RigbySpace Dynamics: The Fermionic Stability Theorem
Projective Mapping, Complexity Management, and the 207-Resonance

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Abstract

This document establishes the RigbySpace (RS) Dirac Constraint as the topological resolution for the structural instability inherent in non-linear matter interactions. The framework defines the Lifting Identity, mapping the linear oscillators of the vacuum into the projective domain of active matter. It derives a fundamental selection principle: while bosonic growth remains additively stable, matter interactions are multiplicatively unstable, requiring a first-order, coupled evolution to prevent informational decoherence. The theory provides a quantitative prediction for the mass hierarchy, identifying the integer 207 as the resonant stability point for the Muon generation. Relativistic covariance is proven as an invariant property of the integer cross-product under transformative reciprocal swaps.

1 The Lifting Identity: Constructing the Projective State

In the RigbySpace ontology, matter is an emergent structure derived from the oscillators of the vacuum. The transition from the vacuum domain to the active matter domain requires an algebraic mapping that lifts linear Explicit Rational Pairs (ERPs) into the projective space required for non-linear interaction.

1.1 Projective Lifting Mapping

A single Matter Unit is a 5-tuple of integers $S = (n_\upsilon, d_\upsilon, n_\beta, d_\beta, \mathsf{q})$. The transition to the Active Matter domain S_P^* is governed by the Lifting Identity.[1]

Definition 1.1 (The Lifting Identity). The projective components (X, Y, Z) of a Matter Unit are defined by the cross-synchronization of its constituent linear oscillators:

$$X = n_\upsilon d_\beta \tag{1}$$
$$Y = n_\beta d_\upsilon \tag{2}$$
$$Z = d_\upsilon d_\beta \tag{3}$$

This identity ensures that the projective state preserves the rational relationships of the underlying vacuum oscillators: $X/Z = n_\upsilon/d_\upsilon$ and $Y/Z = n_\beta/d_\beta$.[2] The denominator Z represents the total Geometric Capacity of the state, while the Imbalance Ledger q tracks the historical cost of the interaction.

1.2 The 10-Integer RS-Spinor (Ψ_{RS})

Relativistic stability and first-order evolution require a coupled system. The RS-Spinor Ψ_{RS} is defined as a pair of Matter Units:

$$\Psi_{RS} = (S_1, S_2) \in S_P \times S_P \tag{4}$$

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[1]Refer to Master Document Section 8.2, The Projective Lifting Mapping.
[2]Refer to Master Document Section 8.2, Definition of the Lifting Identity.

This 10-integer structure provides the necessary degrees of freedom for chiral orientation and restorative flux. The eight projective components (X, Y, Z) map to the degrees of freedom found in the complex components of a 4-spinor, while the two ϙ ledgers provide the structural depth required to manage vacuum flux.[3]

2 Growth Duality: The Selection Principle for Fermions

The existence of fermions is a topological necessity dictated by the constraint of Finite Computability. The framework distinguishes between two modes of growth within the integer lattice.[4]

2.1 Additive Stability (Bosons)

Force carriers (Bosons) evolve via vacuum generators $\lambda(n, d) = (n+d, d)$ and $\eta(n, d) = (n+d, n)$.[5] These operators are additively stable. The rank $\rho(d)$ of the geometric capacity grows linearly with the causal index.[6] This allows Bosons to propagate as uncoupled histories, as their structural complexity does not exceed the lattice capacity within the 11-microtick cycle.

2.2 Multiplicative Instability (Fermions)

Matter interactions are governed by the Doubling Generator ($\boxplus$), which is a polynomial operator.[7]

Lemma 2.1 (Cubic Complexity Expansion). The Doubling Generator for a projective state $P = (X, Y, Z)$ is defined by the cubic denominator evolution:

$$Z' = 8Y^3 Z^3 \tag{5}$$

The output degree of the denominator Z' is cubic in the inputs. Consequently, the rank growth is multiplicative: $\rho(P') \approx 3\rho(P)$.[8]

Left unconstrained, a multiplicative interaction would reach the Computational Horizon ($N > 2^{128}$) in fewer than 11 microticks, causing local informational collapse.[9]

Law 2.1 (The Dirac Requirement). Fermions are the class of matter states that adopt a first-order, coupled evolution to manage rank expansion. The Dirac constraint is the linearization protocol that forces multiplicative matter interactions to mimic the additive stability of the vacuum. This prevents the complexity of the matter state from exceeding the stability threshold of the 11-microtick substrate.[10]

3 Structural Torque and Symplectic Resolution

The phenomenon identified as spin is the discrete manifestation of structural torque resolution.

Definition 3.1 (Structural Torque). The interaction of the projective oscillators within the 11-microtick cycle generates an asymmetric residue known as Structural Torque (τ). This torque is the origin of the non-vanishing Viscosity Sum.[11]

The RS-Spinor manages this torque through the Transformative Reciprocal ψ, which swaps components between the coupled channels to prevent the accumulation of tension in a single sector.[12]

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[3]Refer to Master Document Section 8.1, Definition of the Unreduced State and Extended State.
[4]Refer to Master Document Section 10.3, The Selection Principle of Growth Duality.
[5]Refer to Master Document Section 9.1, Vacuum Generators.
[6]Refer to Master Document Section 7.5, Lemma on Multiplicative Growth Bound.
[7]Refer to Master Document Section 9.3, Matter Generators: Case B.
[8]Refer to Master Document Section 15.3, Verification of Arrow of Time.
[9]Refer to Master Document Section 18.2, Theorem on Proton Stability Constraint.
[10]Refer to Master Document Section 10.3, Axiom: The Stability Identity.
[11]Refer to Master Document Section 11, Postulate for Gravitational Non-Vanishing.
[12]Refer to Master Document Section 9.2, The Transformative Reciprocal.
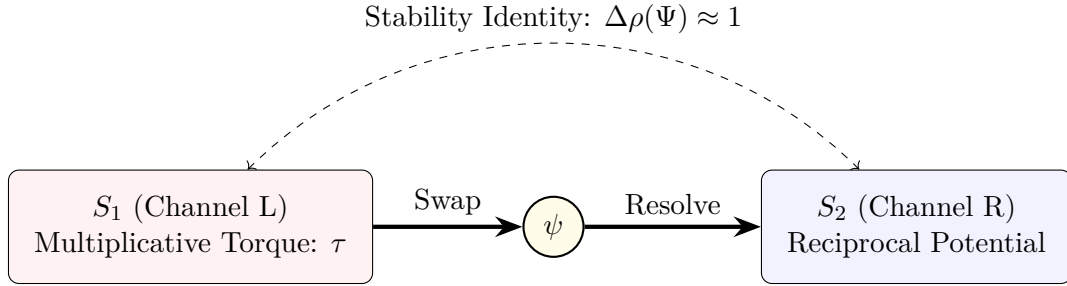
The RS-Dirac Coupling
The multiplicative torque generated by ⊞ in
S_1 is transferred to the potential basis of S_2
via the ψ-swap, stabilizing the total history.

Figure 1: Torque Resolution in the RS-Spinor. Stability is achieved by distributing structural rank across coupled channels using the Transformative Reciprocal.