Perturbation Theory of the Tension Medium — Part V: The Trial's First Verdicts

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Abstract. Part IV framed the final trial: one mediator charge, three measured duties. This note lets the first verdicts fall. With the coupling normalized the only way the framework permits — gravitational strength, as the galaxy screw independently demands — the lattice does not merely freeze: it freezes with seventy-four orders of magnitude to spare, a crystal of rock, thermally perfect. Its wave speed follows with no further freedom: $c_T = \sqrt{(a_0 \cdot d)} \approx$ *1,200 km/s — and that number lands three times at once: on the observed velocities of cosmic matter, on the internal wave-speed class of condensed matter (the Radii note's family), and — the knife-edge — on FIRAS's ceiling for motion at the photosphere. The crystal as normalized predicts a spectral y-distortion in the (1–2)×10^{-5} band: at face value* at or just above* the current experimental bound. Either the next-generation spectrometer finds it barely beneath the ceiling, or the crystal is dead as normalized — a date with an instrument, named in advance. Meanwhile the crystal's third and last static voice (zone-boundary structure) is computed and excluded: only the dynamics can carry the drum, and exactly one theorem now separates the theory from judgment. Every symbol introduced before use.

1. Verdict One: the Crystal Is Rock

The freezing question (Part IV) needed one normalization: how strongly do fall lines couple to the screw mode? The framework permits only one answer. The mediator is a sector of the frame field — the geometry's own fiber — and geometry couples at gravitational strength; independently, Judge 1 (the galaxy rotation phenomenology at the $a_0 = cH$ scale) *demands* that strength, since a weaker screw moves no stars. Insert it, and the neighbor-interaction energy per lattice cell towers over the thermal energy at the wall by a factor of 10^{75} against a freezing threshold of order 10^2. **Frozen, with seventy-four orders of margin.** No crudity in the estimate can threaten a margin like that. And the margin itself is physics: a crystal this cold relative to its stiffness has no thermal wander, no defect soup — its scales are *sharp*. The lattice is not a loose suggestion of order; it is rock.

2. Verdict Two: the Crystal's Own Speed — and the Knife-Edge

A crystal's stiffness and inertia fix its wave speed, with no remaining freedom: $c_T = \sqrt{(a_0 \cdot d^*)} \approx$ **1,200 kilometres per second**. Watch where this lands — three times.

On the matter. The observed velocities of cosmic matter — cluster dispersions, bulk flows — are 300–1,200 km/s. Matter riding a jiggling lattice moves at the lattice's wave speed. The universe's peculiar-velocity scale, unexplained in this series until tonight, is the phonon speed of the fall-line crystal. Quarantined, on the nose.

On the family. The Radii note found condensed matter running the family law at its own internal light speed, the Fermi velocity class, ~10^6 m/s. The cosmic crystal's internal speed is the same class. The ladder's largest crystal and its laboratory crystals hum in the same register.

On the ceiling — the knife-edge. FIRAS bounds motion at the photosphere: bulk velocities above roughly 600 km/s would distort the microwave spectrum beyond the measured $|y| < 1.5\times10^{-5}$. The wall, sitting on the crystal, must jiggle at c_T — and the implied distortion computes to $y \sim 1.7\times10^{-5}$: **at face value, at or marginally above today's ceiling.** At this estimate's honesty (factors of two live in the opacity and the projection of the phonon motion), the prediction straddles the bound. The sharp statement, stated in advance as this series requires: *the crystal as normalized predicts a y-distortion in the (1–2)×10^{-5} band.* A PIXIE-class spectral mission must find it just beneath the current limit — or the precision computation of the straddle (proper opacity, proper projection: the companion calculation now owed) already executes the crystal. No prediction in this corpus has ever stood closer to its executioner, and none has been more honestly placed there.

3. Verdict Three: the Last Static Voice, Silenced

Part IV excluded the crystal's photograph (powder ratios 1 : 1.73 : 2 against the measured 1 : 2.44 : 3.68). One static voice remained: the lattice's zone-boundary structure — the special wavelengths where a crystal's vibrations pile up (Van Hove's peaks). Computed for the triangular lattice: ratios 1 : 1.155. Excluded. Every static voice of the crystal is now eliminated, cleanly and by number. If the crystal carries the drum, it carries it as *music* — dynamics projected through the wall's duct — and the campaign's earlier finding stands ready to receive it: the measured ladder's quarter offset is the signature of the duct's own boundary pair.

4. The Scoreboard, and the One Theorem

Judge 1 (the galaxies): built into the normalization — the screw drives rotation curves at gravitational strength, as its own paper always claimed. Judge 3 (existence): passed, with 74 orders to spare. Judge 4 — a judge the trial did not know it had — the y-distortion: verdict pending at the knife's edge, executioner named. Judge 2 (the spacing, 295 with the quarter offset): still hearing evidence, and what it waits for is now exactly one theorem: **how the crystal's radial music writes angular scale through the duct.** Everything else — the medium, the charge, the freeze, the speed, the offset, the tension, the scale of its forging — is on the table, stated, numbered, and falsifiable. Part VI is that theorem, and it is the last one.

References

One-component-plasma freezing ($\Gamma \approx 130$); L. Van Hove (1953); D. Fixsen et al. (FIRAS, 1996) — $|y| < 1.5\times10^{-5}$; PIXIE: A. Kogut et al. (2011); and the documents of this series (Parts I–IV; the campaign chronicle; the dark-matter paper; the Radii of the Worlds; script: part5calc.py). *(Citations from memory; the literature-verification pass applies.)*