An FDT analysis of "Defect-Mediated Inelastic Light Scattering by Infrared Phonons in Hexagonal Boron Nitride"

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Target: Prabhdeep Singh, Bharti Garg, Maximilian Black, Masoud Taleb and Nahid Talebi ("Defect-Mediated Inelastic Light Scattering by Infrared" "Phonons in Hexagonal Boron Nitride", SC-001, SC-002, L12–L13; "Advanced Functional Materials, 2026; 0:e78847", SC-023, L67; "https://doi.org/10.1002/adfm.78847", SC-024, L68; "Received: 10 June 2026", "Accepted: 26 September 2026", SC-004, L22) [1]. The record prints no arXiv identifier; its DOI is the identifier.

Abstract

This analysis reads the experimental record of Singh, Garg, Black, Taleb and Talebi [1] through Fundamental Density Theory (FDT), core v6.4, a true extension of general relativity and quantum mechanics. The record reports defect-related emission "around" "537 nm" (SC-098, SC-100, L119–L120) and, in photoluminescence alone, an "excitation-dependent emission peak" (SC-063, L98) whose energy differences from the excitation "are distributed around 0.17 eV" (SC-354, L303), with "emission bands at approximately 0.17 and 0.20 eV" after plasma treatment (SC-345, L298) and a component at "∼0.37 eV" on gold (SC-458, L382). On the record's own inputs and dictionary FDT returns the record's three conversions between wavenumber, wavelength and energy and the sum of its two band energies, and the curvature of the record's flakes is general relativity's for the same stress tensor and data. In the manuscript's reading the laser's light, the down-converted light and the lattice vibration are strokes of one carrier (I-2), the energy difference is the lattice stroke's energy in the books of one event (0.1a), and the boron and nitrogen nuclei are the clamps of the lattice's nodal patterns (P-2, P-3). The analysis makes five predictions that general relativity and quantum mechanics do not make, each with a decision rule fixed before its first reading: a hand-odd non-reciprocal polarization rotation of helical stacks of the record's flakes on glass and on gold (P-5); a departure from reduced-mass scaling of each down-converted energy difference across boron-isotope pairs (I-7); and a departure from detailed balance of the up- to down-conversion quotient on one spot (0.1a).

1 Framework

1.1 Source, status and citations

The source is the record [1]; `source_status`: experimental. The verbs are fixed once: the record's results are measured, observed or reported, in the record's own verb at each locus; everything this manuscript adds is derived, estimated, reconstructed or illustrative-assumed. "The source" is the paper and "the core" the locked framework. A citation (SC-nnn, Lnnn) names a row of the claims ledger and the record line it sits on; SA-nn names a source-audit row, a place where the record's data under-determine its reading; U-nn names an assumed input the record does not print. A record value carries the record's qualifier and figures, and no uncertainty, the record printing none; where the record prints two statements for one quantity, each is quoted at its own locus and the two are not reconciled. FDT is a true extension of general relativity and quantum mechanics: it agrees with their data without reservation and declines their interpretations where its invariants read the same record differently (Use items 2, 5 and 6).

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1.2 The seven invariants as this analysis uses them

I-1, the force law. Between two bodies with exterior curvature ratios α_1 and α_2, with c the strand rate, G Newton's constant and $F_{\max}$ the force ceiling, the force law for their force F reads

$$F = \frac{c^4}{4G}\,\alpha_1\alpha_2, \qquad F_{\max} = \frac{c^4}{4G}, \tag{1}$$

always, at all scales, for two bodies. With $R_{s,i}$ each body's Schwarzschild radius, $R_{b,i}$ its configuration (support) radius, $\mathcal{M}_i$ its total gravitating energy and d the distance between the two centres, the law's inputs are the per-body exterior ratios $\alpha_i(d) = R_{s,i}/d$ on two nonoverlapping spherical supports at monopole order, $R_{b,i} \geq R_{s,i}$ and $d \geq R_{b,1} + R_{b,2}$, where the law reduces exactly to $F = G\mathcal{M}_1\mathcal{M}_2/d^2$. The interval ladder holds in three statements never conflated: $0 < \alpha < 1$ is universal, a property of the bounded map; $F < F_{\max}$ holds wherever the inputs occupy that interval; and $F \leq F_{\max}/4$ is the pair-domain statement alone, with equality only for equal saturated supports at contact. The ceiling $F_{\max} = c^4/4G \approx 3.03 \times 10^{43}$ N is never reached (core 0.2). A flake is not spherical, and no multipole remainder of the closed-form pair expression is written here (O-5). The same law at different input pairs is what the consensus calls gravity, electromagnetism, the weak and the strong interaction; no map from a charge, a circulating charge or a colour seat to an I-1 input is written here (O-6).

I-2, one carrier. Photon, graviton, gluon, phonon and magnon are the same spin-1 excitation of the density field read in different density and geometry regimes; the identity is quoted whole in Sec. 3.1, where it carries the record's three kinds of light and vibration.

I-3, three faces. The field equation stands unchanged, with $G_{\mu\nu}$ the Einstein tensor, $T_{\mu\nu}$ the stress tensor and $\kappa = 8\pi G/c^4$ the Einstein coupling,

$$G_{\mu\nu} = \kappa\, T_{\mu\nu}, \tag{2}$$

and the curvature ratio is downstream of its solution. With $R_s = 2G\mathcal{M}/c^2$ the Schwarzschild radius of the total gravitating energy $\mathcal{M}$, r_f the declared field radius, r_c the finite-core cutoff and σ the branch tag, the Alpha Lock gives the exterior ratio α_{ext} on $R_s < r_f < \infty$ and the interior ratio α_{int} on $r_c \leq r_f < R_s$, with their gap odds X_{ext} and X_{int}, together X_σ:

$$\begin{aligned} \alpha_{ext}(r_f) &= \frac{R_s}{r_f} \quad (\sigma = +1,\ R_s < r_f < \infty), \quad X_{ext} = \frac{R_s}{r_f - R_s}, \\ \alpha_{int}(r_f) &= \frac{r_f}{R_s} \quad (\sigma = -1,\ r_c \leq r_f < R_s), \quad X_{int} = \frac{r_f}{R_s - r_f}, \end{aligned} \tag{3}$$

so that $\alpha_\sigma = (R_s/r_f)^\sigma = X_\sigma/(1 + X_\sigma)$, the bounded output of the compactness application A-1; no value of r_c is written here (O-1). The third face is the exact optical metric, with ℓ_{opt} the optical length and s_{sph} the line element of the unit sphere,

$$d\ell_{opt}^2 = \frac{dr_f^2}{(1 - \alpha_{ext})^2} + \frac{r_f^2\, ds_{sph}^2}{1 - \alpha_{ext}}, \tag{4}$$

whose Fermat jump law is generalised Snell's law with the exact index. Containment holds: given the same stress tensor, cosmological terms, initial and boundary data and gauge, FDT and general relativity solve the same equation and return the same curvature, and the curvature ratio alone never produces a divergence. The observation-region rule of I-3 is quoted and applied in Sec. 3.7; chart discipline 5 is quoted with the isotope designs.

I-4, one statement in different limits. Newton's law, general relativity's weak field and the FDT pair law are one statement read in different limits, kept in three layers that no claim spans silently: the pair algebra, exact on its declared domain; containment, general relativity reducing to $G\mathcal{M}_1\mathcal{M}_2/d^2$ at leading order of the weak-field slow-motion expansion; and the FDT source programme with each claimed divergence, the layer the five predictions occupy. Its quantum face is quoted in Sec. 3.5.

I-5, braids and confinement eigenvalues. For a pattern confined to a domain Ω with boundary data B, braid configuration n, orientation χ and position t on the inside/outside chart, with D the confinement operator and $\hbar$ the reduced Planck constant, a mode u_q of frequency ω_q and mass m_q satisfies the confinement eigenproblem

$$D(\Omega, B; n, \chi, t)\, u_q = \omega_q\, u_q, \qquad m_q c^2 = \hbar\, \omega_q, \tag{5}$$

and no form of D, its domains, boundary data or spectrum is written here (O-9). The helix count n fixes the class, with charge magnitude n mod 2, and the fermion class is $\nu_F = B_s$ mod 2, the nested turning-class degree, not n mod 2; no value of ν_F on an exact framed closure is computed here (O-11). The support of a mode is fixed by geometry and is never the reduced Compton wavelength, and no mass formula, anchor radius or absolute address is written for any named particle. The two held-out targets a derived operator must reproduce are, with m_p, m_e and m_μ the masses of the proton, the electron and the muon, $m_p/m_e = 1836.15267343$ and $(m_\mu/m_e)^2 = 4.2753 \times 10^4$.

I-6, the bounded map. Every curvature ratio lives on the open interval, $0 < \alpha_\sigma < 1$, with $\alpha_\sigma \to 0^+$ and $\alpha_\sigma \to 1^-$ the only endpoints, and every bounded-map use names its application A-1 to A-5 (core 0.4). The density input of the isotope designs is the A-1 output of a boron nucleus, and I-6's forbidden phrasing "A response coefficient typed as a density" governs the record's efficiency ratio (Sec. 3.6). I-6 item 6, one symbol and one meaning, governs the notation guard of Sec. 1.5.

I-7, density equivalence and the ledger of a flake. With M the rest mass, E the energy, P the pressure, V the volume, T the temperature and a the radiation energy-density constant built from the flux constant σ_{SB}, every channel enters the total gravitating energy once:

$$\mathcal{M} = M + \frac{E}{c^2} + \frac{PV}{c^2} + \frac{aT^4V}{c^2} + \ldots, \qquad a = \frac{4\sigma_{\mathrm{SB}}}{c}, \tag{6}$$

with $R_{\mathrm{s}} = (2G/c^2)\,\mathcal{M}$, and the curvature ratio is the Alpha Lock's, which I-7 references and never redefines. For one of the record's flakes the ledger carries once each: the rest mass, which the isotope designs T-3 and T-4 move through the boron nuclei's own $\mathcal{M}$; in E/c^2 the energy the laser leaves in the flake, the lattice strokes' included; PV/c^2 at the ambient pressure; and aT^4V/c^2 with $a = 4\sigma_{\mathrm{SB}}/c$. No number is printed for an entry. The solved mass aspect of the flake already carries its gravitational binding, and the ledger holds no separate entry for it (0.5). The Discriminator and Discipline 2 of I-7 are quoted whole with T-3.

1.3 The quantisation chain, the bridges and the strand rate

The chain $E/m = c^2 = 1/(\varepsilon_0\mu_0) = (d/t)^2$, with m a mass, d a distance, t a time and the two coefficients of its third term the response coefficients of the omnium, is one state read four ways: the omnium settles matter, energy and spacetime by one global optimisation, never one term at a time (0.1, 0.1a). With E quantised and c constant, the discreteness lands in the rest masses of confined patterns, confinement eigenvalues whose operator is not written here (O-9), and in the null periods and paths at the locked ratio $\ell_q/T_q = c$ of the length ℓ_q a pattern's thread runs to the time T_q it keeps, bounded below by $2\ell_P$ and $2t_P$, twice the Planck length ℓ_P and twice the Planck time t_P, as

a one-sided infimum; the curvature ratio is a continuous chart over discrete content. The bridges of 0.1a are constants of the medium; with E_q a pattern's energy, m_q its mass, T_q the time it keeps, ℓ_q the length its thread runs, h Planck's constant, d a distance and t a time, in metres (m) and seconds (s), 0.1a displays them so:

$$\begin{aligned} E_q &= m_q c^2 = \hbar\,\omega_q, \\ T_q &= 2\pi/\omega_q = h/E_q, \\ \ell_q &= c\,T_q = h/(m_q c), \\ d/t &= c = 299\,792\,458\ \mathrm{m\,s^{-1}}, \end{aligned} \tag{7}$$

with 0.1a's annotations, line by line: "energy → mass (c^2); energy → frequency ($\hbar$; the I-5 mode cost)"; "the time a pattern keeps"; "the length its thread runs in that time — the Compton length, never the support R_{box} (I-5 vacuity guard)"; and "exactly: meters locked to seconds". A quantity quoted in a unit that contains $\hbar$ writes the $\hbar$. The rate c is the strand rate of the omnium, derived (0.1d): the two responses of the field, written with the electric field E and the magnetic field B and the response coefficients ε_0 and μ_0 of the omnium,

$$\nabla \times \mathsf{E} = -\partial_t \mathsf{B}, \qquad \nabla \times \mathsf{B} = \varepsilon_0\mu_0\,\partial_t \mathsf{E}, \qquad \nabla \cdot \mathsf{E} = 0 = \nabla \cdot \mathsf{B}, \tag{8}$$

give $c^2 = 1/(\varepsilon_0\mu_0)$, the space–time conversion and, squared, the matter–energy conversion. A closed pattern's strand runs at c on a helix, $v^2 + u^2 = c^2$ with v its translation and u its circulation; its inertia E/c^2 carries the stress of its closure (von Laue); and its translation share $\mathfrak{s} = v^2/c^2$ is kinematic, equal to α_{ext} only for a pattern held on the exterior branch, with no kinematic reading of the share on the interior chart written here (O-16). The open stroke runs straight at c, keeps no time, and its grades turn on a helix of radius $\bar{\lambda} = c/\omega$, with ω the angular frequency, standing at $\pi/4$; a closed pattern's phase rate ω/k, with k the angular wavenumber, exceeds its run $d\omega/dk$, their product is c^2, and $\pi/4$ is the equality of the two rates, which only the open stroke has (I-2). Light moves at c because it is an open stroke; c is not defined by light.

1.4 The two readings

A pattern's kept time and thread length rescale together with the density it crosses, by the clock factor $\mathfrak{m}$ (written for the metric $g_{\mu\nu}$, $g_{\mu\nu} \mapsto \mathfrak{m}^2 g_{\mu\nu}$, with $d/t = c$ kept): on its own clocks and rulers nothing changes, while the bookkeeper, with $\mathcal{U}$ the pattern's four-velocity, $\nabla_{\mathcal{U}}$ the covariant rate of change along its path and $\mathfrak{P}^{\mu\nu}$ its projector, reads $\nabla_{\mathcal{U}}\mathcal{U}^\mu = -\mathfrak{P}^{\mu\nu}\partial_\nu \ln \mathfrak{m}$ toward slower clocks. Moving at constant speed, on the pattern's own clocks and rulers, through a density gradient is gravity, the extended equivalence principle (0.1c); a slow pattern reads the lapse and a stroke the optical metric of Eq. (4), the factor of two of I-3. For a stress tensor of perfect form a medium's clock factor is its temperature at zero net conserved count, and its enthalpy per count with a conserved count and fixed entropy per count: the reading of its flow, never the rate of a clock the medium carries, whose thermal shift is the time dilation of its own thermal motion. The clock factor is never an α and never bends a stroke. A curvature, a tide or a density gradient is read between neighbours, two patterns or a pattern and a reference path, an extended pattern's skin against its own centre path among them; it is never read off one pattern. A laboratory pattern's gravitational window $\alpha_{\mathrm{ext}} = \mathcal{M}c^2/(2F_{\max}r_{\mathrm{f}})$ is small and a correct reading, and the bookkeeper's flow runs at every size: patterns falling from rest far away move at $c\sqrt{\alpha_{\mathrm{ext}}}$ and fall at exactly $G\mathcal{M}/r_{\mathrm{f}}^2$, and the frame drag of a rotating source is the local rotation of that flow, half the curl of its swirl, never a medium's vorticity. In a twist (P-5) a pattern takes its rest energy where it sits as its clock factor: with E_0 its rest energy outside every twist, m its held moments and E_{ind} the energy of the moments the twist induces with the work of inducing them, the helical window is $\mathfrak{m} = E/E_0$ with $E = E_0 + E_{\mathrm{ind}} - \sum \mathsf{m}\cdot\mathsf{B}$, and $\mathcal{M} = E/c^2$. There the clock factor belongs to the pattern, so patterns whose held and induced moments, summed per unit E, differ along the field's gradient fall differently where they sit; the universality of free fall is

the gravitational window's, and it stands. A uniform twist turns a held moment and pushes nothing, and a twist is read between neighbours or against a reference path. No clock factor is written here for a stroke, and no frequency is read off a temperature (0.1c). Use item 7 sets how a twist is read: "A reading of curvature, a tide or a density gradient is a comparison of neighbouring patterns, or of a pattern with a reference path", and "That cancellation is the comparator's zero."; in T-1 and T-2 the neighbours are the two hands of a pair of stacks.

1.5 Notation guard

The record's symbols that meet a reserved token of the core are renamed on every surface, the record's printed token kept only inside a quotation; the table below is the census (NG-01 to NG-11 of the claims ledger), and the paragraph after it fixes the core's reserved tokens this manuscript writes.

record token	record meaning	manuscript name and guard
λ, printed $\lambda1$, $\lambda2$, $\lambda3$ (SC-062, L97)	the zero-phonon line and its two sidebands; the record does not say which sideband is which	λ_{Z}, λ_{sb2}, λ_{sb3}; λ is I-2's wavelength, with $\bar{\lambda} = \lambda/2\pi$; I-4's numbered pair is never written for the record's labels
ω (SC-044, L81)	the phonon frequencies, transverse optical (TO) and longitudinal optical (LO); in the caption of Fig. 5 with values in eV	ω_{TO}, ω_{LO}, angular frequencies as I-2's ω; a value in eV is $\hbar\omega_{\mathrm{TO}}$, $\hbar\omega_{\mathrm{LO}}$
E, ΔE (SC-120, L130)	the excitation and emission photon energies and their difference	E_{exc}, E_{em}, ΔE, energies as 0.1's E; never E_0, the rest energy of 0.1c
E1u, E2g, the Γ and K points (SC-028, L71; SC-064, L99)	symmetry labels of two lattice modes; two points of the Brillouin zone; K is also the kelvin	upright E_{1u}, E_{2g}; the Γ point and the K point in words: labels, never an energy; the kelvin upright after its number
B, N, C (SC-033, L74)	boron, nitrogen and carbon	upright in a formula, otherwise the element's name; B is I-5's boundary data, every magnetic field is B; N is the conserved count of 0.1c
S (SC-197, L191)	labels of the Supplementary Notes and Figures	"Note S7" in roman text; S_i is I-7's sensitivity
I, II (SC-050, L84)	positions on the flake; hyperbolic types	roman numerals in text, labels
W (SC-282, L249)	the unit watt with the prefix micro	the upright unit after a number, micro as µ; W a reserved token
T, none printed (SC-055, L92)	the record writes "room-temperature" and prints no temperature symbol	T, the temperature of I-7 and 0.1c, for the stage of T-5; never a transition operator, a kept time or a torus
panel letters (SC-122, L134)	the panels of Figs. 1–6	"panel (a)" in roman text; a is $4\sigma_{\mathrm{SB}}/c$
added (NG-11)	the manuscript's own symbols	fraktur $\mathfrak{w}$, $\mathfrak{r}$, $\mathfrak{y}$, $\mathfrak{b}$, $\mathfrak{c}$, $\mathfrak{h}$, $\mathfrak{v}$, $\mathfrak{u}$, $\mathfrak{o}$ and calligraphic $\mathcal{E}$, $\mathcal{N}$ with roman subscripts, each defined where the predictions first use it; k_{B} (U-06) never without its subscript, a bare k being I-2's ($\omega = ck$); the hands + and − are signs; the core's fraktur letters are never reused

The core's reserved tokens keep one meaning each (I-6 item 6): α_σ is the curvature ratio of core 0.3, branch-tagged, and nothing else; n the strand count; σ the branch tag and σ_{SB} the flux constant; κ the Einstein coupling; X the odds; D the confinement operator; Ω the confinement domain, so the unit sphere's line element is s_{sph}; a the radiation constant; E and B the fields of 0.1d's responses, sans-serif because E is an energy and B boundary data; t the time of d/t and ∂_t and, inside $D(\Omega, B; n, \chi, t)$, the core's own chart position; u the circulation speed of 0.1d beside the core's mode u_q; and R always carries its subscript, as in R_{s}, R_{b}, R_{box} and R_{room}, the skin radius of a bound configuration's interior chart.

1.6 Chart inventory

The chart inventory is declared once, here (I-3 chart discipline 1); every curvature ratio of the manuscript is one of its rows, named with its application of core 0.4. P-3's two-channel discipline holds for every nucleus: "the site's saturation coordinate is not the exterior compactness of the same nucleus ($\ll 1$ for a laboratory nucleus); declare both charts whenever both appear".

token	application	object and evaluation	warrant
α_σ, X_σ	A-1 compactness	the atlas of Eq. (3), with field-point r_f, configuration R_b and source R_s evaluations; interior domain from r_c (O-1)	geometric: two lengths
$\alpha_i(d) = R_{\mathrm{s},i}/d$	A-1	I-1's per-body exterior inputs on nonoverlapping spherical supports	geometric
$\alpha_\mathrm{ext} = \mathcal{M}c^2/(2F_\mathrm{max}r_\mathrm{f})$, a flake	A-1, exterior	a flake's own gravitational window; the record prints no flake size, so no number	geometric
α_ext, a nucleus	A-1, exterior	a boron or nitrogen nucleus as P-3's clamp, its exterior chart, $\ll 1$; for the isotope designs one declared $r_\mathrm{f} = 3$ fm for both boron nuclei (U-14)	geometric
$\alpha_\mathrm{core} \to 1^-$	saturation diagnostic	the same nucleus's interior chart, read with its skin at the fold and its skin radius R_room from data (U-13); no transfer map between the two charts is displayed or used	schematic only
$\beta_\sigma = \alpha_\sigma/(1+\alpha_\sigma)$	A-2 compactification	computational chart only, never in a force, optical or density slot	geometric
α_ovl	A-3 overlap	token only: no value, threshold, ordering, sign or trajectory (O-2)	none
α_conf	A-4 confinement	token only: I-5's cone-position axis, no value (O-3)	none
α_mode	A-5 mode manifestation	token only: a name for the regimes of I-2; it ranks nothing and spaces nothing	none

2 System chart

The table below places each object of the record, and the one object the predictions add, on its chart; in every row the middle column is the manuscript's reading, labelled so, and no mass or position value sits under a compactness heading.

object	record rows	the manuscript's reading	chart, application, branch
a flake on a grid, on glass, on gold	SC-056, SC-409, SC-418	reading: a pattern of the omnium with its own support (0.1b)	A-1, exterior window
boron and nitrogen nuclei	SC-033	reading: the clamps of the lattice's nodal patterns (P-3), each one pattern (0.1b)	A-1 exterior chart; interior chart, schematic
the lattice modes	SC-042, SC-064	reading: nodal patterns of the driven density field (P-2) and strokes of the one carrier (I-2), with no strand count	A-5 naming token
the emitting defect	SC-143, SC-258	reading: its electrons are closed $n = 3$ braids (I-5); its levels are confinement eigenvalues, with no form of D written (O-9)	A-4 token
laser and emitted light	SC-094, SC-114	reading: open strokes (I-2), keeping no time	no curvature ratio
glass and gold	SC-409, SC-418	reading: boundary conditions of the mode geometry (P-2)	no curvature ratio
the electron beam	SC-493, SC-500	reading: a probe whose data are means over the region it weights (I-3)	no curvature ratio
a helical stack (T-1, T-2)	U-18	reading: a physical twist in P-5's words	no curvature ratio

3 Observation map

The table below anchors each family of the record's data to its section of the record, its ledger rows and its verb class, and names the cluster that reads it; each cluster closes with its invariant, its precision and a falsifier or, where a prediction reads it, that prediction's test. A falsifier is an outcome read beyond the errors of the readings compared, with whatever else the cluster's reading lets the outcome depend on held as it was.

record item and section	ledger rows	verb class	cluster
defect line and sidebands, Sec. 1 of the record	SC-098, SC-100, SC-102	reported, approximate	Sec. 3.5
excitation-dependent line, Sec. 2.1	SC-063, SC-065	reported	Sec. 3.1
energy difference and its two bands, Sec. 2.4	SC-348, SC-354, SC-345	definition; reported, approximate	Sec. 3.2
two overlapping components, Sec. 2.2	SC-228, SC-230, SC-232, SC-234	fitted	Sec. 3.2
stages of the record's two mechanisms, Sec. 2.1	SC-152, SC-154, SC-156, SC-158, SC-160, SC-162	reading	Sec. 3.3
defects, symmetry and substrates, Sec. 2.2 and Sec. 2.5	SC-215, SC-175, SC-409, SC-418	reading; literature; reported	Sec. 3.4
the defect's centres and identity, Sec. 2.2	SC-256, SC-143	fitted; simulated	Sec. 3.5
power dependence and widths, Sec. 2.3	SC-275, SC-282, SC-290, SC-331	reported, no value or unit; approximate	Sec. 3.6
the two probes, Sec. 4	SC-494, SC-493	setting	Sec. 3.7
the component on gold, Sec. 2.5 and its figure's caption	SC-419, SC-422, SC-458	reported; derived-value; caption, approximate	Sec. 3.4 and Sec. 8
the record's polarization statements, Sec. 2.2	SC-202, SC-204	supplementary-only	Sec. 3.8

3.1 One carrier

I-2's identity is

$$\begin{aligned} \text{photon} = \text{graviton} = \text{gluon} = \text{phonon} = \text{magnon} \\ = \text{the same spin-1 excitation of the density field,} \\ \text{at different density / geometry regimes} \end{aligned}$$

and its derivation from the chain reads: "A carrier is a disturbance of a medium at that medium's speed. The chain gives one speed to every reading — the mass–energy exchange rate (gravity's ripple), the electromagnetic propagation constant (light) and the medium's own stroke (sound) — and 0.1b leaves one medium for them to be disturbances of. Hence one carrier: the five names are the same stroke read in different density and geometry regimes, never different substances. The gluon is the stroke standing inside a closed pattern's own region (the I-5 mode, $m_q c^2 = \hbar\omega_q$); the magnon is the stroke through a helical density gradient (P-5). The identity is not a postulate added to the chain; it is the chain read as carriers. 'Unification' of separately born carriers at high energy is the consensus reading of a coincidence the chain says is not one." I-2 continues: "There are no independent force carriers. 'Mediation' is a coordinate artifact; interactions are curvature plus geodesic motion. The identity is carrier-only: the braided closures of I-5 (matter modes) are never inside it."

In the manuscript's reading, the laser's light, the down-converted light and the lattice vibration the record calls a phonon are strokes of the one carrier, read in different density and geometry regimes. The record states that infrared (IR)-active phonon modes "couple directly to the electromagnetic field" (SC-072, L103; SA-14), and that statement stands beside this reading as the record's. "Mediated",

"phonon-mediated", "photon-mediated" and "phonon-assisted" are the record's words, at the title (SC-001, L12; SA-01), the abstract (SC-011, L33; SA-04), the sidebands (SC-111, L125; SA-20), the line (SC-115, L128; SA-21) and the momentum-resolved spectra (SC-450, L374; SA-83), each attributed where it is used. The defect's electrons are matter and stand outside the identity; no regime of I-2 is ranked, spaced or placed on an axis (A-5, a token only). The record writes that "The observed phenomenon bears strong resemblance to stim-" "ulated Raman scattering" (SC-183, SC-185, L183–L184; SA-48), where its abstract writes "via stimulated Raman scattering." (SC-012, L34; SA-04); each stands at its locus. It states its excitation range as "a tunable laser excitation from 460 to" "650 nm" (SC-094, SC-096, L117–L118; SA-17), and its captions print "470 to 486 nm" (SC-128, L139), "from 470 to 650 nm" (SC-178, L177) and "560 to 590 nm" (SC-455, L380); the ranges stand at their loci, not reconciled. This cluster is a reading under I-2 and corroborates no invariant (Use item 2): I-2 gives no value of an energy, and that the record's bands' energy shifts, at its two figures approximately 0.17 and 0.20 eV (SC-345, L298), "correspond closely to the infrared-active TO and LO phonon" "pair energies in hBN" (SC-347, SC-349, L299–L300) is the record's own comparison; falsifier: a down-converted line whose energy difference from the excitation changed, at the record's two figures and no finer and beyond the errors of the readings compared, with no change of the flake's lattice or of its substrate.

3.2 The books of one event

0.1a displays the bridges of Eq. (7), quoted whole there. In the manuscript's reading, the record's energy difference, "ΔE = Eexc − Eem" (SC-348, L300; SA-72), is the energy of the lattice's stroke: the excitation stroke's energy is the emitted stroke's plus the lattice stroke's, and each of the three energies is $\hbar\omega$ of its stroke, $E_{\mathrm{exc}} = E_{\mathrm{em}} + \Delta E$. No length, run or speed is written for the lattice's stroke. The record reads its two bands as "These energy" "shifts correspond closely to the infrared-active TO and LO phonon" "pair energies in hBN, respectively" (SC-345, SC-347, SC-349, L298–L300; SA-75), and its fit resolves "two closely overlapping Stokes-shifted" "components", and the record writes that "The emitted spectra exhibit peaks" "corresponding to energy differences of 167 and 170 meV" (SC-228, SC-230, SC-232, SC-234, L209–L212; SA-46), fitted values with no uncertainty printed. It assigns the shift near 0.17 eV twice: "We attribute this shift to the" "coupling to the in-plane TO phonon mode (IR-active) of hBN" (SC-354, SC-356, L303–L304; SA-72), and "The dominant energy shift of ∼0.17 eV corresponds to" "coupling with the IR-active E1 u LO–TO phonon pair" (SC-385, SC-387, L324–L325; SA-84); each stands at its locus, not reconciled. It gives the IR-active mode's transverse energy as "about 169.5 meV" (SC-259, L234; SA-56) and as "approximately 169.8" "meV" (SC-274, SC-276, L245–L246; SA-58), each with no citation in its own sentence, and the Raman-active mode's "approximately 169.8 meV" by its citation (SC-254, L232; SA-55) [5]; the two transverse statements are not reconciled. This cluster is a reading under 0.1a and corroborates no invariant (Use item 2): $E_{\mathrm{exc}} = E_{\mathrm{em}} + \Delta E$ is the record's definition of its energy difference (SC-348, L300) rearranged, the identity map; precision: the record's "distributed around 0.17 eV" (SC-354, L303) over its excitation range; falsifier: a down-converted line's energy difference that followed the excitation energy, beyond the errors of the readings compared, at a fixed lattice, which would be the energy of no single stroke of it.

3.3 System-wide settlement

0.1a reads: "The global optimisation is solved at every step, from the state the system is in; the expected behaviour is not necessarily the evolving system's optimum. Events do not commute, and a process run backward is never the mirror of the forward event. Responses are system-wide and many-to-many (I-5b's reclosure is one), never one-to-one, particle by particle; I-1's pair expression stays exact on its declared domain (I-1, I-4)." The record's account is its own, attributed whole: the

incident laser light “excites the system to a virtual electronic state as well” “as populating a real defect level” (SC-152, SC-154, L157–L158); in one mechanism energy “is released through inelastic photon scattering” (SC-156, L159); in the other “the defect state relaxes” “via radiative recombination” (SC-160, SC-162, L161–L162; SA-35); and “Within this picture, optical excitation” “of the defect states facilitates population of the infrared-active” “phonon manifold. The resulting phonon population then stim-” “ulates the inelastic scattering of the incident laser field” (SC-221, SC-223, SC-225, SC-227, L205–L208; SA-52), “as” “also recently theoretically suggested” (SC-229, SC-231, L209–L210) [6]. In the manuscript's reading, the flake's response to the laser is settled system-wide at every step, from the state it is in, lattice, defects and light together, and a down-conversion and the up-conversion at the same two photon energies are a process and its run backward: two settlements, each from its own starting state. The record reports the down-converted side only (SA-52); T-5 reads both sides on one spot. This cluster is a reading under 0.1a and corroborates no invariant (Use item 2), the record reporting one side of the pair and no datum on the other; test: T-5, whose exclusion test excludes a difference of the two settlements of the scale it names or more, and no smaller one.

3.4 Nodal architecture and clamps

P-2 reads: “Readings: eigenstates, phonon modes and orbitals are nodal patterns of the driven density field; bonding and Cooper pairing are shared scattering-free nodal channels; localisation is trapping in disconnected nodal pockets; condensation, crystallisation and percolation are global eigenmode snaps of the standing-wave network. By I-2 the same nodal structure appears in every carrier window; mode geometry is set by the boundary conditions (the clamps, P-3), not by the medium.” P-3 opens: “Atomic nuclei are the saturated density cores of a material's Chladni volume: fixed pinning sites.” In the manuscript's reading, the lattice modes of hexagonal boron nitride (hBN) are nodal patterns of the flake's driven density field and the boron and nitrogen nuclei its clamps; a defect changes the set of clamps and a substrate the boundary conditions, and with them the mode geometry. Beside this reading stand the record's “We attribute this” “behavior to defect-induced modifications of the local symmetry” (SC-213, SC-215, L201–L202; SA-51), its “local-” “ized vibrational modes” (SC-173, SC-175, L167–L168; SA-40), its glass substrate (SC-409, L343; SA-79) and its gold (Au) film (SC-418, L349; SA-80), where the additional peak's “emergence on Au is attributed to surface-” “enhanced Raman scattering” (SC-426, SC-427, L354–L355; SA-81). The reading carries no equation, no magnitude and no selection rule of its own: “a P-anchor is never citable as the source of an equation”. This cluster is a reading under P-2 and P-3 and corroborates no invariant (Use item 2), the anchors giving no value of an energy; falsifier, at the record's two figures and no finer and beyond the errors of the readings compared: a component of the down-converted spectrum whose energy difference from the excitation moved with no change of the set of clamps, of the boundary conditions or of the load on the flake (pressure, strain, energy injection), where the record reports an additional component on gold (SC-419, L350) and a second band after the plasma treatment (SC-344, L297).

3.5 Electrons, levels and the quantum face

I-5 reads: “Matter is braided photon helices: closed topological loops formed from n open helical strands of the spin-1 excitation of I-2.” and “There are no intrinsic particle masses or properties: charge, colour, flavour, generation and mass are all derived — n sets the topological invariants, confinement sets the mass.” I-4 reads:

> QM is helical geodesics on truncated density cones. The wavefunction $\psi = Ae^{i\varphi}$ is the projection of a helix onto the plane normal to the cone axis; “superposition” is ignorance of the helical phase φ_0 at observation. The universe is deterministic; there are no probability amplitudes.

In the manuscript's reading, the defect's electrons are closed $n = 3$ braids, and the photon energy of the defect's zero-phonon line, the record's "transition energy of the emitting defect" (SC-258, L233; SA-63), is $\hbar$ times a difference of two confinement eigenvalues, as 0.1d reads a transition frequency in its clause "a ratio of two differences of confinement eigenvalues"; no form of D is written for it (O-9). The record's "virtual electronic state" and "real defect level" (SC-152, SC-154, L157–L158) stay its words; no amplitude is written in FDT's voice for either, and no strand count and no curvature ratio is assigned to a level, a mode or a line. The record prints the line "at 537 nm (2.31 eV)" (SC-137, L149; SA-37) and two fitted centres, "537.11 and 537.30 nm" for photoluminescence (PL) and cathodoluminescence (CL) (SC-256, L232; SA-63), which it calls "identical" (SC-253, L231). The defect's identity is the record's "consistent with carbon-related nitro-" "gen vacancy complexes" (SC-143, SC-145, L152–L153; SA-38), resting on first-principles studies the record cites [4], while the experiments it cites detected such emission "only at temperatures below 90 K" (SC-153, L157) [7]. The record's sideband offsets are "approximately 53 and 158 meV" (SC-102, L121; SA-18); of the larger it writes that it "lies within" (SC-103, L121) "the in-plane optical phonon energy range of bulk hBN (150–" "203 meV)" (SC-105, SC-107, L122–L123) [2] and at a second locus writes that "The 158 meV energy is consistent with the in-" "plane optical phonons of the hBN lattice, corresponding to" "the resonant energy of the longitudinal optical (LO) mode at" "the K point of the Brillouin zone" (SC-163, SC-165, SC-167, SC-169, L162–L165; SA-39), and of the smaller it writes that "the former sideband is associated with" "localized phonon excitations surrounding the defect location" (SC-107, SC-109, L123–L124; SA-19) [3]; the two statements on the larger stand at their loci, not reconciled. This cluster is a reading under I-5 and corroborates no invariant (Use item 2), no form of D being written (O-9) and none returning the line; precision: two fitted centres that differ by 0.19 nm with no uncertainty printed; falsifier: a transition energy of one emitting defect that moved with the probe, both probes reading that defect alone under the same load on the flake (pressure, strain, energy injection), beyond the errors of the two readings that return it, among them the two fits' errors and the offset between the wavelength scales of the two set-ups.

3.6 Driven observables and the force law

I-1 reads: "A driven observable (induced magnetisation, rectified signal, rate) vanishes at zero drive and never 'recovers' the static force. The force lives in the isolated static functional; measured dynamics are a separate causal convolution $A(t) = \int \chi_A(t - t')F_{12}(t')\,dt'$, and the susceptibility maps force $\to$ observable — it is not the force law." and "At condensed-matter compactness the bare law returns a small number ($\sim 10^{-41}$ N): a correct prediction, not a wrong-tool symptom — and not the measured binding scale, which is reached only through a declared response kernel (rate $\neq$ force)." The record's emission lines are driven observables, zero at zero drive: "Both the defect zero-phonon line (ZPL) and the Stokes-shifted" "emission increase with excitation power" (SC-270, SC-271, L242–L243; SA-64). Its "down-conversion" "efficiency, defined as the ratio of the integrated down-converted" "signal intensity to the incident laser power" (SC-271, SC-273, SC-275, L243–L245; SA-64) is the quotient of a driven observable by its drive, a response coefficient; the record prints no value and no unit for it, and no curvature ratio, odds or bounded map is built here from it, from a power or from an energy difference, under I-6's forbidden phrasing "A response coefficient typed as a density". The record's "threshold-like" (SC-279, L247; SA-65) names the shape of a curve, rising "below approximately 25–30 µW" (SC-282, L249) and then "saturates" (SC-277, L246); no threshold of I-1a is read on it, under 0.4's "A threshold, sign or trajectory never transfers across applications." The record prints two ranges for one width: from "approximately 1.14 nm" to "approximately 1.04–1.05 nm" (SC-290, SC-292, L253–L254; SA-66) and "0.6–0.75 nm over the entire investigated power" (SC-331, L289; SA-68); each stands at its locus. The law of Eq. (1) holds always, at all scales, for two bodies, and its closed-form pair expression holds at monopole order on I-1's domain of two nonoverlapping spherical supports; a flake is not spherical, and no multipole remainder is written here (O-5); the $\sim 10^{-41}$ N

is the core's. This cluster types the record's lines under I-1 and corroborates no invariant (Use item 2), no value or unit of the ratio being printed; falsifier: a down-converted line that persisted at zero incident power after its response to the earlier incident power had decayed, its intensity beyond the errors of the readings compared, the line's and its baseline's.

3.7 Means over the probed region

I-3's observation-region rule reads: "Every consensus datum about an interior is a profile-weighted mean $\langle f \rangle_w = \int w f \, dV / \int w \, dV$ with the probe weight named — an rms radius is a skin-weighted second moment, a trace share or a mean pressure a volume mean — so a point value is never read off a mean and no single 'nuclear α' is defined by any of them." In the manuscript's reading, each datum of the record about a flake is a mean over the region its probe weights: the focus of the record's "100× objective (numerical aperture 0.9)" (SC-494, L408; SA-94) through the flake for the photoluminescence, and the electron beam's interaction volume for the cathodoluminescence, which the record does not print (SC-493, L408; SC-500, L412; SA-92); no point value is read off a mean. The record prints no focal spot size, no flake thickness and no layer count (SA-25, SA-94). This cluster is a reading under I-3 and corroborates no invariant (Use item 2), the two regions not being printed and the record calling its two fitted centres "identical" (SC-253, L231); falsifier: a mean of one quantity that one probe returned from a region under a weight nowhere negative, outside, beyond the errors of the readings, the range of the means of that quantity it returned under that weight from the disjoint parts that make up that region, the quantity having at each place one value in the reading of the region and in the readings of its parts.

3.8 Magnetism is geometric

P-5 reads: "Magnetism is geometric — twist induces it. A magnetic field is a macroscopic helical density gradient of the omnium: the bivector grade of the density field coherently aligned along an axis; vortex lines are bivector topological defects. Imposing a physical twist (torsion, helical geometry) on a material *is* establishing a magnetic field; mechanical vorticity and magnetic moments are different grade projections of one density-gradient topography, with no carrier exchange (I-2). Quantitative twist → moment forms are derived in-manuscript through I-1/I-2 with a declared kernel." In the manuscript's reading, a stack of flakes, each turned by one angle in one sense from the flake below, is a helical geometry, a physical twist in P-5's words. The record applies no magnetic field and prints none; its polarization statements, that the light "follows the excitation laser" "polarization" (SC-202, SC-204, L194–L195; SA-50), rest on its Note S9, outside the record. This cluster is a reading under P-5 and corroborates no invariant (Use item 2), the record applying no magnetic field and printing none; tests: T-1 and T-2, whose exclusion tests exclude from the contrast of the two hands a term of the scale they name or more, and no smaller one.

4 Cone-position translation

The defect's electrons and the boron and nitrogen nuclei sit on I-5's two axes, the helix count n and the confinement position, whose token α_{conf} of A-4 carries its range and nothing else: no value, threshold, ordering, sign or trajectory (O-3). The record's line energies are not translated onto that axis, and no address is written for the electron, the defect or either nucleus (I-5). In the manuscript's reading, the nuclei of ^{11}B and ^{10}B are two patterns (0.1b: "A nucleus is one pattern") that differ by one $n = 2$ closure, the neutron as I-5 lists it; no form of D is written for either (O-9).

5 Predictions

The five blocks below are predictions that general relativity and quantum mechanics do not make: in each, a core clause supplies an additional source, a constitutive input or a changed observable dictionary that the consensus calculation lacks (Use item 2). Every candidate, DC-1 to DC-5, becomes its block, and none is retired. T-1, T-2 and T-5 are existence predictions and T-3 and T-4 sign predictions, no kernel being declared here; each block carries its own decision rule and one ablation test point, stated as an instantiated effect and never as a derived amplitude.

5.1 Common definitions, tests and test points

The constructions below are the manuscript's own, on flakes made and measured as the record describes (SA-25, SA-90, SA-91, SA-94) unless a design says otherwise. A helical stack is three flakes laid one on another on a substrate, each turned about the stack's normal by the angle $\mathfrak{w} = 5^\circ$ from the flake below (three and $\mathfrak{w}$: U-18, investigator-chosen), all in the sense + or all in the sense − seen from above: the hand; each flake's lattice direction is read before the stacking and the turns are set on a transfer stage (both external). The rotation $\mathfrak{r}$ is the non-reciprocal rotation of the plane of polarization of light reflected from a stack at normal incidence, at the wavelength 633 nm of the record's range (U-19), read inside a magnetic shield, at zero applied field wherever no test field is named, by a Sagnac interferometer (both external), which passes the non-reciprocal part of a rotation and rejects the reciprocal part to a measured ratio. Its scale $\mathfrak{r}_{\mathrm{cal}}$ is half the difference of $\mathfrak{r}$ between the two senses of a test field of 1 mT along the normal (U-20), the mean over a design's $12 \times 2 = 24$ stacks, fixed before the first contrast is read (investigator-chosen). For a flake, $\mathcal{E}_{\mathrm{lo}}$ and $\mathcal{E}_{\mathrm{hi}}$ are its two down-converted energy differences, each evaluated as the record evaluates ΔE (SA-72) and each the mean over five spots of the flake (U-25): that of the band the record puts at approximately 0.17 eV and that of the band it puts at approximately 0.20 eV (SC-345, L298; SA-75).

The sizes are exact: of the $2^{12} = 4096$ equally likely sign assignments of the twelve values, ordered by the mean each gives, and with p the share of them at least as extreme as the one observed, $p \leq 0.0027$ two-sided admits the 10 most extreme ($10/4096 = 0.0024$) and $p \leq 0.00135$ one-sided the 5 most extreme ($5/4096 = 0.0012$); twelve and both levels are investigator-chosen (U-16, U-17). Two tests serve T-1, T-2 and T-5, for twelve values with a bound $\mathfrak{b}$ and a scale $\mathfrak{h}$. The bounded test: the mean lies outside the interval from $-\mathfrak{b}$ to $+\mathfrak{b}$ and the two-sided test of the values, every one shifted by $\mathfrak{b}$ against the sign of the mean, rejects at $p \leq 0.0027$ (with no FDT term its probability is at most $10/4096$ wherever the bounded term lies within its bound). The exclusion test: a term of magnitude $\mathfrak{h}$ or more is excluded when $\mathfrak{b} < \mathfrak{h}$, the mean lies between $-(\mathfrak{h} - \mathfrak{b})$ and $+(\mathfrak{h} - \mathfrak{b})$, and the two-sided tests of the values shifted by $+(\mathfrak{h} - \mathfrak{b})$ and by $-(\mathfrak{h} - \mathfrak{b})$ both reject at $p \leq 0.0027$ (false exclusion at most $5/4096$ wherever the bounded term lies within its bound). Where a design's detection and its exclusion both hold, a term of magnitude smaller than its $\mathfrak{h}$ is detected. Each statistic is a pair contrast or a one-spot quotient, so every response the two members share cancels in it and each test reads the scatter of the twelve values themselves, the covariance of the two members included. The ablation test point of each block: with the FDT input in place every one of the twelve values stands at the block's scale above the comparator's value, and with the input ablated at the comparator's value; the threshold is the mean that one sign flip among the twelve equal values the rule tests leaves short of rejection.

5.2 T-1: a hand-odd non-reciprocal rotation of helical stacks on glass

Candidate DC-1 becomes this block; it carries the divergence of SA-96, whose locus is the record's statement that the inelastically scattered light "follows the excitation laser" "polarization" (SC-202, SC-204, L194–L195), on the warrant of P-5, an additional source: "A magnetic field is a macroscopic

helical density gradient of the omnium" and "Imposing a physical twist (torsion, helical geometry) on a material *is* establishing a magnetic field" (Sec. 3.8).

Referent and design. Twelve pairs of helical stacks of the record's hBN (SA-90) stand on glass slides, the two stacks of a pair on one slide, built from two sets of three flakes of one exfoliation. For each pair a fair coin drawn before the stacking gives one set, its place on the slide already assigned, the hand + and the other the hand −, which randomises the sign of whatever one set or its place carries and the other does not (a thickness, a strain, a magnetic inclusion); a second fair coin, drawn before the pair's first reading, sets which stack is read first, which randomises the sign of a drift between the two readings.

Observable. Per pair the contrast $\mathfrak{y}_{\mathrm{tw}}$ of the two hands is the defining condition

$$\mathfrak{y}_{\mathrm{tw}} = \frac{1}{2}\left[\mathfrak{r}(+) - \mathfrak{r}(-)\right], \tag{9}$$

which the consensus calculation solves as $\mathfrak{y}_{\mathrm{tw}} = 0$ within the leak and the FDT input as a term of one sign in every pair beside the leak.

FDT input. In the manuscript's reading a helical stack is a helical geometry, a physical twist in P-5's words, and by P-5 imposing it "on a material *is* establishing a magnetic field". The mirror through a plane that contains the stack's normal reverses the hand and the part of an axial field along the normal and keeps the substrate below the stack, so the field's part along the normal is odd in the hand and, by the $0 = \nabla \cdot \mathsf{B}$ of 0.1d's display, Eq. (8), continuous across the stack's lower face into the substrate. A twofold axis across a free stack, with nothing to tell its two faces apart, keeps the hand and reverses every vector along the normal, so in such a stack the hand fixes no sense along the normal; the design rests the stack on glass. A field along the normal gives the stack and the glass a non-reciprocal rotation (the Faraday and polar Kerr rotations of a dielectric in a field: consensus data, external). P-5's last sentence, "Quantitative twist → moment forms are derived in-manuscript through I-1/I-2 with a declared kernel", assigns neither magnitude nor sense, and no kernel is declared here: an existence prediction.

Comparator and bounded term. The comparator is zero within the leak. In the consensus calculation (the reciprocity of a medium with no magnetization in no applied field, external) a stack gives no non-reciprocal rotation, whatever its stacking, strain and hand (Use item 7). Two terms enter the contrast, bounded together by $\mathfrak{b}_{\mathrm{leak}}$, fixed before the first reading: the reciprocal rotation of a helical stack that the interferometer passes, odd in the hand, from its measured rejection ratio and each stack's reciprocal rotation measured in transmission; and the field the shield leaves, which rotates the two stacks of a pair alike and enters by the difference of their responses, from the measured response of each pair's contrast to uniform test fields along three axes and the shield's measured residual (U-22). The first pair is read only with $\mathfrak{b}_{\mathrm{leak}}$ at or under its design ceiling $0.04\,\mathfrak{r}_{\mathrm{cal}}$ (U-21, investigator-chosen).

Channels and signs. The sign each channel gives the contrast is in the table below; the pairing cancels every response the two hands share.

channel	sign it gives $\mathfrak{y}_{\mathrm{tw}}$
the twist's field	one sign in every pair, its sense unassigned: the test is two-sided
what one set of flakes or its place carries and the other does not	a sign the hand coin sets
a drift between readings	a sign the order coin sets
the leak	inside the interval from $-\mathfrak{b}_{\mathrm{leak}}$ to $+\mathfrak{b}_{\mathrm{leak}}$, its reciprocal part one sign in every pair and its shield part a sign the hand coin sets

Statistic and decision rule. The statistic is the twelve contrasts, with a two-sided sign-flip permutation test, at $\mathfrak{b} = \mathfrak{b}_{\mathrm{leak}}$ and $\mathfrak{h} = \mathfrak{h}_{\mathrm{tw}} = 0.1\,\mathfrak{r}_{\mathrm{cal}}$ (U-23, investigator-chosen). Detection: the bounded test, at $p \le 0.0027$ (the sign of every term but the twist's field and the leak is a fair coin's or a symmetric reading error's). Attribution: a detection is read as the field P-5 assigns to the helical geometry. Exclusion: the exclusion test, at $p \le 0.0027$ each. Inconclusive otherwise.

Ablation test point. With the twist's field in place every contrast stands at $\mathfrak{h}_{\mathrm{tw}} = 0.1\,\mathfrak{r}_{\mathrm{cal}}$ and, ablated, at 0; with $\mathfrak{b}_{\mathrm{leak}}$ at its ceiling $0.04\,\mathfrak{r}_{\mathrm{cal}}$ the shifted values are $\mathfrak{h} - \mathfrak{b} = 0.06\,\mathfrak{r}_{\mathrm{cal}}$, the threshold is $\mathfrak{b} + 5(\mathfrak{h} - \mathfrak{b})/6 = 0.09\,\mathfrak{r}_{\mathrm{cal}}$, and the difference $0.1\,\mathfrak{r}_{\mathrm{cal}}$ stands above it.

5.3 T-2: the same rotation through a gold film

Candidate DC-2 becomes this block; it carries the divergence of SA-97, whose locus is the record's "In contrast, when hBN is placed on an Au film (Figure 6b,d), an" (SC-418, L349), on the warrant of P-5, an additional source, in the clauses T-1 quotes.

Referent and design. Twelve pairs of helical stacks of the record's hBN (SA-90) stand on a gold film on glass, the record printing no thickness for its gold (SA-79): 50 nm (U-24, investigator-chosen); the two stacks of a pair share one slide and are built from two sets of three flakes of one exfoliation. The hand coin, drawn for each pair before the stacking, and the order coin, drawn before the pair's first reading, are those of T-1, with the scale $\mathfrak{r}_{\mathrm{cal}}$, the shield, the interferometer and the leak $\mathfrak{b}_{\mathrm{leak}}$ of T-1's design, the first pair read only with $\mathfrak{b}_{\mathrm{leak}}$ at or under $0.04\,\mathfrak{r}_{\mathrm{cal}}$ (U-21).

Observable. Per pair the contrast $\mathfrak{y}_{\mathrm{Au}}$ of the two hands is

$$\mathfrak{y}_{\mathrm{Au}} = \frac{1}{2}\left[\mathfrak{r}(+) - \mathfrak{r}(-)\right], \tag{10}$$

solved by the consensus calculation as zero within the leak.

FDT input. The twist's field, as in T-1, threads the gold film, whose polar Kerr rotation in a field along its normal is consensus data (external): an existence prediction, its sense unassigned.

Comparator, channels and statistic. The comparator is zero within the leak, by the reciprocity of T-1's comparator (external). The channels give $\mathfrak{y}_{\mathrm{Au}}$ the signs of T-1's table: the twist's field one sign in every pair; what one set or its place carries, a sign the hand coin sets; the drift, a sign the order coin sets; the leak inside $\pm\mathfrak{b}_{\mathrm{leak}}$. The statistic is the twelve contrasts, with a two-sided sign-flip permutation test, at $\mathfrak{b} = \mathfrak{b}_{\mathrm{leak}}$ and $\mathfrak{h} = \mathfrak{h}_{\mathrm{tw}} = 0.1\,\mathfrak{r}_{\mathrm{cal}}$ (U-23). Detection: the bounded test, at $p \le 0.0027$ (the sign of every term but the twist's field and the leak is a fair coin's or a symmetric reading error's). Attribution: a detection is read as the field P-5 assigns to the helical geometry. Exclusion: the exclusion test, at $p \le 0.0027$ each. Inconclusive otherwise.

Ablation test point. With the twist's field in place every contrast stands at $\mathfrak{h}_{\mathrm{tw}} = 0.1\,\mathfrak{r}_{\mathrm{cal}}$ and, ablated, at 0; with $\mathfrak{b}_{\mathrm{leak}}$ at its ceiling $0.04\,\mathfrak{r}_{\mathrm{cal}}$ the shifted values are $\mathfrak{h} - \mathfrak{b} = 0.06\,\mathfrak{r}_{\mathrm{cal}}$, the threshold is $\mathfrak{b} + 5(\mathfrak{h} - \mathfrak{b})/6 = 0.09\,\mathfrak{r}_{\mathrm{cal}}$, and the difference $0.1\,\mathfrak{r}_{\mathrm{cal}}$ stands above it.

5.4 T-3: the lower energy difference in boron-isotope pairs

Candidate DC-3 becomes this block; it carries the divergence of SA-98, whose locus is the record's "the extracted energy differences" "are distributed around 0.17 eV" (SC-352, SC-354, L302–L303), on the warrant of I-7, a constitutive input, the Discriminator quoted whole: "For purely density-coupled equilibrium observables, a heavier isotope → larger R_s → higher α → **larger** response — opposite in sign to conventional reduced-mass scaling."

Referent and design. Twelve pairs of flakes are taken, one of each pair exfoliated as the record exfoliates (SA-90) from a crystal of hBN enriched to at least 99 % in ^{11}B, the other from a crystal enriched to at least 99 % in ^{10}B (U-15, external growth; the record prints no isotopic composition, SA-25). Each pair has its own grid, twelve of the record's grids in all: the two dispersions are drop-cast on the two halves of each grid, the half each takes set by a fair coin drawn for that grid before its casting, which randomises pair by pair the sign of a gradient across the grid; the pair's two flakes are taken one from each half, and the twelve grids are given the record's plasma treatment (SA-91) in one run. The two flakes of a pair are read in turn in one set-up at the record's excitation wavelength of 475 nm (SC-266, L240), in an order set by a second fair coin drawn before the pair's first reading, which randomises the sign of a drift between the two readings.

Observable. With $\mathfrak{u}_{11}$ and $\mathfrak{u}_{10}$ the reduced masses of a nitrogen atom with an atom of ^{11}B and of ^{10}B (atomic masses: U-11, U-12, external) and $\mathfrak{v}_{\mathrm{rm}}$ the value of conventional reduced-mass scaling, the pair difference $\mathfrak{y}_{\mathrm{lo}}$ is

$$\mathfrak{y}_{\mathrm{lo}} = \ln \frac{\mathcal{E}_{\mathrm{lo}}(^{11}\mathrm{B})}{\mathcal{E}_{\mathrm{lo}}(^{10}\mathrm{B})} - \mathfrak{v}_{\mathrm{rm}}, \qquad \mathfrak{v}_{\mathrm{rm}} = -\frac{1}{2} \ln \frac{\mathfrak{u}_{11}}{\mathfrak{u}_{10}}, \tag{11}$$

and from the atomic masses of U-11 and the nitrogen atom of U-12, $\mathfrak{v}_{\mathrm{rm}} = -0.0271$ (derived), so that reduced-mass scaling alone solves Eq. (11) as $\mathfrak{y}_{\mathrm{lo}} = 0$.

FDT input. I-7 Discipline 2 reads: "A sign prediction competing with geometric, electronic or inertial channels is written as a sensitivity-weighted sum $\delta \ln O = \sum_i S_i\, \delta \ln x_i$ with every S_i defined (held-fixed variables stated). The density-channel **input** sign is the FDT discriminator; the **observable** sign is $\mathrm{sgn}(\prod S_i)$", and it is fixed only once the sensitivities are established. Here $O = \mathcal{E}_{\mathrm{lo}}$ and each $S_i = \partial \ln \mathcal{E}_{\mathrm{lo}} / \partial \ln x_i$ holds the other channels' variables fixed: the inertial channel's x is the reduced mass, its sensitivity at fixed force constants and geometry $-\frac{1}{2}$ in harmonic order, so that its term is $\mathfrak{v}_{\mathrm{rm}}$; the geometric and electronic channels' x are the bond length and the force constant at fixed reduced mass; and the density channel's x is an A-1 α_{ext} of the chart inventory, the exterior compactness of the boron nucleus as P-3's clamp (P-3's two-channel discipline), its sensitivity S_α taken at fixed reduced mass, geometry and force constant. The substitution moves that input through the nucleus's $\mathcal{M}$ at fixed P, one declared r_{f} (U-14) and packing, as I-3 chart discipline 5 reads: "Fixed-geometry perturbations (isotope substitution: P, r, packing all fixed) move compactness only; pressure-trajectory maps do not apply to them." For the finite change, $\Delta \ln \alpha_{\mathrm{ext}} = \Delta \ln \mathcal{M} = 0.0949$ from the nuclear masses of U-11 and U-10 (derived), and no amplitude is derived from it: S_α is not established, so T-3 is a sign prediction, its one-sided rules taking the observable sign as positive on the manuscript's reading. In the manuscript's reading the Discriminator's "larger response" is a larger energy difference, and $\mathcal{E}_{\mathrm{lo}}$, an energy of the undriven lattice, is an "equilibrium" observable and not "purely density-coupled": its

inertial channel is the reduced-mass term $\mathfrak{v}_{\mathrm{rm}}$, which the observable removes, and its geometric and electronic channels are the other terms of Discipline 2's sum.

Comparator. Each pair's consensus departure from reduced-mass scaling, the anharmonic and zero-point lattice changes, the minority isotope each crystal keeps and that pair's differences of strain, thickness and defect density, lies inside the interval from $-\mathfrak{c}_{\mathrm{iso}}$ to $+\mathfrak{c}_{\mathrm{iso}}$, $\mathfrak{c}_{\mathrm{iso}} = 0.01$ (U-26, investigator-chosen), fixed before the first reading; the pairing cancels the set-up, the grid and the plasma run the two flakes share.

Channels and signs.

channel	sign it gives $\mathfrak{y}_{\mathrm{lo}}$
the density channel	its input sign positive (the Discriminator); its sign here the manuscript's reading
the inertial channel	none: $\mathfrak{v}_{\mathrm{rm}}$ removes it
the consensus departures	either sign, each pair's sum inside the interval
the grid gradient and the reading drift	signs the two coins set

Statistic and decision rule. The statistic is the twelve pair differences, with one-sided sign-flip permutation tests. Detection: the one-sided test of the pair differences less $\mathfrak{c}_{\mathrm{iso}}$ rejects upward at $p \le 0.00135$ (size at most 5/4096 wherever every pair's consensus departure lies in the interval). Exclusion: a density-channel contribution of $\mathfrak{h}_{\mathrm{iso}} = 0.03$ or more in the logarithm (U-27, investigator-chosen) is excluded when the one-sided test of the pair differences less $(\mathfrak{h}_{\mathrm{iso}} - \mathfrak{c}_{\mathrm{iso}})$ rejects downward at $p \le 0.00135$ (false exclusion at most 5/4096 on the same condition). Inconclusive otherwise. Attribution: a detection is read as the density channel when it stands with $\mathfrak{c}_{\mathrm{iso}}$ kept for the anharmonic and zero-point channels and added to the bound recomputed from the pairs' measured isotopic purities, strains, thicknesses and defect emission (external).

Ablation test point. With the comparator's value at the interval's upper end and the density channel in place every pair difference stands at $\mathfrak{c}_{\mathrm{iso}} + \mathfrak{h}_{\mathrm{iso}} = 0.04$ against $\mathfrak{c}_{\mathrm{iso}} = 0.01$ ablated, the residuals at $\mathfrak{h}_{\mathrm{iso}} = 0.03$ against 0; the threshold is $5\mathfrak{h}_{\mathrm{iso}}/6 = 0.025$, and the difference 0.03 stands above it.

5.5 T-4: the upper energy difference in boron-isotope pairs

Candidate DC-4 becomes this block; it carries the divergence of SA-99, whose locus is the record's "two clearly resolved down-converted" "emission bands at approximately 0.17 and 0.20 eV" (SC-344, SC-345, L297–L298), on the warrant of I-7, a constitutive input, the Discriminator and Discipline 2 as T-3 quotes them.

Referent, design and comparator. The referent, design, comparator and interval are T-3's, on the same twelve pairs of flakes enriched to at least 99 % in ^{11}B and in ^{10}B (U-15), on twelve grids with the casting coin and the order coin of T-3, read at the record's 475 nm (SC-266, L240), each pair's consensus departure inside $\pm\mathfrak{c}_{\mathrm{iso}}$ with $\mathfrak{c}_{\mathrm{iso}} = 0.01$ (U-26).

Observable. The pair difference $\mathfrak{y}_{\mathrm{hi}}$ of the upper band is

$$\mathfrak{y}_{\mathrm{hi}} = \ln \frac{\mathcal{E}_{\mathrm{hi}}(^{11}\mathrm{B})}{\mathcal{E}_{\mathrm{hi}}(^{10}\mathrm{B})} - \mathfrak{v}_{\mathrm{rm}}, \tag{12}$$

solved by reduced-mass scaling alone as zero.

FDT input, channels and statistic. The FDT input is T-3's, with $\mathcal{E}_{\mathrm{hi}}$ in place of $\mathcal{E}_{\mathrm{lo}}$: the density channel's x the exterior compactness of the boron nucleus at fixed P, r_{f} (U-14) and packing, its input sign positive and its sign here the manuscript's reading; the inertial channel removed by $\mathfrak{v}_{\mathrm{rm}}$; the consensus departures of either sign inside the interval; the grid gradient and the drift of the signs the two coins set. The statistic is the twelve pair differences, with one-sided sign-flip permutation tests. Detection: the one-sided test of the pair differences less $\mathfrak{c}_{\mathrm{iso}}$ rejects upward at $p \le 0.00135$ (size at most 5/4096 wherever every pair's consensus departure lies in the interval). Exclusion: a density-channel contribution of $\mathfrak{h}_{\mathrm{iso}} = 0.03$ or more in the logarithm (U-27) is excluded when the one-sided test of the pair differences less $(\mathfrak{h}_{\mathrm{iso}} - \mathfrak{c}_{\mathrm{iso}})$ rejects downward at $p \le 0.00135$ (false exclusion at most 5/4096 on the same condition). Inconclusive otherwise. Attribution: a detection is read as the density channel when it stands with $\mathfrak{c}_{\mathrm{iso}}$ kept for the anharmonic and zero-point channels and added to the bound recomputed from the pairs' measured isotopic purities, strains, thicknesses and defect emission (external).

Ablation test point. With the comparator's value at the interval's upper end and the density channel in place every pair difference stands at $\mathfrak{c}_{\mathrm{iso}} + \mathfrak{h}_{\mathrm{iso}} = 0.04$ against $\mathfrak{c}_{\mathrm{iso}} = 0.01$ ablated, the residuals at $\mathfrak{h}_{\mathrm{iso}} = 0.03$ against 0; the threshold is $5\mathfrak{h}_{\mathrm{iso}}/6 = 0.025$, and the difference 0.03 stands above it.

5.6 T-5: the up- and down-conversion rates on one spot

Candidate DC-5 becomes this block; it carries the divergence of SA-100, whose locus is the record's "is released through inelastic photon scattering, giving rise to" "excitation-dependent emission analogous to Stokes or Raman" (SC-156, SC-158, L159–L160), on the warrant of 0.1a, a changed observable dictionary, in its sentence "Events do not commute, and a process run backward is never the mirror of the forward event." (Sec. 3.3).

Referent and design. Twelve flakes are given the record's plasma treatment (SA-91), on glass, on a stage whose temperature T a calibrated sensor reads (external). On one spot of each flake, through one objective, two readings are made, with $\mathcal{E}_{\mathrm{sp}}$ that spot's own lower energy difference, evaluated as $\mathcal{E}_{\mathrm{lo}}$ is, the mean of five evaluations of it made before the coin is drawn (U-28): the down reading, excitation at the photon energy $E_{\mathrm{exc}} = 2.61$ eV of the record's 475 nm (SC-266, L240; U-04), the down-converted line read at $E_{\mathrm{em}} = E_{\mathrm{exc}} - \mathcal{E}_{\mathrm{sp}}$; and the up reading, excitation at E_{em}, the up-converted line read at E_{exc}. A fair coin drawn before the first of them sets their order, which randomises the sign of a drift between the two readings. The counts $\mathcal{N}_{\mathrm{dn}}$ and $\mathcal{N}_{\mathrm{up}}$ are the two lines' detected photons per incident photon, each divided by the set-up's measured detection efficiency at the line's photon energy (external). Both lines are read at the highest incident power from which, and from every lower power but the lowest, a halving changes $\ln \mathcal{N}_{\mathrm{dn}}$ and $\ln \mathcal{N}_{\mathrm{up}}$ by less than 0.05 each (U-31), the halvings run on that spot before the coin is drawn, from above the record's "approximately 25–30 µW" (SC-282, L249; SA-65) down to the lowest power at which each logarithm's standard error is under 0.005 (U-31). A flake with no such power below one from which a halving lowers either by 0.05 or more is replaced (U-31); the record's own statement on its low-power limit is SA-71 (SC-334, SC-336, SC-338, SC-340, L291–L294).

Observable. With k_{B} Boltzmann's constant (U-06), the defining condition of $\mathfrak{y}_{\mathrm{mir}}$ is

$$\mathfrak{y}_{\mathrm{mir}} = \ln \frac{\mathcal{N}_{\mathrm{up}}}{\mathcal{N}_{\mathrm{dn}}} - 2 \ln \frac{E_{\mathrm{exc}}}{E_{\mathrm{em}}} + \frac{\mathcal{E}_{\mathrm{sp}}}{k_{\mathrm{B}} T}. \tag{13}$$

In the consensus account (detailed balance, external) the two rates share one squared matrix element and one pair of photon energies, exchanged; the down rate carries the factor $\mathfrak{o} + 1$ and the up rate the

factor $\mathfrak{o}$, with $\mathfrak{o}$ the occupation of the lattice mode, a number of that account and no curvature ratio, and the photon counts give the quotient the factor $(E_{\mathrm{exc}}/E_{\mathrm{em}})^2$; with $\mathfrak{o}$ thermal at T,

$$\frac{\mathfrak{o}}{\mathfrak{o}+1} = \exp\!\left[-\frac{\mathcal{E}_{\mathrm{sp}}}{k_{\mathrm{B}}T}\right], \qquad \frac{\mathcal{N}_{\mathrm{up}}}{\mathcal{N}_{\mathrm{dn}}} = \left(\frac{E_{\mathrm{exc}}}{E_{\mathrm{em}}}\right)^2 \frac{\mathfrak{o}}{\mathfrak{o}+1}, \tag{14}$$

which solves Eq. (13) as $\mathfrak{y}_{\mathrm{mir}} = 0$.

FDT input. In the manuscript's reading of 0.1a, the down-conversion and the up-conversion at the same two photon energies are two settlements, each from its own starting state, so the quotient of their rates is not bound to the factor one matrix element gives both: an existence prediction, its sense unassigned.

Comparator and bounded term. The comparator places $\mathfrak{y}_{\mathrm{mir}}$ inside the interval from $-\mathfrak{c}_{\mathrm{mir}}$ to $+\mathfrak{c}_{\mathrm{mir}}$, $\mathfrak{c}_{\mathrm{mir}} = 0.2$ (U-29, investigator-chosen), fixed before the first reading. A spot warmer than the sensor and an occupation the drive adds each raise $\mathfrak{y}_{\mathrm{mir}}$; the errors of the efficiency calibration, of T and of $\mathcal{E}_{\mathrm{sp}}$, and half the difference between the two orders of the change the first reading's light makes in the second reading's $\ln\mathcal{N}$, take either sign; the sum of the six is the comparator's bounded term, inside the interval.

Channels and signs.

channel	sign it gives $\mathfrak{y}_{\mathrm{mir}}$
the difference of the two settlements	one sign in every flake, its sense unassigned: the test is two-sided
the warmer spot; the added occupation	positive
the three errors; the half difference of the orders	either sign; the sum of the six inside the interval
the drift; the mean over the two orders of the first reading's change	a sign the order coin sets

Statistic and decision rule. The statistic is the twelve values, with a two-sided sign-flip permutation test, at $\mathfrak{b} = \mathfrak{c}_{\mathrm{mir}}$ and $\mathfrak{h} = \mathfrak{h}_{\mathrm{mir}} = 0.6$ (U-30, investigator-chosen). Detection: the bounded test, at $p \le 0.0027$. Exclusion: the exclusion test, at $p \le 0.0027$ each. Inconclusive otherwise. Attribution: a detection is read as the difference of the two settlements when it stands with the interval recomputed from the flakes' measured power dependence, half difference and calibration, temperature and energy-difference errors (external).

Ablation test point. With the bound at $\mathfrak{c}_{\mathrm{mir}} = 0.2$ and the difference of the two settlements in place every value stands at $\mathfrak{h}_{\mathrm{mir}} = 0.6$ and, ablated, at 0; the shifted values are $\mathfrak{h} - \mathfrak{b} = 0.4$, the threshold is $\mathfrak{b} + 5(\mathfrak{h} - \mathfrak{b})/6 = 8/15 = 0.533$, and the difference 0.6 stands above it.

6 Cross-domain reading

The clauses that carry the five blocks read the same way on other platforms, adding no block and no count: P-5's twist wherever layered crystals are stacked with one turn in one sense, read between two hands (Use item 7); I-7's Discriminator wherever a lattice line is compared across an isotope substitution at fixed pressure and packing with the reduced-mass term removed; and 0.1a's dictionary wherever a down-conversion and the up-conversion at the same two photon energies are read on one spot, detailed balance staying the consensus account's premise, attributed as such.

7 System-level reading (exploratory)

Scope: this section re-describes in-sample the record's energy differences through the reading of Sec. 3.2; it is uncounted, its observable is no prediction, and every number in it is the record's or a U-row's.

X-1. Observable: the angular frequency of the lattice's stroke at each of the record's energy differences. Defining condition: $\omega = \Delta E/\hbar$, the bridge $E_q = \hbar\omega_q$ of Eq. (7), at the record's approximately 0.17 and 0.20 eV (SC-345, L298; SA-75) and its ∼0.37 eV (SC-458, L382; SA-89), the last the energy the event leaves in the lattice's strokes together, the record's "sum of" "two phonon energies" (SC-422, SC-424, L352–L353), with $\hbar$ of U-05. Values: $\omega = 2.6 \times 10^{14}$, 3.0×10^{14} and 5.6×10^{14} rad s^{-1}, at the record's two figures. Comparator: the consensus dictionary returns the same numbers from the same inputs; X-1 is a re-description and carries no divergence.

Guards. X-1 is not counted with the predictions and is no test of an invariant. No length, run or speed is written for the lattice's stroke, no kept time and no clock factor, under I-2's forbidden phrasing "The turning of an open stroke's grades read as a clock the stroke keeps", and no strand count and no curvature ratio is assigned to a mode.

8 Convergence statement

On the record's own inputs and dictionary FDT returns the record's values, and each step below is the identity map of Use item 2, which corroborates no invariant; each recomputed value stands beside the record's at the record's figures, with hc of U-04. The record prints no emission wavelength or photon energy of its down-converted line, so no energy difference is recomputed.

record locus	record value	recomputation
SC-064, L99; SA-12	near 1366–1370 cm^{-1} (0.17 eV)	1366 to 1370 cm^{-1} times 1.239842×10^{-4} eV cm gives 0.1694 to 0.1699 eV, that is 0.17 eV
SC-070, L102; SA-13	near 50 cm^{-1} (6.2 meV)	50 cm^{-1} times 0.1239842 meV cm gives 6.2 meV
SC-137, L149; SA-37	537 nm (2.31 eV)	1239.842 eV nm over 537 nm gives 2.31 eV
SC-422, SC-424, L352–L353; SC-345, L298; SA-80	the "sum of" "two phonon energies"; bands at approximately 0.17 and 0.20 eV	$0.17 + 0.20 = 0.37$ eV, beside the record's ∼0.37 eV (SC-458, L382), the record not naming the two energies it sums

The curvature the record's flakes carry is general relativity's for the same stress tensor and data (I-3 containment), and general relativity reduces to $G\mathcal{M}_1\mathcal{M}_2/d^2$ at leading order of the weak-field slow-motion expansion (I-4's second layer); nothing is continued and nothing is corrected. FDT agrees with the record's measurements in full and declines two of its readings.

The record reads its down-converted line as "indicating a phonon-mediated inelastic scat-" "tering of resonant laser excitation" (SC-115, SC-117, L128–L129; SA-21). FDT reads the line as strokes of one carrier, the laser's, the emitted light's and the lattice's, settled in one event, with no carrier in between, "Mediation" being a coordinate artifact (I-2); the line is accepted in full and its energy difference is the lattice stroke's (Sec. 3.2).

The record reads its component on gold through diagrams in which "the enhanced local fields facilitate repeated inelastic" "interactions, in which the emitted photons can be re-coupled to" "intermediate virtual states and subsequently relax via additional" "phonon excitations" (SC-441, SC-442, SC-443, SC-444, L364–L367; SA-82). FDT reads the component as one system-wide settlement of the

flake, its gold and the light from the state they are in, never a chain of one-to-one reactions photon by photon (0.1a); the component is accepted in full and its sum is recovered above.

Divergence enters only where a core clause supplies what the consensus calculation lacks: an additional source in T-1 and T-2 (P-5), a constitutive input in T-3 and T-4 (I-7), and a changed observable dictionary in T-5 (0.1a); no divergence rests on a curvature ratio, a chart or a branch tag alone. By its own statement the record leaves open the mechanism: "There remains to explore the mechanisms of" "defect-phonon inelastic scattering" (SC-434, SC-436, L359–L360; SA-88).

9 Status ledger

item	status	content
O-1	to be derived	the finite-core cutoff r_{c}, the regular core chart, or the outward phase-transfer law
O-2	to be derived	a geometrically constructed odds for the overlap-contrast application (A-3)
O-3	to be derived	a canonical odds for the confinement application (A-4)
O-5	to be derived	multipole and tidal remainders of the closed-form pair expression, and the reading they give of the band outside a rotating source's horizon; the overlap complex; how P-4's many-cone settlement signs a pair it does not join
O-6	to be derived	the maps from a charge, a circulating charge or a colour seat to an I-1 input; derivation of the seat table from cone geometry; the gluon octet's dynamics
O-9	to be derived	the confinement operator D, its domains, boundary data and spectrum; every mass ratio, including the two held-out targets
O-11	to be derived	ν_F on the exact framed closures; the odd-parity absorption proof; proof that the spinorial class is nontrivial
O-16	to be derived	the kinematic reading of the share on the interior chart: the flow reading of 0.1c stops at the fold, and the velocity sphere is the support only for a pattern held on the exterior branch
I-4	to be derived: the third layer	the FDT source programme, and each claimed divergence
targets	held-out, carried as tests	held-out: $m_p/m_e = 1836.15267343$ and $(m_\mu/m_e)^2 = 4.2753 \times 10^4$
T-1	prospective existence test	convergence value: zero within $\mathfrak{b}_{\mathrm{leak}}$
T-2	prospective existence test	convergence value: zero within $\mathfrak{b}_{\mathrm{leak}}$
T-3	prospective sign test	convergence value: inside $\pm\mathfrak{c}_{\mathrm{iso}}$
T-4	prospective sign test	convergence value: inside $\pm\mathfrak{c}_{\mathrm{iso}}$
T-5	prospective existence test	convergence value: inside $\pm\mathfrak{c}_{\mathrm{mir}}$
reading	in-sample, uncounted	the angular frequencies of the exploratory section
tokens	range only	α_{ovl} (A-3), α_{conf} (A-4), α_{mode} (A-5): token and range only, no value

10 Conclusions

On the record's own inputs and dictionary FDT returns its three conversions between wavenumber, wavelength and energy and the sum of its two band energies, and the curvature of its flakes is general relativity's. In the manuscript's reading its three kinds of light and vibration are strokes of one carrier, its energy difference is the lattice stroke's energy, its nuclei are the clamps of the lattice's nodal patterns and its defect's line is $\hbar$ times a difference of confinement eigenvalues; the record's own words keep their verbs beside these readings. The five predictions read what the consensus calculation sets to zero or to a fixed factor, in helical stacks on glass (T-1) and on gold (T-2), in boron-isotope pairs (T-3, T-4) and on one spot read both ways (T-5), each with its decision rule fixed before its first reading and its ablation test point above its threshold.

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