Chapter 5: Discovering the Bipartite Logic of the Constants

For years, from waking to sleep, I asked the same question, in thousands of forms: What do the constants of Nature say to each other? Using WolframAlpha, I systematically compared every constant with every other, examining them via dimensional analysis, ratios, powers, logarithms—relentlessly seeking echoes of order. I followed every numerical shadow and whisper. I was looking not just for patterns, but for reasons.

Eventually, a reliable clue appeared: a curious regularity in how the constants combine.

To construct the constants of Nature from Planck boundaries, we must first assign numerical values to those boundaries with sufficient precision to reproduce the measured constants. Because their exact values were not known, I varied their unknown digits systematically, scanning candidate values out to 14-digit precision. In this process I noticed that no matter which value I used, constructing constants of Nature from Planck constants always revealed the same agreement limit: seven digits. Beyond that, the numbers diverged. What explains this divergence?

It is sometimes said that we extract the Planck length—something we only know to roughly seven significant digits—from the speed of light, but this is an oversimplification. This becomes evident when we note that the speed of light is known to nine significant digits. We only claim seven digits for the Planck length because our knowledge of it is extracted from many possible arrangements of constants. The spread in those values defines its uncertainty.[42] And that uncertainty reveals a constructive feature, a rule for how Planck boundaries construct. This constructive feature is responsible for blurring their precision beyond seven digits.

As we attempt to build the constants of Nature from Planck constants, this constructive feature cannot be normalized away. No matter what number we use for the unknown digits of the Planck constants, when we build constants of Nature from them a structural transition consistently appears around the seventh significant digit. This suggests that the constants of Nature encode a system built from two coherently bound parts. And the second part is much smaller than the first, showing up around the half-precision point.

The best measurements we have for any constant of Nature (or anything else) approach fourteen significant digits. If fourteen digits represents a precision limit, then perhaps something else enters at halfway.

A seven-digit threshold is an invitation to look closer.

If the atomic bases and the Planck constants are derived from many different combinations of constants of Nature, and all of them agree to about seven digits, but then disagree, then something else intervenes at this scale—something not yet understood.

In effect, the constants of Nature are whispering: you're missing something. When building a Universe from Planck constants there appears to be a second layer—also constructed from Planck constants.

And then something clicked.

Earlier, I had noticed that a specific dimensionless combination of Planck boundaries—the base-normalized product of the Planck length and the Planck mass, divided by the Planck charge squared—had a magnitude remarkably close to the value of that seventh digit 1×10^{-7}.

$1.0000000000000 \ldots \times 10^{-7}$ value of digit 7

$0.9999991999736 \ldots \times 10^{-7}$ value of ⊠

$$⊠ = \frac{l_p m_p}{{q_p}^2} \times \frac{\mathrm{C}^2}{\mathrm{m\ kg}}$$

This is the size of the deviation term—the second Planck-constructed contribution that first shows up at the seventh digit. The constants were behaving like dual structures—with a dominant expression and a more subtle one. That idea lit a fuse. The seven-digit threshold was the crossover point where another aspect began to assert itself.

The constants were speaking in pairs. No matter how I approached them, no matter which set of Planck definitions I used, the same pattern emerged: each constant resolved into a dominant structure and a more subtle one—two expressions layered into one.

It was as if each constant of Nature had been woven from two Planck-bounded threads—an external action and an internal counterpart: acting on an embedded inversion whose inherent size meant that it began to assert itself at the seventh digit. These were not small corrections; they were essential structural components of the two part construction. Each constant encodes a pairing—a kind of algebraic dialogue between what is externally arranged and what is internally required to achieve that arrangement.

Every constant of Nature, $\mathcal{C}$, resolves into a two-layer structure:

binomial constructor

$$\mathcal{C} = \mathrm{A_{ext}}\,\mathrm{B_{ext}}\left(1 + \mathrm{A_{int}} \boxtimes\right) \qquad \boxtimes = \frac{l_p m_p}{{q_p}^2} \times \frac{\mathrm{C}^2}{\mathrm{m\,kg}}$$

Where $\mathrm{A_{ext}}$ (external action) is a dimensionless geometric action applied to an external arrangement of boundaries—$\mathrm{B_{ext}}$ drawn from 32 structural boundaries (the five Planck boundaries, five base units, five derived units, 10 mass constants: m_e, m_+, m_n, m_μ, m_τ, $\mathrm{A_{mass}}$, m_{de}, m_{he}, m_{tri}, m_α, and 7 limits: $T_0, p_0, p_1\ E_1, f_1, \nu_{\mathrm{peak}}, \lambda_{\mathrm{peak}}$) that carry all the dimensional content of $\mathcal{C}$. $\mathrm{A_{int}}$ (internal action) is a second dimensionless geometric action applied to the internal inversion boundary—$\boxtimes$—defined as base-normalized relationships between the Planck length l_p, the Planck mass m_p, and the Planck charge q_p squared.

$$\begin{array}{l} \mathrm{A_{ext}} = \text{dimensionless} \\ \mathrm{A_{int}} = \text{dimensionless} \\ \boxtimes = \text{dimensionless} \end{array} \qquad \mathrm{B_{ext}} \in \begin{array}{ccccc} t_p & l_p & q_p & T_p & m_p \\ \mathrm{s} & \mathrm{m} & \mathrm{C} & \mathrm{K} & \mathrm{kg} \\ \mathrm{MHz} & \mathrm{fm} & \mathrm{eV} & \mathrm{MeV} & \mathrm{GeV} \\ m_e & m_+ & m_n & m_\mu & m_\tau \\ \mathrm{A_{mass}} & m_{\mathrm{de}} & m_{\mathrm{he}} & m_{\mathrm{tri}} & m_\alpha \end{array} \; + \; \begin{array}{c} T_0 \\ p_0 \\ p_1 \\ E_1 \\ f_1 \\ \nu_{\mathrm{peak}} \\ \lambda_{\mathrm{peak}} \end{array}$$

Just as the binomial theorem captures the logic of algebraic expansion—revealing how a whole decomposes into its pairwise parts—the binomial constructor may capture the two-part logic of the constants of Nature: each being a constructive balance of two geometric layers, each necessary and encoded in Planck boundaries and their bases.

If we had geometric definitions for the Planck boundaries—if we knew them precisely—then this binomial constructor would give us a way to decisively pull apart every single constant of Nature in terms of its external and internal geometric arrangements of Planck boundaries, and then look for a pattern that captures the whole set. But without precise definitions for the Planck boundaries, the power of this decoder must wait.