



A Physical Origin of Quark Charge Fractions

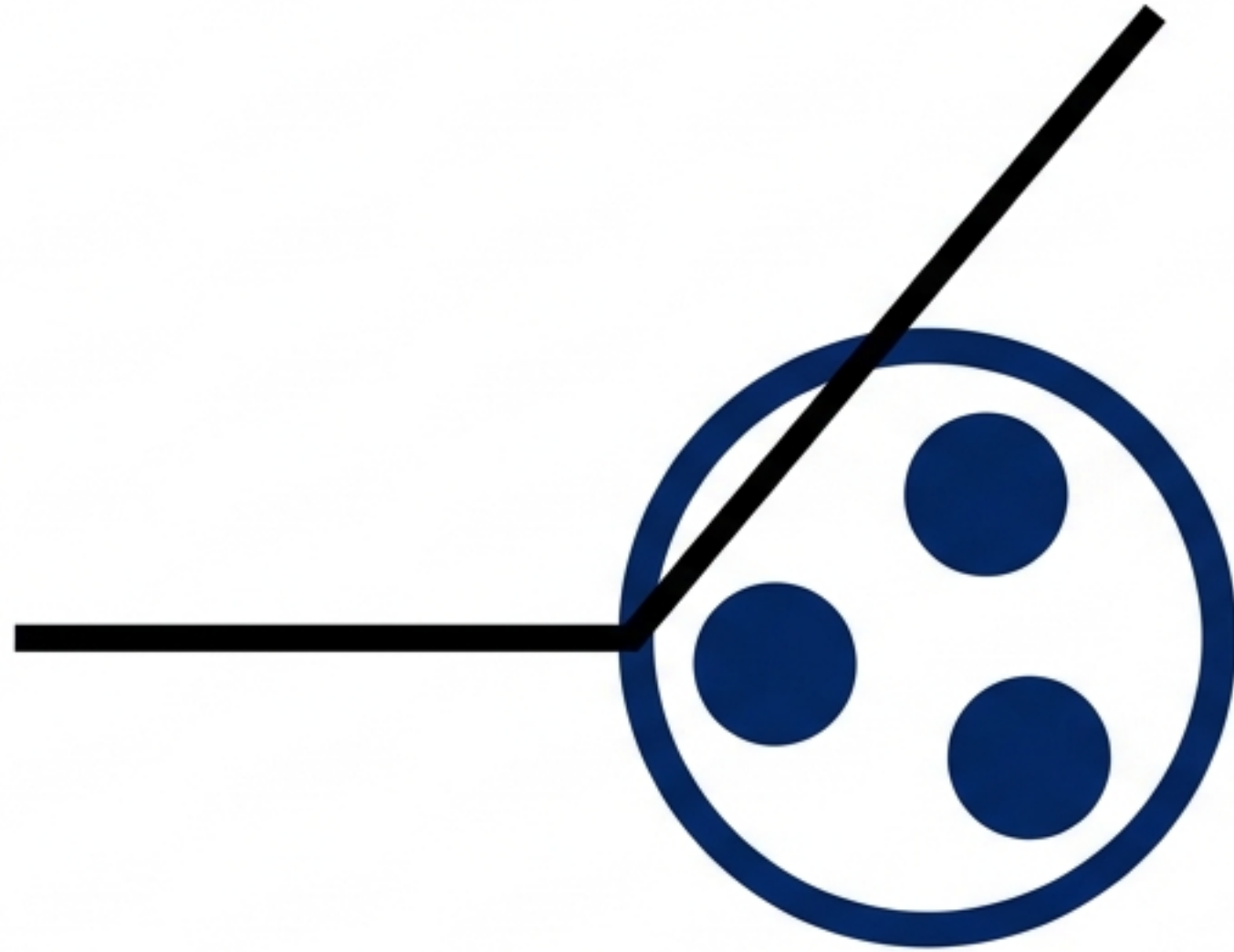
Derived from Condensation Topology in BFUT Paper P64

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Subject: Quantum Chromodynamics & Physical Substrate Topology

Document Focus: Axiomatic Proof of $(+2/3)$ and $(-1/3)$ Charge Divisions

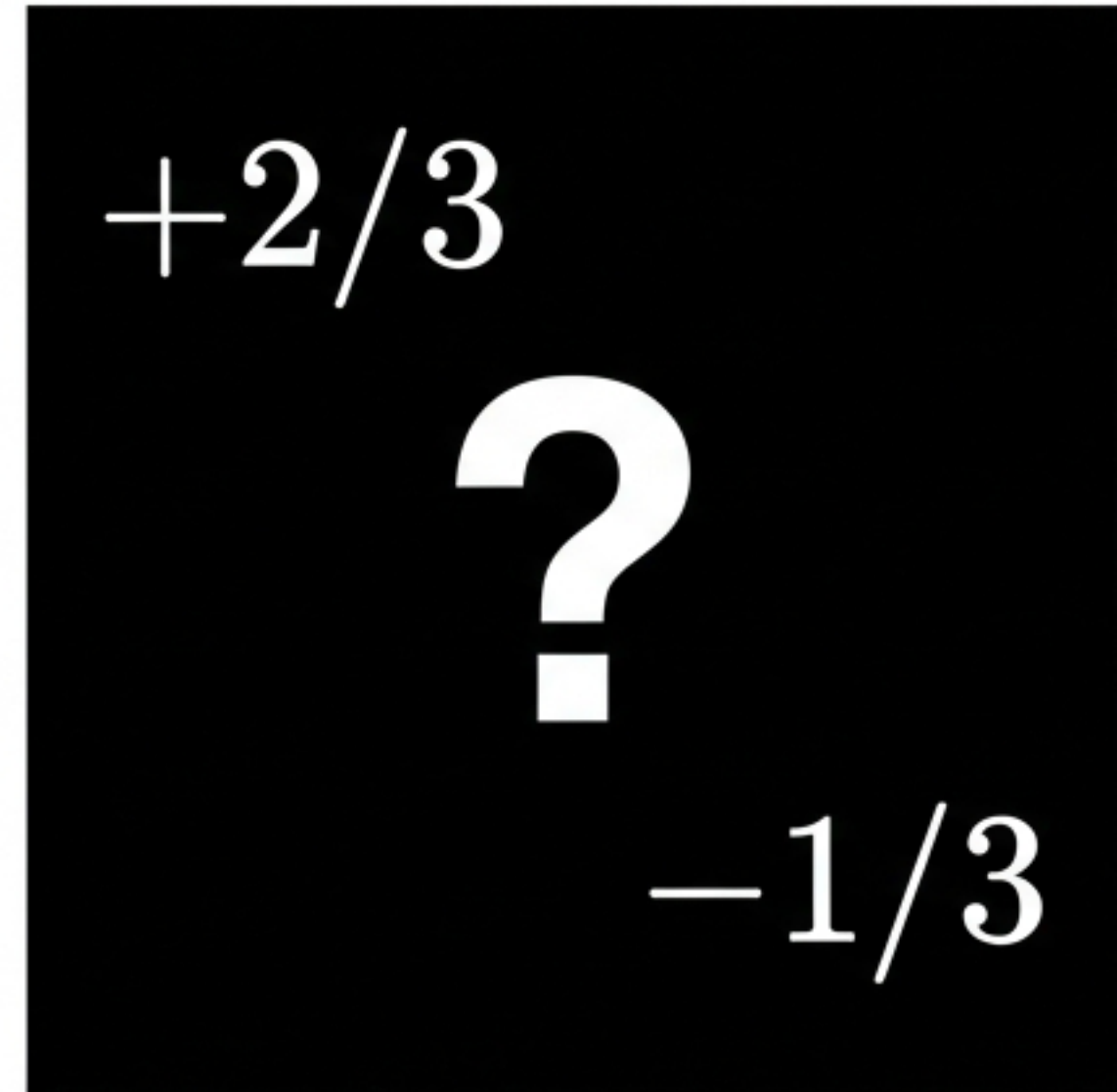
Confirmed Facts



Empirical Reality: Quarks carry fixed electric charges of $+2/3$ (Up-type) and $-1/3$ (Down-type).

Confirmed across all generations via deep inelastic and neutrino-nucleon scattering.

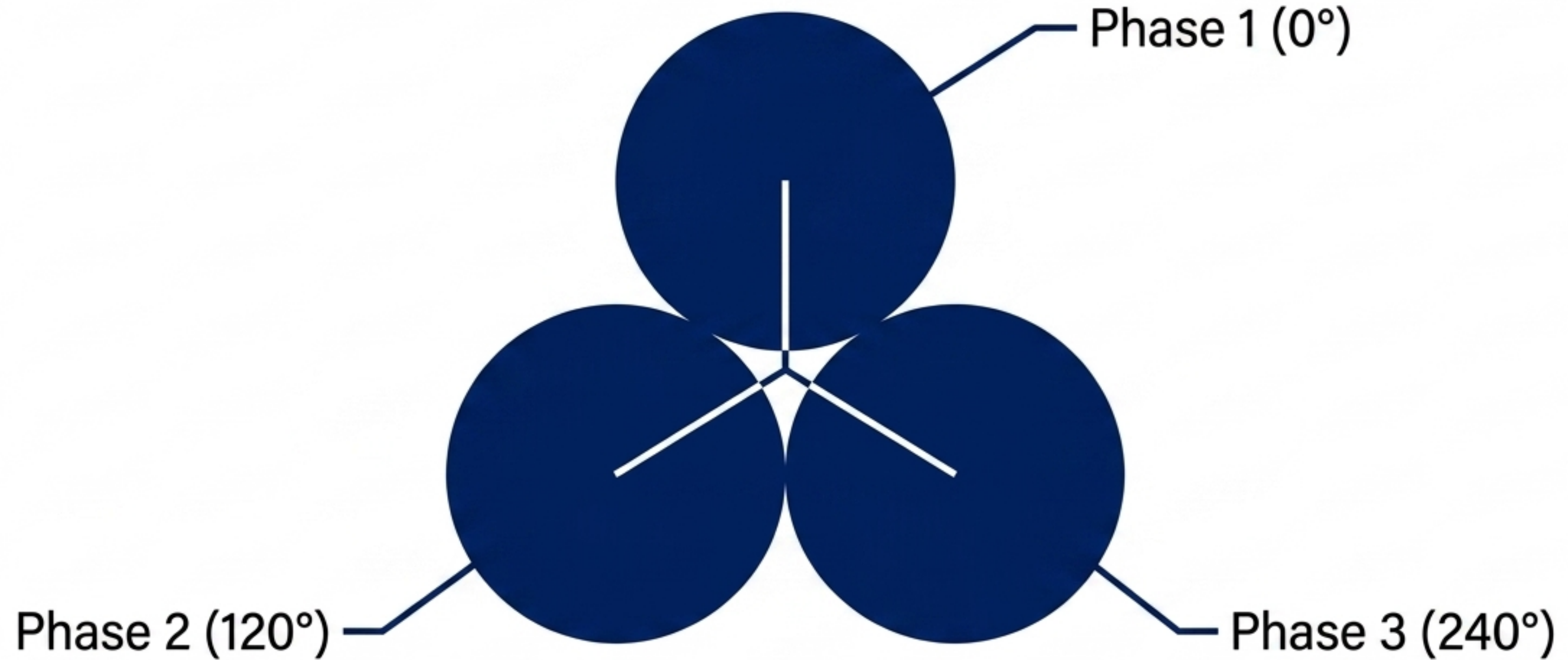
The 'Black Box'



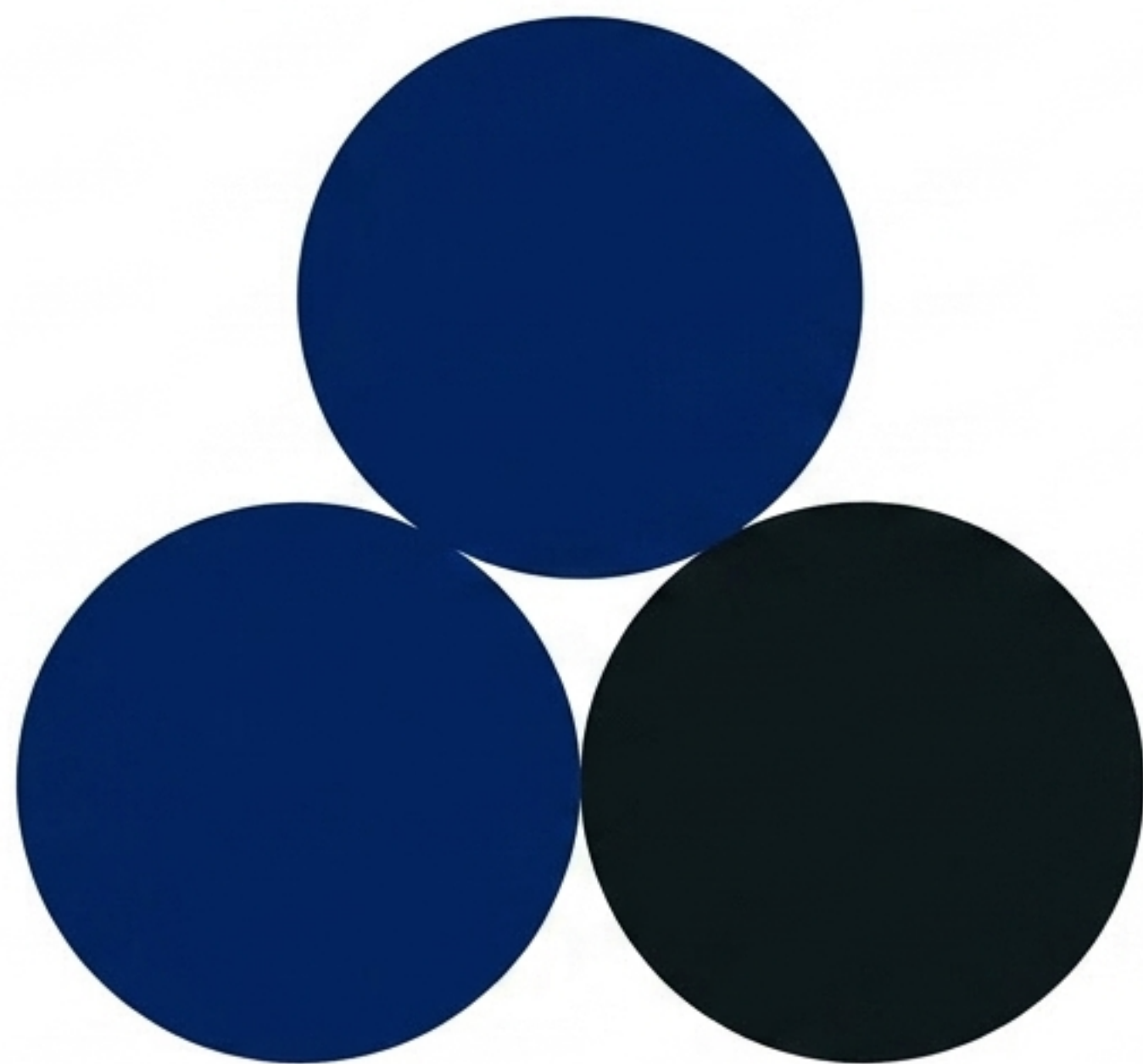
The Standard Model Gap: Fractional charges are treated purely as empirical input parameters.

No physical mechanism explains why fractional charge exists, or why these specific numerical divisions occur rather than any other rational

Three-Phase Geometric Core

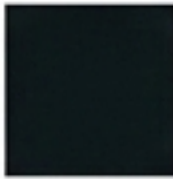


The physical origin relies on a stable matter condensation in the Sparticle substrate.
The retained core strictly retains three constituent units occupying three evenly spaced circulation phases, exhibiting perfect D_{3h} symmetry.



The Symmetry Rule

To achieve distinct stable states within a 3-fold continuous phase symmetry, the system forces a strictly 2:1 topological division.

-  Blue Phases (2): Assume a positive effective role.
-  Black Phase (1): Assumes a negative effective role.

Takeaway: The 2:1 division is not arbitrary; it is the only viable role assignment admitting exactly two distinguishable classes within D_{3h} symmetry.

**The two phases assigned
the positive effective role.**

**The single phase assigned
the negative effective role.**

The diagram features the equation $2q_+ + q_- = +1$ in a large, dark blue serif font. A blue arrow originates from the $2q_+$ term and points diagonally upwards and to the left towards the text 'The two phases assigned the positive effective role.'. Another blue arrow originates from the q_- term and points diagonally upwards and to the right towards the text 'The single phase assigned the negative effective role.'. A third blue arrow originates from the '+1' result and points diagonally downwards and to the right towards the text 'The net elementary charge of the retained three-unit core (mechanically established in established in companion physics)'.

$$2q_+ + q_- = +1$$

**The net elementary charge of the retained
three-unit core (mechanically established in
established in companion physics).**



$$q_- = -1/3$$

The Structural Assumption

The specific identification of the minority phase's partial charge is exactly one-third of the elementary charge. This is explicitly noted in P64 as the core structural assumption bridging the substrate geometry to the fractional calculus.

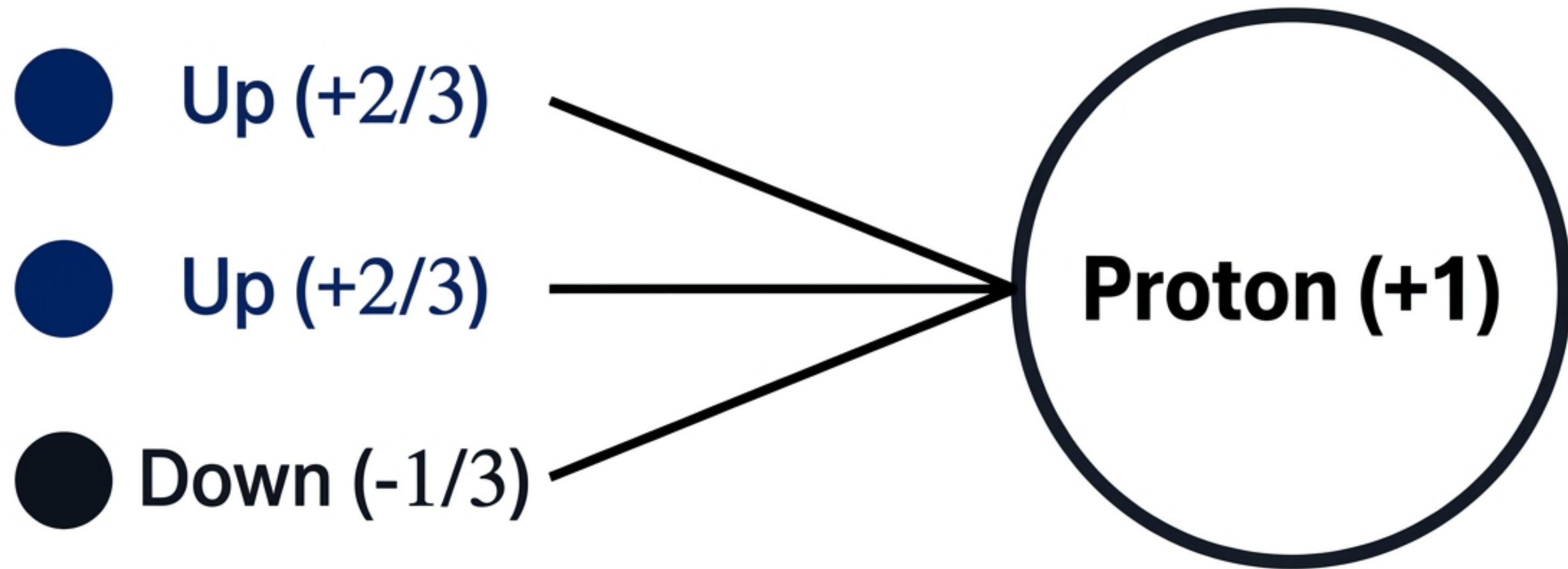
Step 1 (Substitution): $2q_+ + \left(-\frac{1}{3}\right) = +1$

Step 2 (Isolation): $2q_+ - \frac{1}{3} = +1$

Step 3 (Addition): $2q_+ = \frac{4}{3}$

Step 4 (Solution): $q_+ = +2/3$

Substituting the minority phase charge into the net charge equation perfectly yields the exactly observed up-type quark charge fraction. The mathematics are a necessary output of the topology.



The retained core maps exactly to the observed proton architecture. Fractional charge is no longer a bookkeeping device; it is a topological necessity of maintaining a net +1 integer charge across a 3-fold phase condensation.

	Standard Model	BFUT Paper P64
Electric Charge Origin	Empirical Parameter Input (Unexplained)	Phase Role Assignment (2:1 split)
Colour Charge Origin	SU(3) Symmetry postulate (Independent origin)	Phase Identity itself (0°, 120°, 240°)



Electric charge fractions and the existence of exactly three colours share one common geometric origin. They are two contextual manifestations of the same D3h retained-core structure.

The Theoretical Boundary



DOES NOT: Modify the QCD Lagrangian.



DOES NOT: Alter the established mechanism of colour confinement.



DOES NOT: Contradict confirmed deep inelastic scattering predictions.



DOES: Provide the physical substrate origin for two numerical fractions ($+2/3$, $-1/3$) previously treated purely as empirical inputs.

The proposal is intentionally narrow. It operates strictly as an **explanatory** foundation beneath the established predictive successes of the Standard Model.

Falsifiable Predictions

1. No Novel Fractions

No quark flavor (across all six known) will ever be found with a fractional charge other than $+2/3$ or $-1/3$.

2. The Colour-Charge Link

Any future modification to the understanding of quark colour states must alter charge fractions, as they are geometrically locked to the same origin.

3. Absolute Confinement

No free fractionally **charged particle will be observed in isolation**. Phase roles are strictly properties of the 3-fold core, not free entities.



$$2(+2/3) + (-1/3) = +1$$

The quark fractions +2/3 and -1/3 are not a coincidence. They are the inevitable mathematical output of a three-fold phase condensation in a physical substrate.