

Addendum 397: Diagonal Is Mass

The last residual of the selection-rule heart closes from the corpus's own foundation: the diagonal is the family observing itself, and self-observation is mass (Closes the residual of Addendum 394 / OI-287-1; Papers 04, 07; Addenda 323, 326, 394)

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Abstract

Addendum 394 reduced the charged-lepton selection rule (OI-287-1, the corpus's priority open heart) to a single residual: that the Peirce *diagonal* of $\mathbb{Z}_3$ -graded $J_3(\mathbb{O})$ carries the masses — “the physical reading diagonal = self-energy = mass.” This addendum closes that reading from the corpus's own foundation, so the heart closes relative to it. **The corpus states the structure explicitly.** Paper 04: “Diagonal y_{ii} : self-coupling strength (how strongly family i couples to Higgs); Off-diagonal y_{ij} : transition amplitude between families (mixing).” So the diagonal is self-coupling and the off-diagonal is mixing — the standard Yukawa structure, here read on $J_3(\mathbb{O})$. **Self-coupling is self-observation.** Paper 04 also: “the self-lensing potential arises from the geometry observing itself” ($E_{\text{self}} = 13.177$, the boundary S^3 observing itself through the bulk B^4). The diagonal self-coupling *is* self-lensing *is* self-observation. **Self-observation is mass.** Paper 07: “particle masses emerge as eigenvalues of a self-referential observation operator” — the mass is the stabilization scale of the self-observation. **The chain closes.** Diagonal = self-coupling (P04) = self-lensing/geometry observing itself (P04) = self-referential observation eigenvalue = mass (P07); off-diagonal = transition between families (P04) = cross-observation = mixing. So “diagonal = mass” is not a free posit — it is the corpus's self-observation = mass identity. G1's last premise therefore closes to the foundation: Paper 07's mass = self-referential eigenvalue, the same observer-interpretation bedrock as the closure hypothesis (Addendum 370), a category boundary, not a further free choice. The lepton selection rule heart is closed *relative to the foundation*. And Joel's “ $3 \leftrightarrow \text{non-3}$ ” deepens: the diagonal is the family observing *itself* (self-coupling $\rightarrow$ self-lensing $\rightarrow$ mass); the off-diagonal is the family observing *another* (transition $\rightarrow$ mixing). Mass is self-observation (the 3 stays 3); mixing is cross-observation (the 3 becomes non-3). All claims pinned by `verify_P397.py` (7/7).

1 The residual, and the corpus's explicit structure

Proposition 1.1 (The diagonal is self-coupling, the off-diagonal is mixing). *Addendum 394 left one residual of the selection rule: the physical reading that the Peirce diagonal carries the masses. Paper 04 states the Yukawa structure explicitly: the diagonal entries y_{ii} are the self-coupling strengths (how strongly family i couples to the Higgs), and the off-diagonal entries y_{ij} are the transition amplitudes between families — the mixing. On $J_3(\mathbb{O})$ in the $\mathbb{Z}_3$ -graded (T_{cycle}) basis (Addendum 394), this is exactly the Peirce diagonal/off-diagonal split: diagonal = self-coupling, off-diagonal = mixing.*

2 Self-coupling is self-observation; self-observation is mass

Proposition 2.1 (Self-coupling is self-observation). *Paper 04 identifies the self-coupling with self-observation: “the self-lensing potential arises from the geometry observing itself,” the boundary S^3 observing itself through the bulk B^4 , with self-lensing energy $E_{\text{self}} = 13.177$. The diagonal self-coupling of Proposition 1.1 is therefore the family’s self-observation — the diagonal $j \rightarrow j$ is the family lensing itself.*

Proposition 2.2 (Self-observation is mass). *Paper 07 identifies mass with the self-referential observation eigenvalue: “particle masses emerge as eigenvalues of a self-referential observation operator,” the mass being the scale at which the self-observation stabilises. So the self-coupling / self-lensing eigenvalue is the mass.*

Theorem 2.3 (Diagonal is mass; the residual closes). *Chaining Propositions 1.1–2.2:*

diagonal = self-coupling (P04) = self-lensing / geometry observing itself (P04) = self-referential observation eigenvalue

and dually off-diagonal = transition between families (P04) = cross-observation = mixing. Hence “diagonal = mass” is the corpus’s self-observation = mass identity, not a free posit, and the residual Addendum 394 left of the selection rule is closed.

3 What kind of closure this is, and the deepened framing

Corollary 3.1 (OI-287-1 closes relative to the foundation). *The full selection rule now reads end to end: family- k is the ω^k eigenspace of T_{cycle} (Paper 20); Schur orthogonality couples it to its character-resonant diagonal term (Addenda 323/324); the diagonal is self-observation = mass (Theorem 2.3); and the off-diagonal is occupied by mixing (Addendum 394), so the diagonal is the only home for mass. No free posit remains except the foundational identity that mass is self-referential observation (Paper 07) — the same observer- interpretation bedrock that Addendum 370 identified as a category boundary, underivable from within the frame it founds. The lepton selection rule heart OI-287-1 is therefore closed relative to the foundation: as deep as the corpus itself, with no further free choice.*

Remark 3.2 ($3 \leftrightarrow \text{non-3}$, deepened). The diagonal is the family observing *itself* (self-coupling $\rightarrow$ self-lensing $\rightarrow$ self-referential eigenvalue $\rightarrow$ mass); the off-diagonal is the family observing *another* (transition $\rightarrow$ cross-observation $\rightarrow$ mixing). So mass is self-observation — the 3 staying 3, the real diagonal where G_2 does nothing — and mixing/CP is cross-observation — the 3 becoming non-3, the octonionic off-diagonal where $G_2 = \text{Aut}(\mathbb{O})$ acts (Addenda 394/395). “How 3 transforms into non-3” is, at the deepest reading, the passage from a family observing itself (its mass) to a family observing another (their mixing). The honest limit: this closure is *relative* to Paper 07’s foundational mass = self-observation axiom; it is not absolute, and could not be — that axiom is the corpus’s root.

Status

The last residual of Addendum 394 / the OI-287-1 selection-rule heart — the reading diagonal = mass — closes from the corpus’s own foundation. Paper 04 states the diagonal is the self-coupling and the off-diagonal the mixing (Proposition 1.1) and identifies self-coupling with self-lensing, “the geometry observing itself” (Proposition 2.1); Paper 07 identifies mass with the self-referential

observation eigenvalue (Proposition 2.2). The chain diagonal = self-coupling = self-observation = mass (Theorem 2.3) makes “diagonal = mass” the corpus’s self-observation = mass identity, not a free posit, so the heart closes relative to the foundation (Paper 07, the Addendum 370 category boundary; Corollary 3.1). Joel’s $3 \leftrightarrow \text{non-3}$ deepens to self-observation (mass, the diagonal) versus cross-observation (mixing, the off-diagonal; Remark 3.2). The closure is as deep as the corpus itself — no further free posit — which is the honest terminus. No published number changes; the lepton selection rule is reduced to the foundational mass = self-observation identity. Verifier: `verify_P397.py`, 7/7 pass.