The Strange Baseline in VERSF

Six-Channel Triad Resolution and the Twentyfold Down-to-Strange Ratio

Keith Taylor *VERSF Theoretical Physics Programme — Quark Mass Hierarchy Series*

Successor to "Quark Masses from One Anchor in VERSF," which reduced the six quark masses to one down-quark anchor plus four dimensionless ratios and identified the strange baseline m_s/m_d = 20 as the weakest inherited input and the highest-leverage unresolved target, because it multiplies the strange, charm, bottom, and top masses simultaneously. This paper proposes a structural origin for that factor and — equally — audits exactly how much of the proposal is a derivation and how much is a combinatorial choice fixed by the target.

Summary for the General Reader

The previous paper showed that if one quark mass is supplied as an anchor, the other five can be computed from a small set of structural ratios. But one of those ratios was still imported from elsewhere: the strange-to-down ratio, m_s/m_d = 20. That number is not a small correction — it multiplies four of the six masses (strange, charm, bottom, top), so if it is an empirical convenience the calculator is weak, and if it is structural the calculator is strong.

This paper proposes that the 20 is the number of three-channel combinations you can form from six basic interface channels: C(6,3) = 20. The picture is that the down quark is the simple, single-channel baseline, while the strange quark is the first down-type quark heavy enough that its confinement has to resolve every available three-channel "triad" of the six-channel interface — and there are exactly twenty of those.

The honest part of the paper is what it does *not* claim. Twenty is a good match to the measured ratio (the lattice value is about 20.0, within a percent or two). But getting twenty out of six channels is not automatic, and it is not even the only natural answer: counting pairs gives 15, counting triads gives 20, counting triads-paired-with-their-complement gives 10, and counting *ordered* triads gives 120. So six channels can produce 6, 10, 15, 20, 30, 60, or 120 depending on three separate choices — which shell to count, whether to treat a triad and its mirror as the same, and whether order matters. Twenty is reached only by one specific combination of those choices, and the paper's whole worth depends on whether those choices can be forced by the actual physics rather than picked because they land on twenty.

There is also a sharper problem the paper now confronts head-on. The reason the down quark counts as "one" is that the six channels are interchangeable, so they collapse to a single baseline. But if the six channels are interchangeable, then the twenty triads are *also* interchangeable with one another — and by the very same logic they should collapse to one, giving a ratio of 1, not

20. To get 20, the paper has to count the triads as twenty distinct things while counting the channels as one thing, and those two countings use opposite rules. Naming that tension, and showing exactly what physics would have to break the symmetry at the triad level but not the channel level, is the real content here.

In one line: *twenty is the central triad count of a six-channel interface and it matches the data, but the paper has to justify counting triads one way and channels the opposite way to get it, and until that asymmetry is derived from an actual strange-sector operator the factor 20 is a sharp, falsifiable proposal rather than a result.*

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0. Predictive-Content Ledger

This paper addresses one named open problem from the one-anchor calculator — **QM-4: derive m_s/m_d = 20** — and nothing wider. The down-quark anchor remains external; the absolute mass scale is not derived. The target is the single dimensionless, scheme-independent ratio $r_s = m_s/m_d$.

The honest accounting must lead, because the proposal's structure is a count selected from a family of counts. Six interface channels do not yield a unique integer; they yield a *shell row* of binomial counts, and three independent structural choices pick one entry:

Choice	Options	Counts produced
Shell rank k	1, 2, 3, 4, 5	C(6,k) = 6, 15, 20, 15, 6
Complement quotient T ~ I\T	yes / no	halves the count (e.g. 20 → 10)
Ordering	unordered / ordered	C → P (e.g. 20 → 120)
Counting unit	per-triad / per-channel-incidence	20 → 6·C(5,2) = 60

So the reachable region around the target is {6, 10, 15, 20, 30, 60, 120, …}. The value 20 is selected by **k = 3, no complement quotient, unordered, and per-triad (not per-channel) normalisation** — *four* choices (the counting-unit axis, §9, was previously missing), each of which the paper must fix *independently of the target* for the count to be evidence rather than fit. This is the same discipline applied to κ ≈ ln 14 and to the K = 7 cluster elsewhere in the programme: a small integer plus combinatorial freedom can hit many targets, so hitting one is persuasive only if the selection rules are forced from below.

The status grid:

Quantity	Value	Status
Anchor m_d⋆	external	declared scheme/scale
Interface channels |I|	6	[Inherited]
Shell rank k	3	**[Conditional — selection choice]**
Complement quotient	none	**[Conditional — selection choice, coupled to k=3, §5]**
Ordering	none	**[Conditional — selection choice]**
Counting unit	per-triad	**[Conditional — selection choice; per-channel gives 60, §9]**
Triad-shell count C(6,3)	20	[Proven once the four choices are fixed]
Level-1/level-2 multiplicity rule	quotient vs raw count	**[Open — the counting inconsistency, §7]**
Primitive vs composite	r_s vs $(G_2/G_1)e^{(\Delta M\_\chi)}$	**[Open — §10 eviction risk; 20 has no binomial home in five-gate]**
m_s/m_d	20	[Conditional theorem]
Empirical target	≈ 20.0 (lattice, ~1–2%)	[Inherited from data]
Calculator numerics	unchanged	[Proven algebraically — this paper changes status, not numbers]

The decisive new claim is the identification: strange = the central triad shell of the six-channel interface. **The decisive new objections are two:** (§10, the likely killer) under the predecessor five-gate decomposition m_s/m_d is a composite residue with *no binomial home* for 20, so the count may have nothing to attach to; and (§7) even granting it is there, getting 20 requires an additive one-unit-per-triad sum over the down anchor, where the two symmetric self-consistent counting rules give 1 or 10/3, not 20. The paper's contribution is to replace a vague imported "≈

20" with a precise, finite, falsifiable structural candidate *and* to locate the exact unproved step that candidate rests on. It is not a derivation of the strange mass.

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1. The Strange-Baseline Problem

The one-anchor paper showed that, given a down anchor $m_d\star$, the six masses are

$m_u = (6/13)\, m_d\star$, $m_d = m_d\star$, $m_s = 20\, m_d\star$, $m_c = (3080/13)\, m_d\star$, $m_b = 5\, e^{(16/3)}\, m_d\star$, $m_t = 5\, e^{(16/3)}\, (6/13)\, (77/3)^{(3/2)}\, m_d\star$.

The formula is powerful but carries one visible weakness: $r_s = m_s/m_d = 20$ is not derived in the same way the rest of the row is propagated. It is inherited as a standing ratio from the entropic-confinement and quark-grid work. This is not cosmetic — r_s multiplies four masses (s, c, b, t), so a fractional error in it propagates into four of the six outputs. The target is therefore: **derive $r_s = 20$ structurally, or identify exactly why it cannot be derived.**

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2. Definitions, Scheme Discipline, and a Terminology Hazard

Let $I = \{1, 2, 3, 4, 5, 6\}$ be the primitive interface-channel set; the interface/capacity papers supply six equivalent local channels with uniform primitive status. Let $m_d\star$ be the down-quark current-mass anchor in a declared scheme and scale. This paper claims only a dimensionless ratio, $r_s = m_s/m_d$, and mixes no conventions.

Define the k-shell $S_k(I) = \{T \subseteq I : |T| = k\}$, with $|S_k(I)| = C(6,k)$. The shell row is

$|S_k|$: 1, 6, 15, 20, 15, 6, 1 for $k = 0,\ldots,6$,

and the central shell is the unique maximum, S_3 with $|S_3| = C(6,3) = 20$. The proposed law is $r_s = |S_3(I)| = 20$.

A terminology hazard that must be resolved, not glossed. The entropic-confinement paper calls *all* quarks "level-2 partial closures" (as opposed to level-4 intrinsic rest-mass defects) — that "level" is a *confinement-depth* axis shared by every quark, down included. This paper separately introduces "level-1 (down) versus level-2 (strange)" for the *down-sector generational* step $d \to s$. These are different axes, and reusing "level-2" for both invites the false reading that down is excluded from the entropic-confinement classification it actually belongs to. To prevent the collision, this paper relabels the generational axis as **down-sector depth** n = 1, 2, 3 (d, s, b), reserving "closure level" for the shared confinement classification (level-2 for all quarks). The claim is then: the strange readout is the **first down-sector-depth-2** state, and its current-mass multiplicity is the triad shell. Wherever "level" appeared for the $d \to s$ step, read "depth."

3. Prior Inputs

3.1 The one-anchor calculator. Given one anchor and four ratios $r_u = 6/13$, $r_s = 20$, $r_b = (1/4) e^{(16/3)}$, $r_\chi = 77/3$, plus the half-lazy law $\Delta\chi_2 = ½ \Delta\chi_1$, all six masses are fixed. This paper does not alter that theorem; it tries to improve one input. **[Inherited]**

3.2 The strange ratio as the weakest input. The one-anchor audit flags $r_s = 20$ as the weakest inherited ratio (imported from the strange grid, not derived as a closure count) and the largest total-risk lever (it multiplies s, c, b, t). **[Inherited]**

3.3 Six primitive channels. The interface/capacity papers supply $|I| = 6$, locally equivalent and uniformly allocated. The same six-channel structure is used in the $w_\chi = 2/3$ proposal (four fold-orientation states against six channels); this paper uses it differently, asking how many depth-2 triads a six-channel interface admits. **[Inherited]**

3.4 Quarks as confined partial closures. Quark masses are confined partial-closure readouts, not isolated rest masses; strange is a different closure burden in the same down charge sector, not a heavier copy of down. **[Inherited]**

3.5 Bottom as a later localization step. The s → b transition is $m_b/m_s = (1/4) e^{(16/3)}$. The strange step must not duplicate it, so r_s must contain *no* $e^{(16/3)}$ localization factor — it must be a moderate pre-localization confinement-resolution effect (a number near 20, not an exponential generation jump). **[Inherited constraint]**

4. Why Strange Is the Next Target

The hierarchy has two structures: same-generation up/down splits $\chi_g = \ln(m_{up}(g)/m_{down}(g))$, governed by fold-selective accessibility and the half-lazy profile; and same-charge generation steps d → s → b and u → c → t. Strange belongs primarily to the second — it is the first down-sector generational lift, not an up/down split. Since $m_c/m_s = (6/13)(77/3)$ depends on the strange baseline *and* the χ increment, while $r_s = m_s/m_d$ is the baseline that makes the charm step meaningful, strange must be settled before any clean promotion to a CKM or full-Yukawa treatment: the hierarchy cannot become a matrix theory while a highest-leverage diagonal entry is imported.

5. The Six-Channel Interface Shell

At down-sector depth 1, a realized down readout does not multiply by six: the six primitive channels are symmetry-equivalent and quotient to a single maintenance baseline, which the anchor m_d⋆ supplies. At depth 2, confinement asks not whether one channel is available but which multi-channel partial closure can be stabilized. The shell counts are

$|S_1| = 6$, $|S_2| = 15$, $|S_3| = 20$, $|S_4| = 15$, $|S_5| = 6$,

row 1, 6, 15, 20, 15, 6, 1, with the central shell S_3 the unique maximum at 20. The proposal: the strange quark is the first down-sector-depth-2 state reaching this central shell. *(The phrase "unique maximum" is aesthetic, not a selection rule — that the central shell is largest does not make it physically chosen; §9 treats this as one of the choices to be derived.)*

A coupling that ties the rank and complement choices together, and cuts against the central shell. k = 3 is the **unique self-complementary rank** — the only shell where T and I\T have equal size, so the complement map acts *within* S_3 rather than carrying it to another shell. This self-complementarity is the one half-attractive reason to call k = 3 "special," but it is also precisely the feature that makes the T ~ I\T identification tempting and the 10-versus-20 hazard *maximal*: at k = 2 the complement is a 4-set, a different object with no identification temptation and an unambiguous count of 15. So the very property one might lean on to motivate the central shell is the property that most threatens its count. The consequence for the operator-builder is concrete: **SB-2 (why k = 3) and SB-3 (why not identify complements) are not independent and must be solved together** — any argument that selects the self-complementary shell simultaneously strengthens the case for quotienting it, pushing toward 10.

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6. The Central Triad-Shell Proposal

The down quark is the depth-1 down-sector maintenance baseline, m_d = m_d⋆. The strange quark is proposed to be the depth-2 readout that resolves the admissible three-channel confinement triads:

d : single realized down-sector maintenance (channels quotiented to one); s : down-sector maintenance resolved across all admissible triads $T \subseteq I$, $|T| = 3$.

If each admissible triad contributes one down-normalized maintenance unit with flat weighting, then $m_s/m_d = |S_3| = C(6,3) = 20$. This is the proposal; the physics is entirely in (i) the depth-2 = triadic identification and (ii) the counting rule that gives 20 rather than 1 or 3.33, which §7 isolates as the unproved core.

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7. The Multiplicity-Counting Consistency Problem

This section is placed before the theorem deliberately, because it is the objection on which the whole proposal turns, and the natural exposition hides it.

The set-up. The denominator of r_s is fixed to 1 by a *symmetry quotient*: the six channels are equivalent, so they collapse to a single baseline (this is exactly why the anchor supplies one number, not six). The numerator is fixed to 20 by a *raw count*: all twenty triads contribute. These are two different multiplicity rules, applied at the two depths.

Why this is a problem, stated sharply. The interface carries a channel-permutation symmetry — call it the S_6 action permuting {1,…,6}. Under this action:

- the six channels form a single orbit (transitive), so "symmetry-equivalent → quotient to one" gives the depth-1 baseline = 1; and
- **the twenty triads also form a single orbit** — S_6 acts transitively on the C(6,3) = 20 three-element subsets. So the *identical* "symmetry-equivalent → quotient to one" rule, applied at depth 2, gives 20 → 1, hence r_s = 1, not 20.

So the two self-consistent readings are:

- **Both raw microstate counts** (entropy/density-of-states): depth-1 = C(6,1) = 6, depth-2 = C(6,3) = 20, giving r_s = 20/6 = 10/3 ≈ 3.33.
- **Both symmetry orbits** (quotient): depth-1 = 1, depth-2 = 1, giving r_s = 1.

Neither gives 20. The value 20 is reached only by the *mixed* rule — quotient the denominator (6 → 1) but raw-count the numerator (20 → 20) — and that mixture is precisely what the paper must justify and currently asserts.

The multiplicity-asymmetry problem (the load-bearing open step). Derive, from the strange-sector closure operator, why the channel-permutation symmetry quotients the depth-1 baseline to a single orbit while the depth-2 triad readout counts all 20 triads as distinct microstates. The two symmetric, self-consistent rules give r_s = 1 (both-orbit) or r_s = 10/3 (both-microstate); only the mixed rule gives 20, and the mixed rule is the thing owed.

Is there a candidate resolution? Yes — and naming it sharpens rather than rescues the claim. The realised-readout machinery elsewhere in the programme distinguishes an *unrealized symmetric baseline* (no committed record, symmetric average → quotient applies) from a *realised committed configuration* (a record selects one branch). One could argue the depth-1 baseline is unrealized (symmetric, quotiented to 1) while the depth-2 strange readout is a realised confinement that has *committed*, so its mass counts available committed microstates (20, no quotient).

The group-theoretic obstruction this runs into, stated explicitly. "Realised" must mean "symmetry broken, count the orbit." But then the counting is forced by orbit size, and the orbit sizes are fixed: a realised single channel sits in an orbit of size 6 (stabiliser $S_5 \subset S_6$), and a realised single triad sits in an orbit of size 20 (stabiliser $S_3 \times S_3$). So **the moment "realised" is applied symmetrically, down's committed multiplicity is 6, not 1, and the ratio is back to 20/6 = 10/3.** Down can be genuinely multiplicity-1 *only* by being unrealized — the symmetric average. But then the numerator is a realised, broken-symmetry *sum over 20 microstates* while the denominator is an unrealized *symmetric average* — two categorically different objects, and their ratio is not obviously a mass ratio at all. So the realisation story faces a fork with no clean exit: make both depths realised (→ 10/3) or make them incommensurable (a symmetric-average 1 against a broken-sum 20).

The commensurability constraint on SB-1. An acceptable strange operator must produce an asymmetry between depth 1 and depth 2 that does **not** simultaneously destroy the commensurability of numerator and denominator. Every realisation-based story either makes both depths microstate counts (→ 10/3) or makes the denominator a symmetric average and the numerator a broken-symmetry sum (incommensurable, ratio ill-defined as a mass ratio). The operator must thread between these — which is a far more specific demand than "derive the asymmetry," and it rules out the most tempting escape before it is attempted.

A reframing that simplifies what is actually owed. The symmetry-quotient story for the *denominator* is, on inspection, decorative — because **down is the anchor.** $m_d = m_d^\star$ is the unit *by construction*; nobody computes the down baseline by quotienting S_6, it is declared. Two consequences follow. First, the "both-orbit → 1" branch is the weakest of the three readings, since it re-derives the anchor by a route the calculator never uses; the live tension is really **20 (additive numerator over a unit denominator) versus 10/3 (density-of-states, denominator also 6 states).** Second, once down is the unit, all the content collapses into a single claim:

SB-1, in its crisp form. m_s = 20 down-units, additively, **one unit per triad** — i.e. the depth-2 strange readout is an additive sum over the 20 triads, each normalised to one down-unit. No symmetry argument for the denominator is owed (it is the declared anchor); what is owed is the numerator's *additivity* and its *per-triad normalisation*. The two consistent symmetric readings still bound the failure modes (→ 1 or → 10/3), but the thing to derive is just: why an additive, one-unit-per-triad sum.

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8. The Conditional Strange-Baseline Theorem

Theorem 1 — Conditional Strange-Baseline Closure. Let I be a six-element primitive interface-channel set. Assume: (1) the down quark is the depth-1 down-sector maintenance baseline, multiplicity 1 (the declared anchor); (2) the strange quark is the first depth-2 down-sector confined partial closure; (3) the depth-2 readout resolves unordered three-channel triads $T \subseteq I$, $|T| = 3$, counted as **distinct** (no symmetry quotient at depth 2, no complement identification); (4a) all admissible triads carry equal weight, and (4b) the counting unit is **per triad**, one down-normalized unit each (not per channel-incidence); (5) no s → b localization factor enters at the strange step. Then $m_s/m_d = C(6,3) = 20$.

Proof. By (2)–(3) the depth-2 readout is carried by the unordered 3-subsets of a 6-set, of which there are $C(6,3) = 6!/(3!\cdot3!) = 20$. By (4a)–(4b) each triad contributes one down-normalized unit; by (1) the denominator is 1. Hence $m_s/m_d = 20$. ■

The algebra is trivial. **Every gram of physical content sits in the assumptions, and assumption (3) is exactly the mixed multiplicity rule §7 shows is unproved** — "counted as distinct" at depth 2 is the raw-count rule, while assumption (1)'s "multiplicity 1" is the quotient rule at depth 1. The theorem is therefore best read as: *the triad-shell identification, the no-quotient/no-complement/no-order counting, and the depth-1-singlet baseline jointly imply 20* — a conditional whose premises are the work, not a derivation of 20.

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9. The Selection Freedom, Enumerated: Why 20 Rather Than 6, 10, 15, 60, 120

The proposal is precise — not "near 20" — which is its virtue, because each nearby count corresponds to dropping one assumption, making the proposal falsifiable. Enumerating the selection freedom (the §0 ledger, made explicit):

- **6 = C(6,1):** single-channel count. Rejected because down already occupies the single-channel role after quotient; strange is depth-2.
- **15 = C(6,2):** pair shell (or 4-shell, its complement). Rejected as "pairwise bonding," argued insufficient for the first confined partial closure. *This rejection is verbal, not derived.*
- **10 = C(6,3)/2:** triads identified with complements, T ~ I\T. Rejected because a partial quark readout exposes/withholds distinct channel faces, so a triad and its complement differ. **This is load-bearing: if the strange operator identifies complements, the answer is 10, and the proposal fails.**
- **120 = P(6,3):** ordered triads. Rejected because ordering belongs to fold-orientation and the χ sector ($e^{(\Delta\chi_1)} = 77/3$), not the down baseline.
- **60 — and the ordering argument does not actually cover it.** The draft instinct attributes 60 to "ordered quotients," but **60 is reachable with no ordering at all**: if the depth-2 weight is *per channel-incidence* rather than *per triad*, the count is 6 × C(5,2) = 60 (each of 6 channels, paired with the C(5,2) = 10 ways to complete its triad from the other five) — an unordered route to 60 that the ordering argument cannot exclude. This exposes a **fourth selection axis the enumeration was missing — the counting unit (triad versus channel-incidence)** — and it means flat weighting is really *two* assumptions: flat across triads, *and* one-unit-per-triad-not-per-channel. The per-triad normalisation is exactly as unjustified as the rank and complement choices, and it was not previously in the ledger or the falsification list. It is now (SB-4′, falsification 9): **if depth-2 weight is per-channel rather than per-triad, r_s = 60.**

So 20 is selected by *four* independent choices, not three: rank k = 3, no complement quotient, unordered, and **per-triad (not per-channel) normalisation.** Each is plausible and each is currently a paragraph of physical intuition, not a theorem. The proposal's strength is that it is *one* of a finite, enumerated set; its weakness is that the selection within that set is exactly as derived as the four rejections, which is to say: not yet.

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10. Relation to the Orthogonal G/M_χ Basis: Is m_s/m_d Even Primitive?

A tension with the immediately preceding five-gate work must be surfaced, because it is sharper than a tension to reconcile — it questions whether r_s is a quantity a single count can attach to at all, and it is arguably the more likely killer of the proposal than the counting problem of §7. (§7 asks "how do I count to 20." §10 asks "is 20 even there to count.")

The five-gate paper established a renormalization-group-invariant orthogonal basis in which **within-generation** ratios isolate the maintenance amplitude M_χ,g, and **cross-generation geometric-mean** ratios isolate the generation amplifier G_g. In that decomposition, m_s/m_d is *neither* a pure M_χ nor a pure G object: with s a down-sector-depth-2 state and d depth-1,

$m_s/m_d = (G_2/G_1) \cdot e^{(M_{\chi,2} - M_{\chi,1})}$,

and numerically $G_2/G_1 \approx 108$ while $e^{(M_{\chi,2} - M_{\chi,1})} \approx 0.18$, so **m_s/m_d ≈ 108 × 0.18 ≈ 19.44 is the residue of two large opposing factors**, not a primitive quantity.

The primitive-versus-composite problem — eviction, not relocation. The earlier draft instinct ("the triad count most naturally lives in G_2/G_1") is already closed off: **$G_2/G_1 \approx 108$ is not C(6,k) for any k** (the shell row is 6, 15, 20, 15, 6). So under the composite reading the count 20 has *nowhere to attach* — not to the ratio (which is the residue, not a fundamental object), not to G (which is 108, not a binomial), and not to M_χ (a suppression, not a count). C(6,3) = 20 is not relocated by the five-gate decomposition; it is **evicted** by it. Either the composite reading is wrong, or the triad proposal is.

The numerical tell, tracked. The two decompositions are already inconsistent *beyond* the empirical budget: the composite value 108 × 0.18 ≈ 19.44 versus the clean 20.0 is a 2.8% gap, which exceeds the ~1–2% lattice/scheme budget rather than sitting inside it. So at least one of {the clean-20 reading, the inherited $G_2/G_1 \approx 108$, the inherited $e^{(\Delta M_\chi)} \approx 0.18$} is wrong by a margin the data can see. This is a **tracked discrepancy** sharper than a rounding artefact, and it cuts toward §10's thesis: if 20 were the true primitive object, the composite of the inherited factors ought to reproduce it within budget, and it does not. Whichever input gives way is information about which decomposition is primitive — but the bare fact that they disagree at 2.8% is itself evidence that the clean-count reading and the five-gate residue reading cannot both be right at the precision the data already reach.

The honest position: the triad proposal lives in the one-anchor decomposition, where r_s is primitive by construction, and is not merely in tension but in direct conflict with the five-gate decomposition, where r_s is a residue and 20 has no binomial home. A clean version of the proposal would have to show the one-anchor and five-gate decompositions coincide on this ratio, or that the five-gate G_2/G_1 is itself secretly a triad-derived object despite not equalling any C(6,k) — neither is done here. *(The scheme-independence of m_s/m_d remains a real asset: per the five-gate RGI analysis, mass ratios are RG-invariant, so m_s/m_d ≈ 20 is a clean same-scheme target — the comparison to 20 is well-posed regardless of which decomposition is primitive.)*

11. Consequences for the One-Anchor Calculator

Substituting $r_s = C(6,3) = 20$ into the one-anchor theorem leaves the six-mass row numerically unchanged:

$(m_u, m_d, m_s, m_c, m_b, m_t) = m_d\star \cdot (6/13, 1, 20, 3080/13, 5 e^{(16/3)}, 5 e^{(16/3)} (6/13) (77/3)^{(3/2)}),$

$\approx m_d\star \cdot (0.4615, 1, 20, 236.9, 1035.6, 62154).$

What changes is status, not number: the factor 20 is no longer imported but attached to a definite structural candidate, 20 = C(6,3), conditional on §7–§9. Downstream ratios (charm, bottom, top) carry the predecessor's own accuracy, which this paper does not revisit; its sole numerical claim is the strange baseline.

12. Empirical Anchor and Sensitivity

Anchor. Because m_s/m_d is RG-invariant (flavour-blind mass anomalous dimension), the comparison is scheme-independent. The lattice value, via $m_s/m_{ud} \approx 27.2$ and $m_u/m_d \approx 0.47$, is

$m_s/m_d \approx 20.0,$

agreeing with C(6,3) = 20 to ~1–2%. This is a genuine, clean, scheme-independent match — the strongest empirical point in the paper, and the reason the proposal is worth making rather than dismissing. *(The soft input is m_u/m_d, not m_s/m_{ud}: m_s/m_{ud} is determined to sub-percent, while $m_u/m_d \approx 0.47$ carries ~5% uncertainty and swings m_s/m_d by roughly ±0.4. A citation-grade band would propagate the current FLAG values for both; the central result — 20 — is robust to that swing.)*

Sensitivity — the risk is now discrete, not continuous. Before, r_s was a continuous imported number feeding four masses. Now it is a structural integer, and the residual risk is *which integer*: the alternatives are not small perturbations of 20 but distinct shell counts {6, 10, 15, 60, 120}. This is a sharpening — the theory is less adjustable, the baseline is the central triad count or it is not. But the flip side, per §0, is that the *selection* among those integers consumes three structural choices for one output, so the discrete risk is real and concentrated in §7's counting rule, §9's four selection choices, and — most corrosively — §10's eviction risk.

13. Status: Proved, Inherited, Conditional, Open

[Proven here] Given $|I| = 6$, the depth-2 triad identification, no complement quotient, no ordering, flat weighting, and a depth-1 multiplicity-1 baseline, $m_s/m_d = C(6,3) = 20$. The algebra is exact; the premises carry all content.

[Inherited] Six primitive channels; quarks as confined partial-closure readouts; the one-anchor theorem; $m_u/m_d = 6/13$; the s → b step $m_b/m_s = (1/4)\, e^{16/3}$; the χ-increment $e^{\Delta\chi_1} = 77/3$; the half-lazy law $\Delta\chi_2 = \frac{1}{2}\, \Delta\chi_1$; the RG-invariance of mass ratios (five-gate).

[Conditional here] Strange = first down-sector-depth-2 confined partial closure; depth-2 closure = triadic; $r_s = |S_3| = C(6,3)$; the mixed multiplicity rule (quotient at depth 1, raw count at depth 2).

[Open — named targets]

- **SB-1 (the load-bearing one), in crisp form.** Derive that $m_s = 20$ down-units **additively, one unit per triad** — the depth-2 strange readout as an additive sum over the 20 triads, each normalised to one down-unit. The denominator owes no symmetry argument (down is the declared anchor, unit by construction); what is owed is the numerator's *additivity* and *per-triad normalisation*. **Commensurability constraint:** the derived depth-1/depth-2 asymmetry must not make numerator and denominator categorically different objects — every realisation-based story either makes both depths microstate counts (orbit sizes 6 and 20 → $r_s = 10/3$) or makes the denominator a symmetric average against a broken-symmetry numerator sum (incommensurable, ratio ill-defined). An acceptable operator threads between these.
- **SB-2 / SB-3 (coupled, must be solved together, §5).** Prove shell rank $k = 3$ *and* prove complementary triads are not quotient-identified — jointly, because $k = 3$ is the unique self-complementary rank, so any argument selecting the central shell simultaneously strengthens the case for the $T \sim I\setminus T$ identification that would give 10, not 20.
- **SB-4 / SB-4′.** Prove flat weighting *across* triads (else a weighted trace, 20 only by accident) **and** per-triad-not-per-channel normalisation (else $r_s = 6\cdot C(5,2) = 60$, §9). "Flat weighting" is two assumptions, not one.
- **SB-5.** Prove no $e^{16/3}$ localization enters before s → b.
- **SB-6 (primitive-versus-composite, the §10 eviction risk).** Reconcile the primitive (one-anchor) and composite (five-gate, $m_s/m_d = (G_2/G_1)\, e^{\Delta M_\chi} \approx 108 \times 0.18 \approx 19.44$) readings of r_s. Under the composite reading the count 20 has **no binomial home** — $G_2/G_1 \approx 108$ is not $C(6,k)$ for any k — so either the composite reading is wrong or the triad proposal is. The 2.8% disagreement between 19.44 and 20.0 **exceeds the lattice budget**, so at least one inherited input or the clean-20 reading is wrong by a margin the data can resolve.
- **SB-7.** Connect the triad shell to the explicit hadronic confinement operator of the entropic-confinement paper.

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14. Falsification Conditions

The proposal fails or downgrades under any of the following — each diagnostic, none vague.

1. **Non-triadic operator.** If the strange closure operator resolves pairs, four-shells, or ordered paths, the count is 15 or 120, not 20.
2. **Complement identification.** If the closure algebra identifies $T \sim I\setminus T$, the count is 10. **(Load-bearing, §9.)**
3. **Unequal triad weights.** If channels acquire nonuniform depth-2 weights, $r_s \neq C(6,3)$ unless a weighted trace accidentally sums to 20 — downgrading a clean count to a weighted spectral result.
4. **Multiplicity-rule failure (§7).** If the correct multiplicity rule is symmetric across depths, $r_s = 1$ (both-orbit, but down is the anchor so this branch is weak) or 10/3 (both-microstate, orbit sizes 6 and 20); the additive one-unit-per-triad rule giving 20 must be derived, not assumed, and must keep numerator and denominator commensurable.
5. **Strange is not the first depth-2 down-type closure.** Then the physical target is misidentified and the shell count, even if it exists, does not explain r_s.
6. **Same-scheme empirical rejection.** If the clean RG-invariant m_s/m_d lands decisively away from 20 beyond the lattice and scheme budget, the assignment fails phenomenologically. *(Currently it does not — the match is ~1–2%.)*
7. **Bottom step absorbs the strange step.** If a substrate-stiffness derivation shows the s → b localization already contains the triad shell, the factor 20 is double-counted and must be relocated.
8. **Composite eviction (§10).** If r_s is the five-gate residue $(G_2/G_1)\, e^{(\Delta M_\chi)} \approx 108 \times 0.18$ with $G_2/G_1 \approx 108$ not equal to any C(6,k), the triad count has no home in the composite decomposition and 20 is evicted, not merely relocated. The 2.8% gap between 19.44 and 20.0 — which exceeds the lattice budget — is the live tell.
9. **Per-channel normalisation (§9).** If the depth-2 weight is per channel-incidence rather than per triad, $r_s = 6 \cdot C(5,2) = 60$, with no ordering required — so the per-triad normalisation is an independent load-bearing choice, not a consequence of "unordered."

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15. Conclusion

The one-anchor calculator left one especially high-leverage imported input, $m_s/m_d = 20$. This paper proposes it is the central shell count of the six primitive interface channels,

$$m_s/m_d = C(6,3) = 20,$$

with the down quark the depth-1 baseline and the strange quark the first down-sector-depth-2 confined partial closure carrying all unordered three-channel triads. The match to the scheme-independent lattice ratio (≈ 20.0, ~1–2%) is genuine, and the result introduces no continuous fit parameter: it replaces "≈ 20" with the structural claim $r_s = |S_3(I)|$.

But the honest verdict is a narrowing, not a closure, and the paper locates the exact unproved steps rather than smoothing them. Twenty is selected from the shell family {6, 10, 15, 20, 60, 120} by *four* choices — rank k = 3, no complement quotient, unordered, and per-triad (not per-channel) normalisation — each currently intuition rather than theorem (§9), and the rank and complement choices are coupled ($k = 3$ is the unique self-complementary shell, which is exactly what makes the 10-versus-20 hazard maximal, §5). Deeper, the value 20 requires an additive one-unit-per-triad numerator over the declared down unit, and every realisation-based route to that either returns 10/3 (both depths counted as orbits, sizes 6 and 20) or makes numerator and denominator incommensurable (§7). And deepest — arguably the more likely killer — the five-gate decomposition makes m_s/m_d a composite residue, $(G_2/G_1)\, e^{(\Delta M_\chi)} \approx 108 \times 0.18 \approx 19.44$, in which **20 has no binomial home at all** ($G_2/G_1 \approx 108$ is no C(6,k)): under that reading the triad count is not relocated but evicted, and the 2.8% gap between 19.44 and 20.0 — *outside* the empirical budget — is a live tell that the clean-20 reading and the inherited five-gate factors cannot both be right at the precision the data already reach (§10).

So the contribution is precise: an imported empirical baseline is replaced by a finite, falsifiable structural candidate, and the decisive open problems are named exactly — **(i)** is 20 even there to count, or is m_s/m_d a residue with no binomial home (§10, SB-6); and **(ii)** if it is there, **construct the strange current-mass operator and show its depth-2 trace is an additive, per-triad, complement-distinct sum over the twenty triads, commensurable with the unit down baseline** (§7, SB-1). If that operator delivers the additive per-triad sum from below and the composite residue resolves toward 20, QM-4 closes and the one-anchor calculator strengthens substantially. If the operator delivers an orbit count, the baseline is 10/3 or 60, not 20; if the composite reading holds, 20 has nowhere to live. Either way the failure is clean and identified. The next task is that operator and its trace — nothing vaguer, and nothing read off the number 20 it is meant to produce.

References

1. Keith Taylor, *Quark Masses from One Anchor in VERSF.* (One-anchor calculator; status audit; identification of m_s/m_d = 20 as weakest inherited / highest-leverage input — QM-4.)
2. Keith Taylor, *From Charge-Sector Maintenance to Quark Masses in VERSF.* (Five-gate audit; the RG-invariant orthogonal G/M_χ basis; m_s/m_d as a composite cross-generation ratio.)
3. Keith Taylor, *Entropic Confinement and Effective Quark Mass.* (Quarks as confined partial closures; the shared confinement-level classification; strange baseline.)
4. Keith Taylor, *Interface / Capacity Papers.* (Six primitive local channels; uniform primitive allocation.)
5. Keith Taylor, *Particle / Fold Ontology.* (Admissible fold-orientation states; the $w_\chi = 2/3$ four-against-six structure.)
6. Keith Taylor, *The Substrate-Stiffness Hierarchy in VERSF.* ($m_b/m_s = (1/4)\, e^{(16/3)}$; localization and colour-channel saturation.)
7. Keith Taylor, *The Single-Scheme χ Audit.* ($\rho = \Delta\chi_2/\Delta\chi_1$ consistency with ½.)
8. Keith Taylor, *Uniform Binary Admissibility and the Half-Lazy Closure Operator.* ($W = ½(I + \Pi_e)$; conditional halving law.)

9. Keith Taylor, *Closure Orientation, Fold Access, and the χ Sector.* (Up/down fold orientation; ordered-path counts and the $e^{(\Delta\chi_1)} = 77/3$ χ-access factor.)