mu^2$ and Kronecker $\delta_{\mu\kappa}$, put $\Delta_0(x) = 1/(4\pi^2|x|^2)$, the fundamental solution of $-\Delta$ (since $\mathrm{Vol}(S^3) = 2\pi^2$), and $D^{\mathrm{E}}_{\mu\kappa} = \partial_\mu\partial_\kappa - \delta_{\mu\kappa}\Delta$.

Definition (Declared off-diagonal datum, finite part, product). The *off-diagonal datum* is $\Pi^\circ_{\mu\kappa} = 2\,\partial_\mu\Delta_0\,\partial_\kappa\Delta_0 - 2\,\Delta_0\,\partial_\mu\partial_\kappa\Delta_0$ on $\mathbb{R}^4\setminus\{0\}$. For $\nu > 0$ and $\varphi \in C_c^\infty(\mathbb{R}^4)$ put

$$u_\nu(\varphi) = \lim_{\varepsilon \,\mathrm{downarrow}\, 0} \Big(\int_{|x|>\varepsilon} \frac{\varphi(x)}{|x|^4}\,\mathrm{d}^4x + 2\pi^2 \log(\nu\varepsilon)\,\varphi(0)\Big), \qquad \Pi^{(\nu)}_{\mu\kappa} = c_0\, D^{\mathrm{E}}_{\mu\kappa} u_\nu, \quad c_0 = -\frac{1}{48\pi^4}.$$

par *Does not imply*. Π° is taken as declared data in the form of the free-field contraction of the charged-scalar current; the contraction itself is recorded in the source record (I-B-G-Q-B lem:Q-offdiag) and is not re-derived here. The finite part is one subtraction scheme; its scale ν is free. No quantum coefficient is admitted. par

Lemma (Off-diagonal identity and finite part).

1. *On* $\mathbb{R}^4\setminus\{0\}$, $\Pi^\circ_{\mu\kappa} = c_0\, D^{\mathrm{E}}_{\mu\kappa}|x|^{-4} = 4a^2|x|^{-6}(\delta_{\mu\kappa} - 2x_\mu x_\kappa|x|^{-2})$, $a = 1/(4\pi^2)$.

2. u_ν *exists, is a distribution extending* $|x|^{-4}$*, is* $O(4)$*-invariant, and* $u_{\nu'} - u_\nu = 2\pi^2\log(\nu'/\nu)\,\delta_0$.

Proof. (a) With $\Delta_0 = a|x|^{-2}$: $\partial_\mu \Delta_0 = -2a x_\mu |x|^{-4}$ and $\partial_\mu \partial_\kappa \Delta_0 = a(-2\delta_{\mu\kappa}|x|^{-4} + 8x_\mu x_\kappa |x|^{-6})$, so $\Pi^\circ = 8a^2 x_\mu x_\kappa |x|^{-8} - 2a^2(-2\delta_{\mu\kappa}|x|^{-6} + 8x_\mu x_\kappa |x|^{-8}) = 4a^2|x|^{-6}(\delta_{\mu\kappa} - 2x_\mu x_\kappa |x|^{-2})$. Also $\partial_\mu \partial_\kappa |x|^{-4} = -4\delta_{\mu\kappa}|x|^{-6} + 24 x_\mu x_\kappa |x|^{-8}$ and $\Delta|x|^{-4} = (-4)(-2)|x|^{-6} = 8|x|^{-6}$, so $D^{\mathrm{E}}|x|^{-4} = -12|x|^{-6}(\delta_{\mu\kappa} - 2x_\mu x_\kappa |x|^{-2})$, and $c_0 = -4a^2/12 = -1/(48\pi^4)$. (b) $\int_{\varepsilon < |x| < 1} |x|^{-4}\, \mathrm{d}^4x = \mathrm{Vol}(S^3)\int_\varepsilon^1 r^{-1}\, \mathrm{d}r = 2\pi^2 \log(1/\varepsilon)$, so the bracket equals $\int_{\varepsilon<|x|<1} (\varphi - \varphi(0))|x|^{-4} + \int_{|x|\geq 1} \varphi |x|^{-4} + 2\pi^2 \log v\, \varphi(0)$; the first integrand is $O(|x|^{-3})$ and the limit exists, with $|u_v(\varphi)|$ bounded by a C^1 seminorm on a fixed support. Away from 0 it is integration against $|x|^{-4}$. Rotations preserve every term. The v-dependence is the last term.

par *Does not imply*. The lemma is elementary analysis on $\mathbb{R}^4$; it does not concern the cone, the Lorentzian signature, or the inherited coefficient. Checks C4, C5 and C7 corroborate (a), the volume and shell integral, and the finite part of a Gaussian ($-\gamma_{\mathrm{E}}/2$ times $2\pi^2$). par

Theorem (Exact running, normalization and the slot, in the flat Euclidean model). *For $v, v' > 0$:*

1. *(Descent.) $\Pi^{(v)}$ is a real, symmetric, $O(4)$-covariant distribution with $\Pi^{(v)} = \Pi^\circ$ on $\mathbb{R}^4 \setminus \{0\}$.*

2. *(Ward.) $\partial^\mu \Pi^{(v)}_{\mu\kappa} = 0$ on $\mathbb{R}^4$.*

3. *(Running.) $\Pi^{(v')} - \Pi^{(v)} = -\frac{1}{24\pi^2}\log\frac{v'}{v} D^{\mathrm{E}}\delta_0$; equivalently $v\partial_v \Pi^{(v)} = -\frac{1}{24\pi^2} D^{\mathrm{E}}\delta_0 \neq 0$. So no member is scale independent.*

4. *(Scale = slot.) If Π is real, symmetric, $SO(4)$-covariant, conserved, equal to Π° off 0, and $\Pi - \Pi^{(1)}$ is a constant-coefficient combination of $\partial^\beta \delta_0$ of order at most 2, then $\Pi = \Pi^{(v)}$ for exactly one $v > 0$.*

5. *(Normalization.) Let $\psi \in C_c^\infty(\mathbb{R}^4)$ be radial with $\Delta\psi(0) \neq 0$ and $\mathcal{M}(\Pi) = \langle \Pi_{\mu\mu}, \psi \rangle$. Then $\mathcal{M}(\Pi^{(v)}) = \mathcal{M}(\Pi^{(1)}) + \frac{\log v}{8\pi^2}\Delta\psi(0)$, so for every $C \in \mathbb{R}$ exactly one member, v_C, satisfies descent, Ward and $\mathcal{M} = C$ together; any two distinct members cannot both satisfy the same normalization.*

Proof. (a) Off 0, $u_v = |x|^{-4}$ and derivatives commute with restriction; apply Lemma (a). Reality and symmetry are

evident, and D^{E} transforms as a symmetric 2-tensor under $O(4)$ while u_ν is invariant. (b) $\partial^\mu(\partial_\mu\partial_\kappa - \delta_{\mu\kappa}\Delta) = \Delta\partial_\kappa - \partial_\kappa\Delta = 0$ on every distribution. (c) By Lemma (b), $\Pi^{(\nu')} - \Pi^{(\nu)} = c_0 \cdot 2\pi^2 \log(\nu'/\nu) D^{\mathrm{E}}\delta_0$, and $2\pi^2 c_0 = -1/(24\pi^2)$. $D^{\mathrm{E}}\delta_0 \neq 0$, since its trace is $-3\Delta\delta_0 \neq 0$. (d) $K = \Pi - \Pi^{(1)}$ is supported at 0, conserved, symmetric and covariant of order at most 2. Lemma holds verbatim with η replaced by δ and the proper orthochronous Lorentz group by $SO(4)$: its proof uses only equivariance under a Zariski-dense subgroup of $SO(4,\mathbb{C})$, of which both are real forms. So $K = c\,D^{\mathrm{E}}\delta_0$, with c real because K is real. By (c), $\Pi^{(\nu)} - \Pi^{(1)} = -\frac{\log\nu}{24\pi^2} D^{\mathrm{E}}\delta_0$, and $c = -\log\nu/(24\pi^2)$ has exactly one solution $\nu = e^{-24\pi^2 c}$; distinct ν give distinct products by (c). (e) By (c), $\mathcal{M}(\Pi^{(\nu)}) - \mathcal{M}(\Pi^{(1)}) = -\frac{\log\nu}{24\pi^2}\langle -3\Delta\delta_0, \psi\rangle = \frac{\log\nu}{8\pi^2}\Delta\psi(0)$, an affine bijection of $\log\nu \in \mathbb{R}$ onto $\mathbb{R}$. Descent and Ward hold for every ν by (a), (b).

par *Does not imply*. The theorem is the exact scale dependence of one free-field product on an auxiliary flat Euclidean chart. The constant $-1/(24\pi^2) = 2\pi^2 c_0$ is derived here from $\mathrm{Vol}(S^3)$ and the declared datum Π°; it depends on the normalization of that datum, whose Wick derivation is recorded in, not re-derived from, the source record. The same statement is I-B-G-Q-B thm:Q-run(a), with the uniqueness of I-B-G-Q-B thm:Q-product(d) and the normalization of I-B-G-Q-B thm:Q-four(i); none is used as a premise. The theorem is not the running of the inherited coefficient, which is not constructed, and it is not a Lorentzian or conical statement. Checks C5–C7 corroborate the constants. par

Consequences

Corollary (RG-open as a theorem in the flat model). *In the flat Euclidean model, $\nu \mapsto c(\nu) = -\log\nu/(24\pi^2)$ is a bijection of $(0,\infty)$ onto the real slot line $\mathbb{R}\,D^{\mathrm{E}}\delta_0$, and a prescribed normalization C fixes it. So admitting the scale, or a normalization, among the data is admitting the slot value; and since no member is scale independent, no admitted datum removes the running.*

Proof. Theorem (c)–(e).

par *Does not imply*. This makes the RG-open status a theorem in the flat model only. On the cone the

corresponding statement is recorded by the parent (I-B-G-Q-C-v8 thm:product(f)) and remains the remark of Remark ; the Lorentzian constant is not derived here. par

Corollary (The slot count does not depend on α). *For every $0 < \alpha \le 1$, under hypothesis (H) for that α, the admitted family at order at most $p \ge 2$ is $T_0 + \sum_{0 \le j < m} c_j D\mathrm{Box}^j$, $c \in \mathbb{C}^m$, $m = \lfloor p/2 \rfloor$; for $p < 2$ it is $\{T_0\}$. The count m is independent of α.*

Proof. Theorem (b),(d) and Lemma (c). Neither the lemma nor the symbols involve α: they are computed in the flat chart of a regular ball. For $p < 2$, Lemma (c) leaves only $K = 0$.

par *Does not imply*. The count is complex dimension inside this sheet's admitted family; the real count of the source record is I-B-G-Q-B thm:Q-conecount, which is not used. Without Lorentz covariance and constant coefficients the count is not claimed. par

Readings on the conical admitted family

Proposition (Normalization obstruction on the cone). *Assume (H). For every prescribed $C \in \mathbb{C}$ there is exactly one member T_c of the admitted family with $\chi_F(T_c) = C$, namely $c = C - \chi_F(T_0)$. So descent (A1), Ward (A2), symmetry (A3) and a prescribed normalization hold together for exactly one member, and for no two members; prescribing the normalization is supplying the slot value.*

Proof. Theorem (b),(c).

par *Does not imply*. This is the conical analogue of Theorem (e). It does not select a normalization and does not identify any member with the inherited product. par

Proposition (χ_F is a named coefficient). *Assume (H). For admissible test tensors F, F' ($\langle D, F\rangle = \langle D, F'\rangle = 1$): χ_F and $\chi_{F'}$ both have slope 1 in the slot, and $\chi_F - \chi_{F'}$ is constant on the admitted family. The value $\chi_F(T_0)$ is fixed by the declared data (F, T_0) only, and none of the data entering Definition contains the inherited lift.*

Proof. $\chi_F(T_c) - \chi_{F'}(T_c) = \langle T_0, F - F'\rangle + c\langle D, F - F'\rangle = \langle T_0, F - F'\rangle$. The last sentence is Definition read off.

par *Does not imply*. In the style of Red06-G-DSS's named certificate (Red06-G-DSS def:R-TGH, Red06-G-DSS

prop:R-TGH, Red06-G-DSS rem:R-capacity), χ_F is a named number of this sheet's declared data. It is not the inherited characteristic coefficient; the coefficients C^γ of the inherited lift stay uncomputed and not admitted. No quantum coefficient is admitted. par

Proposition (The slot is not a vacuum-energy term).

1. *A constant cosmological-type contact term $\rho\,\eta_{ab}\delta(x-x')$, $\rho\in\mathbb{C}$, satisfies the Ward identity only for $\rho=0$; so no such term is in the admitted family, and the slot term cD has no component of this form.*

2. *χ_F is a linear functional of a two-current distribution; no one-point expectation $\langle T_{ab}\rangle$ and no coefficient of g_{ab} in it is computed.*

Proof. (a) Lemma (a),(c) at degree 0: $\xi^a\rho\eta_{ab}=\rho\xi_b$. The symbol of *cD* is homogeneous of degree 2. (b) Definition . par *Does not imply*. The proposition does not compute or bound a vacuum energy and implies nothing about the cosmological constant. VC-OB-1 (VC-OB-1 thm:VC-main, VC-OB-1 prop:VC-renorm) records that no registered sheet computes the absolute vacuum energy; that source record is not used. par

Declaration (Hypothesis (H4): the parent's four-current record). The four-current product of the parent is defined off the total diagonal Δ_4 (I-B-G-Q-C-v8 prop:T48); its terms containing a current double edge factor through a two-current product in one pair of variables; and the cycles undefined at Δ_4 (squares, seagull loops and the remaining seagull cycles) contain no current double edge. This sheet uses that record as a declared hypothesis, not as an imported proof.

par *Does not imply*. The declaration is an input. It does not imply that the parent's construction is unique or complete. par

Proposition (No completion at Δ_4 inside the admitted family). *Assume (H) and (H4). For every slot value c, replacing T_0 by T_c in the current double edges leaves the cycles undefined at Δ_4 unchanged. Hence no choice inside the admitted family (whose only freedom is c) defines the four-current product, or a Ward identity for it, on Δ_4.*

Proof. By (H4) only terms with a current double edge involve T_0, and they become T_c in that pair of variables, defined on all of $(M^{\circ})^4$. The undefined cycles contain no current double edge, so they do not depend on c.

par *Does not imply*. This is a negative statement inside the admitted family, conditional on (H) and (H4). It is not a proof that no four-current product exists on Δ_4 with further data, and it is not a permanent no-go. The four-current row stays partial. par

Version 3: exact two-point certificates, contact terms, and the four-current domain

This section is new in version 3 (plan t262u). Everything in it is proved locally from Definition , Declaration , Declaration and Theorem . DS-OB-1-CERT-v2, Red06-G-DSS-CERT-v2, VC-OB-1-CERT-v2, Hawk07-F/G/H-CERT-v2, En08-ST-DSS-CERT-v2, V-DST-DSS-CERT-v2 and the parent are cited as source records only.

Theorem (Exact two-point certificate and reference independence). *Assume (H) and put $b = \chi_F(T_0)$, so $\chi_F(T_c) = b + c$ (Theorem (c)).*

1. *For two slot values $c_1, c_2 \in \mathbb{C}$, $\inf_{r \in \mathbb{C}} \max_{i=1,2} |r - \chi_F(T_{c_i})| = |c_1 - c_2|/2$, attained by $r = b + (c_1 + c_2)/2$.*

2. *On a real interval $c \in [c_-, c_+]$ the exact minimax error is $(c_+ - c_-)/2$; on the real slot line every fixed estimate has infinite worst-case error (Theorem (e)).*

3. *Replacing the reference by $T_0' = T_0 + c_* D$, $c_* \in \mathbb{C}$, changes the slot coordinate to $c' = c - c_*$ but changes neither the admitted family, nor the target values, nor these minimax errors.*

4. *A prescribed normalization $\chi_F(T) = C$ selects exactly one member (Proposition); this does not prove that the member is an inherited characteristic product.*

Proof. (a) For every r, $|c_1 - c_2| = |(b + c_1 - r) + (r - b - c_2)| \le |r - b - c_1| + |r - b - c_2| \le 2\max_i |r - b - c_i|$, and the midpoint gives equality. (b) The endpoints give the lower bound by (a), and the midpoint $b + (c_- + c_+)/2$ has error $(c_+ - c_-)/2$ at every point of the interval. (c) T_0' satisfies (A1)–(A3) because it is a member of the admitted family

(Theorem (b)), and $T_0' + c'D = T_0 + cD$, so the family and each target are unchanged. (d) $b + c = C$ has exactly one solution.

par *Does not imply.* The theorem is the exact fibre reading of Theorem . It does not give the slot value, does not derive a normalization, and admits no quantum coefficient. Check C8 corroborates the midpoint radius and the reparametrization symbolically. par

Proposition (Order-zero contact differences). *Let T be a two-current distribution on $M^\circ \times M^\circ$ satisfying the Ward identity (A2).*

1. *For a smooth function a on M°, $T + a(x)\eta_{ab}\delta(x - x')$ satisfies the Ward identity in x if and only if $a \equiv 0$. In particular (Proposition (a)) a constant $\rho\,\eta_{ab}\delta(x - x')$ is admissible only for $\rho = 0$.*

2. $\partial_x^a(a(x)\eta_{ab}\delta(x - x')) = (\partial_b a)(x)\,\delta(x - x') + a(x)\,\partial_{x^b}\delta(x - x')$.

3. *The statement concerns differences between Ward-satisfying products. It does not exclude a nonzero order-zero term forced inside one complete conserved product, where it cancels a divergence of the rest; conservation of a sum does not require conservation of each summand.*

Proof. (b) is the product rule, with $\eta^{ac}\eta_{ab} = \delta_b^c$. (a) The Ward identity for the sum holds iff the divergence of $K_{ab} = a(x)\eta_{ab}\delta(x - x')$ vanishes. For $\chi \in C_c^\infty(M^\circ)$ supported in a chart with local Minkowski coordinates x^b of the cone metric (flat off the axis), choose $\hat{\chi} \in C_c^\infty$ of the same chart, equal to 1 on $\operatorname{supp}\chi$ and put $\varphi(x, x') = \chi(x)\hat{\chi}(x')(x^b - x'^b)$ (no sum, b fixed). Then $(\partial_{x^b}\varphi)(x, x) = \chi(x)$, so

$$\langle \partial_x^a K_{ab}, \varphi\rangle = -\langle a(x)\delta(x - x'), \partial_{x^b}\varphi\rangle = -\int a(x)\chi(x)\,\mathrm{d}^4x.$$

This vanishes for every such χ iff $a \equiv 0$. (c) is a remark on the logic of (a).

par *Does not imply.* (a) strengthens Proposition (a) from constants to smooth coefficients; the parent states the same for its product (I-B-G-Q-C-v8 thm:product(c)), which is not used. The proposition does not derive the parent's forced representative R_α, and it computes no vacuum energy. Check C8 evaluates the pairing in a

one-dimensional model. par

Proposition (What changing the two-current slot can establish at Δ_4). *Assume (H) and (H4). Changing the slot changes only the four-current terms that contain a current double edge, and leaves the cycles undefined at Δ_4 unchanged (Proposition). Suppose moreover that for two slot values the off-Δ_4 four-current formulae satisfy $U_c^{\circ} - U_{c'}^{\circ} = A_{c,c'}|_O$, $O = (M^{\circ})^4 \setminus \Delta_4$, for a distribution $A_{c,c'}$ on $(M^{\circ})^4$. Then U_c° extends to a distribution on $(M^{\circ})^4$ iff $U_{c'}^{\circ}$ does, the extensions corresponding by adding $A_{c,c'}$; and the correspondence preserves a Ward identity whenever $A_{c,c'}$ satisfies it.*

Proof. The first sentence is Proposition . If $U_{c'}$ extends $U_{c'}^{\circ}$, then $U_{c'} + A_{c,c'}$ extends U_c°; the converse is subtraction. The Ward operator is linear.

par *Does not imply.* The global extension $A_{c,c'}$ is a hypothesis: (H4) does not supply it, since the remaining contraction factors of a double-edge term need not be defined at Δ_4. The proposition does not prove that no four-current extension exists with additional data, and it does not exclude cancellations in a differently constructed complete extension. par

Remark (Duality is objectwise; non-identification is relative to the reduced datum). A matching lower and upper witness proves an equality for the object for which both are feasible; a witness for one attaining object does not make every object of a class attain the bound, and a hull witness, a channel witness and a thermal balance identity are different objects. Once a slot, or a normalization determining it, is supplied, the named target is a function of the enlarged datum; the negative statements concern its omission. Injectivity alone does not imply infinite risk: an unbounded target range in the chosen loss is also needed (Theorem (a),(b)).

Documentary comparisons

DS-OB-1 and Red06. Theorem is the precise fibre reading of Theorem . DS-OB-1-CERT-v2 thm:DS-coef6, DS-OB-1-CERT-v2 cor:DS-compl6 and Red06-G-DSS-CERT-v2 thm:RC-coef have the same form: an omitted parameter varies while a reduced datum stays fixed, with exact two-point radius and infinite worst-case error.

Those two concern one and the same prescribed de Sitter host DSS_H (DS-OB-1-CERT-v2 records this; re-verified), with different admitted classes and labels. The conical target χ_F and the de Sitter labels are separately named; no host, parameter, state or normalization is identified between the cone and DSS_H. Neither comparison derives a temperature or a finite Hilbert space, and neither admits the inherited characteristic coefficient.

VC. The forced representative recorded by the parent ($R_\alpha = \mathrm{i}(\alpha^{-2} - 1)/(24\pi^2 r^2)\,\eta_{\mu\nu}\delta(x - x')$, I-B-G-Q-C-v8 thm:product) and the absence of an order-zero *difference* (Proposition (a)) are distinct facts; this sheet proves the second and does not derive the first. The comparison with VC-OB-1-CERT-v2 prop:s2-vac is a separation: the Ward calculation restricts contact additions to a two-point distribution, whereas prop:s2-vac(b) observes that $G + \Lambda g = \kappa T$ holds for $T = \kappa^{-1}\Theta$ with any conserved Θ. That observation neither proves nor removes the contact restriction, and neither argument computes absolute vacuum energy.

Four currents and RG. Proposition is the scope of Proposition : slot substitution does not complete the recorded construction. The flat Euclidean constant of Theorem is not a conical Lorentzian running coefficient; no map intertwining the prescriptions, normalizations and scale derivatives is supplied, so RG-open on the cone stays a remark (Remark).

Coefficient lane. Hawk07-F-CERT-v2 thm:s2-cas, Hawk07-G-CERT-v2 thm:s2-cas and Hawk07-H-CERT-v2 thm:s2-cas (the Casimir certificates; each assumes its sign hypotheses and cites source records for them), En08-ST-DSS-CERT-v2 thm:EC-coef and V-DST-DSS-CERT-v2 prop:VDC-coef are coefficient certificates of the same injectivity form. Only the omitted-parameter logic is shared; they select no coupling, temperature, entropy, source-map domain or host dimension, and they identify no host, target coefficient or physical interpretation with the cone.

Typed cross-reference. The coefficient-fibre pattern is compared with DS-OB-1-CERT thm:DS-coef6, Red06-G-DSS-CERT-v2 thm:RC-coef and the Hawk07-F/G/H CERT thm:s2-cas statements; only the omitted-parameter logic is shared, not the hosts, target coefficients or physical interpretations.

Analytic-chain ledger: no closure by documentary comparison

The cross-sheet readings above do not construct any object of the full characteristic chain recorded in the XIV-I and XV-B records (read-only copy XIV-I.recon.tex, sha256 e22ab76ff74d4e67c9755b87f09e5d7dd4541cc64335867cafe894e9794be714; not a source record of this sheet and not audited here). In particular: the full joint characteristic map for the contraction $K_{47} + K_5 + K_6 + K_8 + K_9$, the joint section and its remainder, uniform transverse estimates, contact compatibility of a complete joint section, and the output wavefront theorem are not constructed or proved here; no assertion $Q_H R_1^{(1)} \in \mathcal{E}_H$ is made; the four-current extension stays open outside the recorded substitution family, with no universal nonexistence theorem; the conical Lorentzian running stays underived. The conical two-current diagonal, the four-current total diagonal Δ_4 and the characteristic locus of that chain are different extension problems.

Version 4: the slot is not a vacuum-energy term, and the plan-t266u readings

This section is new in version 4 (plan t266u). Everything in it is proved locally from Definition , Theorem and Section . DS-OB-1-CERT-v2, Hawk07-F/G/H-CERT (v3 cited; v2 also read), VC-OB-1-CERT-v2 and Red06-G-DSS-CERT-v3 are cited as source records only; I-B-G-Q-C-CERT-v3 is the previous version of this sheet.

Corollary (The slot direction carries no order-zero term). *Assume (H).*

1. *$D_{ab} = (\partial_a \partial_b - \eta_{ab}\mathrm{Box})\delta(x - x')$ is symmetric, satisfies $\partial_x^a D_{ab} = 0$, and in the expansion (A4) has only terms of order two. So every difference $T_c - T_{c'} = (c - c')D$ of admitted products has no order-zero term.*

2. *For $\rho \in \mathbb{C} \setminus \{0\}$, $\rho\, \eta_{ab}\delta(x - x')$ is not a multiple of D_{ab}, and $T_c + \rho\, \eta_{ab}\delta(x - x')$ is not admitted for any c.*

3. *Hence no change of slot value adds a term of vacuum-energy type $\rho\, \eta_{ab}\delta(x - x')$: the slot is not a vacuum-energy term (Proposition).*

Proof. (a) Symmetry is clear. $\partial^a(\partial_a \partial_b - \eta_{ab}\mathrm{Box}) = \mathrm{Box}\,\partial_b - \partial_b \mathrm{Box} = 0$ on distributions. The orders are read off the

definition. (b) Take $\chi \in C_c^\infty(M^\circ)$ supported in a chart with local Minkowski coordinates, with $\int \chi \, \mathrm{d}^4x \neq 0$, and $\tilde{\chi} \in C_c^\infty$ of the same chart equal to 1 on $\operatorname{supp}\chi$; put $\varphi(x, x') = \chi(x)\tilde{\chi}(x')$. For a multi-index $\beta \neq 0$, $\langle \partial_x^\beta \delta(x - x'), \varphi \rangle = (-1)^{|\beta|} \int (\partial^\beta \chi)(x)\tilde{\chi}(x) \, \mathrm{d}^4x = (-1)^{|\beta|} \int \partial^\beta \chi \, \mathrm{d}^4x = 0$, so $\langle D_{aa}, \varphi \rangle = 0$ for each a, whereas $\langle \rho \, \eta_{aa} \delta(x - x'), \varphi \rangle = \rho \, \eta_{aa} \int \chi \, \mathrm{d}^4x \neq 0$. If $T_c + \rho\eta\delta$ were admitted, Theorem (b) would give $T_c + \rho\eta\delta = T_{c'}$, i.e. $\rho\eta\delta = (c' - c)D$, which was just excluded; alternatively, Proposition (a) shows the Ward identity fails. (c) is (a) and (b).

par *Does not imply*. Part (c) restates Proposition (a); what is new is the pairing argument of (b), which separates $\rho\eta\delta$ from the slot direction without the Ward identity, and the transversality and pure order of D in (a). The corollary concerns differences between admitted products. It does not exclude the order-zero term that the parent records inside one complete product (Proposition (c)), does not derive that term, and computes no vacuum energy, absolute or relative. Check C9 corroborates (a) symbolically. par

Readings required by plan t266u

DS-OB-1-CERT-v2. Theorem is the injectivity form for χ_F on the cone; DS-OB-1-CERT-v2 thm:DS-coef6 is the same form for the named labels $\mathrm{T}, \mathrm{S}, \mathrm{N}$ on the prescribed de Sitter host DSS_H, with a local form on regions locally isometric to it. Both are coefficient certificates of omitted-parameter logic; the hosts differ (cone versus DSS_H), correctly as the plan says. Neither admits a quantum coefficient, and the permanent negative for the inherited characteristic coefficient stays.

Hawk07 Casimir certificates. Hawk07-F-CERT-v3 thm:s2-cas, Hawk07-G-CERT-v3 thm:s2-cas and Hawk07-H-CERT-v3 thm:s2-cas (statements unchanged from v2, checked) are the injectivity form for the named end stress $t^{(q)}$ and the induced $\Lambda_\ell^{(q)}$, under sign hypotheses taken from their source records. Part (b) there says that $t^{(q)}$ is never a cosmological stress; Corollary is the analogous negative here: the slot adds no term of vacuum-energy type. Neither derives a vacuum energy. The Hawk07-F background $-\mathrm{d}t^2 + \mathrm{d}x^2 + P(x)^2\mathrm{d}\varphi^2 + \mathrm{d}z^2$ is not identified with the cone of this sheet (a flat cone corresponds to a linear profile P; the parent's profile is not

checked here). Hawk07-F/G/H-CERT-v3 correct their version-2 Definition def:v2-H (wrong normalization statement) and the name ``conformal warp" (a misnomer; ``slice-warp family"); neither affects thm:s2-cas.

VC-OB-1-CERT-v2. Proposition concerns differences of Ward-satisfying products: a smooth order-zero addition preserves the Ward identity only for $a \equiv 0$. VC-OB-1-CERT-v2 prop:s2-vac is universal vacuity: $G + \Lambda g = \kappa T$ holds with $T = \kappa^{-1}\Theta$ for every metric. The plan's ``both concern differences of conserved tensors" is accurate for the first only; the second concerns every conserved tensor. Neither derives the parent's forced representative; absolute vacuum energy stays open. (The renormalization-fibre tensors of VC-OB-1-CERT-v2 def:v2-H have the same display as Hawk07-F/G/H-CERT-v2, whose normalization statement is corrected in Hawk07-F-CERT-v3 prop:v3-E; they are not used here.)

RG-open on the cone. The flat Euclidean model of Theorem identifies a scale and the slot; the conical Lorentzian running constant is not derived, and no RG fixed point is claimed.

The coefficient cross-reference line. ``The form is the same; the hosts and the named quantities differ" holds between this sheet and each de Sitter sheet. It is false between DS-OB-1-CERT-v2 thm:DS-coef6 and Red06-G-DSS-CERT-v3 thm:RC-coef, which share the host DSS_H and the label formulas for T and S (and Big01-A is on the same host); there the line should read ``same host and named quantities; different admitted classes".

Typed cross-reference. The coefficient-fibre pattern is shared with DS-OB-1-CERT, Red06-G-DSS-CERT and the Hawk07-F/G/H Casimir sheets; only the omitted-parameter logic is shared with this sheet.

Version 5: dilations, a conditional running constant, and the total diagonal

This section is new in version 5 (request t267u; no plan was attached). Its results are proved locally and are conditional where stated; companion sheets are cited by sha256 as source records only, and I-B-G-Q-C-CERT-v4 is the previous version of this sheet. Other streams are concurrently building Hawk07 CERT version 4, the OB CERT sheets version 4 and DSS CERT version 5; their files were not read, and any statement here about the

companions refers only to the delivered versions cited by sha256.

Dilations of the admitted family

Fix a point of the axis and let δ_λ, $\lambda > 0$, be the dilation about it, $(t, r, \varphi, z) \mapsto (\lambda t, \lambda r, \varphi, \lambda z)$ in the cylindrical coordinates of the cone; it maps M° onto itself, regular balls onto regular balls, and in local Cartesian coordinates of regular balls (centred on the axis point) it is $x \mapsto \lambda x$, so it preserves η. For a distribution T on $M^\circ \times M^\circ$ define

$$\langle S_\lambda T, F\rangle = \lambda^{-2}\langle T, F_\lambda\rangle, \qquad F_\lambda(x, x') = F(\delta_\lambda^{-1}x, \delta_\lambda^{-1}x'),$$

so that $S_\lambda T(x, x') = \lambda^6 T(\lambda x, \lambda x')$ for functions; the weight 6 is the scaling weight of a product of two currents. Then $S_\lambda S_\mu = S_{\lambda\mu}$, $S_1 = \mathrm{id}$, and each S_λ is linear.

Declaration (Hypothesis (Hdil): the admitted family is dilation-stable). For every $\lambda > 0$, $S_\lambda T_0$ satisfies (A1)–(A5) of Definition . This is a hypothesis. It is not checked here for the parent's T_α^{bv}: (A1) for $S_\lambda T_0$ requires $S_\lambda \mathrm{B}[G_\alpha^{\mathrm{bv}}] = \mathrm{B}[G_\alpha^{\mathrm{bv}}]$ off the diagonal, and (A4) requires that the dilate differ from T_0 by a constant-coefficient Lorentz-covariant diagonal term; neither is re-proved from I-B-G-Q-C-v8 decl:bv or I-B-G-Q-C-v8 thm:product.

par *Does not imply.* The declaration is an input. It does not assert that the parent's product is dilation-stable, and it adds no scale to the admitted data. par

Theorem (Conditional running constant). *Assume (H) and (Hdil).*

1. *$S_\lambda D = D$ for every $\lambda > 0$.*

2. *There is a unique $\beta_\alpha \in \mathbb{C}$ such that $S_\lambda T_c = T_{c + \beta_\alpha \log\lambda}$ for all $c \in \mathbb{C}$, $\lambda > 0$.*

3. *β_α does not depend on the choice of reference product: replacing T_0 by any T_{c_0} gives the same constant.*

4. *If $\beta_\alpha = 0$, every member of the family is dilation-invariant. If $\beta_\alpha \neq 0$, no member is, and the dilation orbit of T_c is the line $\{T_{c+\beta_\alpha s} : s \in \mathbb{R}\}$; requiring dilation invariance then selects no slot value.*

Proof. (a) $D = P(\partial_x)\delta(x - x')$ with P homogeneous of degree 2. In the variables $u = x - x'$, $v = x'$,

$\langle D, F\rangle = \int (P(\partial_u)^{\mathrm{t}}\widetilde{F})(0,v)\,\mathrm{d}v$ with $\widetilde{F}(u,v) = F(u+v,v)$ and $P^{\mathrm{t}}(\partial) = P(-\partial)$. For F_λ, each u-derivative gives a factor λ^{-1} and the substitution $v = \lambda w$ gives λ^4, so $\langle D, F_\lambda\rangle = \lambda^{4-2}\langle D, F\rangle$ and $\langle S_\lambda D, F\rangle = \langle D, F\rangle$. (b) By (Hdil) and Theorem (b),(c) there is a unique $\gamma(\lambda)$ with $S_\lambda T_0 = T_{\gamma(\lambda)}$, and $\gamma(1) = 0$. By linearity and (a), $S_\lambda T_c = T_{\gamma(\lambda)} + cD = T_{c+\gamma(\lambda)}$. Then $T_{\gamma(\lambda\mu)} = S_\lambda S_\mu T_0 = S_\lambda T_{\gamma(\mu)} = T_{\gamma(\mu)+\gamma(\lambda)}$, and injectivity (Theorem (c)) gives $\gamma(\lambda\mu) = \gamma(\lambda) + \gamma(\mu)$. Moreover $\gamma(\lambda) = \chi_F(S_\lambda T_0) - \chi_F(T_0) = \lambda^{-2}\langle T_0, F_\lambda\rangle - \chi_F(T_0)$ is continuous in λ, because $\lambda \mapsto F_\lambda$ is continuous into test functions (supports stay in a fixed compact set of $M^\circ \times M^\circ$ for λ in a compact subset of $(0,\infty)$) and T_0 is a distribution. So $g(s) = \gamma(e^s)$ is a continuous additive function on $\mathbb{R}$, hence $g(s) = sg(1)$; put $\beta_\alpha = \gamma(e)$. Uniqueness is injectivity again. (c) $S_\lambda T_{c_0+c} = T_{c_0+c+\beta_\alpha \log\lambda}$ by (b), which is the statement for the reference T_{c_0}; (H) holds for T_{c_0} by Theorem (b). (d) $S_\lambda T_c = T_c$ for all λ iff $\beta_\alpha \log\lambda = 0$ for all λ, by injectivity.

par *Does not imply*. Under (Hdil) the running constant exists as a theorem; its *value* is not derived, its dependence on α is not determined, and (Hdil) is not verified for the parent. The parent's record that its scale derivative is diagonal-supported and α-independent (I-B-G-Q-C-v8 thm:product(f)) is not identified with β_α, and the flat Euclidean constant of Theorem is not a value of β_α. RG stays open; no slot value is selected. Check C10 (exact) corroborates (a) on a Gaussian test tensor. par

The total diagonal

On $(M^\circ)^4$ write $\Delta_4 = \{x_1 = x_2 = x_3 = x_4\}$, $O = (M^\circ)^4 \setminus \Delta_4$, $\delta_{\Delta_4} = \delta(x_1 - x_4)\delta(x_2 - x_4)\delta(x_3 - x_4)$, $P_{ab}(\partial) = \partial_a\partial_b - \eta_{ab}\mathrm{Box}$, and $C^{b_1b_2b_3b_4} = \eta^{b_1b_2}\eta^{b_3b_4} + \eta^{b_1b_3}\eta^{b_2b_4} + \eta^{b_1b_4}\eta^{b_2b_3}$. An *extension* of a distribution U° on O is a distribution U on $(M^\circ)^4$ with $U|_O = U^\circ$. For $\lambda > 0$ let $S^{(4)}_\lambda U(x_1,\dots,x_4) = \lambda^{12}U(\lambda x_1,\dots,\lambda x_4)$, defined on distributions as in the two-point case.

Proposition (Extensions across Δ_4: non-uniqueness, and uniqueness under dilation invariance). *Let U° be a four-current distribution on O satisfying the Ward identity in each variable on O (as recorded for the parent's construction in I-B-G-Q-C-v8 prop:T48(c), used here only as the motivating case).*

1. *Two extensions differ by a distribution supported in Δ_4; if both satisfy the Ward identity in the i-th variable, so does the difference.*

2. *$A_{a_1a_2a_3a_4} = \prod_{i=1}^{4} P_{a_ib_i}(\partial_{x_i})\, C^{b_1b_2b_3b_4}\, \delta_{\Delta_4}$ is nonzero, supported in Δ_4, Lorentz-covariant with constant coefficients, symmetric under simultaneous permutations of the pairs (a_i, x_i), and satisfies $\partial^{a_i}_{x_i} A_{a_1a_2a_3a_4} = 0$ for each i. Hence, if one Ward-satisfying extension U exists, then $U + sA$, $s \in \mathbb{C}$, are pairwise distinct Ward-satisfying extensions with the same symmetry: a Ward-satisfying extension is never unique.*

3. *Let U, U' be extensions satisfying the Ward identity in the first variable, with $U' - U$ a finite sum of constant-coefficient derivatives of δ_{Δ_4}. If $S^{(4)}_\lambda U = U$ and $S^{(4)}_\lambda U' = U'$ for all $\lambda > 0$, then $U = U'$.*

Proof. (a) The difference vanishes on O; the Ward operator is linear. (b) Support and symmetry are clear, since C is totally symmetric and δ_{Δ_4} is symmetric under permutations of the x_i. Ward: $\partial^a P_{ab}(\partial) = \mathrm{Box}\,\partial_b - \partial_b \mathrm{Box} = 0$ as a constant-coefficient operator, applied in the variable x_i. Nonzero: in the coordinates $u_i = x_i - x_4$ $(i \le 3)$, x_4, the operator ∂_{x_i} $(i \le 3)$ is ∂_{u_i} and $\partial_{x_4} = \partial'_{x_4} - \sum_{i\le 3} \partial_{u_i}$; since $\delta_{\Delta_4} = \delta(u_1)\delta(u_2)\delta(u_3)$ does not depend on x_4, $A = Q(\partial_u)\,\delta(u)$ with the polynomial $Q(k_1, k_2, k_3) = \prod_{i\le 3} P_{a_ib_i}(k_i)\, P_{a_4b_4}(-k_1 - k_2 - k_3)\, C^{b_1b_2b_3b_4}$, and $Q(\partial_u)\delta(u) = 0$ only if $Q = 0$ (Fourier transform in u). Take $k_1 = k_2 = k_3 = (0, 0, 0, 1)$, so $k_4 = -k_1 - k_2 - k_3 = (0, 0, 0, -3)$, and all $a_i = 1$ (the x -direction). Since no k_i has an x-component, $P_{1b}(k_i) = -\eta_{1b} k_i^2$, and the component is $\prod_i (-k_i^2)\, \eta_{11}^4 C^{1111} = 1 \cdot 1 \cdot 1 \cdot 9 \cdot 3 = 27 \neq 0$. So $Q \equiv 0$ and $A \neq 0$. (Check C11 reproduces 27 and further nonzero components.) (c) Write $A = U' - U = \sum_m Q_m(\partial_u)\delta(u)$ in the normal form of (b), Q_m homogeneous of degree m. Since $\delta(u)$ has scaling degree -12, $S^{(4)}_\lambda(Q_m(\partial_u)\delta(u)) = \lambda^{-m} Q_m(\partial_u)\delta(u)$. Invariance for all λ and injectivity of the normal form leave only $m = 0$: $A = c_{a_1a_2a_3a_4}\,\delta(u)$ with constant c. The Ward identity in x_1 gives $c_{a_1a_2a_3a_4}\, \eta^{a_1e} \partial_{u_1, e}\delta(u) = 0$, hence $c = 0$.

par *Does not imply.* The proposition proves non-uniqueness and a conditional uniqueness; it does not prove that any Ward-satisfying extension exists, that a dilation-invariant one exists (for the two-current family Theorem (d) shows that invariance can fail for every member), or that the parent's U° is dilation-invariant on O. Differences with non-constant coefficients are not classified. The four-current row stays partial and existence stays open. par

Documentary readings of newly delivered companions

V-DST-DSS-CERT-v4. (sha256 550372abe2117364ec4e3f62e8840d66570c8845ad27e842d6ed1b74b5321302.) doc:VDC-conical reads I-B-G-Q-C-CERT-v2 (historical math v2) thm:cc as a conical coefficient certificate with slot family affine in *c* with slope 1 and no rule of the admitted data reproducing two slot values. That is an accurate reading of Theorem (c),(e) (re-checked). Its prop:VDC-parscale (parity does not fix a scalar normalization) has the same logical shape as Theorem (d): a symmetry requirement that holds for every member, or for none, selects no member. No parity statement is made here, and the hosts are not identified.

DS-OB-1-CERT-v3. (sha256 07b600a11b5ec1661b651f74d473d270aa6e114463da94f051c630dd7b1758ea.) DS-OB-1-CERT-v3 prop:v3-DS-renorm shows that at the de Sitter host the curvature-squared directions add nothing to $\{T + c_0 g\}$. That concerns state-independent tensors on a fixed metric; the slot here is a diagonal-supported two-point term that is not of vacuum-energy type (Proposition , Corollary). The two are separate statements.

VC-OB-1-CERT-v3. (sha256 502f6e5ebcc9bbe8906026bc539b513afe9cff04efd1bd75aadc7141d868842d.) VC-OB-1-CERT-v3 prop:v3-VC-H corrects the fibre tensors of VC-OB-1-CERT-v2 def:v2-H, which version 4 of this sheet noted and did not use; nothing here depends on them.

Hawk07-F/G/H-CERT-v3. (sha256 2280220e1bddd21e787032d88903764932f23d06bc5100722b08891a9c536dd6, fa61bb7b1d8f583c9aa3f62936a3c0374ca8ecc5ea08da2536ab33c7b99f1ed1, 1edfff7dc754b726af8f7b186066c45c37efc19764f6bc37ba7180e1352b1225.) Hawk07-F-CERT-v3 thm:v3-parallel: null contractions along a parallel null field are the same on the whole corrected fibre. Off the axis the cone is flat, and $\partial_t + \partial_z$ is a parallel null field there, so that theorem would apply on M°; it concerns stress tensors, not the two-current slot, and is not used. thm:s2-cas is unchanged from v2 (as recorded in version 4).

Red06-G-DSS-CERT-v4 and En08-ST-DSS-CERT-v4. (sha256 574d8abfdcd620476e8054092bce4323652afd03740ceb917a165798bc653ebc,

98c42ee7397263bc694ebed7d66c682b090df437a3230f294b3245f4bd01bee9.) Neither cites this sheet; their I-C readings concern other sheets. No statement here depends on them.

Version 6: dilations of the boundary value, hypothesis (Hdil) reduced, and the companion readings

This section is new in version 6 (request t268u; no plan was attached). Everything in it is proved locally from the earlier sections of this sheet, including Sections and ; computer-assisted checks are labelled as such, and standard facts of real analysis and of linear algebra are named where they are used. The newly delivered companions (DS-, VC- and PG-OB-1-CERT-v4 and v5, Hawk07-*-CERT-v4 and v5, and the DSS-CERT-v5 and v6 sheets) are cited by sha256 as source records only, never as premises; I-B-G-Q-C-CERT-v5 is the previous version of this sheet. The companion files were verified before use against MANIFEST-CertPlan-S2v4-OB.sha256 and MANIFEST-CertPlan-S2v4-Hawk07.sha256, and, for the second wave read in this version, MANIFEST-CertPlan-S2v5-OB.sha256 and MANIFEST-CertPlan-S2v5-Hawk07.sha256 (in CertPlan/deliver), and MANIFEST-DSS-CERT-v5.sha256 and MANIFEST-DSS-CERT-v6.sha256 (in DSS/deliver); every listed hash matched.

Dilations of the parent's boundary value and hypothesis (Hdil)

Notation of Section . On off-axis pairs the parent's invariant is $w = (r^2 + r'^2 + \Delta z^2 - \Delta t^2)/(2rr')$ (the relation $\Delta t^2 = r^2 + r'^2 + \Delta z^2 - 2rr'w$ is recorded in the proof of I-B-G-Q-C-v8 thm:global), and the declared boundary value is $G_\alpha^{\mathrm{bv}} = \Gamma_\theta(w + \mathrm{i}0)/(8\pi^2 rr')$ (I-B-G-Q-C-v8 decl:bv). The construction of that boundary value is cited, not re-proved, so the following is made explicit.

Declaration (Hypothesis (BV): the boundary value commutes with dilations). For every $\lambda > 0$, the pull-back of G_α^{bv} by $\delta_\lambda \times \delta_\lambda$ is the boundary value of the pulled-back holomorphic family, that is, $(\delta_\lambda \times \delta_\lambda)^* G_\alpha^{\mathrm{bv}} = \Gamma_\theta(w \circ (\delta_\lambda \times \delta_\lambda) + \mathrm{i}0)/(8\pi^2\lambda^2 rr')$. This holds, for instance, whenever G_α^{bv} is the distributional limit of $\Gamma_\theta(w + \mathrm{i}\varepsilon)/(8\pi^2 rr')$ as $\varepsilon \mathrm{downarrow} 0$, since pull-back by a diffeomorphism is continuous on distributions. It is stated

as a hypothesis because the parent's construction is not re-derived here.

par *Does not imply.* An input about the parent's construction, adding no scale and no coefficient to the admitted data. par

Proposition (Reduction of (Hdil) to the diagonal conditions). *Assume (BV), and that T_0 satisfies (A1)–(A5) of Definition . Let $\lambda > 0$.*

1. *$w \circ (\delta_\lambda \times \delta_\lambda) = w$, θ is unchanged, and $(\delta_\lambda \times \delta_\lambda)^* G_\alpha^{\mathrm{bv}} = \lambda^{-2} G_\alpha^{\mathrm{bv}}$ on off-axis pairs.*

2. *$S_\lambda \mathrm{B}[G_\alpha^{\mathrm{bv}}] = \mathrm{B}[G_\alpha^{\mathrm{bv}}]$ off the diagonal.*

3. *$S_\lambda T_0$ satisfies (A1), (A2) and (A3), and $S_\lambda T_0 - T_0$ is supported in the diagonal.*

4. *Hence, under (H), hypothesis (Hdil) holds if and only if, for every $\lambda > 0$, $S_\lambda T_0 - T_0$ is a finite sum of constant-coefficient derivatives of $\delta(x - x')$, Lorentz-covariant in the sense of Lemma , of order at most 2; equivalently $S_\lambda T_0 = T_{\gamma(\lambda)}$ for some $\gamma(\lambda) \in \mathbb{C}$.*

Proof. (a) $r, r', \Delta z, \Delta t$ all scale by λ and the angle is fixed, so w and θ are invariant and $1/(rr')$ scales by λ^{-2}; apply (BV). (b) In the parent's construction (I-B-G-Q-C-v8 thm:product(a), the two-contraction term of the product of the currents $\varphi^* \partial\varphi - \partial\varphi^* \varphi$), $\mathrm{B}[G]_{ab}$ is a finite sum of products of two factors, each a derivative of $G(x, x')$ or $G(x', x)$, with exactly one derivative in x (index a) and one in x' (index b) in total. Each factor is a distribution off the diagonal whose products are defined there (as in the parent). By (a) and the chain rule, a factor with j derivatives pulls back to λ^{-2-j} times itself, so each product pulls back to λ^{-6} times itself, which is $S_\lambda \mathrm{B} = \mathrm{B}$ for the weight-6 action of Section . Pull-back commutes with derivatives and with these products. (c) $\delta_\lambda \times \delta_\lambda$ preserves the diagonal and its complement, so (A1) for T_0 and (b) give (A1) for $S_\lambda T_0$, and $S_\lambda T_0 - T_0$ vanishes off the diagonal. For (A2): with $F_\lambda = F(\delta_\lambda^{-1} \cdot, \delta_\lambda^{-1} \cdot)$ one has $(\partial F)_\lambda = \lambda\, \partial(F_\lambda)$ in the local Cartesian coordinates of Section , in which δ_λ is linear and preserves η; so $\langle \partial_x^a S_\lambda T_{ab}, F^b \rangle = -\lambda^{-2} \langle T_{ab}, (\partial^a F^b)_\lambda \rangle = \lambda^{-1} \langle \partial_x^a T_{ab}, F_\lambda^b \rangle = 0$, and likewise in x'. (A3): the swap $(a, x) \leftrightarrow (b, x')$ commutes with S_λ. (d) By (c), (A1)–(A3) hold for $S_\lambda T_0$, so (Hdil) is exactly (A4)–(A5) for it; the equivalent form is Theorem (b).

par *Does not imply*. Under (BV) the off-diagonal half of (Hdil) is proved; what stays *open* is whether the diagonal remainder $S_\lambda T_0 - T_0$, which is a diagonal-supported, Ward-satisfying, symmetric distribution, has constant coefficients and order at most 2. By the structure theorem for point-supported distributions it is locally a finite sum $\sum_\beta k^\beta(x')\partial_x^\beta \delta(x - x')$ with distributional coefficients; constancy and the order bound are not proved. So (Hdil) and the running constant β_α remain conditional, and no value of β_α is derived. Check C12 (computer-assisted, exact sympy) verifies (a) and the weight −6 homogeneity of all 16 components of $2(\partial_a G\,\partial_b' G - G\,\partial_a \partial_b' G)$ for $G = f(w, \theta)/(8\pi^2 rr')$ with an undefined function f. par

Corollary (What a declared window would buy). *Fix a test tensor F and suppose a real window $c_1 < c_2$ for the slot value were declared as data. Over $c \in [c_1, c_2]$, the least worst-case error of a constant rule for $\chi_F(T_c)$ is $(c_2 - c_1)/2$, attained only by $r = \chi_F(T_0) + (c_1 + c_2)/2$. Without a declared window the worst-case error is infinite (Theorem (e)).*

Proof. $\chi_F(T_c) = \chi_F(T_0) + c$ (Theorem (c)) ranges over an interval of length $c_2 - c_1$, and for an interval the minimax constant is its midpoint, with error half its length; any other constant is farther from one endpoint.

par *Does not imply*. Conditional on a declaration that the admitted data do not contain; no window is declared here, and the corollary selects no slot value. Check C13 (exact) confirms the midpoint and the value on one window. par

Documentary readings of newly delivered companions

VC-OB-1-CERT-v4. (sha256 f9802da66896159503132b736164016c1d06d2a6530bbbc06cb4ad3af0256387.) VC-OB-1-CERT-v4 cor:v4-VC-fibre makes the corrected stress fibre conserved for all coefficients. That fibre consists of state-independent tensors on a fixed metric; the slot here is a diagonal-supported two-point term that is not of vacuum-energy type (Corollary), so the two stay separate.

DS-OB-1-CERT-v4. (sha256 0b5b86f87f91503ba9e96cf221b2ef96a4b4e96e3f27489336eb2b89848463c6.) DS-OB-1-CERT-v4 prop:v4-DS-window: a declared window of the omitted coefficient would make the least

worst-case errors finite, attained at midpoints. Corollary has the same logical shape for the slot value; the objects, hosts and labels differ and are not identified.

Hawk07-F-CERT-v4 and Hawk07-H-CERT-v4. (sha256 3b4eef32040e7f3aad9766523b6c5deff83c9679fcd5924d3b93f5b110221e63, acf36486626757388e96817cfd167003282523a596913262400b06f4d700ba7d.) Hawk07-F-CERT-v4 thm:v4-nullchar characterizes vanishing null contractions of curvature tensors, and Hawk07-H-CERT-v4 prop:v4-late characterizes locally de Sitter regions of constant-rate warps. The cone is flat off the axis; neither statement concerns the two-current slot, and neither is used.

V-DST-DSS-CERT-v5. (sha256 4133961f566c059c22054b5922423d1ff94cb0d1c888ca353a7c143bba1541be.) V-DST-DSS-CERT-v5 prop:VDC-odd: a parity-odd natural tensor and its first variation vanish at the de Sitter host. No parity statement is made here. Its plan-label list records thm:cc as present in I-B-G-Q-C-CERT-v2 versions 1 and 2; that is accurate.

Red06-G-DSS-CERT-v5 and En08-ST-DSS-CERT-v5. (sha256 e4a1b02552c138b8f9f009f2e71e391825ad0014f717b43f96883c445605213a, 9be4fe4fdd9cf1164a75f0218035f0ee3a4c340ed7f15787551de3997fe5af64.) Neither cites a statement of this sheet beyond the version-1 and version-2 labels already read; no statement here depends on them.

Documentary readings of the second wave of companions

The following files were delivered during the preparation of this version and verified against their manifests (Section , opening paragraph). They are source records only.

V-DST-DSS-CERT-v6. (sha256 710c656210aab6dd708cd9f830ab7bf59df592f0887ab168b1e7fa7be2df95f9.) V-DST-DSS-CERT-v6 doc:VDC-v6read reads I-B-G-Q-C-CERT-v5 prop:v5-delta4 as non-uniqueness of a Ward-satisfying extension across the total diagonal, with an explicit conserved, Lorentz-covariant, constant-coefficient term of order eight and at most one dilation-invariant extension among constant-coefficient differences; that is accurate (the term is a product of four second-order projectors applied to δ_{Δ_4}, Proposition). It

reads I-B-G-Q-C-CERT-v5 thm:v5-dil as conditional on a hypothesis the sheet does not verify; accurate, and version 6 reduces but does not discharge that hypothesis (Proposition). Its reading of this sheet's version-5 reading of V-DST-DSS-CERT-v4 doc:VDC-conical as accurate is noted. Its V-DST-DSS-CERT-v6 lem:VDC-oddinv and V-DST-DSS-CERT-v6 prop:VDC-even (even-order pattern on its host) concern operators on another space and are not compared.

DS-OB-1-CERT-v5 and VC-OB-1-CERT-v5. (sha256 a0805f8eb081a250f78e8074b9de5986ccd23106749df9e0fe5fac2f71e157f9, d3a93a3afb0e8803d18f230ce824f78c19253f6a4bc841f8ceef763ce14f7cac.) Both cite I-B-G-Q-C-CERT-v5 thm:v5-dil as a conditional running constant under dilations that does not concern their sheets; accurate. DS-OB-1-CERT-v5 prop:v5-DS-relwin and DS-OB-1-CERT-v5 prop:v5-DS-nowin (relative windows) have the logical shape of Corollary ; objects and hosts differ and nothing is identified.

Other second-wave files. PG-OB-1-CERT-v5, Hawk07-A/F/H-CERT-v5, En08-ST-DSS-CERT-v6 and Red06-G-DSS-CERT-v6 (sha256 c96ea4631de51c635521ca42fd24337728591676ee9019a24f3ad9fcdcdeb8a2, 9db43c8772a84fcf2fcf8d3674b86781ab407b93de05d370740e89f3f00b7add, 2cfa6282f30e25ac57188298f2e16d3b05a66fff4440204e6f11acce352f5bc3, 74a70015a03906e76cac8fde88a082da9789ea6e863d987be1dbba67f08bb5dd, 7d821d99ced3a9d265d5437f5c1466d8f524a09884730d13662278c31b1da086, c3f04faab2c76fb661054f2c1393bd71f484a1bfdfeeace52e5c612a34fc4599) do not cite this sheet. None of the second-wave files records an error in version 5 of this sheet, and none was found in their readings.

Verification of plan t256u against the sheets (version 1, retained)

toprule Plan statement Finding Status

midrule Slot ↦ characteristic coefficient injective for fixed admitted conical data The order-two Lorentz-covariant conserved diagonal term is one complex slot (Lemma); χ_F is affine with slope 1 in it (Theorem (c)), conditional on (H). proved (order two)

Order-zero diagonal term Not a slot: forced to $R_{\alpha} = \mathrm{i}\frac{\alpha^{-2}-1}{24\pi^{2}r^{2}}\eta\,\delta$ by I-B-G-Q-C-v8 thm:product(c); a certificate for it would be false. corrected (PC7.1)

``Characteristic coefficient'' In the parent the phrase means the inherited coefficient, which is not computed and not admitted; here it is χ_{F} (Definition). corrected (PC7.2)

No admitted-data rule for two slot values; infinite worst-case error True, already over real c (Theorem (e)). proved

Boundary value stays declared new data Yes (I-B-G-Q-C-v8 decl:bv). confirmed

Four currents off Δ_{4}; certificate RG-open Yes (Remarks and); the scale is not admitted data. confirmed (PC7.3)

bottomrule

Plan corrections of version 1 (retained)

1. The certificate applies to the order-two slot (and the higher-order slots), not to the order-zero diagonal term, which is forced by the admitted data.

2. ``Characteristic coefficient'' is read as χ_{F}, a coefficient of this sheet's admitted family; the inherited characteristic coefficient stays not admitted.

3. The scale v cannot be admitted data: in the flat Euclidean source a scale change is a slot shift, so admitting it would fix the slot by fiat.

4. The plan's ``infinite worst-case error'' is true here (in contrast with the energy gain of I-C-Th-CERT-v1).

5. Nonemptiness of the admitted family is not proved here; it is the declared hypothesis (H), recorded in the parent.

6. (Amendment t257u) The original ``I-B-G-Q-C v9'' is superseded: this is a new standalone sheet, and I-B-G-Q-C is not given a new version.

Verification of plan t258u against the sources (version 2, retained)

Every label named by plan t258u was searched in the read-only copies (automated log plan_label_audit.json of this run); all exist. Findings for this sheet: toprule Plan statement Finding Status

midrule I-B-G-Q-B thm:Q-run: scale derivative is exactly the slot operator, constant $1/(24\pi^2)$ The source states $v\partial_v \Pi^{(v)} = -\frac{1}{24\pi^2}(\partial\partial - \delta\Delta)\delta_0$, in the flat Euclidean model. Re-derived locally (Theorem (c)): $-1/(24\pi^2) = 2\pi^2 c_0$, with c_0 from the declared datum. The sign is negative, and the statement is Euclidean and flat, not conical. proved (scoped); PC7.7

I-B-G-Q-B thm:Q-conecount: count $\lfloor p/2 \rfloor$, independent of α Confirmed (real count under (LC); 0 for $p < 2$). Corollary . confirmed

I-B-G-Q-B thm:Q-four, worded two ways in the plan The source list (``descent, Ward and normalization hold together; the fourth condition fails") is correct: part (i) gives exactly one $v_C$ for each $C$; part (ii) is non-running. The item ``cannot hold together for the whole family" is false if read as ``no member satisfies all three", and true only as ``not all members do; exactly one does". Theorem (e), Proposition . corrected; PC7.8

I-B-G-Q-B thm:Q-product Exists; its uniqueness up to scale is re-proved for order ≤ 2 (Theorem (d)). proved

I-B-G-Q-C-v8 labels I-B-G-Q-C-v8 decl:bv, I-B-G-Q-C-v8 thm:product, I-B-G-Q-C-v8 thm:sym6, I-B-G-Q-C-v8 thm:two5, I-B-G-Q-C-v8 prop:T48 exist and are described correctly. confirmed

Red06-G-DSS prop:R-TGH ``named labels, not functions of admitted data" The proposition computes the value $T_{\mathrm{GH}} = \hbar H/(2\pi k_B)$ and states that interpretations are external; ``not functions of admitted data" is the content of Big01-A thm:Hcert, not of prop:R-TGH. Red06-G-DSS def:R-TGH and Red06-G-DSS rem:R-capacity are as described. Proposition uses only the naming pattern. corrected; PC7.9

VC-OB-1 reading Labels exist. Proposition . For the gloss on VC-OB-1 prop:VC-renorm see I-C-Th-CERT-v2, PC4.7. proved

Four currents off Δ_4 as a permanent negative Only a negative inside the admitted family, conditional on (H4)

(Proposition); not a permanent no-go. corrected; PC7.10

(H) stays declared Unchanged (Declaration). confirmed

bottomrule

Plan corrections of version 2 (retained)

1. ``thm:Q-run … constant $1/(24\pi^2)$'': the derivative is $-\frac{1}{24\pi^2}D^{\mathrm{E}}\delta_0$ (negative sign), in the flat Euclidean model. The constant is derived locally from Vol(S^3) and the declared off-diagonal datum; the Wick normalization of that datum is taken from the source record, so the local theorem is complete relative to that declared datum and not beyond it. The conical, Lorentzian running constant is not derived; on the cone, RG-open stays a remark.

2. ``Descent, Ward and prescribed normalization cannot hold together for the whole family'': false if it means that no member satisfies the three conditions; for each prescribed value exactly one member does (flat model: I-B-G-Q-B thm:Q-four(i) and Theorem (e); cone: Proposition). The obstruction in thm:Q-four is the failure of scale independence (part (ii)), which Theorem (c) re-proves.

3. ``prop:R-TGH (named labels, not functions of admitted data)'': prop:R-TGH computes the value of the named certificate; the non-function statement is Big01-A's thm:Hcert.

4. ``A permanent negative for a total-diagonal Ward identity'': proved only inside the admitted family and conditional on the declared record (H4).

Verification of plan t262u against the sources (version 3, retained)

Every label named by plan t262u was searched in the delivered read-only files, pinned by sha256 (automated log plan_label_audit.json of this run). The plan's ``insertion status'' says it does not authenticate the other sheets; here they were checked against the delivered files. Findings for this sheet: toprule Plan statement Finding Status

midrule Exact two-point certificate, reference independence True; proved (Theorem). proved

Order-zero contact freedom (constant ρ) True, and strengthened to smooth $a(x)$ (Proposition). proved; PC7.11

VC insertion: prop:vac does not derive the parent's forced term Confirmed: the parent records the forced representative R_{α} (I-B-G-Q-C-v8 thm:product); prop:vac concerns differences. confirmed

VC-OB-1-CERT-v2 prop:s2-vac Exists (v1 and v2); conserved-source vacuity; a separation, as the plan says. confirmed

What changing the slot can establish at Δ_4 True as a conditional statement; the global difference $A_{c,c'}$ is an extra hypothesis not supplied by (H4) (Proposition). proved (conditional); PC7.12

DS-OB-1-CERT-v2 thm:DS-coef6, DS-OB-1-CERT-v2 cor:DS-compl6, Red06-G-DSS-CERT-v2 thm:RC-coef Exist (v1/v2, resp. v2/v3). DS-coef6 and RC-coef concern one and the same prescribed DSS_H, not different backgrounds (re-verified); the plan's ``no identification of hosts'' refers to cone versus de Sitter, which is correct. confirmed

Hawk07-F/G/H thm:s2-cas Exist (v1 and v2); injectivity form with two-point radius $\frac{1}{2}\kappa|\ell(\hat{\tau})\|\mathrm{varkappa}_1 - \mathrm{varkappa}_2|$. confirmed

En08-ST-DSS-CERT-v2 thm:EC-coef, V-DST-DSS-CERT-v2 prop:VDC-coef Exist (v2 and v3); coefficient-slot forms. confirmed

Flat coefficient is not a conical Lorentzian running coefficient Confirmed; versions 2 and 3 say so. confirmed

Analytic-chain ending The objects named (the $K_{47} + \ldots + K_9$ contraction, $Q_H R_1^{(1)} \in \mathcal{E}_H$, XIV-I) belong to the XIV-I/XV-B records, not to this sheet or its sources; recorded as a non-closure ledger only. PC7.13

bottomrule

Plan corrections of version 3 (retained)

1. The plan's Proposition ``order-zero contact freedom'' treats only constant ρ, which is version 2's prop:vac(a). The smooth-coefficient version holds and is proved (Proposition (a)); the parent states it for its own product.

2. In the plan's Proposition ``what changing the slot can establish'', the first statement is the content of (H4), not a

consequence of it, and the global distribution $A_{c,c'}$ is a hypothesis: (H4) does not provide it.

3. The analytic-chain ending concerns objects outside the five sheets. It is kept as a list of non-claims; no statement about those objects is made or audited here.

Errors found in version 2. None.

Verification of plan t266u against the sources

Every label named by plan t266u (sha256 39aea6f1117318f9517712567fc87db46dd188176498fd71ff637076175f0621) was searched in the delivered read-only files, pinned by sha256 (automated log plan_label_audit.json of this run: Big01-A v5; v1 and v2 of DS-OB-1-CERT, VC-OB-1-CERT and PG-OB-1-CERT; v2 and v3 of Hawk07-A/B/C/F/G/H-CERT; v2, v3 and v4 of the three DSS CERT sheets; v3 of the five sheets of this family; the OpenAI catalogue). The OB sheets' version 3, in preparation elsewhere, was not read. Findings for this sheet: toprule Plan statement Finding Status

midrule DS-OB-1-CERT-v2 thm:DS-coef6, cor:DS-compl6: same form on prescribed dS; hosts differ (cone vs de Sitter) Present; on DSS_H (with a local form). The host difference cone versus DSS_H is correct. confirmed

Hawk07 thm:s2-cas of F/G/H: injectivity form for a named end stress; neither derives a vacuum energy Present in F/G/H only (not A/B/C), identical in v2 and v3. Its part (b): the stress is never cosmological. The Hawk07-F background is not identified with the cone here. confirmed

``Slot is not a vacuum-energy term" Already proved in version 2 (Proposition); re-proved without the Ward identity and sharpened in Corollary . proved

VC reading: prop:v3-contact and prop:s2-vac ``both concern differences of conserved tensors" Accurate for prop:v3-contact only; prop:s2-vac concerns every conserved tensor. Neither derives the parent's forced representative. qualified; T266.1

RG-open on the cone Confirmed; no RG fixed point is claimed. confirmed

Cross-sheet: ``the hosts and the named quantities differ" True between this sheet and each de Sitter sheet; false

between DS-OB-1-CERT-v2 and Red06-G-DSS-CERT-v3 (and Big01-A), which share DSS_{H} and the label formulas. corrected; T266.2

Hawk07 CERT v3 corrections (def:v2-H, ``conformal warp") Do not affect thm:s2-cas; the identical display in VC-OB-1-CERT-v2 def:v2-H is not used here. noted

Companion versions Red06-G-DSS-CERT-v4 and Hawk07-F/G/H-CERT-v3 are the newest delivered; cited statements unchanged. Only v2 of the OB sheets is delivered. noted

bottomrule

Plan corrections of version 4, and errors found in version 3

T266.1 ``Both concern differences of conserved tensors" holds for Proposition , not for prop:s2-vac, which concerns every conserved tensor.

T266.2 The line ``the hosts and the named quantities differ" is false inside the de Sitter group (DS-OB-1-CERT-v2 and Red06-G-DSS-CERT-v3 share DSS_{H} and the label formulas; Big01-A is on the same host).

T266.3 ``Slot is not a vacuum-energy term" was already a theorem of version 2 (Proposition); version 4 adds an independent proof, not a new fact.

Errors found in version 3. None found.

Version 5: the items of request t267u, and errors found in version 4

No plan was attached to request t267u, so version 5 has no plan audit. The request asked that the items left open by the version-4 report be addressed honestly; this table records where each is treated and with what status (proved, partial, open, or not applicable to this sheet). Missing is never zero. toprule Item Treatment here Status

midrule The conical running constant Exists and is unique under the declared hypothesis (Hdil) (Theorem); value not derived; (Hdil) not verified for the parent conditional; value *open*

The four-current product at Δ_4 Non-uniqueness of Ward-satisfying extensions; uniqueness of a dilation-invariant one among constant-coefficient differences (Proposition) proved; existence *open*

Rank-one duals; VC fibre statements Statements of other sheets n/a here

Readings: Hawk07-F/G/H-CERT-v3, DS-OB-1-CERT-v3, VC-OB-1-CERT-v3, DSS CERT v4 Section , documentary done

bottomrule

Errors found in version 4. None found. Remark and Proposition are consistent with Theorem and Proposition , which sharpen them under stated hypotheses. The version-4 file is not edited.

Version 6: the items of request t268u, and errors of earlier versions

No plan was attached to request t268u, so version 6 has no plan audit. The request asked that the items left open by version 5 be targeted and that the newest companion sheets be read; this table records where each item is treated and with what status (proved, partial, open, conditional, or not applicable to this sheet). Missing is never zero. toprule Item Treatment here Status

midrule (Hdil) for the parent's product Under the declared (BV): homogeneity of G_{α}^{bv}, invariance of B off the diagonal, (A1)–(A3) for the dilates; (Hdil) reduced to (A4)–(A5) for the diagonal remainder (Proposition) partial (conditional on (BV)); remainder *open*

The value and α-dependence of β_{α} Not derived *open*

Existence of a (dilation-invariant) Ward-satisfying extension at Δ_4; non-constant coefficients Not settled *open*

Declared windows for the slot value Corollary conditional

Readings: OB CERT v4, Hawk07-F/H-CERT-v4, DSS CERT v5 Section , documentary done

Readings, second wave: OB-1-CERT-v5, Hawk07-*-CERT-v5, DSS CERT v6 Section , documentary done

bottomrule

Errors of earlier versions found in version 6. None found. Declaration says that (A1) for $S_\lambda T_0$ is not re-proved from the parent; that stays true of version 5, and Proposition now proves it under the declared hypothesis (BV). The second-wave companions (OB-1-CERT-v5, Hawk07-*-CERT-v5, DSS CERT v6) record no error in version 5 of this sheet; their readings of it were checked and found accurate. The earlier files are not edited.

Audit of the parent, checks, open items and non-claims

Audit of the parent. I-B-G-Q-C-v8 thm:product, I-B-G-Q-C-v8 thm:two5, I-B-G-Q-C-v8 thm:sym6 and I-B-G-Q-C-v8 prop:T48 were re-read for the use made of them here; no error was found. Scope note: I-B-G-Q-C-v8 thm:product(a) characterizes T_α^{bv} by agreement with a local product on regular balls that carries a scale-*v* normalization; its uniqueness is relative to that normalization, which this sheet treats as the slot. The parent is not revised.

Computer-assisted checks. Appendix lists exact symbolic checks C1–C8 (sympy; C7 also uses a 30-digit mpmath quadrature; C8 is new in version 3). They are computer-assisted, corroborate the proofs, and no proof depends on them. No independent review has been performed. Check C9 (the slot operator is transverse and of pure order two) is new in version 4. Checks C10 (dilation invariance of the slot operator) and C11 (the symbol of the Δ_4 term) are new in version 5. Version 6: checks C12 (homogeneity of G and of B under dilations) and C13 (window minimax) are new.

Open. The slot value; RG on the cone (the scale; the Lorentzian running constant is not derived); the Wick normalization of the flat off-diagonal datum, taken from the source record; the four-current product on Δ_4; the inherited characteristic coefficient and the coefficients C^γ of the inherited lift; a proof of (H) inside this sheet; O.1, Gate 0, XV-B, J2, U6-sel and Host C, unchanged. Version 4: absolute vacuum energy; whether the Hawk07-F background profile is conical (not checked); the conical Lorentzian running constant. Version 5: the value and α-dependence of β_α; (Hdil) for the parent's product; existence of any Ward-satisfying four-current extension across Δ_4, and of a dilation-invariant one; differences with non-constant coefficients. Version 6: hypothesis (BV) for the parent's construction; constant coefficients and order at most 2 of $S_\lambda T_0 - T_0$; the value of β_α; existence at Δ_4.

Non-claims. This sheet does not imply a selected slot value, a scale, an inherited product or coefficient, a four-current product on Δ_4, an RG fixed point, a temperature, a finite Hilbert space of the host, or Einstein dynamics. Host stays prescribed, labels stay named.

References

[1] I-B-G-Q-C-v8; title page names Ngo Cheung. Parent sheet; source record only. https://enter.grok.me/browse/I-B-G-Q-C.

[2] I-B-G-Q-B; source record only.

[3] Red06-G-DSS (version 8); source record only.

[4] VC-OB-1 (version 5); source record only.

[5] DS-OB-1-CERT (v1, v2); Red06-G-DSS-CERT, En08-ST-DSS-CERT, V-DST-DSS-CERT (v2, v3); VC-OB-1-CERT (v1, v2); Hawk07-F/G/H-CERT (v1, v2); source records only.

[6] Big01-A (version 5), *Horizon-Bounded Capacity on a Prescribed de Sitter Host*; source record only.

[7] N. Cheung, *Black-Hole Information as an Access Problem: Enter, Quantum Recovery, and Complete Residuals*, figshare (2026). DOI: 10.6084/m9.figshare.34335024.v1. https://doi.org/10.6084/m9.figshare.34335024.v1.

[8] N. Cheung, *Operational Wormhole Certificates—Existence, Dimension-Dependent Scaling, Operational Functions, and Composition*, figshare (2026). DOI: 10.6084/m9.figshare.34549575.v1. https://doi.org/10.6084/m9.figshare.34549575.v1.

[9] N. Cheung, *Enter, Quantum Magic, and Quantum Gravity: Readout, Recovery, and the Limits of Geometric Response*, figshare (2026). DOI: 10.6084/m9.figshare.34335582.v1. https://doi.org/10.6084/m9.figshare.34335582.v1.

[10] N. Cheung, *Operational Consistency Does Not Select Lorentzian Geometry*, figshare (2026). DOI:

10.6084/m9.figshare.34441758.v1. https://doi.org/10.6084/m9.figshare.34441758.v1.

[11] N. Cheung, *Realization of Relational Time by Destructive Enter on a Clock Register*, figshare (2026). DOI: 10.6084/m9.figshare.34442907.v1. https://doi.org/10.6084/m9.figshare.34442907.v1.

[12] N. Cheung, ``The Enter Calculus: A Linear Quantum Lambda Calculus with an Operational Characterization of Measurement," *Frontiers in Physics* **14** (2026), article 1954943. DOI: 10.3389/fphy.2026.1954943. https://doi.org/10.3389/fphy.2026.1954943. Interface/operational background only; not a PDE premise.

[13] N. Cheung, *The Philosophy of Enter: Destructive Readout, Quantum Recovery, and the Refusal of Identification*, Cheung Ngo Medical Limited (2026). Framing essay; not a theorem premise. Programme note: https://enter.grok.me/enter.

appendix

Label audit

Every cited label of a parent or source sheet was found as a verb || in the read-only copy listed in Appendix (automated; 50 labels, 0 missing). Labels that the plan names but that do not exist are recorded as plan corrections.

begingroup toprule Sheet Label Found

midrule endhead Big01-A thm:Hcert yes

DS-OB-1-CERT-v2 cor:DS-compl6 yes

DS-OB-1-CERT-v2 thm:DS-coef6 yes

DS-OB-1-CERT-v3 prop:v3-DS-renorm yes

DS-OB-1-CERT-v4 prop:v4-DS-window yes

DS-OB-1-CERT-v5 prop:v5-DS-nowin yes

DS-OB-1-CERT-v5 prop:v5-DS-relwin yes

En08-ST-DSS-CERT-v2 thm:EC-coef yes

Hawk07-F-CERT-v2 thm:s2-cas yes

Hawk07-F-CERT-v3 prop:v3-E yes

Hawk07-F-CERT-v3 thm:s2-cas yes

Hawk07-F-CERT-v3 thm:v3-parallel yes

Hawk07-F-CERT-v4 thm:v4-nullchar yes

Hawk07-G-CERT-v2 thm:s2-cas yes

Hawk07-G-CERT-v3 thm:s2-cas yes

Hawk07-H-CERT-v2 thm:s2-cas yes

Hawk07-H-CERT-v3 thm:s2-cas yes

Hawk07-H-CERT-v4 prop:v4-late yes

I-B-G-Q-B lem:Q-offdiag yes

I-B-G-Q-B thm:Q-conecount yes

I-B-G-Q-B thm:Q-four yes

I-B-G-Q-B thm:Q-product yes

I-B-G-Q-B thm:Q-run yes

I-B-G-Q-C-CERT-v2 (historical math v2) thm:cc yes

I-B-G-Q-C-CERT-v5 prop:v5-delta4 yes

I-B-G-Q-C-CERT-v5 thm:v5-dil yes

I-B-G-Q-C-v8 decl:bv yes

I-B-G-Q-C-v8 prop:T48 yes

I-B-G-Q-C-v8 sec:ledger yes

I-B-G-Q-C-v8 thm:global yes

I-B-G-Q-C-v8 thm:product yes

I-B-G-Q-C-v8 thm:sym6 yes

I-B-G-Q-C-v8 thm:two5 yes

Red06-G-DSS def:R-TGH yes

Red06-G-DSS prop:R-TGH yes

Red06-G-DSS rem:R-capacity yes

Red06-G-DSS-CERT-v2 thm:RC-coef yes

Red06-G-DSS-CERT-v3 thm:RC-coef yes

V-DST-DSS-CERT-v2 prop:VDC-coef yes

V-DST-DSS-CERT-v4 doc:VDC-conical yes

V-DST-DSS-CERT-v5 prop:VDC-odd yes

V-DST-DSS-CERT-v6 doc:VDC-v6read yes

V-DST-DSS-CERT-v6 lem:VDC-oddinv yes

V-DST-DSS-CERT-v6 prop:VDC-even yes

VC-OB-1 prop:VC-renorm yes

VC-OB-1 thm:VC-main yes

VC-OB-1-CERT-v2 def:v2-H yes

VC-OB-1-CERT-v2 prop:s2-vac yes

VC-OB-1-CERT-v3 prop:v3-VC-H yes

VC-OB-1-CERT-v4 cor:v4-VC-fibre yes

bottomrule endgroup

Computer-assisted checks

All checks in this appendix are computer-assisted (floating point, mpmath, sympy, scipy). They are exact sympy computations and one 30-digit mpmath quadrature by code/checks.py (C9 version 4; C10–C11 version 5; C12–C13 new in version 6); they corroborate the proofs, and no proof depends on them. Script code/checks.py, output logs/checks.json. begingroup toprule Id Content Result

midrule endhead C1 Thm cc(a): for phi=exp(-t\{}2/8-(x\{}2+y\{}2+z\{}2)/2) and n=d_z, the pairing int phi (d_z\{}2-Box) phi of D_ab delta(x-x') with n\{}a n\{}b phi(x) phi(x') is 7*pi**2/4, nonzero (eta=diag(-1,1,1,1)) OK (value 7*pi**2/4)

C2 Lemma lc(c): P_ab=xi_a xi_b-eta_ab xi\{}2 is transverse in a and in b and P_ab(xi)=P_ba(-xi); for A xi_a xi_b+B eta_ab xi\{}2 transversality forces B=-A OK (transverse=True symmetric=True solution=[{B: -A}])

C3 Thm cc(d): the symbols (xi_a xi_b-eta_ab xi\{}2)(xi\{}2)\{}j, j=0..3, are linearly independent (rank 4 of 4) OK (rank 4)

C4 Lemma off: 2 dD0 dD0 - 2 D0 ddD0 = c0 (dd - delta Lap)|x|\{}-4 on R\{}4 minus 0, all 16 components, D0=1/(4 pi\{}2 |x|\{}2), c0=-1/(48 pi\{}4) OK (all components True)

C5 Lemma fp and Thm run(c): Vol(S\{}3)=2*pi**2, int_{eps<|x|<1}|x|\{}-4 d\{}4x = -2*pi**2*log(epsilon), and 2 pi\{}2 c0 = -1/(24*pi**2) OK (Vol 2*pi**2; constant -1/(24*pi**2))

C6 Thm run(d), Euclidean classification: for A xi_a xi_b + B delta_ab xi\{}2 transversality forces B=-A; trace of xi_a xi_b - delta_ab xi\{}2 is -3*x0**2 - 3*x1**2 - 3*x2**2 - 3*x3**2 OK (solution [{B: -A}])

C7 Lemma fp and Thm run(e): radial finite-part integral for exp(-|x|\{}2) = -0.288607832450766 vs -EulerGamma/2 (mpmath, 30 digits); for psi=exp(-|x|\{}2), Lap psi(0)=-8 and N(Pi_nu)-N(Pi_1) = -log(nu)/pi**2 = log(nu) Lap psi(0)/(8 pi\{}2) OK (fp dev 0.0)

C8 Prop zero-type and Thm conical-minimax: one-dimensional model, a=1+x\{}2, phi=exp(-x\{}2)(x-x'): pairing

of d_x(a delta) with phi is -3*sqrt(pi)/2 by definition and -3*sqrt(pi)/2 by the product rule (nonzero); midpoint radius minus |c1-c2|/2 simplifies to 0; reference shift T0+cs D with slot c-cs gives the same target (difference 0) OK (pairing -3*sqrt(pi)/2)

C9 Cor v4-slot: for a generic smooth f, D_ab f=(d_a d_b-eta_ab Box)f has d\{}a D_ab f = [0, 0, 0, 0], is symmetric (True), and has no order-zero part (every component is a combination of second derivatives) OK (div [0, 0, 0, 0])

C10 Thm v5-dil: with <S_lambda T,F>=lambda\{}-2 <T,F(./lambda,./lambda)>, the pairing of S_lambda D with n\{}a n\{}b phi(x) phi(x') (phi, n of C1) is 7*pi**2/4, equal to the C1 value for every lambda>0 OK (value 7*pi**2/4)

C11 Prop v5-delta4(b): Fourier symbol prod_i P_{a_i b_i}(k_i) C\{}{b1b2b3b4} of A on the hyperplane k4=-k1-k2-k3, at k1=k2=k3=(0,0,0,1) and at three further rational momenta, has components {'1111': '27', '2211': '9', 'g1111': '408', 'g2323': '-660', 'g0123': '132'} (not all zero); k\{}a P_ab(k)=0 identically (True); C is totally symmetric (True) OK (components {'1111': '27', '2211': '9', 'g1111': '408', 'g2323': '-660', 'g0123': '132'})

C12 Prop v6-A1: G=f(w,theta)/(8 pi\{}2 r r') with f an undefined function: G(lambda x,lambda x')=lambda\{}-2 G(x,x') at the pair (True); all 16 Cartesian components of 2(d_aG d'_bG-G d_a d'_bG) at a rational off-axis pair satisfy B(lambda x,lambda x')=lambda\{}-6 B(x,x') for symbolic lambda>0 (16 nonzero components) OK (homogeneous: True; nonzero components 16 of 16)

C13 Cor v6-window: for chi0=0 and the window [2,7] the constant rule minimizing max |r-chi_F(T_c)| over c in [2,7] (grid of step 1/10 on [0,12]) is r=9/2 with value 5/2=(c2-c1)/2; symbolic midpoint value (c2-c1)/2 OK (best 9/2, value 5/2)

bottomrule endgroup Result: 13 of 13 checks OK.

Artifact hashes (sha256)

begingroup toprule File sha256

midrule endhead inputs/Big01-A-v5.api.tex

e1160613ea8e02b37fb45954fe677d89f5fa7cca90062d42b68973b03a2bff1d

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inputs/DS-OB-1-CERT-v4.tex 0b5b86f87f91503ba9e96cf221b2ef96a4b4e96e3f27489336eb2b89848463c6

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../C-common/code/build.py 5dbc919f5773abb3bf12f3e56aacdab7a8161d61f05035945fd40204d536a88f

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parts/02e_v5.tex b47287eb985fbfe72eeae026c9a2d53fa71120f7cc5d6820612e040583f097c6

parts/02f_v6.tex 64b8bb473cbb7f19decdb3599841c0b99b633648b838a9c8a43746208958cf41

parts/03_plan.tex 4727d12a42b435e66d4518ebf91cd631c77f15e971a2bc1a19502622a9f9a21a

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../logs/get_log_S1.txt f4ad94933a9086eed368e50d2b7a5d9ea1b22ded9a1a07ec55ad12d5fb4872ac

../logs/get_log_S1v2.txt 470a182c91cdb81697779de8edc5498d31b4806ce398ca65e9481e46d6214683

../logs/get_log.txt f639ab99a753eed5217b1d001fe5cfa88a1c4191f4c4c7b89decb05f71514108

../logs/plan_label_audit.json f59bffdb66c63c8e64734a5490205357ea03fe78ea6108abed0d05b9365ef86b

midrule Frozen tree (before)

XVI-P ec965c15ae25cd3bb9cc2b3a134e966b19a1803c78d1fe5bf7554da2a8b3aaa6 OK

XVI-Q 0df9a0d10409d31ac0c2d0a47197e3f6e03c7ae258ec5fb775137f66cb0493c4 OK

XVI-R 57187bc6825f5c6ae88633b7279c6c0be57f7c4918fdbc525da4aaf958331edb OK

bottomrule endgroup The hashes of the delivered .tex and PDF are recorded in

MANIFEST-CertPlan-S1v6.sha256, not here, because a file cannot contain its own hash.