

Addendum 296: Index Matching

The selection rule in final form; a structured flag
for the integer ten

TOE Corpus

2026-06-11

Skill: gap-closure v1.1 — **Outcome:** Case B (exact reformulation + third exclusion + structured flag; both OIs open, compressed) — **Addresses:** OI-287-1, OI-282-1 — **Verifier:** verify_P296.py — all PASS

Abstract

(i) *The selection rule, reformulated exactly.* The lepton law's coefficients $(c_e, c_\mu, c_\tau) = (2, 3, 16)$ are the coefficients of x^1, x^2, x^3 in $\rho(x)/\pi^{\deg}$: family n draws precisely the degree- n monomial of the density. The level-to-layer assignment of A287 is therefore *index matching*, level number equal to monomial degree, and since the monomial coefficients are the Taylor data of ρ at $x = 0$, the rule reads: **the charged-lepton families are the Taylor coefficients of the density at the unobservable center**, the point where observation vanishes (A281). OI-287-1's final form: derive why level n reads degree n . (ii) *Third mechanism exclusion.* The bare Taylor-probe coupling (perturbation $\kappa c_n \pi^n x^n$ acting diagonally on level n) fails: it underestimates the required log-eigenvalue shifts by factors 32 and 42 at $n = 2, 3$, and the two factors differ by 28%, so no overall rescaling repairs it. With A292 (universal first-order) and A295 (dressing, wrong κ -order), three mechanism classes are now closed; what survives must couple level n to degree n at first order in κ with the specific strength $\kappa \Omega/\lambda_1$. (iii) *The ten, structurally flagged.* The hierarchy constant decomposes as

$$\frac{3\pi}{20} = \pi \cdot \frac{d_{\text{edge}}}{d_{\text{bnd}} d_{\text{blk}}}, \quad (d_{\text{edge}}, d_{\text{bnd}}, d_{\text{blk}}) = (3, 4, 5),$$

where $d_\ell = k_\ell + 2$ are exactly the denominators the three layers contribute to the first moment $\mu_1 = \sum_\ell c_\ell \pi^{k_\ell} / (k_\ell + 2)$. Equivalently $10 = d_{\text{bnd}} d_{\text{blk}} / 2$. The constant of the twenty-two-decade formula is assembled from the same layer data as everything else in the framework, with the edge's denominator in the numerator and the interior denominators below; the structure is exact arithmetic and is recorded as a flag per the promotion convention, since no derivation produces it. (The Pythagorean triple $(3, 4, 5)$ formed by the three denominators is noted without weight.) OI-282-1's final form: derive the moment-denominator combination, or the integer ten, from the flow; either suffices.

1 Index Matching

Theorem 1.1 (The selection rule is degree matching). *Write $\rho(x) = \sum_{k=1}^3 c_k \pi^k x^k$ with $(c_1, c_2, c_3) = (2, 3, 16)$. The lepton law's coefficients satisfy $c_n = c_{k=n}$: the anchor (electron, $n = 1$) sits at degree one, the muon ($n = 2$) draws the degree-two coefficient, the tau ($n = 3$) the degree-three coefficient. Exact by inspection; the content is the reformulation, which replaces the two-part assignment (level $\rightarrow$ layer, layer $\rightarrow$ coefficient) by a single rule (level $n \rightarrow$ degree n) and relocates the data to the Taylor expansion at the origin: $c_k = \rho^{(k)}(0)/(\pi^k k!)$. The origin is the center, where observation*

terminates; the families are, in this reading, the structure of the world at the point no measurement reaches, made visible as masses.

Proposition 1.2 (Third exclusion). *The minimal mechanism suggested by the reformulation, a diagonal coupling of level n to its own monomial at strength $\kappa c_n \pi^n$, gives $\delta \ln \lambda_n = -\kappa c_n \pi^n \langle x^n \rangle_n / \lambda_n = -0.00039$ ($n=2$), -0.0026 ($n=3$), against required -0.0126 and -0.1084 : short by factors 32 and 42, which moreover disagree with each other by 28%. Excluded both on scale and on shape. Three mechanism classes are now closed (A292, A295, this); the surviving requirement is stated in the abstract.*

2 The Ten

Proposition 2.1 (Moment-denominator decomposition). *$3\pi/20 = \pi \cdot 3/(4 \cdot 5)$ exactly, with $(3, 4, 5)$ the first-moment denominators of the edge, boundary, and bulk terms respectively. Hence the hierarchy formula reads $\ln(M_{P1}/m_e) = \pi \frac{d_e}{d_b d_B} \mu_1 (1 + \mu_1 \alpha^2)$: every constant in it is layer data. Recorded as a structured flag; a derivation must still produce the combination. The previous candidates (metric components, 2×5 , $\binom{5}{2}$) remain listed in A285; this decomposition supersedes them as the sharpest, being built from objects the formula already contains.*

Status. OI-287-1 and OI-282-1 remain open. Both are now in single-sentence form: *why does level n read degree n* , and *why does the flow weigh μ_1 by $\pi d_e/(d_b d_B)$* . The package publishes with these as its stated open hearts; nothing in this addendum changes a published number.

Verifier. `verify_P296.py`: the coefficient identification; the Taylor reading; the probe-mechanism exclusion numerics (re-run); the decomposition arithmetic and its uniqueness among small denominator combinations; the $(3, 4, 5)$ note. All PASS.