The Weak-Orientation Admissibility Theorem in VERSF

▲ Programme Milestone — Standard Model Chirality Series

Deriving P_W = P_L: Why Weak Attachment Is Left-Handed from Substrate Admissibility Rather Than Empirical V–A Input

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General Reader Summary

The weak force has one of the strangest features in all of physics: it treats left-handed and right-handed matter differently. In the Standard Model, the weak force acts on left-handed particle pairs — the electron and its neutrino, the up and down quarks — but not on the corresponding right-handed singlets. This fact is built into the Standard Model. It is not explained by it.

This paper asks whether VERSF can explain it.

The answer proposed here is that weak handedness is not an arbitrary rule and not an empirical insertion. It follows from an admissibility condition on the substrate. The weak force is a force of **unresolved two-way commitment**. It acts where the substrate still carries a live two-branch structure: electron/neutrino, up/down. A single already-committed record has no such two-way structure for the weak force to act on.

In VERSF language, the spinorial matter layer has two orientation faces. One face carries unresolved weak-branch pairs; the opposite face carries branch-committed singlet records. A weak connection can attach only to the unresolved branch face. If it tried to attach to the committed face, there would be no two-branch bath to transport. If it tried to attach to both faces, it would introduce mirror weak structure, destroy the minimal chiral skeleton, and break the completion architecture derived elsewhere. And there is no third, "in-between" face for it to attach to: a representation-theoretic argument (Schur's lemma) shows that the only stable orientation selectors on the spinorial carrier are left, right, both, or neither.

The theorem is stated in two layers, and the layering matters.

Layer one (convention-free): weak transport attaches to the unresolved-branch orientation, and to no other. Write P_U for the projector onto that orientation. Then

$P_W = P_U$.

Layer two (convention-fixing): in the inherited source-carrier convention, the unresolved-branch orientation is the one named "left". Hence

$P_W = P_L$.

The physical content lives entirely in layer one. Layer two is bookkeeping. If the naming convention were globally reversed, every equation in this paper would survive with the labels swapped, and the physical statement — weak transport attaches to the unresolved face — would be untouched.

The paper does not use observed parity violation or the measured V–A weak interaction as an input. That is the key firewall. Instead, it enumerates all possible weak-orientation assignments — left, right, vector-like, mixed — and eliminates every rival by substrate admissibility.

In plain language:

The weak force is left-handed because only one spinorial face contains the unresolved two-branch structure that weak transport needs, and in the inherited convention that face is the left-handed one. Right-handed matter is already branch-committed, so the weak force has no admissible handle there.

That is the milestone.

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Abstract

The Standard Model takes the chiral orientation of the weak force as a primitive fact: weak SU(2) acts on left-handed fermion doublets and not on right-handed singlets. The present paper formulates and proves the corresponding VERSF admissibility theorem.

Let the spinorial source-carrier layer decompose into two Lorentz-stable chiral orientations,

$S = S_L \oplus S_R$,

with projectors

$P_L = (1 - \gamma^5)/2$, $P_R = (1 + \gamma^5)/2$,

up to the orientation convention fixed by the source-carrier stack. Let P_W denote the projector onto the orientation to which weak branch transport attaches, and let P_U denote the projector onto the orientation carrying unresolved two-branch weak commitment. The theorem proven is

$P_W = P_U$,

with the corollary, under the inherited source-carrier naming convention $P_U = P_L$,

$P_W = P_L$.

The derivation proceeds without importing observed V–A phenomenology. It inherits only the spinorial orientation dichotomy, the chiral-locking result that one orientation carries unresolved two-branch weak commitment while the opposite orientation carries branch-committed singlet records, the anomaly-admissible source ledger, and the electroweak completion-interface architecture. The paper then imposes weak-orientation admissibility:

1. weak transport must act on a genuine two-branch unresolved commitment carrier;
2. the weak projector must be a Lorentz-stable idempotent;
3. the local weak connection must preserve source-current admissibility;
4. no mirror or hidden weak sector may be introduced at the same layer;
5. the completion interface must remain the unique and necessary left–right mass-attachment bridge;
6. left–right completion must be carrier-mediated (no bare chiral bridges).

The candidate census is closed by a Schur-commutant lemma: on the Dirac spinorial carrier, the commutant of the Lorentz action is exactly span{P_L, P_R}, so the only Lorentz-stable idempotent orientation selectors are 0, P_L, P_R, and I = P_L + P_R. There is no continuously rotated or off-diagonal alternative; mixed orientations are excluded by representation theory, not by stipulation.

A right-handed weak orientation fails because the right-handed sector is branch-committed and weak-singlet in the inherited chiral skeleton; making it weak-active either leaves no two-branch carrier — and su(2) admits no nontrivial action on a one-dimensional carrier — or forces new right-handed doublets, mirror partners, and a revised hypercharge ledger. A vector-like weak orientation fails because it duplicates the right-sector obstruction and makes the completion interface non-unique; anomaly admissibility cannot rescue it, because anomaly cancellation is necessary but not sufficient for orientation selection, and vector-like assignments are trivially anomaly-safe. The only survivor is the unresolved-branch orientation:

P_W = P_U = P_L.

The result closes the weak-orientation chirality gate conditionally on the inherited chiral-locking and spinorial source-carrier machinery. It does not derive generation number, hypercharge values, weak coupling strength, the numerical W/Z masses, or the full quantum electroweak theory. It derives the handedness of weak attachment as an admissibility theorem.

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0. Notation, Conventions, and Firewalls

0.1 Spinorial orientation projectors

Let

S = S_L ⊕ S_R

be the spinorial source-carrier decomposition into two Lorentz-stable chiral orientations, with S_L and S_R the two inequivalent Weyl subrepresentations of the Lorentz spin representation. Write

$P_L : S \to S_L$, $P_R : S \to S_R$,

with

$P_L^2 = P_L$, $P_R^2 = P_R$, $P_L \cdot P_R = 0$, $P_L + P_R = I$.

In standard gamma-matrix convention,

$P_L = (1 - \gamma^5)/2$, $P_R = (1 + \gamma^5)/2$,

and both projectors commute with every Lorentz generator $\Sigma^{\mu\nu} = (i/4)[\gamma^\mu, \gamma^\nu]$, since γ^5 does. (Verified by explicit matrix computation; this is the standard chirality-stability statement.)

Definition (Lorentz stability). Throughout this paper, *Lorentz stability* of an operator on S means stability under the **proper orthochronous** spin action — equivalently, commutation with all generators $\Sigma^{\mu\nu}$. The justification is operational: local gauge transport must be consistent under continuous changes of frame, and the continuous frame changes available to any local observer generate exactly the proper orthochronous component. Discrete parity is not a frame change any observer can perform; it is a discrete extension of the connected group, and whether the substrate carries it as a symmetry is precisely what the weak-orientation question is about. Requiring parity-stability of P_W would therefore not be a neutral strengthening — it would presuppose a parity-symmetric substrate, i.e., presuppose the vector-like answer, inverting the burden of proof. The consequence of this choice is made quantitative in Remark 1.1 and defended in Objection 8; its failure mode is falsifier F9.

The sign convention is not load-bearing. If the global naming convention for chirality is reversed, the theorem still asserts that weak transport attaches to the unresolved-branch orientation. The name "left" is fixed by the inherited source-carrier convention and enters only in the corollary.

0.2 Unresolved-branch and weak orientation projectors

Let P_U denote the projector onto the spinorial orientation carrying unresolved two-branch weak commitment (defined in §0.3 and inherited in §0″.2). Let P_W be the projector selecting the spinorial orientation on which weak SU(2)-type branch transport acts.

The target theorem is

$P_W = P_U$,

with corollary $P_W = P_L$ under the inherited naming convention $P_U = P_L$.

Non-circularity of P_U. The projector P_U is not defined as "the orientation on which the weak force acts." It is defined independently, as the projector onto the spinorial orientation carrying unresolved two-branch commitment structure — a substrate property fixed by the chiral-locking layer before any weak transport is assigned. The theorem $P_W = P_U$ is therefore not a definition. It is a selection result: weak transport is shown to attach only to the already-defined unresolved-branch orientation, and to no admissible alternative. The naming of that orientation as "left" enters only afterwards, through the source-carrier convention $P_U = P_L$. Definition, selection, and naming are three separate steps, and only the second is proven here.

0.3 Weak branch carrier

A weak branch carrier is a twofold unresolved commitment module, schematically

$(\nu, e), (u, d),$

before branch completion. Such a module supports non-abelian SU(2)-type transport because it has two unresolved internal alternatives sharing one bath: the connection acts by transporting weight between the two branch lines.

A weak singlet has no such two-branch carrier. A committed record exposes a single support line, on which the only available local transport is phase-type (abelian) comparison or the trivial action.

0.4 Inherited chiral skeleton

This paper inherits the one-generation chiral skeleton:

$L = (\nu, e), Q = (u, d)$

on the unresolved-branch orientation, and

e, u, d

as branch-committed singlet records on the opposite orientation. In the standard source-carrier convention these are written

$L_L = (\nu_L, e_L), Q_L = (u_L, d_L),$

and

$e_R, u_R, d_R.$

This paper does **not** rederive the existence of the chiral skeleton. It proves the weak orientation assignment given that inherited skeleton and the spinorial source-carrier orientation structure.

The division of labour is exact: chiral locking says *where the unresolved structure lives*; this paper says *the weak force can live nowhere else*.

0.5 Empirical V–A firewall

The observed V–A form of the weak interaction is not used as a premise.

This paper may use the words "left" and "right" as orientation labels, but it must not use experimental parity violation, beta-decay asymmetry, neutrino helicity observations, or measured weak charged-current structure to select P_W. Any such use fails the paper. Appendix B contains the no-empirical-input audit.

0.6 Electroweak completion firewall

This paper does not rederive the Higgs-like completion interface,

$\Phi_{cl} \sim (1, 2, +½)$.

It inherits the result that this interface is the minimal weak-active, colourless completion object connecting weak doublets to weak-singlet records. The present paper asks which spinorial orientation the weak doublets inhabit.

0.7 Coupling firewall

This paper derives no numerical values for g, g′, e, $\sin^2\theta_W$, or v.

0.8 Neutrino firewall

This paper does not decide the neutrino mass branch: Dirac, Majorana, sterile, weak-commitment, or effective. It derives only the weak orientation of the active doublet layer. Debt 4 records the required re-audit if a sterile branch is later selected.

0′. Predictive-Content Ledger

Object	Status	Comment
Spinorial chiral decomposition $S = S_L \oplus S_R$	Inherited	Source-carrier layer
Weak branch is twofold unresolved commitment	Inherited / conditional	Weak-commitment architecture

Object	Status	Comment
Opposite orientation carries branch-committed singlet records	Inherited / conditional	Chiral-locking stack
Weak transport requires unresolved two-branch carrier	Derived here	Lemma 2; su(2) has no nontrivial 1-dim action
Lorentz commutant on S is span{P_L, P_R}	Derived here	Lemma 1 (Schur); verified by explicit computation
Only 0, P_L, P_R, I are admissible orientation selectors	Derived here	Corollary of Lemma 1
Right-handed weak assignment excluded	Derived here	No unresolved weak bath; repairs require mirror structure
Right-singlet promotion contradicts hypercharge ledger	Derived here	Proposition 3.1; forced Y = +⅙ / −½ vs inherited grades
Vector-like weak assignment excluded	Derived here	Carrier absence + two-leg bare-mass obstruction; anomaly-safety insufficient
Mirror routes 1–2 excluded (committed face; second carrier)	Derived here	Proposition 4.2, conditional on WO-3 and WO-6
Mirror route 3 (via existing Φ_cl) and decoupled world	Conditional	Minimality now; Debt 7(ii) and Debt 3 respectively
Vector-like assignment opens completion-free bare mass channel	Derived here	Proposition 4.1; $\bar{2} \otimes 2 \supset 1$ with automatic hypercharge match
Mixed weak assignment excluded	Derived here	Schur exclusion, not stipulation
P_W = P_U	Central theorem	Convention-free layer
P_W = P_L	Corollary	Under inherited naming P_U = P_L
Observed V–A not used	Firewall	Appendix B
Hypercharge values	Inherited	Not derived here
Weak coupling values	Owed	Not derived here
Quantum electroweak completion	Owed	Not derived here

0″. Inherited Infrastructure

The present paper inherits five layers.

0″.1 Spinorial source-carrier layer

Prior source-carrier work supplies a spinorial matter carrier with two Lorentz-stable chiral orientations. This gives the substrate a genuine left/right orientation structure before any weak force is assigned.

0″.2 Chiral-locking layer

The chiral-locking stack supplies the key asymmetry:

- one spinorial orientation carries unresolved two-branch weak commitment (this defines P_U);
- the opposite orientation carries branch-committed singlet records.

The present paper does not hide this inheritance. It is the load-bearing inherited layer, and the theorem is graded conditional on it. If chiral locking fails, the present theorem fails with it. What chiral locking does **not** supply is the conclusion: it locates the unresolved structure, but it does not by itself forbid weak transport from attaching elsewhere, from attaching to both faces, or from attaching to a rotated mixture. Those exclusions are the work of this paper.

Why chiral locking is a structural premise, not an empirical one. A critic may suspect that the inherited asymmetry is observed weak chirality relabelled. Three features of the premise, as inherited, block that reading. First, chiral locking is stated in convention-free terms — one orientation carries unresolved two-branch commitment, the opposite carries committed records — with no reference to any measurement; the words "left" and "right" do not appear in the premise, only in the naming convention applied afterwards. Second, the asymmetry it asserts is representable without observation: the two Weyl faces of the spinorial carrier are structurally inequivalent as Lorentz representations (Lemma 1, Step 1), so an asymmetric assignment of commitment status across them is a substrate possibility, not an imported fact — the premise says the substrate realises that possibility. Third, the directionality of the asymmetry matches the directionality of commitment itself: completion runs from unresolved to committed, never the reverse, so a carrier layer feeding a directional completion architecture is structurally expected to be commitment-asymmetric. None of this proves chiral locking — that is Debt 1 — but it fixes the audit criterion: the parent derivation passes if its grounds for placing unresolved structure on one face are substrate-structural in the above sense, and fails if, at any load-bearing step, the placement is justified only by the observed particle content. The present paper's firewall (WO-7) then extends upstream as an audit demand rather than a mere disclaimer.

0″.3 Weak-commitment layer

Weak structure is a two-branch commitment structure. The weak force is not merely a label; it is the transport of unresolved branch alternatives within a shared bath.

0″.4 Anomaly-admissible source ledger

The source ledger is inherited as anomaly-admissible. Any alternative weak orientation must preserve the same source-current consistency. Note the direction of use: anomaly admissibility functions here as a **necessary** condition that rivals must also satisfy, never as the discriminator that selects P_L. This matters because vector-like assignments are automatically anomaly-safe, so anomaly arguments alone could never exclude them.

0″.5 Completion-interface layer

The electroweak completion-interface theorem supplies the weak-active completion object Φ_cl bridging the unresolved doublet orientation to the committed singlet orientation, and establishes two distinct properties at this layer: **necessity** (mass attachment between weak-active doublets and committed singlet records requires completion mediation; no direct channel is admissible) and **uniqueness** (Φ_cl is the only such bridge). Both properties are inherited and both are used: uniqueness constrains repairs that add a second carrier, while necessity is the load-bearing premise of Proposition 4.1's bare-mass exclusion. The paper declares this dual inheritance explicitly because Proposition 4.1 would regrade from theorem-contradiction to minimality argument if the parent theorem established uniqueness-given-need only; the inheritance must therefore be confirmed against the parent paper's claim ledger (Debt 7), and falsifier F5 covers both components.

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1. Purpose and Claim Level

The purpose of this paper is to discharge the weak-orientation gate:

P_W = P_U (convention-free), P_W = P_L (under inherited naming).

The question is not:

Do weak interactions experimentally look left-handed?

They do. That is not the derivation.

The question is:

Given the VERSF substrate architecture, which spinorial orientation is admissible as the support of weak branch transport?

The claim level is:

Exact given inherited chiral-locking and source-carrier premises; conditional on those inherited premises.

The paper therefore closes the gate only conditionally. The remaining exposure is explicit: if the inherited chiral-locking theorem is false, or if weak transport can act on branch-committed singlets without unresolved two-branch support, the theorem fails. Both exposures appear as falsifiers (F1, F6).

1.1 Scope of the result

This paper does not derive the existence of the unresolved weak-branch orientation itself. That result is inherited from the chiral-locking and source-carrier stack.

What this paper proves is **exclusivity**. Given one spinorial orientation carrying unresolved weak-branch structure and the opposite orientation carrying committed singlet records, weak transport can attach only to the unresolved orientation. It cannot attach to the committed orientation, to both orientations, or to a mixed orientation without adding structure the substrate does not supply.

So the result is not:

chirality derived from nothing.

It is:

weak orientation derived from chiral-locking admissibility.

The distinction is load-bearing for how the theorem should be cited and audited.

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2. The Orientation Problem

The weak force could, in principle, be assigned to one of four orientation classes:

1. **Left-oriented weak transport:** $P_W = P_L$.
2. **Right-oriented weak transport:** $P_W = P_R$.
3. **Vector-like weak transport:** $P_W = I = P_L + P_R$.
4. **Mixed or rotated weak transport:** $P_W = P_\theta$, where P_θ is neither P_L, P_R, nor I.

The Standard Model chooses the first. This paper must not choose it. It must eliminate the other three — and it must first show that this four-way list is exhaustive, so that no fifth candidate hides behind the census. Lemma 1 closes the census; Lemma 2 supplies the attachment criterion; Propositions 3–5 eliminate the rivals; Proposition 6 verifies the survivor.

The problem in one sentence:

Weak transport may attach only where an unresolved two-branch carrier exists.

If the inherited source-carrier structure puts that carrier on S_L, then $P_W = P_L$. If it does not, the corollary reverses its labels and the theorem $P_W = P_U$ stands unchanged.

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3. Weak-Orientation Admissibility Premises

WO-1 — Spinorial orientation dichotomy

Matter source-carriers decompose into two Lorentz-stable chiral orientations,

$S = S_L \oplus S_R$,

with S_L, S_R the two inequivalent Weyl subrepresentations.

Status: inherited.

Falsifier: no such substrate-level orientation dichotomy exists, or the two Weyl factors are equivalent as Lorentz representations.

WO-2 — Weak branch requires unresolved twofold support

A weak SU(2)-type connection can act nontrivially only on a twofold unresolved commitment carrier.

Status: derived here (Lemma 2) from bath-transport logic, the meaning of weak branch structure, and the representation theory of su(2).

Falsifier: weak non-abelian transport acts nontrivially on a single branch-committed singlet.

WO-3 — Chiral locking

The unresolved weak-branch carrier inhabits one spinorial orientation; the opposite orientation carries branch-committed singlet records. In standard convention:

S_L: L_L, Q_L; S_R: e_R, u_R, d_R.

Status: inherited / conditional.

Falsifier: the opposite orientation also carries unresolved weak branch structure at the same layer.

WO-4 — Projector admissibility

The weak orientation selector P_W must be a Lorentz-stable idempotent projector compatible with local gauge transport, introducing no new spinorial structure.

Status: derived here (Lemma 1).

Falsifier: weak transport can be consistently defined on a non-idempotent or Lorentz-unstable mixed orientation.

WO-5 — No hidden mirror weak sector

No additional low-energy weak doublet sector may be introduced merely to rescue an alternative orientation.

Status: partially derived here — Proposition 4.2 excludes mirror configurations occupying the committed face or requiring a second completion carrier, conditional on WO-3 and WO-6. Mirror configurations completing through the existing Φ_{cl} remain a minimality condition pending the Debt 7 scope audit (component ii); the decoupled-mirror-world residue remains a minimality condition pending Debt 3.

Falsifier: the substrate forces mirror weak doublets at the same layer.

WO-6 — Completion-interface necessity and uniqueness

The electroweak completion interface remains the **unique and necessary** minimal weak-active bridge between unresolved weak doublets and committed singlet records: mass attachment requires completion mediation, and Φ_{cl} is the only admissible mediator.

Status: inherited from the completion-interface theorem (both components; see §0″.5 for the audit obligation).

Falsifier: a second independent completion carrier is required at the same layer (uniqueness fails), or a direct mass-attachment channel is admissible without completion mediation (necessity fails).

WO-7 — Empirical weak chirality firewall

No observed parity-violation fact may enter the proof.

Status: methodological firewall.

Falsifier: any derivation step depends on measured V–A phenomenology.

WO-8 — Completion requires a carrier

Left–right completion — any structure connecting the two chiral faces of a spinorial carrier, including mass attachment — must be mediated by a substrate completion carrier. A bare coefficient connecting the faces is carrier-free completion and is inadmissible.

Status: inherited from the commitment-event and fold-interface layer of the foundational architecture, where completion is an irreversible commitment event requiring bath mediation. **Independence note:** this premise is load-bearing for Leg B of Proposition 4.1, and Leg B is genuinely independent of Leg A only if WO-8's provenance is upstream of, and independent from, the Completion-Interface Theorem (which supplies Leg A via WO-6). The provenance must be confirmed against the foundational papers' claim ledgers: this is Debt 7, component iii. If WO-8's actual source turns out to be the completion-interface theorem itself, the two legs collapse into one and Proposition 4.1 reverts to its single-leg form.

Falsifier: a bare left–right bridge is admissible without carrier mediation.

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4. Lorentz-Stable Projector Lemma

Lemma 1 — Admissible weak-orientation selectors are exactly 0, P_L, P_R, and I

Let P_W be a Lorentz-stable idempotent acting on the Dirac spinorial carrier $S = S_L \oplus S_R$. If P_W defines a local gauge orientation without introducing new spinorial structure, then

$P_W \in \{0, P_L, P_R, I\}$.

Proof

Step 1 (commutant). Lorentz stability of an orientation selector means P_W commutes with the Lorentz spin action on S, i.e. with every generator $\Sigma^{\mu\nu}$. The subspaces S_L and S_R are the two inequivalent irreducible Weyl subrepresentations. By Schur's lemma, any operator commuting with the full Lorentz action on $S_L \oplus S_R$ is block-diagonal with scalar blocks: the off-diagonal blocks are intertwiners between inequivalent irreducibles and therefore vanish, and the diagonal blocks are scalars. Hence

$P_W = a\cdot P_L + b\cdot P_R,\ a, b \in \mathbb{C}$.

Equivalently: the Lorentz commutant on S is $\text{span}\{I, \gamma^5\} = \text{span}\{P_L, P_R\}$. (Verified by explicit computation: imposing $[\Sigma^{\mu\nu}, M] = 0$ for all μ, ν on a general 4×4 matrix M forces $M = c\cdot I + d\cdot\gamma^5$.)

Step 2 (idempotency). Since $P_L\cdot P_R = 0$,

$(a\cdot P_L + b\cdot P_R)^2 - (a\cdot P_L + b\cdot P_R) = (a^2 - a)\cdot P_L + (b^2 - b)\cdot P_R$,

so idempotency forces $a^2 = a$ and $b^2 = b$ independently, i.e. $a, b \in \{0, 1\}$.

The admissible selectors are therefore exactly

0, P_L, P_R, I.

Since weak transport is nontrivial, $P_W \neq 0$. The live candidates are P_L, P_R, I. ■

Note (antilinear maps). The census covers linear operators. Antilinear maps of charge-conjugation type ($\psi \mapsto i\gamma^2\psi^*$) do intertwine the two Weyl factors — verified by explicit computation, $(i\gamma^2)\cdot P_L^*\cdot(i\gamma^2)^{-1} = P_R$ — but an orientation selector for gauge attachment must be complex-linear to be compatible with the linear action of the connection on the carrier. Antilinear candidates are therefore excluded at the definition of P_W, not by the commutant argument.

Reading

There is no continuous "partly left, partly right" weak orientation, and no off-diagonal chiral rotation, available at this layer. This is not a modelling choice: Schur's lemma closes the census. Any operator connecting S_L to S_R fails Lorentz stability as an orientation selector; such an operator has the structural form of a mass or completion bridge and must be separately earned as one. The weak force must attach to one chirality, the other chirality, or both.

Remark 1.1 — The stability group is load-bearing

The census depends on the stability group chosen in §0.1, and the dependence is quantitative. Under the proper orthochronous spin action, the commutant on S is two-dimensional: span{P_L, P_R}. If stability under parity is additionally imposed, the commutant collapses to one dimension. Explicitly, parity acts by conjugation with γ^0, and

$$\gamma^0(a\cdot P_L + b\cdot P_R)\gamma^0 = a\cdot P_R + b\cdot P_L$$

(since γ^0 anticommutes with γ^5; verified by explicit computation), so parity-stability forces $a = b$ and the commutant reduces to span{I}. The census would then be {0, I}, and the only nontrivial weak orientation would be vector-like.

This is why the definition in §0.1 is stated with justification rather than assumed silently: the exclusion of parity from the stability group is not bookkeeping. It is the operationally correct requirement — continuous frame consistency — and imposing parity instead would presuppose the parity symmetry of the substrate that the theorem is precisely in the business of adjudicating. The paper's position is that the substrate owes stability only to the connected isometry structure it represents; discrete parity is a property some assignments have (vector-like) and others lack (chiral), to be decided by admissibility, not imposed by fiat. Objection 8 and falsifier F9 record the exposure.

Remark 1.2 — The census applies carrier-by-carrier; sector hybrids do not survive

Lemma 1 constrains the orientation selector on each spinorial carrier. In principle, P_W could be assigned per matter sector — P_L on leptons and P_R on quarks, say, or any mixture across species — and such sector-hybrid assignments lie outside the four-way list of §2 read globally. They do not, however, open a fifth surviving class, because the exclusions of §§6–7 operate sector-wise: Proposition 3's quark argument and lepton argument are independent, Proposition 3.1's ledger obstruction applies within each sector separately, and Proposition 4.1's bare-mass channel opens sector-by-sector. Any hybrid assignment with a right-oriented or vector-like component in **any** sector therefore fails by that sector's instance of the corresponding proposition. The exhaustiveness claim of Theorem 7 is to be read accordingly: the census is per carrier, the exclusions hold per sector, and the unique global survivor assigns P_U in every sector. Appendix A records the hybrid row.

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5. Weak-Branch Carrier Lemma

Lemma 2 — Non-abelian weak transport requires an unresolved two-branch carrier

A nontrivial weak SU(2)-type connection cannot act on a branch-committed singlet record. It requires a twofold unresolved commitment carrier.

Proof

A branch-committed singlet exposes one resolved support line: a one-dimensional local carrier. The Lie algebra su(2) has no nontrivial one-dimensional representation — every one-dimensional representation of a semisimple algebra is trivial, since traceless generators must act as zero on a one-dimensional space. Hence on a single support line the only available local transports are the trivial su(2) action and, separately, abelian comparison associated with independent U(1) structure — not any subgroup of the weak algebra, since the singlet is the trivial representation of the full algebra and every subalgebra therefore also acts trivially.

Equivalently, in branch language: an SU(2) doublet requires two branch lines sharing one bath, so that off-diagonal generators can transport weight between them. With one branch present, no off-diagonal generator has anywhere to act; the representation content collapses to the singlet.

Therefore nontrivial weak transport requires an unresolved two-branch carrier. ■

Reading

The weak force cannot act where the substrate has already made a one-branch commitment. It acts where the commitment is still branch-structured. This is the substrate translation of the elementary fact that su(2) cannot act faithfully on one dimension.

6. Right-Oriented Weak Transport Fails

Proposition 3 — P_W = P_R is inadmissible

The right-oriented weak assignment P_W = P_R is inadmissible in the inherited VERSF matter skeleton.

Proof

By chiral locking (WO-3), the P_R orientation carries branch-committed singlet records:

e_R, u_R, d_R.

By Lemma 2, weak SU(2)-type transport requires an unresolved two-branch carrier. The P_R sector contains no such carrier at the inherited layer, so the bare assignment P_W = P_R supports no nontrivial weak transport at all.

There are only two repairs, and each fails admissibility.

Repair 1: promote existing right records to weak doublets. For quarks, one would have to assemble (u_R, d_R) as a right weak doublet. This destroys their inherited status as weak singlets, deprives the completion interface of its singlet targets in the quark sector, and forces a revised hypercharge/source ledger — contradicting the inherited anomaly-admissible ledger of §0″.4. For leptons, one would have to introduce a right-handed neutrino partner to form (ν_R, e_R), which is not part of the minimal inherited charged-matter skeleton and would fix the neutrino branch before the neutrino module has selected it, violating the neutrino firewall (§0.8).

Repair 2: introduce mirror right-handed weak doublets. This adds a hidden or mirror weak sector, violating WO-5 unless independently forced by substrate structure. No such forcing is inherited (Debt 3 records the owed census theorem).

Therefore P_R either supports no weak transport or requires inadmissible new weak-active matter. Hence P_W = P_R is inadmissible. ■

Reading

Right-handed matter is not weak-inactive by stipulation. It is weak-inactive because it is already branch-committed at this layer. The weak force has no unresolved two-way handle there.

Proposition 3.1 — Existing right singlets cannot be promoted to weak doublets without rewriting the source ledger

Repair 1 of Proposition 3 is not a harmless relabelling. Promoting the inherited right-handed singlets into weak doublets contradicts their inherited hypercharge grades.

Proof

Work with the inherited charge relation $Q = T_3 + Y$ and the inherited hypercharge ledger (both firewalled as inputs; hypercharge values are not derived in this paper).

Quark sector. Suppose the existing right-handed quark singlets u_R, d_R are promoted into a right-handed weak doublet

$Q\_R = (u\_R, d\_R)$.

A weak doublet carries $T_3 = +½$ on the upper component and $T_3 = −½$ on the lower component, with a single common hypercharge. Preserving electric charge requires

$Y(Q\_R) = Q(u\_R) − \tfrac{1}{2} = \tfrac{2}{3} − \tfrac{1}{2} = +\tfrac{1}{6}$

and simultaneously

$Y(Q\_R) = Q(d\_R) + \tfrac{1}{2} = −\tfrac{1}{3} + \tfrac{1}{2} = +\tfrac{1}{6}$.

The two conditions are consistent, so a right quark doublet with $Y = +\tfrac{1}{6}$ is charge-coherent as an abstract object. But the inherited singlet records carry

$Y(u\_R) = +\tfrac{2}{3}$, $Y(d\_R) = −\tfrac{1}{3}$.

Neither equals $+\tfrac{1}{6}$. Promotion therefore forces both records to change source grade.

Lepton sector. Placing e_R into a right-handed lepton doublet (ν_R, e_R) requires

$Y(L\_R) = Q(e\_R) + \tfrac{1}{2} = −1 + \tfrac{1}{2} = −\tfrac{1}{2}$,

whereas the inherited singlet carries $Y(e\_R) = −1$. Again the record must change grade (and the ν_R entry violates the neutrino firewall independently, per Proposition 3).

Therefore the existing right-handed records cannot be promoted into weak doublets while preserving the inherited source ledger. Repair 1 rewrites the ledger; it does not extend it. ■

Reading

The right-handed option does not merely require "more stuff." It conflicts with the inherited charge ledger: the hypercharge a right doublet would be forced to carry (+⅙ for quarks, −½ for leptons) is not the hypercharge the inherited records actually carry. Note for later use that these forced values are exactly the inherited **left**-doublet hypercharges $Y(Q_L) = +1/6$ and $Y(L_L) = -1/2$ — an interlock that Proposition 4.1 exploits.

---

7. Vector-Like Weak Transport Fails

Proposition 4 — $P_W = I$ is inadmissible

The vector-like weak assignment $P_W = I = P_L + P_R$ is inadmissible in the minimal VERSF Standard Model skeleton.

Proof

If $P_W = I$, weak transport acts on both spinorial orientations. Since P_L already contains unresolved weak-branch carriers, the additional content is the action on P_R. But Proposition 3 shows that P_R lacks an admissible unresolved weak carrier unless one of the same two repairs is made: promote right-handed singlets to right doublets, or introduce mirror weak doublets. Both violate the inherited minimal skeleton unless independently forced, and no forcing is inherited.

There is a second, independent obstruction. If both orientations carry weak doublets, the completion interface loses its structural role. Φ_{cl} is inherited (WO-6) as the unique minimal bridge from unresolved weak doublets to committed weak singlets. Under a vector-like assignment the right sector is no longer weak-singlet committed, so either the bridge has no committed target — and the mass-attachment architecture fails — or a second completion carrier must be introduced, contradicting completion-interface uniqueness.

Finally, note what does **not** decide the question. Vector-like assignments are automatically anomaly-safe: left and right contributions cancel identically. Anomaly admissibility therefore cannot exclude $P_W = I$ — and, symmetrically, cannot be what selects the survivor. The exclusion rests on carrier admissibility, minimality, and completion uniqueness, with anomaly consistency held as a necessary side condition throughout.

Therefore vector-like weak transport is inadmissible. ■

Reading

A vector-like weak force would erase the central asymmetry the completion interface is built to resolve. It turns the weak sector into a mirror-symmetric object, while the VERSF matter skeleton is a completion-asymmetric object. Left–right symmetric gauge structures are mathematically consistent as field theories; what excludes them here is not internal inconsistency but substrate admissibility — they demand unresolved right-branch support the substrate does not supply, plus completion machinery the substrate does not force.

Proposition 4.1 — Vector-like weak transport destroys completion-mediated mass attachment

If both chiral orientations carry matching weak doublets, a direct gauge-invariant Dirac mass channel opens that bypasses the completion interface entirely.

Proof

Suppose both orientations carry weak doublets Q_L and Q_R (respectively L_L and L_R). In SU(2), the doublet product decomposes as

$\bar{2} \otimes 2 \supset 1$,

so the left–right bilinear

$\bar{Q}_L Q_R$ (respectively $\bar{L}_L L_R$)

contains a weak singlet. It is a full gauge singlet — hence an admissible bare Dirac mass term — precisely when the hypercharges match, $Y(Q_L) = Y(Q_R)$. But by Proposition 3.1, charge coherence forces any right quark doublet to carry $Y(Q_R) = +1/6$, which is exactly the inherited $Y(Q_L) = +1/6$; likewise $Y(L_R) = -1/2 = Y(L_L)$. So in any charge-coherent vector-like assignment, the hypercharge match is automatic, and the bare mass channel

$m \cdot \bar{Q}_L Q_R$, $m \cdot \bar{L}_L L_R$

is gauge-invariant without any completion insertion.

That is inadmissible in the VERSF stack, on two independent legs.

Leg A (inherited-theorem leg). The completion interface Φ_{cl} is inherited (WO-6) as the **necessary and unique** bridge between weak-active doublets and weak-singlet committed records: mass attachment is derived to require completion mediation. A vector-like weak assignment makes mass attachment possible without the interface, removing the structural necessity that the completion-interface theorem establishes. On this leg, the vector-like option contradicts an inherited theorem. This leg is exposed to Debt 7: if the parent theorem establishes only uniqueness-given-need, Leg A regrades to a minimality argument.

Leg B (carrier-requirement leg). Independent of the parent theorem's grading, a bare mass term is a left–right bridge operator: it connects the two chiral faces of the carrier. By WO-8 — completion requires a carrier — such bridge structure must be mediated by a substrate completion carrier, not written down as a bare coefficient. A bare coefficient m is bridge structure with **no** carrier: completion performed by no substrate operator, which WO-8 forbids. This is consonant with the census discipline of Lemma 1 and Proposition 5 — which exclude off-diagonal operators in the different role of orientation selector — but Leg B does not rest on them: a mass term is a Lorentz-invariant scalar in the dynamics, not a selector, and was never in the census. Leg B rests on WO-8 alone. Its independence from Leg A is therefore exactly the independence of WO-8's provenance from the Completion-Interface Theorem, recorded as Debt 7, component iii: confirmed independent, the legs are two; sourced from the same theorem, they collapse to one.

The vector-like option therefore does not merely offend a minimality preference. It contradicts an inherited theorem (Leg A) and, on presently independent grounds, the carrier requirement WO-8 (Leg B). The exposure map is explicit: a Debt 7(i) regrade removes Leg A's theorem status; a Debt 7(iii) collapse merges the legs; only both failing together reduces the proposition to minimality.

So P_W = I fails twice over:

1. the right orientation lacks an inherited unresolved branch carrier (Proposition 4, first obstruction);
2. repairing it opens a completion-free bare mass channel, making the completion interface non-unique or unnecessary (this proposition). ■

Scope note. The bare-mass channel applies to the charge-coherent vector-like assignment — right doublets built from the existing records, whose hypercharges are then forced to match the left doublets'. A mirror-doublet vector-like variant with non-matching hypercharges escapes this proposition's channel, but is caught upstream by Proposition 4's first obstruction and, more strongly, by Proposition 4.2 below, which converts most of the WO-5 territory from minimality discipline into a conditional census result. The obstructions thus divide the vector-like territory between them: coherent promotion falls to the mass channel; mirror addition falls partly to Proposition 4.2's census routes and partly — the Φ_cl-coupled and decoupled residues — to minimality, pending the Debt 7 scope audit and the Debt 3 census respectively.

Reading

In the Standard Model, chirality is what forbids bare fermion masses and forces mass generation through the Higgs. The VERSF stack derives the corresponding statement in the other direction: mass attachment is completion, completion requires a carrier, and any weak orientation that would permit carrier-free completion — a bare mass — is thereby inadmissible. Vector-like transport is exactly such an orientation, and the inadmissibility stands on the carrier requirement WO-8 (Leg B) even before the completion-interface theorem is invoked (Leg A), provided the two premises are confirmed independent (Debt 7, component iii).

Proposition 4.2 — Partial mirror-sector exclusion

Conditional on WO-3 (chiral locking) and WO-6 (completion-interface necessity and uniqueness), no mirror weak doublet sector is admissible that either occupies the committed face of the inherited carrier or requires a second completion carrier. Mirror configurations that complete through the existing interface Φ_{cl} are **not** excluded by this proposition; their exclusion is conditional on the scope of the parent completion-interface theorem (Debt 7, component ii).

Proof

A mirror weak doublet sector at this layer must place unresolved two-branch weak structure somewhere. There are three routes.

Route 1: on the existing carrier. The spinorial carrier S has exactly two Lorentz-stable orientation faces — Lemma 1's commutant is two-dimensional, so there is no third face. One face carries the inherited unresolved doublets; by WO-3 the opposite face carries branch-committed singlet records. Placing mirror unresolved structure on the committed face contradicts WO-3 directly. This route is closed.

Route 2: on new carriers, with a second completion carrier. New spinorial carriers hosting unresolved doublets, completed by a new bridge of their own, require a second completion carrier — contradicting WO-6 uniqueness. This route is closed.

Route 3: on new carriers, completing through the existing Φ_{cl}. This route is not closed by gauge structure. Explicitly: a charge-coherent mirror right quark doublet Q_R with $Y = +\tfrac{1}{6}$ (the value charge coherence forces, Proposition 3.1) together with new left-handed singlets u'_L ($Y = +\tfrac{2}{3}$) and d'_L ($Y = -\tfrac{1}{3}$) admits gauge-invariant Yukawa couplings through the existing interface,

$$Y(\bar{Q}_R\, \Phi\, d'_L) = -\tfrac{1}{6} + \tfrac{1}{2} - \tfrac{1}{3} = 0, \quad Y(\bar{Q}_R\, \tilde{\Phi}\, u'_L) = -\tfrac{1}{6} - \tfrac{1}{2} + \tfrac{2}{3} = 0,$$

with the SU(2) singlet supplied by $\bar{2} \otimes 2 \supset 1$, and likewise in the lepton sector. (All hypercharge sums verified exactly.) This is precisely how mirror families acquire mass from the single Higgs in standard mirror-matter models. Whether this route is nonetheless inadmissible in VERSF depends on a scope question about the parent theorem: if the completion-interface theorem derives Φ_{cl} as the completion carrier **for the inherited doublet–singlet pairing specifically**, then extending its completion reach to new carriers is enlarged bridge structure — a modified interface, not reuse of the same one — and Route 3 collapses into Route 2. If instead the parent theorem derives Φ_{cl} representation-theoretically, as the minimal weak-active completion object available to *any* admissible doublet–singlet pairing, Route 3 stands open and is excluded only by minimality (WO-5). The question is a cross-paper audit item, recorded as Debt 7, component ii.

Routes 1 and 2 are closed unconditionally (given WO-3 and WO-6). Route 3 is closed conditionally on the pairing-specific reading of the parent theorem, and otherwise falls to minimality. ■

Reading

This proposition converts part of WO-5 from minimality preference into census result — but only part, and the boundary is now exact. Closed outright: mirror structure on the committed face (no room), and mirror structure demanding its own bridge (no second carrier). Open pending the Debt 7 scope audit: mirror carriers riding the existing bridge. Open pending Debt 3: the fully decoupled mirror world. An earlier draft of this proposition claimed Route 3 closed on the ground that new carriers "require their own bridge"; the explicit Yukawa arithmetic above shows that claim false at the gauge level, and the honest statement is the conditional one given here.

Impact of the residues on SM-1 — two very different cases. The **decoupled** residue (Debt 3) is inert by construction: a sector sharing no faces, no completion channel, and no transport with the inherited stack cannot alter which orientation the inherited weak connection attaches to, and the moment it couples through any of those routes it ceases to be decoupled and falls under this proposition or its Debt 7 conditional. Its resolution in either direction leaves SM-1's closure intact. The **Φ_cl-coupled** residue (Route 3) is not inert, and the paper must say so plainly: if the substrate were shown to force such a sector, weak-active doublets would exist on right-handed carriers, and while the convention-free theorem $P_W = P_U$ would survive — weak transport would still attach to unresolved branch structure, wherever it lives — the corollary that weak attachment is globally left-handed would be revised. That is exactly the scenario falsifier F3 exists to record. The closure of SM-1 therefore carries the Route 3 conditionality explicitly: it is closed against Route 3 by minimality now, and by census only if the Debt 7 scope audit returns the pairing-specific reading.

Anomaly side-audit

Anomaly admissibility is necessary but not sufficient for weak-orientation selection.

A fully vector-like weak sector is automatically anomaly-safe: left and right contributions cancel identically. Therefore anomaly cancellation cannot be the principle that selects P_L, and this paper never uses it as one. Anomaly admissibility enters only as a side-condition: any admissible orientation must preserve the inherited anomaly-admissible source ledger, but anomaly safety alone does not make an orientation admissible.

This blocks a common confusion:

anomaly-safe ⇏ substrate-admissible.

The weak orientation is selected by unresolved-branch support (Lemma 2), projector admissibility (Lemma 1), completion-interface necessity and uniqueness (WO-6, Proposition 4.1 Leg A), the carrier requirement (WO-8, Proposition 4.1 Leg B), and mirror exclusion (Proposition 4.2 with the WO-5 residues) — not by anomaly cancellation.

---

8. Mixed Weak Orientation Fails

Proposition 5 — Mixed weak orientations are inadmissible

No mixed or continuously rotated orientation $P_W = P_\theta$ is admissible as the weak projector.

Proof

By Lemma 1 the census is already closed: every Lorentz-stable idempotent on S lies in $\{0, P_L, P_R, I\}$, so no candidate outside that set exists to consider. It remains only to make the two failure modes explicit.

Diagonal mixtures. $P_\theta = a \cdot P_L + b \cdot P_R$ with $(a, b) \notin \{0,1\}^2$ fails idempotency, since $(a^2 - a) \cdot P_L + (b^2 - b) \cdot P_R \neq 0$. A non-idempotent selector does not define an orientation: repeated selection changes the selected content.

Off-diagonal mixtures. Any operator with a component mapping S_L into S_R (or conversely) fails Lorentz stability, since by Schur's lemma no nonzero intertwiner exists between the inequivalent Weyl irreducibles. Such an operator is additional spinorial structure — structurally a completion or mass bridge — and using it as P_W would make the weak connection itself perform left–right completion, collapsing the derived distinction between gauge transport and mass attachment and contradicting WO-6.

Therefore no mixed weak orientation is admissible. ■

Reading

The weak force cannot be "a little bit left and a little bit right" at the substrate orientation level. Representation theory forbids it: there is no stable object for such an assignment to be.

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9. Left-Oriented Weak Transport Survives

Proposition 6 — $P_W = P_L$ is admissible

The left-oriented weak assignment $P_W = P_L$ is admissible under the inherited VERSF matter skeleton.

Proof

By inherited chiral locking, the P_L orientation contains the unresolved two-branch weak carriers

$L_L = (\nu_L, e_L)$, $Q_L = (u_L, d_L)$.

By Lemma 2, these are precisely the carriers on which weak SU(2)-type branch transport can act: each is a two-branch module sharing one bath, on which the full su(2) generator set acts nontrivially. The opposite orientation contains the committed singlet records e_R, u_R, d_R, which serve as completion targets rather than weak branch carriers.

The assignment $P_W = P_L$ therefore:

1. supplies a genuine two-branch weak carrier in both the lepton and quark sectors;
2. requires no mirror weak sector;
3. preserves the right-handed singlets as completion targets;
4. leaves the completion interface Φ_{cl} structurally necessary and unique;
5. respects the inherited anomaly-admissible source ledger without revision;
6. introduces no additional low-energy weak representation.

Thus $P_W = P_L$ satisfies every admissibility premise WO-1 through WO-8: in particular it requires no bare left–right bridge, since its mass attachment proceeds through Φ_{cl}. ■

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10. The Weak-Orientation Admissibility Theorem

Theorem 7 — Weak-Orientation Admissibility

Given:

1. the spinorial source-carrier dichotomy $S = S_L \oplus S_R$ into inequivalent Weyl factors (WO-1);
2. inherited chiral locking, with unresolved weak doublets on the orientation P_U and branch-committed singlets on the opposite orientation (WO-3);
3. the requirement that weak SU(2)-type transport act only on a genuine unresolved two-branch carrier (WO-2, Lemma 2);
4. Lorentz-stable projector admissibility (WO-4, Lemma 1);
5. no hidden mirror weak sector at the same layer (WO-5);
6. completion-interface necessity and uniqueness (WO-6);
7. the empirical V–A firewall (WO-7);
8. the carrier requirement for left–right completion (WO-8);

the unique admissible weak orientation is the unresolved-branch orientation:

$P_W = P_U$.

Corollary. Under the inherited source-carrier naming convention $P_U = P_L$,

$P_W = P_L$.

Proof

By Lemma 1, the nontrivial orientation candidates are exactly P_L, P_R, and I; no mixed candidate exists (Proposition 5 makes the failure modes explicit).

By Proposition 3, P_W = P_R is inadmissible: the P_R orientation contains branch-committed singlet records rather than unresolved weak branch carriers, and every repair requires inadmissible mirror or right-doublet structure. Proposition 3.1 reinforces the exclusion: promotion of the existing right records to doublets contradicts the inherited hypercharge ledger, so the repair rewrites rather than extends the source ledger.

By Proposition 4, P_W = I is inadmissible: vector-like weak transport duplicates the right-sector obstruction and destroys completion-interface uniqueness, and anomaly safety cannot rescue it. Proposition 4.1 sharpens the second obstruction on two independent legs: the bare Dirac mass channel opened via $\bar{2} \otimes 2 \supset 1$ contradicts inherited completion necessity (Leg A) and constitutes carrier-free bridge structure forbidden by the carrier requirement WO-8 (Leg B). Proposition 4.2 closes the mirror repair routes that occupy the committed face or require a second completion carrier, conditional on WO-3 and WO-6; the Φ_cl-coupled mirror route is excluded conditionally, pending the Debt 7 scope audit, and by minimality meanwhile.

By Proposition 6, P_W = P_U is admissible and satisfies all eight premises.

Elimination is exhaustive over a census closed by representation theory. Therefore the unique admissible weak orientation is P_W = P_U, and under the inherited convention P_W = P_L. ■

Reading

The weak force is left-handed because only the left-handed source-carrier face contains the unresolved weak branch structure that weak transport requires. This is not an empirical V–A insertion. It is an admissibility result, with the physical content carried by the convention-free statement P_W = P_U and the familiar label supplied by the corollary.

---

11. Relation to the Standard Model

In the Standard Model, weak interactions are written with left-handed doublets

L_L = (ν_L, e_L), Q_L = (u_L, d_L)

and right-handed singlets

e_R, u_R, d_R.

The Standard Model encodes this structure. It does not explain why the assignment is left-handed; the assignment is representation input, chosen to match observation.

This paper gives the VERSF explanation:

weak transport requires unresolved branch support; unresolved branch support inhabits P_L; therefore $P_W = P_L$.

The theorem reproduces the Standard Model chirality pattern without using the observed weak current as input. The pattern moves from the Standard Model's input ledger to the VERSF derivation chain, conditional on the inherited chiral-locking layer.

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12. Relation to the Completion-Interface Theorem

The completion-interface theorem derives the Higgs-doublet-form object $\Phi_{cl} \sim (1, 2, +½)$ as the common carrier of weak-branch completion, electroweak breaking, and mass attachment. It relies on the asymmetry between weak doublets and right-handed singlets.

The present theorem strengthens that foundation. It explains why the weak-active side of the asymmetry is the left-handed side, and the two results interlock without circularity: the completion-interface theorem takes the doublet/singlet asymmetry as given and derives the unique bridge; the present theorem takes the bridge's uniqueness as an admissibility constraint and derives which orientation is weak-active. Neither uses the other's conclusion as its own premise.

Weak-orientation theorem: $P_W = P_L$. Completion-interface theorem: Φ_{cl} completes P_L doublets against P_R singlets.

The electroweak completion interface is therefore not merely a bridge between arbitrary representations. It is the bridge between the weak-admissible orientation and the branch-committed orientation.

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13. What Has Actually Been Derived

Conditionally on inherited source-carrier and chiral-locking premises, this paper derives:

1. the Lorentz commutant on the spinorial carrier is span$\{P_L, P_R\}$, so the census of orientation selectors is closed at $\{0, P_L, P_R, I\}$;

2. weak SU(2)-type transport requires an unresolved two-branch carrier, since su(2) admits no nontrivial one-dimensional action;
3. right-oriented weak transport fails because the right orientation is branch-committed and every repair is inadmissible;
4. promotion of the existing right singlets to weak doublets contradicts the inherited hypercharge ledger (forced $Y = +\frac{1}{6}$ for quarks and $-\frac{1}{2}$ for leptons versus inherited grades $+\frac{2}{3}, -\frac{1}{3}, -1$);
5. vector-like weak transport fails because it requires mirror or right-doublet structure and destroys completion-interface uniqueness, with anomaly safety explicitly insufficient to rescue it;
6. any charge-coherent vector-like assignment opens a gauge-invariant bare Dirac mass channel via $\bar{2} \otimes 2 \supset 1$, inadmissible on two independent legs — contradiction of inherited completion necessity (Leg A), and carrier-free bridge structure forbidden by the carrier requirement WO-8 (Leg B);
7. mirror weak sectors occupying the committed face or requiring a second completion carrier are excluded conditional on WO-3 and WO-6; the Φ_cl-coupled mirror route is shown gauge-consistent by explicit Yukawa arithmetic and its exclusion is honestly regraded to minimality pending the Debt 7 scope audit;
8. mixed weak orientations fail by Schur's lemma and idempotency, not by stipulation;
9. left-oriented weak transport survives because it acts exactly on the unresolved weak branch carriers;
10. therefore P_W = P_U, and under the inherited convention P_W = P_L.

This paper does **not** derive:

1. the full spinorial source-carrier construction;
2. the chiral-locking theorem itself;
3. the number of generations;
4. the hypercharge ledger;
5. weak coupling values;
6. the electroweak completion interface;
7. the Higgs potential;
8. W/Z masses;
9. CKM or PMNS structure;
10. fermion mass values;
11. full quantum electroweak renormalisation.

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14. Open Debts

Debt 1 — Chiral-locking derivation audit

This paper inherits chiral locking. A dedicated audit must verify that the unresolved weak-branch orientation and committed singlet orientation are substrate-forced, not empirically named. The audit criterion is fixed in §0″.2: the parent derivation passes if its grounds for the asymmetric placement are substrate-structural (inequivalent Weyl faces, directional completion architecture), and fails if any load-bearing step justifies the placement only by observed particle content — in which case the V–A firewall of this paper is breached upstream and the closure grade of Appendix G must be withdrawn. This is the largest single exposure of the present theorem.

Debt 2 — Right-sector non-selection proof

The present proof excludes right weak transport by the absence of right unresolved branch support. A stronger version should derive the non-existence of right weak branch support directly from source-carrier stability, rather than inheriting it through WO-3.

Debt 3 — Mirror-sector exclusion census (residues)

Proposition 4.2 excludes mirror weak doublet sectors that occupy the committed face (contradicting WO-3) or demand a second completion carrier (contradicting WO-6). Two residues remain, of very different character.

Residue (a) — the Φ_{cl}-coupled mirror sector (Route 3). Mirror carriers completing through the existing interface are gauge-consistent (the Yukawa arithmetic in Proposition 4.2 is exact) and are excluded at present only by minimality. Their census-level exclusion depends on the Debt 7 scope audit (component ii): pairing-specific Φ_{cl} closes the route; representation-generic Φ_{cl} leaves it to minimality or a future census theorem. This residue is chirality-relevant: if substrate-forced, it triggers F3 and revises the naming corollary, though not the convention-free theorem $P_W = P_U$.

Residue (b) — the decoupled mirror world. A sector with its own carriers, records, and interface, sealed off from the inherited stack. Excluded only by minimality until a census theorem exists. This residue is inert for SM-1: by construction it cannot alter the inherited weak attachment, and its resolution in either direction leaves the closure grade of Appendix G unchanged.

The census theorem owed here must address both residues; residue (a) may alternatively be discharged by the Debt 7 scope audit.

Debt 4 — Neutrino branch integration

If a sterile or right-handed neutrino branch is later selected, the theorem must be re-audited to confirm the new branch enters as a weak singlet (or as structure above this layer) and does not reopen right weak doublet transport.

Debt 5 — Anomaly-descent integration

The theorem uses the inherited anomaly-admissible ledger as a necessary side condition. Once a substrate-native anomaly descent theorem exists, the weak orientation must be re-audited against it.

Debt 6 — Quantum completion

The theorem is representation-level and source-carrier-level. Full quantum gauge completion — the weak sector as a renormalised quantum theory — remains downstream.

Debt 7 — Completion-architecture cross-paper audit (three components)

Component (i) — necessity vs uniqueness-given-need. Sections 0″.5 and WO-6 declare the completion interface as both necessary and unique, and Leg A of Proposition 4.1 rests on the necessity component. Confirm against the Completion-Interface Theorem's claim ledger. Failure consequence: Leg A regrades from theorem-contradiction to minimality argument.

Component (ii) — Φ_{cl} scope: pairing-specific or representation-generic. Route 3 of Proposition 4.2 (mirror carriers completing through the existing interface) is excluded at census level only if the parent theorem derives Φ_{cl} as the completion carrier for the inherited doublet–singlet pairing specifically, so that serving new carriers constitutes enlarged bridge structure. Confirm the parent theorem's scope. Failure consequence: Route 3 falls to minimality, and Debt 3's residue (a) stands as stated.

Component (iii) — WO-8 provenance. Leg B of Proposition 4.1 rests on WO-8 (completion requires a carrier), declared as inherited from the commitment-event and fold-interface layer. Confirm that WO-8's actual derivation is upstream of, and independent from, the Completion-Interface Theorem. Failure consequence: Legs A and B collapse into one, and Proposition 4.1 reverts to its single-leg form.

Joint failure consequence, stated in advance: if (i) and (iii) both fail, the vector-like exclusion rests on Proposition 4's first obstruction plus WO-5 minimality, and the closure grade of Appendix G must be re-audited. The theorem's conclusion survives every combination; its strength against the vector-like and mirror rivals varies with the audit outcomes.

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15. Falsification Conditions

F1 — Weak transport on a singlet

If a nontrivial weak SU(2)-type connection can act on a branch-committed singlet without hidden branch support, Lemma 2 fails. (Given standard su(2) representation theory, this would require the singlet to carry hidden multi-line structure — itself a substrate discovery.)

F2 — Right weak carrier discovered

If the right orientation is shown to carry unresolved weak branch doublets at the same layer, Proposition 3 fails and WO-3 is falsified.

F3 — Mirror weak sector forced

If the substrate forces mirror weak doublets, WO-5 fails and the vector-like and right-oriented exclusions must be reopened.

F4 — Mixed projector admissible

If a Lorentz-stable mixed chiral weak projector exists without additional structure, Lemma 1 fails — which, given Schur's lemma, would require the two Weyl factors to be equivalent Lorentz representations, falsifying WO-1 as stated.

F5 — Completion-interface necessity or uniqueness fails

If the completion interface is not the unique left–right weak bridge, the second obstruction in Proposition 4 weakens. If, independently, a direct mass-attachment channel between weak-active doublets and committed singlet records is admissible without completion mediation — necessity failure — then Proposition 4.1's premise fails and its exclusion regrades from theorem-contradiction to minimality argument. Either failure mode leaves the vector-like exclusion resting on minimality alone. This falsifier matches both components of WO-6.

F6 — Chiral locking fails

If the inherited chiral-locking theorem fails, the present theorem loses its base. P_U is then undefined and the theorem is void rather than false.

F7 — Empirical V–A contamination

If any step in the derivation relies on observed parity violation, the paper fails its methodological firewall regardless of the truth of its conclusion.

F8 — Reversed source-carrier convention

If the source-carrier convention identifies the unresolved weak-branch orientation with P_R rather than P_L, the corollary reverses its labels while the theorem $P_W = P_U$ survives unchanged. This falsifier targets only the naming layer; the physical content — weak transport attaches to the unresolved branch orientation — is unaffected.

F9 — Parity-stable orientation selector forced

If the substrate is shown to force stability of the orientation selector under the parity-extended Lorentz group — not merely the proper orthochronous component — the commutant collapses from span{P_L, P_R} to span{I} (Remark 1.1), the census becomes {0, I}, and the only nontrivial candidate is vector-like. The present theorem then fails outright, since P_L is no longer in the census. This is the sharpest available structural falsifier: it targets the stability-group choice of §0.1 rather than any individual proposition. If it triggers, it also forces the reconsideration recorded in F3, though F3 can trigger independently — the substrate could force mirror weak doublets without ever forcing parity-stability of the selector — so neither falsifier is redundant.

F10 — Bare left–right bridge admissible

If a bare coefficient connecting the two chiral faces of the carrier is admissible without carrier mediation, WO-8 fails, Leg B of Proposition 4.1 falls, and the vector-like exclusion rests on Leg A alone — itself exposed to Debt 7(i). If F10 triggers jointly with a Debt 7(i) regrade, the vector-like exclusion reduces to Proposition 4's first obstruction plus minimality, as recorded in Debt 7's joint failure consequence.

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16. Milestone Statement

The result of this paper is:

unresolved weak-branch carrier + projector admissibility (Schur) + completion necessity and uniqueness + ledger coherence ⟹ P_W = P_U = P_L.

The paper does not yet derive the full chiral matter skeleton. It does something narrower and crucial: it proves that once the substrate supplies one unresolved branch orientation and one committed singlet orientation, the weak connection has **no admissible freedom**. It cannot attach to the committed orientation (no carrier, and promotion contradicts the hypercharge ledger). It cannot attach to both orientations (mirror structure is unforced, and a bare mass channel would void the completion interface). It cannot attach to a mixture (Schur's lemma leaves no such object). It must attach to the unresolved branch orientation. In the inherited source-carrier convention, that is the left-handed orientation.

Weak handedness is therefore no longer an empirical representation choice. It is the unique admissible attachment of weak transport to the substrate's unresolved branch face.

This closes the weak-orientation gate conditionally on inherited chiral locking.

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17. Conclusion

The weak force is famously chiral. In the Standard Model, that chirality is written into the theory as a representation assignment: left-handed fermions form weak doublets, while right-handed fermions are weak singlets.

The present paper gives the VERSF reason for that assignment.

Weak transport is transport of unresolved two-branch commitment. It needs a two-way branch carrier, because su(2) cannot act nontrivially on a single committed line. The inherited spinorial source-carrier architecture supplies exactly one orientation with such carriers. In the standard convention, that orientation is left-handed. The opposite orientation carries committed singlet records — the right-handed charged lepton, up quark, and down quark. Those records are completion targets, not weak branch carriers.

The possible alternatives fail, and the list of alternatives is provably complete. Schur's lemma closes the census of Lorentz-stable orientation selectors at four: left, right, both, neither. Right-handed weak transport has no unresolved branch carrier unless new mirror or right-doublet structure is added, and none is substrate-forced. Vector-like weak transport duplicates that problem and destroys the completion-interface asymmetry, and its automatic anomaly safety cannot save it, because anomaly admissibility is necessary rather than sufficient. Mixed orientations are not stable objects at all.

The only survivor is

$P_W = P_U = P_L$.

That is the theorem.

The paper therefore moves weak handedness from the list of Standard Model brute facts into the VERSF derivation chain. The result is conditional, because the chiral-locking and source-carrier machinery remain load-bearing inherited layers, and the debts and falsifiers record that exposure without disguise. But the logic is finite, closed, and falsifiable.

In one sentence:

The weak force is left-handed because only the left-handed spinorial source-carrier face contains the unresolved two-branch commitment structure that weak transport can act on — and representation theory guarantees there is nowhere else for it to attach.

That is the milestone.

Appendix A — Candidate Orientation Audit Table

Candidate	Weak carrier present?	New matter required?	Completion interface preserved?	Census status	Verdict
P_W = P_L	yes	no	yes	in census	admissible
P_W = P_R	no	yes	no	in census	excluded (Props. 3, 3.1)
P_W = I	left yes, right no	yes	no	in census	excluded (Props. 4, 4.1 two-leg, 4.2)
mixed P_θ	—	—	—	excluded from census by Lemma 1	excluded (Prop. 5)
sector hybrid (e.g. P_L on leptons, P_R on quarks)	fails in the right-assigned sector	yes, in that sector	no	per-carrier census; see Remark 1.2	excluded sector-wise (Props. 3, 3.1, 4.1 per sector)

Appendix B — No-Empirical-Input Audit

The following facts are **not** used in the proof:

1. observed beta-decay parity violation;
2. measured V–A charged-current structure;
3. observed neutrino helicity;
4. measured W-boson couplings;
5. measured weak mixing angle;
6. CKM data;
7. PMNS data;
8. fermion mass values.

The proof uses only:

1. spinorial source-carrier orientation into inequivalent Weyl factors;
2. inherited chiral locking (location of P_U);
3. weak branch as unresolved twofold commitment;
4. Schur-commutant projector admissibility;

5. su(2) representation theory (no nontrivial one-dimensional action; $\bar{2} \otimes 2 = 1 \oplus 3$);
6. the inherited hypercharge ledger and charge relation $Q = T_3 + Y$, used in Propositions 3.1 and 4.1 as consistency constraints, never as chirality selectors;
7. completion-interface necessity and uniqueness;
8. the carrier requirement for left–right completion (WO-8), inherited from the commitment-event and fold-interface layer;
9. minimal no-mirror-sector discipline.

Audit note on item 6: the hypercharge grades are inherited numbers, and the derivation uses them only to test whether rival assignments preserve them. No hypercharge value is chosen to favour a chirality; the same arithmetic applied to a hypothetically reversed ledger would reverse the corollary's labels while leaving the theorem P_W = P_U intact, consistent with F8.

Audit note on the labels "left" and "right": these words appear throughout the paper, but they enter the derivation only through the inherited convention P_U = P_L, which is a naming inheritance from the source-carrier stack, not an observational input. The convention-free theorem P_W = P_U contains the labels nowhere.

Appendix C — Claim-Status Ledger

Claim	Status	Comment
S = S_L ⊕ S_R, inequivalent Weyl factors	Inherited	Source-carrier layer
Lorentz commutant on S is span{P_L, P_R}	Derived here	Lemma 1, Step 1; explicit computation
Lorentz-stable idempotents are {0, P_L, P_R, I}	Derived here	Lemma 1, Step 2
Weak branch requires twofold unresolved carrier	Derived here	Lemma 2; su(2) representation theory
Right orientation branch-committed	Inherited	Chiral-locking stack (WO-3)
P_R excluded	Derived here	Proposition 3
Right-singlet promotion contradicts inherited ledger	Derived here	Proposition 3.1; hypercharge arithmetic verified
I excluded	Derived here	Proposition 4; anomaly safety insufficient
Vector-like bare mass channel inadmissible	Derived here	Proposition 4.1, two legs: Leg A exposed to Debt 7(i), Leg B rests on WO-8, exposed to Debt 7(iii)
WO-8: completion requires a carrier	Inherited	Provenance confirmation owed, Debt 7(iii)
Mixed P_θ excluded	Derived here	Proposition 5, via Lemma 1

Claim	Status	Comment
P_L admissible	Derived here	Proposition 6
P_W = P_U	Central theorem	Convention-free; conditional on chiral locking
P_W = P_L	Corollary	Under inherited naming P_U = P_L
No empirical V–A input	Firewall	Appendix B
Mirror exclusion: committed-face and second-carrier routes	Derived here	Proposition 4.2, Routes 1–2, conditional on WO-3, WO-6
Mirror exclusion: Φ_cl-coupled route	Conditional	Minimality now; census iff Debt 7(ii) returns pairing-specific Φ_cl
Decoupled mirror-world exclusion	Conditional	Residual census theorem owed (Debt 3, residue b); inert for SM-1
Full chirality proof	Conditional	Chiral-locking audit owed (Debt 1)

Appendix D — Referee Objections and Responses

Objection 1 — "You assumed left-handed doublets, then proved the weak force is left-handed."

Response: The paper inherits a chiral-locking asymmetry, but it does not use observed weak handedness, and the theorem is deliberately split into two layers to make the division auditable. The inherited premise is that one spinorial orientation carries unresolved two-branch support while the opposite carries committed singlet records — a structural asymmetry, stated without the words "left" or "right". The theorem proves that weak transport must attach to the unresolved orientation and can attach nowhere else: P_W = P_U. The label "left" enters only in the corollary, through the source-carrier naming convention. Falsifier F8 makes the separation operational: reversing the convention flips the corollary and leaves the theorem intact.

Objection 2 — "The proof is just Standard Model representation theory."

Response: The proof uses representation theory — Schur's lemma and the representation content of su(2) — but not the Standard Model's representation *assignments*. Standard Model representation theory states which fields sit in which representations, as input. This paper asks which spinorial orientation is admissible before any assignment is made, closes the census of candidates by Schur's lemma, and eliminates the rivals by substrate admissibility. No step restates observed weak couplings.

Objection 3 — "Right-handed weak doublets are mathematically possible."

Response: Yes. They are mathematically possible if new right-handed doublet structure is added; left–right symmetric gauge theories are internally consistent field theories. The theorem excludes them in the minimal inherited VERSF skeleton because they are not substrate-forced and because they destroy the completion-interface asymmetry. The exclusion is admissibility relative to the substrate, not impossibility in the space of all field theories. A substrate result forcing mirror weak doublets would trigger F3 and revise this paper.

Objection 4 — "Vector-like weak forces can be anomaly-safe."

Response: They are anomaly-safe — automatically so, which is precisely why anomaly admissibility cannot be the discriminator, and the paper never uses it as one (§0″.4, Proposition 4). The vector-like assignment fails because it requires right-weak branch support absent from the inherited skeleton and makes the completion interface non-unique. Anomaly admissibility is necessary, not sufficient.

Objection 5 — "You have not proven chiral locking here."

Response: Correct, and the paper says so at every level: the claim grade (§1), the inherited-infrastructure section (§0″.2), Debt 1, and falsifier F6. Chiral locking is inherited and explicitly firewalled. This paper closes the weak-orientation gate conditional on that inherited result. What the paper adds beyond chiral locking is the exclusivity: chiral locking locates the unresolved structure, while this paper proves the weak force can attach to nothing else — including proving, via Schur, that no mixed alternative exists to attach to.

Objection 6 — "Lorentz stability is too strong a requirement; why must the weak projector commute with the full spin action?"

Response: Because P_W is an orientation selector for a local gauge attachment, and an orientation that changed under a change of frame would not define a consistent local transport: the set of weak-active components would be observer-dependent, and the covariant derivative built on it would fail to transform covariantly. Frame-independence of the gauge-orientation assignment is exactly the statement $[\Sigma^{\mu\nu}, P_W] = 0$. Weakening this requirement does not open new candidates gently — it abandons the claim that P_W is an orientation of the spinorial carrier at all.

Objection 7 — "Left–right symmetric theories exist, so P_W = P_L cannot be forced."

Response: Left–right symmetric theories are mathematically consistent extensions of the Standard Model. This paper does not deny their formal consistency. It asks whether the VERSF substrate forces the additional ingredients they require: right-handed unresolved weak doublets, revised source ledgers (Proposition 3.1), extra gauge structure such as a separate SU(2)_R factor, and additional completion carriers to control the bare mass channel of Proposition 4.1. In the inherited minimal VERSF skeleton, none of those ingredients is forced. Left–right symmetry is therefore excluded here by substrate economy, ledger coherence, and completion uniqueness — not by field-theoretic inconsistency. Appendix E tabulates the cost of each repair route; Proposition 4.2 excludes the committed-face and second-carrier routes outright, while the route through the existing Φ_cl — gauge-consistent, as the Yukawa arithmetic in Proposition 4.2 shows — is held by minimality pending the Debt 7 scope audit, and the decoupled mirror world by minimality pending Debt 3. If the substrate is later shown to force any of those ingredients, falsifier F3 triggers and the exclusion must be reopened.

Objection 8 — "Your census presupposes that parity is not a symmetry the selector must respect. That is uncomfortably close to presupposing the conclusion."

Response: The objection correctly identifies that the stability group is load-bearing: as Remark 1.1 shows quantitatively, imposing parity-stability collapses the commutant to span{I} and the census to {0, I}, leaving vector-like as the only nontrivial option. The choice is therefore stated, defined, and defended rather than assumed (§0.1), and the defence is operational, not circular. Lorentz stability of an orientation selector is required because local gauge transport must be consistent under the frame changes observers can actually perform, and those changes generate the proper orthochronous component only — parity is not a continuous frame change but a discrete extension. Whether the substrate represents that extension as a symmetry is exactly the question under adjudication: a chiral assignment breaks it, a vector-like assignment preserves it. Requiring the selector to be parity-stable would therefore decide the question by definition in favour of the vector-like answer — the inversion of burden the objection worries about, applied in the opposite direction. The neutral procedure is the one used: demand only what frame-consistency forces (proper orthochronous stability), let the census come out as {0, P_L, P_R, I}, and adjudicate among the survivors by substrate admissibility. The exposure is honestly recorded: if the substrate independently forces parity-stability of the selector, F9 triggers and the theorem fails outright — not merely reopens.

Appendix E — Right-Sector Repair Cost Table

Each route by which the right orientation could be made weak-active carries an identifiable cost, and each cost violates an inherited constraint of the minimal skeleton.

Right-sector repair	What it adds	Why it fails in this paper
Promote u_R, d_R, e_R into doublets	Changes their hypercharges/source grades (forced Y = +⅙, −½)	Violates inherited source ledger (Proposition 3.1)
Add ν_R and right lepton doublets only	Selects the neutrino branch prematurely	Violates neutrino firewall (§0.8)
Mirror doublets on the committed face	Unresolved structure where WO-3 places committed records	Excluded by Proposition 4.2, Route 1
Mirror carriers with their own completion bridge	A second completion carrier	Excluded by Proposition 4.2, Route 2 (WO-6 uniqueness)
Mirror carriers completing through the existing Φ_cl	Gauge-consistent mirror Yukawas (arithmetic in Prop. 4.2)	Excluded by minimality now; by census iff Debt 7(ii) returns pairing-specific Φ_cl
Decoupled mirror world	Sealed-off carriers, records, and interface	Excluded by minimality only; residual census owed (Debt 3, residue b); inert for SM-1
Add a second completion carrier for the inherited sector	New mass bridge alongside Φ_cl	Breaks completion-interface uniqueness (WO-6) directly
Add SU(2)_R as a separate gauge factor	New gauge group at this layer	Violates gauge-census closure unless independently derived

The theorem does not claim mirror theories are mathematically inconsistent. It claims they are not admissible in the minimal VERSF Standard Model skeleton unless the substrate independently forces their census and completion machinery. Debt 3 records the owed census theorem that would convert the minimality rows of this table from discipline into proof.

Appendix F — Dependency Ladder

The proof architecture, from inherited base to naming corollary:

Layer	Claim	Status
Spinorial source carrier	Two Lorentz-stable chiral orientations exist (inequivalent Weyl factors)	Inherited
Chiral locking	One orientation carries unresolved branch pairs; the other, committed singlets (defines P_U)	Inherited

Layer	Claim	Status
Hypercharge ledger	Inherited source grades Y(u_R) = +⅔, Y(d_R) = −⅓, Y(e_R) = −1, Y(Q_L) = +⅙, Y(L_L) = −½	Inherited
Stability group	Selector stability owed to proper orthochronous spin action only; parity is a discrete extension under adjudication	Definition, defended (§0.1, Remark 1.1, Objection 8)
Projector census	Only 0, P_L, P_R, I are Lorentz-stable idempotent selectors (per carrier)	Derived here (Lemma 1)
Weak branch condition	SU(2) transport needs two unresolved support lines	Derived here (Lemma 2)
Hypercharge interlock	Charge coherence forces right-doublet grades Y = +⅙, −½, coinciding with the inherited left-doublet grades — the hinge of the bare-mass channel	Derived here (Props. 3.1, 4.1)
Right exclusion	P_R fails: no carrier; promotion contradicts the ledger	Derived here (Props. 3, 3.1)
Vector-like exclusion	I fails: mirror structure unforced; bare mass channel voids Φ_cl	Derived here (Props. 4, 4.1)
Mixed exclusion	P_θ fails: no such stable object exists	Derived here (Prop. 5)
Hybrid exclusion	Sector-hybrid assignments fail sector-wise	Derived here (Remark 1.2)
Mirror exclusion (Routes 1–2)	No free face on the carrier; no second completion carrier	Derived here (Prop. 4.2), conditional on WO-3, WO-6
Mirror residues (Route 3; decoupled)	Existing-Φ_cl completion is gauge-consistent; sealed worlds untouched	Minimality; pending Debt 7(ii) and Debt 3
Carrier requirement	Left–right completion requires a substrate carrier (WO-8)	Inherited; provenance owed (Debt 7 iii)
Orientation theorem	P_W = P_U	Derived here (Theorem 7)
Naming corollary	P_U = P_L ⟹ P_W = P_L	Inherited convention

Every row above the projector census is an exposure; every row from the census down is closed in this paper conditional on the rows above it.

Appendix G — SM-1 Closure Certificate

The Master Ledger defines the SM-1 gate as: eliminate all rival weak orientations and establish the weak attachment orientation without importing observed V–A structure. The pass conditions and their status:

SM-1 pass condition	Status
Stability group stated and defended	Closed by §0.1 definition, Remark 1.1 quantification, Objection 8; exposure recorded as F9
Candidate orientation list exhausted	Closed by Schur-commutant lemma (Lemma 1): per-carrier census is exactly {0, P_L, P_R, I}; sector hybrids excluded sector-wise (Remark 1.2)
Weak transport criterion stated	Closed by unresolved two-branch / su(2) support lemma (Lemma 2)
P_R eliminated	Closed by branch absence (Prop. 3) + source-ledger obstruction (Prop. 3.1)
P_W = I eliminated	Closed by right-sector obstruction (Prop. 4) + two-leg bare-mass obstruction (Prop. 4.1)
Mirror sectors addressed	Routes 1–2 closed by Proposition 4.2 (WO-3, WO-6); Route 3 (via existing Φ_cl) held by minimality pending Debt 7(ii); decoupled residue (Debt 3b) shown inert for the theorem
Mixed orientation eliminated	Closed by Schur/idempotency (Prop. 5)
Survivor shown admissible	Closed: P_W = P_U satisfies WO-1 – WO-8 (Prop. 6, Theorem 7)
Empirical V–A firewall	Closed by no-input audit (Appendix B)
Remaining conditionality named	Chiral-locking audit (Debt 1), mirror-census theorem (Debt 3, two residues), and the completion-architecture cross-paper audit (Debt 7, three components) remain as explicit debts

Closure statement. SM-1 is closed at the conditional-theorem grade: exact given inherited source-carrier and chiral-locking premises; conditional on those premises.

The gate is marked **Closed — Conditional / strong**. Not absolutely complete, because chiral locking and the mirror census remain load-bearing inherited or owed layers, and falsifiers F1–F10 record precisely how the closure could be reopened. But as the ledger defines SM-1 — eliminate rival weak orientations without importing V–A — the gate's pass conditions are all discharged.

Closure impact on the Master Ledger. SM-1 runs first among the Tier A gates because chirality failure is a programme-level failure mode: if VERSF could not account for weak handedness without empirical insertion, the Standard Model derivation programme would be structurally compromised regardless of progress elsewhere. Closing SM-1 therefore does three specific things in the ledger. First, it converts a diffuse programme risk into a single named audit: the remaining chirality exposure is localised entirely in the upstream chiral-locking audit (Debt 1, with its pass/fail criterion now fixed in §0″.2), rather than spread across the weak sector. Second, it changes the citation status of the assignment: downstream gates that consume left-handed weak attachment — the hypercharge ledger derivation, electroweak completion and breaking, and the CKM/PMNS structure — may now cite P_W = P_L as a conditional theorem with a stated dependency chain, not as an assumption. Third, it sharpens the owed items into precisely scoped questions: Debt 3 is split into a chirality-relevant residue (the Φ_cl-coupled mirror route, held by minimality pending the Debt 7 scope audit) and an inert one (the decoupled world), and Debt 7 becomes a three-component cross-paper audit — necessity grading, Φ_cl scope, WO-8 provenance — each with its regrade consequence stated in advance. What SM-1's closure does **not** change: the gates it feeds remain open, and it establishes no numerical electroweak quantity.

The exclusivity statement, restated for the ledger. This paper does not derive the existence of the unresolved weak-branch orientation itself; that result is inherited from the chiral-locking/source-carrier stack. What this paper proves is exclusivity: once that orientation exists, weak transport can attach nowhere else. It cannot attach to the committed face (no carrier, and promotion contradicts the hypercharge ledger), to both faces (mirror structure unforced, and a bare mass channel would void the completion interface), or to a mixed face (no such stable object exists). Weak handedness is the unique admissible attachment of weak transport to the substrate's unresolved branch face.