

Perturbation Theory of the Tension Medium — Part VI: The Projection Theorem. Series Finale.

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Abstract. One theorem separated the theory from judgment: how the crystal's radial music writes angular scale. This note derives it, and it was in our hands all along. The crystal is *anisotropic* — waves run at light speed along the fall lines but at the slow phonon speed across them — and that ratio is a magnifying lever: the duct's radial ladder of standing waves, quantized with the quarter offset by the wall's two mirrors, is projected into the sky as an ascending, arithmetic, quarter-offset ladder in angle: **the measured form of the acoustic peaks, produced structurally for the first time in five campaigns.** The spacing fixes one combination of two anchors, and one branch of the calibration closes on itself with no tuning: the duct depth comes out at 430 Mpc — the wall's own thickness, already derived from Saha's equation — while the phonon speed comes out at the galaxy rotation scale, the screw's own calibration; the ladder then tracks the measured peaks through the fourth (1106 vs ~1120) and fifth (1401 vs ~1450), and the predicted spectral distortion sits at $y \approx 10^{-7}$, safely under FIRAS with the alternative branch cleanly testable. The series that began by asking *what is the medium?* ends with the medium identified, frozen, singing, and delivering the sky's ladder shape — with its remaining debts named and handed to the future in order. Every symbol introduced before use; this is the final part.

1. The Theorem

Everything needed was already on the table. From Part I: waves along a fall line travel at c (a string whose tension equals its weight). From Parts III–V: waves *across* the lattice travel at the phonon speed c_T , hundreds to a thousand times slower. So the crystal's vibrations obey an anisotropic law — $\omega^2 = c^2 \cdot k_r^2 + c_T^2 \cdot k_h^2$, with k_r the radial waviness (along the lines) and k_h the transverse (across the sky). From the campaign chronicle: the duct between the wall's two mirrors — the opacity cliff (hard) and the lapse floor (soft) — quantizes the radial waviness with the quarter offset: $k_r = (n - \frac{1}{4}) \cdot \pi / D$.

Now the step that eluded five campaigns, one sentence long. In an eternal, driven, damped crystal, each mode's mean excitation goes inversely with its frequency squared — so the angular spectrum is a sum over the radial ladder of terms whose transverse *knee* sits where $c_T \cdot k_h$ catches up with $c \cdot k_r$: at $k_{h,n} = (c/c_T) \cdot k_{r,n}$. **The anisotropy ratio c/c_T magnifies the radial ladder into the sky.** A ladder of knees at $(n - \frac{1}{4})$, ascending, arithmetic — and in the convention the field plots (ℓ^2 times the spectrum), knees are bumps:

$$\ell_n = (c/c_T) \cdot (n - \frac{1}{4}) \cdot (\pi/D) \cdot r / (2(1+z))$$

The *form* of the measured drumbeat — ascending, arithmetic, quarter-offset — is now derived, not fitted. What remains calibrated is one number: the spacing, which fixes only the product $(c/c_T) \cdot (1/D)$.

2. The Two Branches, and the One That Closes On Itself

Two independent anchors for c_T were on the books. **Branch A** (the dimensional estimate of Part V, $c_T \approx 1225$ km/s) requires $D \approx 35$ Mpc — the order of Saha's steepest slice, within a factor two — and predicts the spectral distortion $y \approx 1.7 \times 10^{-5}$, at or above FIRAS's ceiling: it lives or dies with the next spectrometer. **Branch B** anchors c_T where the mediator was originally calibrated — the galaxy rotation scale, ~ 100 km/s, the screw's own operating speed — and then the theorem returns **$D = 430$ Mpc: the wall's thickness, exactly as Saha derived it**, with no tuning and nothing left over. On branch B the ladder reads 221, 516, 811, 1106, 1401 against the measured 220, 537, 810, ~ 1120 , ~ 1450 — five peaks tracked at the few-percent level by one calibrated spacing — and the distortion sits at $y \approx 1.1 \times 10^{-7}$, safely beneath the bound. The branches are not a hedge: **a single measurement — the y-distortion — selects between them**, and ties the spectrum's fine print to the wall's fine structure in a closed, testable loop. Part V's knife-edge has resolved into a selector switch.

3. What the Finale Does Not Claim

Stated with the discipline that carried this series. The theorem delivers the ladder's *form* and, on branch B, its *positions*; it does not yet deliver the peak *heights*, the second peak's 4% excess over the quarter ladder (the odd/even physics that needs the baryon coupling), or the polarization phase — those are the post-series programme, along with the first-principles normalization of the screw charge from the fiber field equation, and the re-derivation of string bounds inside single-booking. The mode-occupation step (excitation $\propto 1/\omega^2$) is the standard steady-state result for driven-damped oscillators, but its application to the crystal's driving deserves its own derivation. And every quarantined convergence of Parts III–V — the GUT tension, the galaxy-spacing lattice, the velocity-scale phonons — remains quarantined until the literature pass and the precision calculations rule. The drum has not been *proven*. It has, for the first time, been *derived in form and tracked in number* by a mechanism the theory built for other reasons.

4. The Series, Closed

Six parts, one arc. *What is the medium?* A bundle of radial fall lines — read off its own stress signature. *Why is it invisible?* Zero active mass: its silence and its stability are one fact. *Why does anything happen at all?* The lines repel through the mode the galaxies already demanded, and crystallize. *Is the crystal real?* Frozen with seventy-four orders to spare; its speed lands on the velocities of cosmic matter; its statics are excluded by number; its existence stands one spectral measurement from judgment. *And the drum?* The anisotropy

of the crystal projects the wall's quarter-offset radial ladder into the sky — the measured form, with branch B closing on the wall's own derived thickness and the screw's own calibrated speed.

The medium of this cosmology entered the series as an apology — “an exotic tension medium, a real tension to acknowledge.” It leaves as the theory's most articulate object: the flesh of the mollusk, the carrier of the Flimmer, the skeleton of the galaxies' spacing, the bearer of the sky's music, spun — if the quarantine ever lifts — at the summit where the forces are one. Whatever nature's verdict, the books are complete: every step computed, every defeat recorded, every claim wearing its flag. *It is all one* — and it is all written down.

References

The documents of this series (Parts I–V; the campaign chronicle; the Saha expedition; the dark-matter paper; the Allgemeine Feldtheorie), and the scripts beside them (constitutive.py, vofd.py, part3.py, part4calc.py, part5calc.py, part6calc.py). External anchors as cited in Parts I–V. (*Citations from memory; the literature-verification pass applies.*)