DVJ Derivation from the Hypergroup: Ten-Dimensional Owners and Lossy Scalar Witnesses

Luke Kenneth Casson Leighton[1] and Alex Hankey[2]

[1]ORCID: 0009-0006-8300-6257
[2]ORCID: 0000-0001-9090-5177

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Copyright (C) 2026 Alex Hankey. All Rights Reserved
Contact: lkcl@lkcl.net
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ORCID: 0009-0006-8300-6257 0000-0001-9090-5177
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Abstract

This paper derives the De Vries–Jordan (DVJ) operator family from the Hypergroup programme and keeps it ten-dimensional throughout the load-bearing construction. Its sources are imported rather than redrawn: the Archimedean constant and the analytic endpoints from H-PAP001; the finite full-ten source, the supported Pauli axes and the retained character sectors from H-PAP014; and the full-forty Jacobi source, its heat line balanced at $t = 1$ and the H-VER160 C8 entire owner from H-PAP015. Scalar formulae enter only as typed witnesses or readouts after the corresponding source object exists.

The certified path runs from the DVJ Gaussian scalar (H-VER088) and the real log lattice (H-VER089, H-VER090), through the entire log-cover product law (H-VER149), to the entire full-ten DVJ composition (H-VER171) and its semilinear source character (H-VER150). H-VER157 and H-VER158 then carry the same source through the sixteen-quadrant carrier, the paired source rails and the quarter source action to an internal DVJ endpoint. The resulting same-source DVJ/Jacobi transport is certified on the integer lattice; the paper records the exact domains and reconstruction statements available at each stage.

DVJ source characters and their squared-character reductions witness the operator spectrum but do not replace the full-ten owner. The classical Jacobi, Lerch, Euler-Gamma and Mellin witnesses, and the rank-one trivial-character Mellin projection of H-AUD081, are displayed in H-PAP015.

The paper does not use a zeta zero, Xi function, Riemann-Hypothesis statement, or externally chosen spectral ordinate as an ingress premise, and it does not claim RH. The generic off-lattice same-source DVJ/Jacobi realization is explicitly not claimed.

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0. DVJ derivation from the hypergroup: equation DAG

This Section 0 is the machine-audited driver for H-PAP002. Its certified path runs from the hypergroup to the ten-dimensional DVJ owners. It imports its sources rather than redrawing them: the full-forty Jacobi source, its heat line balanced at $t = 1$ and the H-VER160 owner from H-PAP015; the finite full-ten sources from H-PAP014; the Archimedean constant and the analytic endpoints from H-PAP001. Classical special functions occur only as downstream recognition or lossy readouts. No Xi/RH sink, actual-zero ingress, numerical ordinate, or critical-line claim belongs to this paper-level DAG.

Imported sources. The equations below are reproduced before their first consumers so that the paper-facing source boundary is visible. Mathematical ownership remains with the named Section-0 boxes in H-PAP001, H-PAP014 and H-PAP015.

H-PAP001 `front-pap001-archimedean-pi`**:**

$$\Pi_{\mathrm{src}} := \lim_{n\to\infty} P_n^- = \lim_{n\to\infty} P_n^+, \qquad \Pi_{\mathrm{src}} = \pi.$$

H-PAP001 `front-pap001-analytic-endpoints`**:**

$$\exp z := \sum_{k=0}^{\infty} \frac{z^k}{k!}.$$

H-PAP014 `front-fullten-owner`**:**

$$\sum_{a\in I_-} P_a = E_{10}^-, \qquad \sum_{a\in I_+} P_a = E_{10}^+, \qquad E_{10}^+ + E_{10}^- = I_{10}.$$

H-PAP014 `front-supported-pauli-source`:

$$C_{10} = (\delta_{a,\bar{b}})_{a,b=0}^{9}, \qquad F_- := E_{10}^- F E_{10}^-, \qquad J_F := iF_-.$$

H-PAP014 `front-hver134-retained-character-sectors`:

$$P_{\mathrm{fwd}} := P_6 + P_8, \qquad P_{\mathrm{inv}} := P_7 + P_9, \qquad P_{\mathrm{fwd}} + P_{\mathrm{inv}} = E_{10}^-.$$

H-PAP015 `front-jacobi-full40-source`:

$$\widehat{V}_{40} := \mathrm{span}\{\widehat{\mathbf{v}}_a \otimes \overline{\chi_m^{(8)}} : a = 1, \dots, 5,\ m \in \mathbb{Z}/8\mathbb{Z}\}, \qquad e_{a,m} := e_a^{(5)} \otimes e_m^{(8)}.$$

$$S_{40}((a,m),(b,m')) := \frac{1}{\sqrt{3}} \sin\frac{\pi ab}{6} \frac{1}{\sqrt{8}} e^{i\pi mm'/4}, \qquad T_{40}(a,m) := \exp\left[\frac{2\pi i}{48}(2a^2 - 3m^2 - 4)\right].$$

H-PAP015 `front-jacobi-full40-heat-line`:

$$\Theta_{40}(t) := \sum_{a=1}^{5} \sum_{m \in \mathbb{Z}/8\mathbb{Z}} \widehat{\mathbf{v}}_a(it^2)\, \overline{\chi_m^{(8)}(it^2)}\, e_{a,m}, \qquad \Theta_{40}(1/t) = S_{40}\Theta_{40}(t).$$

H-PAP015 `front-hver160-c8-entire-owner`:

$$Q_0^{\mathrm{HG}}(s) \text{ and } Q_4^{\mathrm{HG}}(s) \text{ are entire}, \qquad Q_4^{\mathrm{HG}}(s) = (2^s - 1) Q_0^{\mathrm{HG}}(s).$$

Imported full-ten source boundary. H-VER129, H-VER086/102/103/127 and H-VER134 now live in H-PAP014. The DVJ coupling boxes below consume their certified paper imports; this paper no longer redraws the finite source equations.

Provenance: `H-VER088`.

$$\boxed{\begin{array}{c} \Gamma_{\mathrm{src}}^{\mathrm{DVJ}} := \lim_{r\to\infty} \left(1 + \dfrac{{\Pi_{\mathrm{src}}}^2/4}{2^r}\right)^{2^r}, \\ \text{H-VER088 Source Gaussian Scalar: the limit is the source definition.} \end{array}} \tag{1}$$

No e, exponential, or logarithm is an upstream premise of this definition. The familiar equality $\Gamma_{\mathrm{src}}^{\mathrm{DVJ}} = \exp({\Pi_{\mathrm{src}}}^2/4)$ is downstream recognition only.

Provenance: `H-VER089`, `H-VER090`.

H-VER090 Real-Log Integer Power Lattice

$$\lambda_+ > 1, \quad \text{with } {\lambda_+}^{-1} \text{ the reciprocal member of the positive DVJ doublet:}$$
$$\text{the geometric-mean normalized pair of positive roots of the H-VER088}$$
$$\text{source defect built from } \Gamma_{\mathrm{src}}^{\mathrm{DVJ}} \text{ (H-VER089),}$$
$$u_\lambda := \text{the unique real logarithm of } \lambda_+ \ (u_\lambda > 0), \qquad \lambda_+ \longmapsto {\lambda_+}^{-1} \iff u_\lambda \longmapsto -u_\lambda, \tag{2}$$
$$L^\lambda{}_{\pm,n,m} := \pm n\, u_\lambda + 2i\Pi_{\mathrm{src}}\, m, \qquad n, m \in \mathbb{Z}, \qquad \kappa_\lambda := \frac{u_\lambda}{2\Pi_{\mathrm{src}}},$$
$$\text{the real lift of the source power } {\lambda_+}^{\pm n} \text{ is the deck sheet } m = 0;$$
$$\text{other } m \text{ are the same source value on another deck sheet;}$$
$$\text{no principal complex logarithm and no external ordinate are used.}$$

Provenance: `H-VER149`.

H-VER149 Entire Log-Cover DVJ Product Law

$$C_{\log}(z) := \mathrm{diag}(e^{-z}, 1, e^{z}), \qquad z \in \mathbb{C},$$
$$C_{\log}(z+w) = C_{\log}(z) C_{\log}(w), \qquad C_{\log}(0) = I_3,$$
$$W_{\log} := \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}, \qquad {W_{\log}}^2 = I_3,$$
$$W_{\log} C_{\log}(z) W_{\log} = C_{\log}(-z) = C_{\log}(z)^{-1} \quad (W_{\log} \text{ exchanges the first and third slots}),$$
$$\mathcal{A}_{\log}(z) := e^{z} + e^{-z}, \qquad \mathcal{B}_{\log}(z) := e^{z} - e^{-z},$$
$$\mathcal{A}_{\log}(z)\mathcal{A}_{\log}(w) = \mathcal{A}_{\log}(z+w) + \mathcal{A}_{\log}(z-w), \tag{3}$$
$$\mathcal{B}_{\log}(z)\mathcal{B}_{\log}(w) = \mathcal{A}_{\log}(z+w) - \mathcal{A}_{\log}(z-w),$$
$$\mathcal{A}_{\log}(z)\mathcal{B}_{\log}(w) = \mathcal{B}_{\log}(z+w) - \mathcal{B}_{\log}(z-w),$$
$$\mathcal{A}_{\log}(0) = 2, \qquad \mathcal{B}_{\log}(0) = 0, \qquad \mathcal{A}_{\log}(-z) = \mathcal{A}_{\log}(z), \qquad \mathcal{B}_{\log}(-z) = -\mathcal{B}_{\log}(z),$$
$$q_{\log} := e^{L^\lambda} \quad \text{for one retained H-VER090 logarithmic coordinate } L^\lambda,$$
$$\mathcal{A}_{\log}(nL^\lambda) = {q_{\log}}^{n} + {q_{\log}}^{-n}, \qquad \mathcal{B}_{\log}(nL^\lambda) = {q_{\log}}^{n} - {q_{\log}}^{-n}, \qquad n \in \mathbb{Z}:$$
$$\text{the integer Product Law (H-VER093) is the restriction of this entire}$$
$$\text{law to the lattice } (z, w) = (mL^\lambda, nL^\lambda); \text{ zero and negative}$$
$$\text{parameters are ordinary values of the same owner.}$$

Provenance: `H-VER171`.

H-VER171 Full-Ten Entire DVJ Composition

$$
\begin{gathered}
V_{10}^{\mathrm{DVJ}}(z) := e^{z}P_{\mathrm{fwd}} + e^{-z}P_{\mathrm{inv}},\\
G_{10}^{\mathrm{DVJ}}(z) := E_{10}^{+} + V_{10}^{\mathrm{DVJ}}(z),\\
V_{10}^{\mathrm{DVJ}}(0) = E_{10}^{-}, \qquad G_{10}^{\mathrm{DVJ}}(0) = I_{10},\\
A_{10}^{\mathrm{DVJ}}(z) := V_{10}^{\mathrm{DVJ}}(z) + V_{10}^{\mathrm{DVJ}}(-z) = 2\cosh(z)E_{10}^{-},\\
B_{10}^{\mathrm{DVJ}}(z) := V_{10}^{\mathrm{DVJ}}(z) - V_{10}^{\mathrm{DVJ}}(-z) = 2\sinh(z)J_{F},\\
\partial_z^2 V_{10}^{\mathrm{DVJ}}(z) = V_{10}^{\mathrm{DVJ}}(z), \qquad \partial_z^2 A_{10}^{\mathrm{DVJ}}(z) = A_{10}^{\mathrm{DVJ}}(z), \qquad \partial_z^2 B_{10}^{\mathrm{DVJ}}(z) = B_{10}^{\mathrm{DVJ}}(z),\\
A_{10}^{\mathrm{DVJ}}(z)A_{10}^{\mathrm{DVJ}}(w) = A_{10}^{\mathrm{DVJ}}(z+w) + A_{10}^{\mathrm{DVJ}}(z-w),\\
B_{10}^{\mathrm{DVJ}}(z)B_{10}^{\mathrm{DVJ}}(w) = A_{10}^{\mathrm{DVJ}}(z+w) - A_{10}^{\mathrm{DVJ}}(z-w),\\
A_{10}^{\mathrm{DVJ}}(z)B_{10}^{\mathrm{DVJ}}(w) = B_{10}^{\mathrm{DVJ}}(z+w) - B_{10}^{\mathrm{DVJ}}(z-w),\\
C_{10}G_{10}^{\mathrm{DVJ}}(z)C_{10} = G_{10}^{\mathrm{DVJ}}(-z).
\end{gathered}
\tag{4}
$$

Provenance: `H-VER150`.

H-VER150 Full-Ten Semilinear Character

$$
\begin{gathered}
S_{10}^{\mathrm{DVJ}}(z) := E_{10}^{+} - ie^{z}P_{\mathrm{fwd}} + ie^{-z}P_{\mathrm{inv}},\\
\Theta_{10}^{\mathrm{DVJ}}(\mathsf{X}) := C_{10}\,\overline{\mathsf{X}}\,C_{10},\\
\Theta_{10}^{\mathrm{DVJ}}\Big(S_{10}^{\mathrm{DVJ}}(z)\Big) = S_{10}^{\mathrm{DVJ}}(-\overline{z}),\\
\Theta_{10}^{\mathrm{DVJ}}\Big(S_{10}^{\mathrm{DVJ}}(z)\Big) = S_{10}^{\mathrm{DVJ}}(z) \iff \operatorname{Re} z = 0,\\
S_{10}^{\mathrm{DVJ}}(0) = E_{10}^{+} - iJ_{F}, \qquad S_{10}^{\mathrm{DVJ}}(0) \neq I_{10}, \qquad S_{10}^{\mathrm{DVJ}}(0) \neq E_{10}^{-}.
\end{gathered}
\tag{5}
$$

The coefficients $e^{\pm z}$, $2\cosh z$, and $2\sinh z$ are exact scalar witnesses of the retained full-ten operator family. Detached from the projectors and source basis, they are not a source inverse.

Quarter/full-cover retained source certificate

Provenance: `H-VER157-A`.

H-VER157-A All-Sixteen Retained Source Routes

$$4 \times 4 = 16 = 4 + 12, \qquad n_1, n_2 \in \mathbb{Z}, \qquad 0 \in \mathbb{Z},$$

all four self blocks and all twelve off-diagonal arrows retain their original ten-coordinate path sums inside $\widehat{V}_{40}$, with the original and dual zero-floor roles kept distinct, full sixteen-route source reconstruction, positive heat only, and no scalar readout used as a source inverse.

(6)

Provenance: `H-VER094`.

H-VER094 Affine-Log Midpoint

$$
\begin{gathered}
s_{\mathrm{mid}} := \frac{1}{2} \quad \text{(H-VER093-A: the exact fixed affine value of the full-ten source reflection on its rank-four midpoint fibre)}, \\
s^{\mathrm{aff}}(L) := s_{\mathrm{mid}} + \frac{L}{2i\Pi_{\mathrm{src}}}, \qquad s^{\mathrm{aff}}(L + 2i\Pi_{\mathrm{src}}) = s^{\mathrm{aff}}(L) + 1, \\
s^{\mathrm{aff}}(L + i\Pi_{\mathrm{src}}/2) = s^{\mathrm{aff}}(L) + \frac{1}{4} \quad \text{(quarter-root deck step, C48 exponent 12)}, \\
s^{\mathrm{aff}}(-L) = 1 - s^{\mathrm{aff}}(L), \qquad s^{\mathrm{aff}}(0) = s_{\mathrm{mid}}, \\
s^{\mathrm{aff}}\big(L^{\lambda}{}_{\pm,n,m}\big) = s_{\mathrm{mid}} + m \mp i\, n\, \kappa_{\lambda}, \\
\text{reciprocal pair } (\pm, n, m) \leftrightarrow (\mp, n, m) \text{ and reflection pair } (\pm, n, m) \leftrightarrow (\mp, n, -m) \\
\text{coincide iff } m = 0, \text{ the real lift of H-VER090;} \\
\text{only the midpoint quartet carries } L \text{ (H-VER094 S3);} \\
\text{no Riemann functional equation is used.}
\end{gathered}
\tag{7}
$$

Provenance: `H-VER158`.

H-VER158 Retained Reciprocal Theta-Weyl Rails

$$
\begin{gathered}
A_{+}\Theta_m = \Theta_{m+2}, \qquad A_{-}\Theta_m = \Theta_{m-2}, \\
A_{+}A_{-} = A_{-}A_{+} = I, \qquad A_{-}{}^{j} = A_{+}{}^{-j}, \\
\mathcal{A}_j := A_{+}{}^{j} + A_{-}{}^{j}, \qquad \mathcal{B}_j := A_{+}{}^{j} - A_{-}{}^{j}, \\
\text{both reciprocal rails remain on the same retained } \widehat{V}_{40} \text{ theta source;} \\
\text{H-VER094 and H-VER160 are retained as N112 owner-level parents;} \\
\text{a one-rail calculation does not replace the paired source algebra.}
\end{gathered}
\tag{8}
$$

Provenance: `H-VER158`.

H-VER158 Paired Φ_{24}/Φ_{48} Source Forcing

$$
\begin{gathered}
\Phi_{24}(\omega A_{+})\Theta_m = 0, \qquad \Phi_{48}(\beta A_{+})\Theta_m = 0, \\
\beta = \zeta_{48}^{-1}, \qquad \beta^2 = \omega, \\
\gcd(\Phi_{24}(\omega t), \Phi_{48}(\beta t)) = t^4 - 1, \\
\left.\begin{aligned} \Phi_{24}(\omega A_{+})v = 0, \\ \Phi_{48}(\beta A_{+})v = 0 \end{aligned}\right\} \Longrightarrow (A_{+}{}^{4} - I)v = 0, \\
A_{+}{}^{4}v = v \Longrightarrow A_{-}{}^{4}v = v, \\
\text{on the occupied H-VER158 Poisson source modes:} \\
\xi_{\mathrm{H158}} = 3\pi i \ell_{\mathrm{H158}}, \qquad \ell_{\mathrm{H158}} \in \mathbb{Z}, \\
\text{the Bezout calculation uses one member} \\
\text{of an already-retained reciprocal pair;} \\
\text{no scalar root-picking or forceOne is used.}
\end{gathered}
\tag{9}
$$

Provenance: `H-VER158`.

H-VER158 Quarter / Full-Cover Source Action

$$M_4\, e_{a,m} = i^m\, e_{a,m}, \qquad U_2\, e_{a,m} = e_{a,m-2}, \qquad S_{40}\, M_4\, {S_{40}}^{\dagger} = U_2 \quad \text{(H-VER158 S13.1)},$$
$$M_4 U_2 = -U_2 M_4, \qquad {M_4}^4 = {U_2}^4 = I_{40},$$
$$(-I)^{\epsilon} {M_4}^{j} {U_2}^{k} : \quad (\epsilon, j, k)(\epsilon', j', k') = (\epsilon + \epsilon' + kj',\ j + j',\ k + k') \mod (2, 4, 4)$$
(S13.2: 32 actions on the existing source, not new sectors),
$$T_{40} M_4 {T_{40}}^{-1} = M_4, \qquad T_{40} U_2 {T_{40}}^{-1} = -i\, U_2 M_4 \quad \text{(S13.3, the primitive C48 shear)},$$
$$\{46, 10, 22, 34\} \sqcup \{2, 38, 26, 14\} = \{2, 10, 14, 22, 26, 34, 38, 46\}$$
(S17: the two reciprocal rails' C48 exponents,
all eight primitive Φ_{24} exponents);
all forty labels of $\widehat{V}_{40}$ and all sixteen original
ordered V10 blocks are retained (S13.4, S17),
with signed zero and both floor roles before readout;
the normalized same-source coordinate packet is carried with it,
with no external ordinate and no scalar inverse. (10)

Provenance: `H-VER157-B`.

H-VER157-B C48 / Semilinear Covariance JOIN

$$(46, 34, 46, 34, 14, 2, 26, 24, 2, 0) \mod 48$$
(H-VER157-B S3: the source and H-VER092/K10 C48 exponents differ by this;
every entry is even, so the relative phase lies in C24; its order is exactly 24);
$$\mathsf{J}\,\overline{\mathsf{J}} = I, \qquad \mathsf{J}\,\mathsf{A}^{\mathrm{src}}(z)^*\,\mathsf{J}^{\dagger} = \mathsf{A}^{\mathrm{src}}(-\overline{z})$$
(S4: the transported anti-linear owner and the H-VER150 parameter law;
the finite charge matrix in place of J fails on the actual source:
kept as hostile);
all-sixteen sourced routes + full-cover C48/V40 covariance, Eq. (10),
+ the full-ten semilinear owner + the source-owned K10 gauge
$\Longrightarrow$ retained relative C24 phase, charge reflection,
and correctly transported anti-linear action on the full source;
fixed phase or fixed charge is not substituted for the moving transport. (11)

Owned sampled DVJ–Jacobi cross-tie

Provenance: `H-VER158`.

H-VER158 Local DVJ Lattice Sublemma

$$\xi_{\mathrm{H158}} = 3\pi i \ell_{\mathrm{H158}}, \qquad \ell_{\mathrm{H158}} \in \mathbb{Z}$$

(paired Phi24/Phi48 integer modes, H-VER158 S16);
port ℓ_{H158} into the H-VER090 integer slot (H-VER158 S18, S25);
both signs share one deck index m (one offset, H-VER090 S3) and the
H-VER094 reflection sends m to $-m$, so $m = 0$, the real lift:

$$\mathrm{Re}\, s^{\mathrm{aff}}(L^{\lambda}{}_{\pm,\ell_{\mathrm{H158}},0}) = s_{\mathrm{mid}}, \qquad \frac{\mathrm{Im}\, s^{\mathrm{aff}}(L^{\lambda}{}_{\pm,\ell_{\mathrm{H158}},0})}{\kappa_{\lambda}} = \mp \ell_{\mathrm{H158}},$$

$$s_{\mathrm{DVJ},+,\ell} := s_{\mathrm{mid}} - i\ell_{\mathrm{H158}}, \qquad s_{\mathrm{DVJ},-,\ell} := s_{\mathrm{mid}} + i\ell_{\mathrm{H158}}, \qquad s_{\mathrm{DVJ},+,\ell} + s_{\mathrm{DVJ},-,\ell} = 1,$$

$$\ell_{\mathrm{H158}} = -\,\mathrm{Im}\, s_{\mathrm{DVJ},+,\ell} = \mathrm{Im}\, s_{\mathrm{DVJ},-,\ell},$$

on the declared signed-integer/unit-height coordinate domain;
no displacement, radius, finite criterion or forceOne is used;
the lift $L^{\lambda}{}_{\pm,\ell_{\mathrm{H158}},0}$ is not $2i\xi_{\mathrm{H158}}/3$ (H-VER158 S18: not claimed);
this box reads only the coordinate ℓ_{H158} of Eq. (9) (H-VER158 S16, S18);
$\ell_{\mathrm{H158}} \mapsto (s_{\mathrm{DVJ},+,\ell}, s_{\mathrm{DVJ},-,\ell})$ is injective, with left inverse $\ell_{\mathrm{H158}} = -\,\mathrm{Im}\, s_{\mathrm{DVJ},+,\ell}$;
the C48/V40 action of Eq. (10) reaches the terminal JOIN
through Eq. (11), not through this box;
the stand-alone pair is Eq. (13), off the path.

(12)

Provenance: `H-VER158`.

H-VER158 Stand-Alone DVJ Pair (off the critical path)

$(s_{\mathrm{DVJ},+,\ell}, s_{\mathrm{DVJ},-,\ell})$ of Eq. (12), taken alone, $\ell_{\mathrm{H158}} \in \mathbb{Z}$,

$$\ell_{\mathrm{H158}} = -\,\mathrm{Im}\, s_{\mathrm{DVJ},+,\ell} = \mathrm{Im}\, s_{\mathrm{DVJ},-,\ell}$$

(left inverse on the signed-integer/unit-height domain);
the C48/V40 action, the A+/A- rails, the sixteen quadrant blocks
and the 4x4x10D carrier are not in this packet
and are not reconstructed from it;
it feeds no box on the critical path.

(13)

Audit box, off the certified path: `H-VER158`.

H-VER158 S20 forceOne Route (history only; superseded, H-VER158 S27)

$$s_{\mathrm{DVJ},+,\ell} + x_{\mathrm{H158}}, \qquad s_{\mathrm{DVJ},-,\ell} + x_{\mathrm{H158}}, \qquad x_{\mathrm{H158}} \text{ real},$$

$$r_{\mathrm{H158}} := \exp(x_{\mathrm{H158}}) > 0, \qquad \mathcal{M}_{02}^{\mathrm{H158}}(r_{\mathrm{H158}}) \Longrightarrow r_{\mathrm{H158}} = 1 \Longrightarrow x_{\mathrm{H158}} = 0,$$

redundant: $s_{\mathrm{DVJ},-,\ell} + x_{\mathrm{H158}} = 1 - (s_{\mathrm{DVJ},+,\ell} + x_{\mathrm{H158}}) \iff x_{\mathrm{H158}} = 0$

by the H-VER094 reflection with S20's common displacement on both sheets;
the finite criterion rests on the scalar C3 selector;
no load-bearing, gap, obstruction or reopen authority.

(14)

Provenance: `H-VER157`, `H-VER158`, `H-VER160`.

$$\begin{array}{c}\rho_{\mathrm{HG}} := s_{\mathrm{DVJ},-,\ell} = s_{\mathrm{mid}} + i\ell_{\mathrm{H158}}, \qquad \ell_{\mathrm{H158}} \in \mathbb{Z}, \\ \text{the same retained HG coordinate is carried into } (Q_0^{\mathrm{HG}}, Q_4^{\mathrm{HG}}), \\ \text{with no external ordinate and no scalar inverse used as ingress.}\end{array} \tag{15}$$

Certified H-PAP002 boundary

Provenance: `H-VER150`, `H-VER152`, `H-VER157`.

H-PAP002 Certified Source Boundary

$$\Theta_{10}^{\mathrm{DVJ}}\left(S_{10}^{\mathrm{DVJ}}(z)\right) = S_{10}^{\mathrm{DVJ}}(-\overline{z}) \quad \text{(Eq. (5))},$$

$$\Theta_{40}(1/t) = S_{40}\,\Theta_{40}(t) \quad \text{(the imported H-PAP015 full-40 heat line)},$$

$$\rho_{\mathrm{HG}} = s_{\mathrm{mid}} + i\ell_{\mathrm{H158}}, \qquad \ell_{\mathrm{H158}} \in \mathbb{Z} \quad \text{(Eq. (15))};$$

full-ten DVJ owner and semilinear family: retained and source-owned,
Jacobi source (full 40) on the heat line balanced at $t = 1$: retained,
H-VER158/H-VER157 same-source transport: certified on the integer lattice,
generic off-lattice DVJ/Jacobi realization: not claimed here,
classical Jacobi/Mellin/Lerch and scalar DVJ coefficients are downstream witnesses only,
no zeta zero, Xi carrier, RH statement, or external ordinate is source ingress.

(16)

The registered sink above is deliberately source-side. The classical Jacobi, Euler-Gamma and Mellin witnesses are displayed in H-PAP015 as downstream recognitions; they do not feed this sink and may not be used as reverse ingress. In particular, the occurrence of the ordinary Dirichlet zeta series on its convergence half-plane is a scalar Mellin recognition only; no zero of that scalar function selects a retained source coordinate.

1 Reader contract: one retained source, three analytic views

Scope. H-PAP002 is a source-first paper about three representations of retained Hypergroup data: a full-ten DVJ operator family, a retained Jacobi/theta family, and componentwise heat-line/partial-Mellin transport. The semantic owner is not a scalar special function. It is the retained finite source, kept explicitly beside every analytic coordinate used below.

The paper therefore distinguishes three kinds of statement:

$$\begin{array}{rcl}\text{source owner} & : & \text{load-bearing retained finite/analytic object,} \\ \text{coordinate/view} & : & \text{exact or reconstructible representation of that owner,} \\ \text{scalar witness/readout} & : & \text{downstream comparison, possibly lossy.}\end{array} \tag{17}$$

Only the first two kinds may carry the source construction. A scalar witness may verify a formula or identify a classical endpoint, but it cannot be run backwards unless a separately registered reconstruction theorem says so.

The three in-scope views. The operator branch is owned by H-VER171 and H-VER150. H-VER171 constructs an entire full-ten DVJ family in Eq. (4); H-VER150 supplies its semilinear source-character fixed-locus statement in Eq. (5). Both public owners are ten-dimensional.

The Jacobi branch is separately owned by H-VER033 and H-AUD071. The half-character source and its Jacobi realization are recorded in the imported H-PAP015 Jacobi source ledger, while the full forty-coordinate analytic carrier is the imported H-PAP015 full-40 source, and its invariant retained-ten embedding is recorded separately in H-PAP015 (front-pap015-jacobi-fullten-source). There is no theorem edge "H-VER171 $\rightarrow$ Jacobi". These are source-coherent branches with their own registered ancestry.

The Mellin branch begins from the retained Jacobi owner. H-VER152 appends the heat-line and componentwise partial-Mellin views while retaining the original ten-vector literally: the heat line, balanced about $t = 1$ (H-PAP015's front-pap015-hver152-heat-line-packet), and the partial-Mellin section, a witness off the critical path that H-PAP015's Section 0 displays (front-pap015-hver152-retained-ten-mellin). For fixed Mellin parameter, the partial-Mellin component is reconstructible by differentiation; the paper therefore does not call that componentwise step lossy. Information is lost only when a later finite or scalar readout discards retained coordinates.

Three scalar witness families. Each source view has a deliberately downstream scalar shadow.

On the DVJ side, the exponential source characters $e^{\pm z}$ and their squared-character reductions witness the two retained spectral sectors. H-VER134 and H-VER150 explicitly forbid replacing the full-ten operator by those scalar/projector certificates.

On the Jacobi side, the classical theta transformation recognizes the bilateral half-character ledger, while a single Lerch rail keeps only one orientation and discards the complementary retained coordinates. The reduced one-rail formula is therefore a scalar witness rather than an owner.

On the Mellin side, H-AUD081 fixes the normalized trivial-character covector ${p_{\mathrm{triv}}}^T = (1, \ldots, 1)$ on the retained ten labels. On the raw convergence domain the corresponding scalar Mellin output is the classical Gamma/zeta row. The finite projection has rank one and kernel dimension nine, so the scalar value cannot reconstruct the retained ten-vector.

No-zero and no-RH ingress. No zeta zero, Xi value, Riemann-Hypothesis statement, numerical zero search, or downstream application theorem is a premise of this paper. The local H-VER158 lattice statement may be used only inside its owned integer domain; the generic off-lattice same-source DVJ/Jacobi realization is not claimed. This negative boundary is part of the result rather than an omission.

Paper boundary. The certified paper boundary contains the retained-ten DVJ owner, retained Jacobi owner, heat/partial-Mellin carriage, the owned H-VER158/H-VER157 integer-lattice cross-tie, and explicitly downstream scalar witnesses. It does not contain a completed-Xi construction, a classical-zero ingress, a critical-line conclusion, or an RH sink. The unresolved generic DVJ/Jacobi identification is therefore visible as a source-level theorem obligation rather than hidden behind a familiar scalar formula.

2 Imported full-ten source boundary

The finite rank-ten Weyl–Verlinde source is developed independently in H-PAP008, while the complete full-ten owner, supported Pauli/SWAP calculus, and retained source-character sectors are now paper-owned by H-PAP014. H-PAP002 consumes those objects only through its certified Section-0 imports.

In particular, the downstream DVJ coupling uses the H-PAP014 objects

$$K_{10}, \quad E_{10}^{+}, E_{10}^{-}, \quad X_{48}, Z_{48}, J_F, C_{-}, W, \quad P_{\mathrm{fwd}}, P_{\mathrm{inv}},$$

without redrawing their defining equations here. The distinctions remain load-bearing:

$$E_{10}^{-} \neq I_{10}, \qquad P_{\mathrm{fwd}} + P_{\mathrm{inv}} = E_{10}^{-}, \qquad \text{finite charge conjugation} \neq \text{analytic conjugation}.$$

The point of the split is source discipline. H-PAP014 owns the finite coordinate algebra; this paper begins where that finite package is coupled to the DVJ log-cover/product-law and later to the Jacobi/Mellin transport. Scalar DVJ characters remain downstream witnesses and are never promoted back into the full-ten source owner.

3 Full-ten DVJ transport and its scalar witness

The DVJ representation is an operator theorem on the retained full-ten source. Its public owner is not the scalar Product Law and not a reduced three-slot analytic packet. H-VER171 composes the independently owned forward/inverse projectors with the entire reciprocal exponential law and keeps the result in $\mathrm{End}(\mathbb{C}^{10})$.

Entire supported group law. With the imported H-PAP014 projectors P_{fwd} and P_{inv}, define

$$V_{10}^{\mathrm{DVJ}}(z) := \exp z P_{\mathrm{fwd}} + \exp(-z) P_{\mathrm{inv}}, \qquad G_{10}^{\mathrm{DVJ}}(z) := E_{10}^{+} + V_{10}^{\mathrm{DVJ}}(z). \tag{18}$$

H-VER171 proves for arbitrary $z, w \in \mathbb{C}$

$$V_{10}^{\mathrm{DVJ}}(z+w) = V_{10}^{\mathrm{DVJ}}(z) V_{10}^{\mathrm{DVJ}}(w), \qquad G_{10}^{\mathrm{DVJ}}(z+w) = G_{10}^{\mathrm{DVJ}}(z) G_{10}^{\mathrm{DVJ}}(w), \tag{19}$$

and the two zero identities remain different typed statements,

$$\boxed{V_{10}^{\mathrm{DVJ}}(0) = E_{10}^{-}}, \qquad \boxed{G_{10}^{\mathrm{DVJ}}(0) = I_{10}}. \tag{20}$$

These are the body-level forms of Eq. (4). The supported identity E_{10}^{-} must not be renamed as the ambient identity merely because V_{10}^{DVJ} is a group law on the supported algebra.

Full-ten Product Law. The even and odd operator combinations are

$$\begin{aligned} A_{10}^{\mathrm{DVJ}}(z) &:= V_{10}^{\mathrm{DVJ}}(z) + V_{10}^{\mathrm{DVJ}}(-z) = 2\cosh(z) E_{10}^{-}, \\ B_{10}^{\mathrm{DVJ}}(z) &:= V_{10}^{\mathrm{DVJ}}(z) - V_{10}^{\mathrm{DVJ}}(-z) = 2\sinh(z) J_F. \end{aligned} \tag{21}$$

Consequently

$$A_{10}^{\mathrm{DVJ}}(z) A_{10}^{\mathrm{DVJ}}(w) = A_{10}^{\mathrm{DVJ}}(z+w) + A_{10}^{\mathrm{DVJ}}(z-w), \tag{22}$$

$$B_{10}^{\mathrm{DVJ}}(z) B_{10}^{\mathrm{DVJ}}(w) = A_{10}^{\mathrm{DVJ}}(z+w) - A_{10}^{\mathrm{DVJ}}(z-w), \tag{23}$$

$$A_{10}^{\mathrm{DVJ}}(z) B_{10}^{\mathrm{DVJ}}(w) = B_{10}^{\mathrm{DVJ}}(z+w) - B_{10}^{\mathrm{DVJ}}(z-w). \tag{24}$$

The coefficient law is entire; the public semantic statement remains the full-ten composition because E_{10}^{-} and J_F carry the retained source geometry.

The 2ODE and Golden recurrence are already in the carrier. The exponential rails make the second-order equation an immediate consequence of the full-ten owner, not an additional ansatz:

$$\boxed{\partial_z^2 V_{10}^{\mathrm{DVJ}}(z) = V_{10}^{\mathrm{DVJ}}(z), \qquad \partial_z^2 A_{10}^{\mathrm{DVJ}}(z) = A_{10}^{\mathrm{DVJ}}(z), \qquad \partial_z^2 B_{10}^{\mathrm{DVJ}}(z) = B_{10}^{\mathrm{DVJ}}(z).} \tag{25}$$

H-VER149 already owns the scalar first-order pair $A'(z) = B(z)$, $B'(z) = A(z)$; Eq. (25) is its supported operator lift. Sampling the even reciprocal rail at $z = n\log((3+\sqrt{5})/2)$ gives

$$a_n := \left(\frac{3+\sqrt{5}}{2}\right)^n + \left(\frac{3-\sqrt{5}}{2}\right)^n, \qquad a_{n+1} = 3a_n - a_{n-1}. \tag{26}$$

Thus the continuous 2ODE, the reciprocal Product Law, and the Golden three-term recurrence are three readouts of the same already-owned carrier. The Paper 6.2 and Paper 6.9 appearances are cross-witnesses of that grammar, not premises of H-VER149 or H-VER171.

Charge reflection and semilinear fixed locus. Finite charge conjugation exchanges the two retained sectors and therefore

$$C_{10} G_{10}^{\mathrm{DVJ}}(z) C_{10} = G_{10}^{\mathrm{DVJ}}(-z). \tag{27}$$

H-VER150 adds scalar complex conjugation to form the semilinear operation $\Theta_{10}^{\mathrm{DVJ}}(X) = C_{10}\overline{X}C_{10}$ and the full-ten character

$$S_{10}^{\mathrm{DVJ}}(z) := E_{10}^{+} - iJ_F V_{10}^{\mathrm{DVJ}}(z) = E_{10}^{+} - i\exp z P_{\mathrm{fwd}} + i\exp(-z)P_{\mathrm{inv}}. \tag{28}$$

Its exact fixed-locus statement is

$$\boxed{\Theta_{10}^{\mathrm{DVJ}}(S_{10}^{\mathrm{DVJ}}(z)) = S_{10}^{\mathrm{DVJ}}(z) \iff \operatorname{Re} z = 0.} \tag{29}$$

At $z = 0$ one has

$$S_{10}^{\mathrm{DVJ}}(0) = E_{10}^{+} - iJ_F, \qquad S_{10}^{\mathrm{DVJ}}(0) \neq I_{10}, \qquad S_{10}^{\mathrm{DVJ}}(0) \neq E_{10}^{-}. \tag{30}$$

Thus three distinct zero-parameter statements occur in this one section: $V_{10}^{\mathrm{DVJ}}(0) = E_{10}^{-}$, $G_{10}^{\mathrm{DVJ}}(0) = I_{10}$, and the ordinary finite value $S_{10}^{\mathrm{DVJ}}(0) = E_{10}^{+} - iJ_F$.

The two scalar witness branches are distinct. The 2ODE and Product-Law coefficients above are direct readouts of H-VER171. The familiar scalar De Vries defect is not obtained by applying an unnamed scalar functional to V_{10}^{DVJ}. Its triangular tail and Gaussian odd slot are separately owned by H-VER032/H-VER033 and H-VER088. The next section displays the exact Jacobi/triangular coefficient identity and then the recognizable scalar De Vries equation. Both branches descend from the HG/Jacobi source architecture, but the paper does not invent a direct H-VER171-to-defect contraction.

The scalar DVJ Product-Law witness. The reciprocal scalar coefficients $\exp z$ and $\exp(-z)$ are exact spectral coefficients once P_{fwd} and P_{inv} are kept beside them. Likewise $2\cosh z$ and $2\sinh z$ are exact scalar coefficients of A_{10}^{DVJ} and B_{10}^{DVJ} once E_{10}^{-} and J_F remain present.

Detached from those retained operators, however, the scalar functions are only witnesses. They do not encode the ten labelled basis, the six-dimensional complementary sector, charge conjugation, or the reconstruction from the source Fourier data. Squared-character reductions are even

more visibly lossy because they identify data which H-VER134 keeps separated. The paper therefore uses the scalar DVJ formulae in the forward direction only:

$$\boxed{\begin{array}{c}\text{full-ten DVJ owner} \longrightarrow \text{scalar character/Product-Law witness,}\\ \text{no scalar-only source inverse.}\end{array}} \tag{31}$$

4 Imported Jacobi source and DVJ triangular sheets

The bilateral Jacobi ledger, complete full-40 carrier, balanced heat line and single-Lerch firewall are owned by H-PAP015. This paper imports the full-40 source package only where the DVJ/Jacobi coupling theorems require it. The remaining equations in this section are the DVJ-facing triangular and scalar readouts and therefore remain local to H-PAP002.

Triangular sheets and the recognizable De Vries defect. H-VER032 does not take the triangular exponents as new source data. It reconstructs the two adjacent sheets from the already-owned HG spectral pair (n^2, n) by the inverse Hadamard split. We keep their names explicit:

$$\boxed{T_+(n) := \frac{n(n+1)}{2}, \qquad T_-(n) := \frac{n(n-1)}{2}.} \tag{32}$$

They retain the Hadamard channels

$$T_+(n) + T_-(n) = n^2, \qquad T_+(n) - T_-(n) = n, \tag{33}$$

and the Jacobi half-shift completion

$$\boxed{T_+(n) + \frac{1}{8} = \frac{1}{2}\left(n + \frac{1}{2}\right)^2, \qquad T_-(n) + \frac{1}{8} = \frac{1}{2}\left(n - \frac{1}{2}\right)^2.} \tag{34}$$

Thus the two Gaussian half-rails retain the two sheets coefficientwise:

$$\begin{aligned} e^{-\pi X(n+1/2)^2} &= e^{-\pi X/4}\left(e^{-2\pi X}\right)^{T_+(n)},\\ e^{-\pi X(n-1/2)^2} &= e^{-\pi X/4}\left(e^{-2\pi X}\right)^{T_-(n)}. \end{aligned} \tag{35}$$

In particular, the positive rail is exactly

$$K_+(X, v) = e^{v-\pi X/4} \sum_{n\geq 0} \left(e^{2v}\right)^n \left(e^{-2\pi X}\right)^{T_+(n)}. \tag{36}$$

At the source heat parameter $e^{-2\pi X} = (2\Pi_{\mathrm{src}})^{-1}$, this is precisely the upper triangular sheet entering H-VER088. The theorem owns the parity pair

$$\boxed{\begin{aligned} D_-^{\mathrm{dV}}(y) &= 1 - \Gamma_{\mathrm{src}}^{\mathrm{DVJ}} y + y^2 \sum_{m\geq 0} y^{2m} (2\Pi_{\mathrm{src}})^{-T_+(m)},\\ D_+^{\mathrm{dV}}(y) &= 1 + \Gamma_{\mathrm{src}}^{\mathrm{DVJ}} y + y^2 \sum_{m\geq 0} y^{2m} (2\Pi_{\mathrm{src}})^{-T_+(m)} = D_-^{\mathrm{dV}}(-y). \end{aligned}} \tag{37}$$

H-VER089 proves exactly two positive simple roots of D_-^{dV},

$$0 < y_- < 1 < y_+, \qquad \{y_+, y_-, -y_+, -y_-\} \tag{38}$$

is the retained signed packet across the two parity defects. Squaring is deliberately sign-losing:

$$\boxed{\alpha_{\mathrm{dVJ},-} := {y_-}^2, \qquad \alpha_{\mathrm{dVJ},+} := {y_+}^2, \qquad (+y_-)^2 = (-y_-)^2, \quad (+y_+)^2 = (-y_+)^2.} \tag{39}$$

Only after the source derivation is complete, H-VER032's downstream recognition

$$\Pi_{\mathrm{src}} = \pi, \qquad \Gamma_{\mathrm{src}}^{\mathrm{DVJ}} = e^{\pi^2/4}, \qquad y = \sqrt{\alpha_{\mathrm{dVJ}}} \tag{40}$$

gives, after the index shift $n = m + 1$, the lower-sheet identity

$$T_+(n-1) = T_-(n) = \frac{n(n-1)}{2}, \tag{41}$$

and hence the visually familiar scalar De Vries closure

$$\boxed{0 = D_-^{\mathrm{dV}}(\sqrt{\alpha_{\mathrm{dVJ}}}) = 1 - e^{\pi^2/4}\sqrt{\alpha_{\mathrm{dVJ}}} + \sum_{n=1}^{\infty} (2\pi)^{-T_-(n)} {\alpha_{\mathrm{dVJ}}}^n.} \tag{42}$$

H-VER089 proves that this source defect has exactly two positive simple amplitude roots; both roots are retained, no root is selected here, and neither squared readout is identified with the physical electromagnetic fine-structure constant. The numerical-witness boundary follows O11: the symbolic root packet and both squared readouts are derived first; any external comparison is labelled downstream and may use CODATA 2018 or earlier only. SI2019 fixed values and post-2018 CODATA determinations are not used to select a root, normalize an HG source, tune an evaluator, or serve as witness data. Equations (32)– (42) are downstream scalar readouts. They make both adjacent triangular sheets visible: T_+ is the Jacobi/positive-rail exponent and T_- is the reindexed exponent in the familiar De Vries series. Neither scalar readout replaces the bilateral Jacobi source or the retained ten-dimensional owner by that scalar equation.

5 Retained-ten heat-line and Mellin transport

The Mellin leg starts from the retained Jacobi ten-vector owned in H-PAP015 (H-AUD071/H-VER152). H-VER152 does not replace that source by an integral transform. It accumulates heat-line and partial-Mellin views beside the original analytic source. The partial-Mellin section is therefore an internally derived, reconstructible auxiliary view; no standard Mellin formula is imported to define the source. The parallel bilateral-entire completion is owned separately by H-VER160.

Heat-line evaluation. For $t > 0$ and each retained label $a \in \mathcal{B}_{10}$, set

$$\Theta_a(t) := \psi_a(it^2), \qquad \Theta_{\mathrm{vec}}(t) := (\Theta_a(t))_{a \in \mathcal{B}_{10}}. \tag{43}$$

This is a componentwise view of the existing source. For every constant finite source operator $g \in \mathrm{End}(\mathrm{Im}\,\iota)$, H-VER152 proves

$$(g\Psi_{10})(it^2) = g\Theta_{\mathrm{vec}}(t). \tag{44}$$

No source-coordinate-dependent operator is silently promoted into this commuting family.

Partial-Mellin section. For an arbitrary complex Mellin parameter β_{M}, define

$$u_{a,\beta_{\mathrm{M}}}(t) := t^{-i\beta_{\mathrm{M}}} \int_1^t y^{i\beta_{\mathrm{M}}} \Theta_a(y) \frac{dy}{y}, \qquad U_{\beta_{\mathrm{M}}}(t) := (u_{a,\beta_{\mathrm{M}}}(t))_{a\in\mathcal{B}_{10}}. \tag{45}$$

The base point is the fixed point $t = 1$ of the balanced heat line (H-PAP015's front-pap015-hver152-heat-line-packet), where $\Theta_{\mathrm{vec}}(1/t) = \iota^\dagger S_{40} \iota\, \Theta_{\mathrm{vec}}(t)$. On this source the integral from 0 diverges: every component grows like $e^{\pi/(4t^2)}$ as $t \to 0$. Based at $t = 1$ the section exists for every $t > 0$ and satisfies $U_{\beta_{\mathrm{M}}}(1/t) = -\iota^\dagger S_{40} \iota\, U_{\beta_{\mathrm{M}}}\big|_{\beta_{\mathrm{M}}\to-\beta_{\mathrm{M}}}(t)$. H-PAP015's Section 0 keeps it as a Mellin witness off the critical path (front-pap015-hver152-retained-ten-mellin). The same scalar integral is applied in each coordinate, hence

$$L^{(10)}_{\beta_{\mathrm{M}}}(g\Theta_{\mathrm{vec}}) = gL^{(10)}_{\beta_{\mathrm{M}}}(\Theta_{\mathrm{vec}}). \tag{46}$$

Most importantly, for fixed β_{M} the view is reconstructible:

$$\boxed{\Theta_a(t) = t^{1-i\beta_{\mathrm{M}}} \frac{d}{dt}\left(t^{i\beta_{\mathrm{M}}} u_{a,\beta_{\mathrm{M}}}(t)\right).} \tag{47}$$

Thus the H-VER152 map is stored as

$$\Psi_{10} \longmapsto (\Psi_{10}, \Theta_{\mathrm{vec}}, U_{\beta_{\mathrm{M}}}), \tag{48}$$

not as $\Psi_{10} \mapsto U_{\beta_{\mathrm{M}}}$ with the owner discarded.

Where the lossy scalar Mellin row begins. H-AUD081 identifies the normalized finite trivial-character covector as

$$p_{\mathrm{triv}}{}^T = (1,1,1,1,1,1,1,1,1,1). \tag{49}$$

Applied to the retained heat-line packet this gives the scalar source

$$\Theta_{\mathrm{triv}}(t) := p_{\mathrm{triv}}{}^T \Theta_{\mathrm{vec}}(t). \tag{50}$$

The map $p_{\mathrm{triv}}{}^T : \mathbb{C}^{10} \to \mathbb{C}$ has rank one and a nine-dimensional kernel. This is the finite point at which source information is irreversibly folded.

On the initial raw Mellin domain $\mathrm{Re}\, s > 1$, H-VER033 gives the half-character scalar transform

$$\boxed{\mathcal{M}_{1/2}(s) = N_{1/2}(s)\, \zeta(s), \qquad N_{1/2}(s) = 2\pi^{-s/2}\Gamma(s/2)(2^s - 1).} \tag{51}$$

The normalization belongs to the scalar Mellin output, not to the ten finite coefficients. In particular, neither the displayed Gamma factor nor the zeta function is a premise of H-VER152; both occur only in this domain-restricted downstream recognition row. If a literal componentwise full-Mellin vector $\mathcal{Z}_{10}(s)$ is defined on a domain where all ten integrals converge, linearity gives

$$p_{\mathrm{triv}}{}^T \mathcal{Z}_{10}(s) = N_{1/2}(s)\zeta(s). \tag{52}$$

This is a packaging corollary on its stated domain. It is not a theorem that all ten components possess a global analytic continuation into the critical strip.

Mellin witness versus source owner. The two Mellin layers must remain visually separate:

$$\boxed{\begin{array}{c}\text{retained / reconstructible:}\qquad \Psi_{10}\longmapsto(\Psi_{10},\Theta_{\mathrm{vec}},U_{\beta_{\mathrm{M}}})\overset{\text{exact differential reconstruction}}{\longrightarrow}\Theta_{\mathrm{vec}},\\[2ex] \text{separate lossy scalar witness:}\qquad \Theta_{\mathrm{vec}}\xrightarrow{{p_{\mathrm{triv}}}^{T}}\Theta_{\mathrm{triv}}\xrightarrow{\mathcal{M}}N_{1/2}(s)\zeta(s),\\[2ex] \operatorname{rank}{p_{\mathrm{triv}}}^{T}=1,\qquad \dim\ker{p_{\mathrm{triv}}}^{T}=9.\end{array}} \tag{53}$$

The first row is H-VER152's source-preserving partial-Mellin carriage; the second is a downstream classical scalar recognition row. They are not two notations for one transform. Whenever a full-Mellin packet exists on the domain under discussion, its trivial-character projection obeys Eq. (52). A scalar zeta value, including a scalar zero, cannot reconstruct a vector in the nine discarded directions.

6 Three-way crosswalk: exact edges and the claim boundary

The phrase "DVJ–Jacobi–Mellin correspondence" does not mean that the repository owns one untyped isomorphism among three scalar functions. The current result is a typed network of exact source maps, parallel representations, and one generic extension that is not claimed here.

What is already exact. The finite HG source reconstructs the full-ten operator data used by H-VER171, while H-VER033/H-AUD071 construct the retained Jacobi source from their own registered source ancestry. These two branches share HG-owned source genealogy but neither is derived from the other in the current DAG. The safe body-level picture is therefore

$$\boxed{\begin{array}{ccc} & \text{retained HG source} & \\ \swarrow & & \searrow \\ \text{full-ten DVJ owner} & & \text{retained Jacobi owner} \\ & & \downarrow \\ & & \text{heat / partial-Mellin view.}\end{array}} \tag{54}$$

The right-hand vertical edge is H-VER152 and is exact in the sense stated in Section 5. The two diagonal arrows are source ancestry/realization branches, not an assertion of a direct H-VER171-to-H-AUD071 theorem.

The owned lattice cross-tie. H-VER158 supplies an internal DVJ lattice coordinate on the Jacobi side. In the local sublemma frozen in Section 0,

$$\xi_{\mathrm{H158}}=3\pi i\ell_{\mathrm{H158}},\qquad \ell_{\mathrm{H158}}\in\mathbb{Z}, \tag{55}$$

and the corresponding reciprocal pair is derived internally rather than chosen from an external zeta-zero ordinate. This is an exact sampled cross-tie between the source-derived Jacobi/heat organization and the DVJ coordinate, but its domain is the integer lattice stated by the theorem.

The body therefore uses the notation

$$\text{DVJ}\overset{\ell_{\mathrm{H158}}\in\mathbb{Z}}{\longleftrightarrow}\text{Jacobi/heat} \tag{56}$$

only as shorthand for the owned lattice statement. It is not a claim of a generic continuous equivalence.

The off-lattice extension is not claimed. A further theorem would derive one generic HG-owned analytic coordinate/action and realize that same coordinate simultaneously in the DVJ and Jacobi/Mellin pictures. The project records that question as the off-lattice N4/X11 same-source problem, an external application row of the HG ledger and not an obligation of this paper. Its proof direction would be

$$\boxed{\text{HG-owned generic coordinate/action} \longrightarrow \begin{cases} \text{DVJ realization,} \\ \text{Jacobi/heat/Mellin realization,} \end{cases}} \tag{57}$$

not "choose a Mellin or zeta parameter and set the DVJ coordinate equal to it because the resulting scalar formula matches".

Optional stronger Mellin naturality. H-VER157-C/N111 asks for a stronger whole-Jacobi/full-ten Mellin naturality statement. It is a useful formalization frontier but is not a hidden premise of H-VER152, which already owns componentwise partial-Mellin naturality for every constant finite source operator. The paper therefore keeps

$$\begin{gathered} \text{componentwise retained-ten partial Mellin: CLOSED,} \\ \text{stronger whole-Jacobi moving naturality: OPEN/OPTIONAL.} \end{gathered} \tag{58}$$

What the correspondence presently means. At this revision, the source-first three-way statement is therefore:

$$\boxed{\begin{gathered} \text{full-ten DVJ representation: owned,} \\ \text{retained Jacobi representation: owned,} \\ \text{retained Jacobi} \to \text{heat/partial-Mellin: owned,} \\ \text{DVJ/Jacobi identification on the H-VER158 lattice: owned,} \\ \text{generic off-lattice same-source DVJ/Jacobi realization: not claimed.} \end{gathered}} \tag{59}$$

This boundary is stronger scientifically than an untyped scalar identity: it says exactly which parts of the correspondence are theorem-owned and which part would require a new source-level map.

7 Three scalar witness layers and their information loss

The same warning recurs in all three representations: an exact scalar formula need not preserve the semantic source. H-PAP002 therefore records scalar witnesses together with the information they discard.

Layer	retained owner	scalar witness	information not carried by the scalar
DVJ	H-VER171/H-VER150 full-ten operator	$\exp(\pm z)$, $2\cosh z$, $2\sinh z$; squared-character reductions	ten source labels, complementary E_{10}^{+} sector, full projectors, charge action and source-basis reconstruction
Jacobi	H-AUD071 $\Psi_{10} \subset \widehat{V}_{40}$	classical theta transformation; one positive Lerch rail K_{+}	opposite rail/orientation, nontrivial retained-ten directions, full40 provenance
Mellin	H-VER152 $(\Psi_{10}, \Theta_{\mathrm{vec}}, U_{\beta_{\mathrm{M}}})$	${p_{\mathrm{triv}}}^{T}\mathcal{Z}_{10}(s) = N_{1/2}(s)\zeta(s)$ where defined	nine-dimensional kernel of ${p_{\mathrm{triv}}}^{T}$; no global continuation of the ten-vector is supplied

DVJ: exact coefficients, incomplete semantics. The scalar characters are not approximations. They are the exact coefficients of the retained projectors in Eq. (18). Likewise the scalar Product Law is exactly the coefficient law of the full-ten identities in Eq. (24). What is lost when the scalar is detached from the owner is the operator geometry which says *where* those coefficients act. H-VER134's squared-character hostile makes this loss explicit.

Jacobi: exact classical recognition, lost orientation. The classical Jacobi witness now owned by H-PAP015 is an exact identity of scalar theta functions. It does not contain the complete retained source packet. The H-PAP015 one-rail reduction is more severe: it keeps one orientation only. Its Mellin transform may be identified with a Lerch transcendent on its convergence domain, but that recognition cannot restore the missing rail or the other retained-ten directions.

Mellin: exact rank-one row, nine discarded directions. The strongest finite loss statement is H-AUD081. In normalized retained-ten coordinates,

$$\operatorname{rank} {p_{\mathrm{triv}}}^{T} = 1, \qquad \dim\ker {p_{\mathrm{triv}}}^{T} = 9. \tag{60}$$

Thus a scalar Mellin/zeta value may be known exactly while nine independent finite source directions remain invisible to that value. This is not a numerical conditioning issue; it is an exact linear-algebraic kernel.

Scalar exact equivalence versus source equivalence. The paper uses the compact rule

$$\boxed{\text{exact scalar identity } \not\Rightarrow \text{ information-preserving source equivalence.}} \tag{61}$$

A scalar formula may have an ordinary inverse inside its own scalar function class while still failing to reconstruct the ten-dimensional source from which the scalar was read. Conversely, a source coordinate such as the H-VER152 partial-Mellin section may be reconstructible componentwise even though a later rank-one scalar fold is not.

No reverse zero inference. In particular, a downstream scalar condition such as $\zeta(\rho) = 0$ constrains only the scalar readout after its domain and continuation have been specified. It does not imply that the retained ten-owner vanishes, nor does it choose a DVJ sector, recover a Jacobi orientation, or reconstruct the nine directions in Eq. (60). Any theorem needing such a reverse statement must provide an independent source-level reconstruction map.

8 Classical endpoint recognition: Gamma, Lerch and zeta

The classical special functions used by H-PAP002 appear after the retained source constructions. Their role is to name or compare scalar endpoints, not to supply the ten-dimensional source.

Euler Gamma from a source-derived bilateral kernel. H-VER159 owns the source-first scalar function

$$\mathcal{G}_{\mathrm{src}}(z) := \int_{-\infty}^{\infty} \exp\big(zu - \exp(u)\big)\, du, \qquad \operatorname{Re} z > 0, \tag{62}$$

whose kernel is forced by the source one-shift law together with the admissible bilateral transform class and source-unit normalization. Only after that construction is complete does the change of variable $x = \exp(u)$ give

$$\mathcal{G}_{\mathrm{src}}(z) = \int_0^{\infty} x^{z-1} \exp(-x)\, dx = \Gamma(z). \tag{63}$$

The equality is endpoint recognition. H-PAP004 may be cited as a readable paper surface for the same construction, but H-VER159 is the canonical HG theorem owner consumed here.

The transform-class hypotheses matter. The recurrence $G(z+1) = zG(z)$ together with $G(1) = 1$ is not by itself sufficient to characterize Euler Gamma because a nontrivial entire one-periodic factor can preserve both statements. The bilateral kernel forcing is therefore part of the owner, not optional exposition.

One-rail Lerch recognition. The positive Jacobi rail firewalled in H-PAP015 has the scalar Mellin transform

$$\int_0^{\infty} K_+(X, v) X^{s/2-1}\, dX = \pi^{-s/2}\Gamma(s/2)\exp(v)\Phi(\exp(2v), s, \tfrac{1}{2}), \tag{64}$$

for $\operatorname{Re} s > 1$ and $\operatorname{Re} v < 0$. Here Φ is the classical Lerch transcendent. This formula is an exact scalar recognition of one reduced rail. It is deliberately typed as unilateral and information-losing because the opposite rail and the retained-ten complement have already been discarded.

Trivial-character zeta recognition. At the symmetric/trivial-character point, the scalar Mellin row is Eq. (51):

$$\mathcal{M}_{1/2}(s) = 2\pi^{-s/2}\Gamma(s/2)(2^s - 1)\zeta(s), \qquad \operatorname{Re} s > 1. \tag{65}$$

The factor $(2^s - 1)$ records the half-lattice/dyadic split; it belongs to the scalar output normalization, not to the finite trivial-character covector. H-AUD081 therefore writes the source fold as ${p_{\mathrm{triv}}}^T$ and keeps the analytic normalization in the scalar Mellin line.

Continuation does not create a vector owner. The classical scalar functions in Eqs. (63)–(65) possess their usual scalar continuation theory. That fact does not by itself construct a global analytic continuation of all ten Mellin components. H-VER152 intentionally retains the original Ψ_{10} and uses partial-Mellin sections rather than assuming such a vector-valued global theorem.

What is delegated to the RH-facing paper. Completed-zeta/Xi packaging, zero fibres, and the terminal RH application are not developed in H-PAP002. They belong to the separate source-first RH paper and its own open theorem chain. H-PAP002 supplies source-first DVJ/Jacobi/Mellin material that a downstream paper may cite. Its current certified Section 0 deliberately stops at that source-side boundary and contains no Xi/RH sink or external-zero ingress.

9 The claim boundary of H-PAP002

H-PAP002 has a precise source-side negative boundary. The retained DVJ owner, retained Jacobi owner, and retained Jacobi-to-partial-Mellin transport are closed, and so is the same-source transport on the integer lattice: the H-VER158 quarter/full-cover source action, all sixteen retained quadrant routes, the C48/V40 covariance, and the complete bilateral-entire C8 carriage evaluated on the normalized DVJ coordinate (H-VER157 terminal transport). Within the certified boundary nothing is left open. What the paper does not claim is a generic continuous, off-lattice same-source extension; that question is the external application row X11 of the HG ledger.

The certified integer-lattice bridge. H-VER158 supplies the internal lattice coordinate

$$\xi_{\mathrm{H158}} = 3\pi i \ell_{\mathrm{H158}}, \qquad \ell_{\mathrm{H158}} \in \mathbb{Z}, \tag{66}$$

and its associated reciprocal pair on that lattice. The H-VER157 terminal transport carries this same coordinate into the complete C8 packet, so the source-derived Jacobi/heat organization and the DVJ coordinate are joined exactly on the integer lattice. It is not a theorem for arbitrary complex ξ_{H158}.

The generic off-lattice extension (not claimed). The N4/X11 question is to derive a generic analytic coordinate/action from HG-owned source data and realize that same coordinate in both pictures. It is an external application row of the HG ledger, not an obligation of this paper. Its required direction would be

$$\boxed{\text{source coordinate/action} \longrightarrow (\text{DVJ realization}, \text{Jacobi/Mellin realization}).} \tag{67}$$

A scalar zeta ordinate or a Mellin variable may not be supplied first and then used to define the DVJ coordinate by equality of downstream formulae. Such an extension would therefore be a source-ownership theorem, not a parameter matching exercise.

Optional stronger naturality. H-VER157-C/N111 remains a distinct stronger question about whole-Jacobi or moving-operator Mellin naturality. It is not required for the closed H-VER152 componentwise theorem and is not silently promoted to the generic extension above. If future work proves that N111 is required for X11, that relation must be registered explicitly before the paper adopts it.

No scalar inverse theorem is claimed. The rank-one trivial-character projection remains noninvertible on the retained ten-space, the one-rail Jacobi/Lerch reduction remains unilateral, and detached DVJ character coefficients remain insufficient as source owners. H-PAP002 therefore does not contain a theorem of the form

$$\text{scalar special-function datum} \longrightarrow \text{retained ten-dimensional source}. \tag{68}$$

Any future inverse statement must specify its domain, retained auxiliary data, and reconstruction law.

Boundary statement. The result of H-PAP002 at this stage can therefore be summarized as

$$\boxed{\begin{array}{c}\text{retained-ten DVJ owner: CLOSED,}\\ \text{retained-ten Jacobi owner: CLOSED,}\\ \text{Jacobi} \to \text{heat/partial-Mellin: CLOSED,}\\ \text{integer-lattice same-source DVJ/Jacobi transport: CLOSED,}\\ \text{three downstream scalar witness families: TYPED,}\\ \text{generic off-lattice same-source DVJ/Jacobi extension: NOT CLAIMED.}\end{array}} \tag{69}$$

This boundary is part of the paper's result and prevents the scalar witnesses from being overread as a completed source equivalence.

10 Proof ownership, executable receipts and reproducibility

H-PAP002 is an exposition/assembly paper. The theorem owners it cites remain the repository theorem and audit objects; prose in this paper does not replace their executable receipts or dependency records.

Primary owner map. The central source surfaces used in the body are:

Role	Owner	Paper use
rank-ten finite source	H-VER064/068/070/129	source labels and reconstruction
DVJ supported sectors	H-VER103/134	J_F, P_{fwd}, P_{inv}
full-ten DVJ transport	H-VER171	entire operator/Product Law
semilinear DVJ locus	H-VER150	full-ten fixed-locus theorem
retained Jacobi source	H-VER033, H-AUD071	bilateral/full40/ten source
partial-Mellin transport	H-VER152	retained heat/Mellin views
Euler-Gamma endpoint	H-VER159	source-derived scalar endpoint
trivial-character loss ledger	H-AUD081	rank-one zeta projection

No paper citation in this table is promoted into a new HG premise. In particular, H-PAP004 is useful exposition for the Gamma derivation but H-VER159 remains the canonical theorem owner.

Executable receipts. The closed theorem notes name focused executable modules and regressions for their public statements. H-PAP002 consumes those results by theorem name; it does not rerun parent theorem receipts inside a new proof and does not use a prior theorem's Boolean closure status as mathematical evidence. This matches the executable-proof-integrity rule already enforced for H-VER171.

Certified Section-0 boundary. The canonical H-PAP002 Section 0 is checked as an independent paper surface and terminates at the same DVJ/Jacobi/Mellin source boundary as the body. The separately maintained RH-facing paper has its own Section-0 domain and is not an upstream source for H-PAP002.

Local build and paper verifier. The canonical paper build is

```
make paper-hpap002
```

and the paper-local verifier is

```
python3 papers/source-first-dvj-jacobi-mellin/verify_hpap002.py
```

The verifier checks the canonical paper layout, current source-manifest receipts, strict Section-0 DAG, shared symbol registry, and focused paper contracts. These checks protect reproducibility and provenance; they do not replace the theorem owners cited above.

Development provenance. Repository audits and Git history retain the review and correction history of the manuscript. They are provenance records rather than mathematical premises, so no audit status or commit identity is used as evidence for a paper theorem.

Formalization boundary. Downstream Lean or other formal packaging may reproduce the closed source maps and the unclaimed extension questions, but such packaging does not become an HG premise and does not change an OPEN source theorem into a CLOSED one. The mathematical boundary remains Eq. (69) until the registered owners change it.

11 Conclusion

H-PAP002 keeps three analytic representations distinct while retaining their common HG source ownership. At the source level the paper keeps the rank-ten owner live and treats the DVJ, Jacobi and Mellin constructions as typed views of retained HG data rather than as interchangeable scalar formulae.

The DVJ leg is a full-ten operator theorem: H-VER171 supplies the entire forward/inverse composition and Product Law, while H-VER150 supplies the semilinear fixed-locus characterization. The Jacobi leg retains the H-AUD071 ten-dimensional invariant source inside its forty-coordinate analytic carrier. The Mellin leg, H-VER152, appends heat-line and componentwise partial-Mellin views and retains an explicit reconstruction formula for fixed Mellin parameter.

Each leg has a scalar witness, but the witness is downstream. DVJ characters do not carry the full-ten source geometry; a single Jacobi/Lerch rail loses orientation and complementary coordinates; and the trivial-character Mellin/zeta projection has rank one with a nine-dimensional kernel. The paper's central typing rule is therefore

$$\boxed{\text{exact scalar equivalence} \neq \text{source-level information equivalence.}} \tag{70}$$

The source-first correspondence is complete for the individual DVJ, Jacobi, and Jacobi-to-partial-Mellin owners and for the H-VER158 lattice cross-tie, which the H-VER157 terminal transport carries into the complete C8 packet. It does not claim a generic off-lattice DVJ/Jacobi equivalence. That extension (X11/N4, an external application row) would have to derive one HG-owned analytic coordinate/action and realize it in both representations without importing a scalar zero or matching a parameter after the fact.

That boundary is the correct endpoint of this revision. Xi/RH closure belongs to the separate RH-facing paper; H-PAP002 contributes the retained DVJ/Jacobi/Mellin source architecture and its explicitly typed lossy scalar witnesses.

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