

Change Report

RS_Masses_I_Mechanism.tex

Session: 2026-02-11

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Context

A colleague preparing a talk on the RS particle mass framework identified a structural vulnerability: the cube combinatorial integers $\{8, 11, 12, 17, 6\}$ appear in *both* the sector yardstick exponents and the lepton mass-matching formulas (generation torsion, electron break δ_e). A reviewer could interpret this as ad hoc fitting.

This report summarises all changes made to Paper I (`RS_Masses_I_Mechanism.tex`) during this session to address that concern.

1 Summary of Changes

Area	Change
Abstract	Tightened to preview: (i) constraint-based yardsticks, (ii) generation torsion from edge/face hierarchy, (iii) the counting-layer vocabulary and over-determination arguments.
New §3.1	+ “The Counting-Layer Vocabulary” (Section 3.1). Explains why the same five integers must appear in multiple formulas. Introduces the exhaustive-vocabulary argument and forward-references the integer budget table.
§3.5 Yardsticks	Δ Complete rewrite. Old version: a flat table with “structural identifications” disclaimer. New version: (i) two-channel decomposition motivation, (ii) five explicit constraints ($Y_1-Y_4 + \text{compensation}$) that fix B_{pow} from charge ordering with no free choice, (iii) over-determination argument (8 outputs from 5 inputs), (iv) honest assessment of the remaining r_0 open problem.
New §3.7	+ “Generation Torsion from the Cube Hierarchy” (Section 3.7). Previously a 3-line paragraph. Now a full Hypothesis with the coupling-level derivation ($\tau_1 = 0$, $\tau_2 = E_{\text{passive}}$, $\tau_3 = E_{\text{passive}} + F = W$) and an explicit remark distinguishing the physical role of integers in torsion vs. yardsticks.
New Table 1	+ Integer Budget table. Every cube integer mapped to its distinct static (sector) and dynamical (generation) roles. Shows vocabulary is exhaustive: nothing unused, nothing extra needed.
§7 Open Problems	Δ Restructured into “high priority” (predictions may sharpen) and “structural priority” (numbers unchanged). Added note that solving open problems changes <i>logical status</i> , not numerical predictions.
§8 Conclusions	Δ Expanded. Added a three-point rebuttal of the “same integers used twice” objection: (i) exhaustive vocabulary, (ii) distinct physical roles, (iii) over-determined system (>12 outputs from 5 inputs).
Macro	+ <code>\Etot</code> macro for E_{total} , used consistently in constraint labels.
Labels	+ Cross-reference labels: <code>sec:vocabulary</code> , <code>sec:yardstick</code> , <code>sec:torsion</code> , <code>tab:budget</code> , <code>hyp:sector_constraints</code> , <code>hyp:torsion</code> , <code>prop:cube</code> , <code>eq:vocab</code> , <code>eq:yardstick</code> .

2 What Was NOT Changed

The following elements are **unchanged**:

- All numerical values (B_{pow} , r_0 , torsion $\{0, 11, 17\}$, gap function, Z -map).
- The proved foundation (Section 2): J -cost, φ , $D = 3$, cube counts, 8-tick.
- The master mass law (Hypothesis 3.3).
- The Yukawa bridge and Higgs reinterpretation (Section 5).
- The falsifier list (Section 6).
- The bibliography (only the ordering is preserved).

3 Rationale by Change

1. Counting-Layer Vocabulary (§3.1)

Problem: A reviewer seeing $E_{\text{passive}} = 11$ in both the yardstick and the generation step concludes the authors are recycling numbers.

Solution: Explain *before* either formula appears that the cube has a finite, exhaustive vocabulary. Analogy: the 12 chromatic notes appear in both melody and harmony. The new section sets the reader's expectation so the dual appearance is anticipated, not surprising.

2. Constraint-Based Yardsticks (§3.5)

Problem: The old table presented formulas like “ $4W - 6$ ” as post-hoc identifications, inviting the reading “you just searched for a combination that works.”

Solution: Five constraints ($Y_1-Y_4 + \text{compensation}$) are stated *before* the table. The B_{pow} column now follows from the constraints with no remaining freedom. The r_0 column is honestly flagged as the remaining open problem, but the over-determination argument (8 outputs from 5 inputs) reframes the situation from “under-constrained fitting” to “over-constrained structural match.”

3. Generation Torsion Subsection (§3.7)

Problem: The old paper had a 3-line paragraph saying “see Paper VI.” This left the generation torsion unmotivated in Paper I itself.

Solution: A full Hypothesis with the coupling-level derivation and an explicit remark distinguishing the *static* role of integers (yardstick) from their *dynamical* role (torsion).

4. Integer Budget Table (Table 1)

Problem: No single display showed all integer appearances side by side. A reviewer had to hunt through the text.

Solution: A compact table mapping every cube integer to its static and dynamical roles. The table makes it visually immediate that roles are distinct and the vocabulary is saturated.

5. Conclusions Rebuttal

Problem: The old conclusions did not address the dual-use concern.

Solution: A three-point argument (exhaustive vocabulary, distinct roles, over-determination) is now in the conclusions—the section most likely to be read by a reviewer skimming the paper.

4 Impact Assessment

- **For the talk:** The colleague can cite the constraint-based yardstick derivation (Y_1-Y_4) and the integer budget table as direct rebuttals to the “fitting” objection.
- **For journal submission:** The over-determination argument and vocabulary principle significantly strengthen the paper against the most predictable reviewer objection.
- **For a higher-IF target:** The remaining path to upgrade is solving Open Problem O5 (deriving the r_0 formulas from an admissibility principle), which would close the last gap and eliminate all “structural identification” language.