The Universal Golden Operator $D(q) = q - \varphi^{-1}$: Venus Address and the Fine-Structure Register in the UKF

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Abstract

Within the Universal Kochenov Framework (UKF), the same algebraic operator

$$D(q) = q - \varphi^{-1}, \qquad \varphi = \frac{1+\sqrt{5}}{2},$$

appears in two independent constructions: the local orbital address of Venus and the register formula for the inverse fine-structure constant. We record the numerical content of both occurrences and the projection factors that relate global and local Venus addresses. No dynamical derivation of α from the Venus orbit (or conversely) is claimed; the result is an exact structural correspondence of the inverse-golden remainder $-\varphi^{-1}$.

1 The operator

$$D(q) = q - \varphi^{-1}. \tag{1}$$

Two evaluations used below:

$$D(2) = 2 - \varphi^{-1}, \qquad D(186) = 186 - \varphi^{-1}. \tag{2}$$

2 Local Venus address

$$a_V^{\text{local}} = \frac{\varphi}{\sqrt{5}} = \frac{1}{D(2)} \approx 0.72360679775 \text{ AU}. \tag{3}$$

Adopted semimajor axis (NASA): 0.723332 AU.
Relative deviation: $\delta = +0.038\,\%$.

3 Fine-structure register

With the integer set $\{31, 144, 720, \varphi\}$:

$$\alpha_{\text{UKF}}^{-1} = 137 + \frac{31^2/144}{(720/120)\cdot 31 - \varphi^{-1}} = 137 + \frac{31^2/144}{D(186)}. \tag{4}$$

$$\alpha_{\text{UKF}}^{-1} = 137.035999246608\ldots \tag{5}$$

CODATA 2022: $\alpha^{-1} = 137.035999177(21)$.
Difference: $\Delta = 6.96 \times 10^{-8}$ (≈ 0.51 ppb).

4 Global circular factor and projection

Definition: L_{base} is the UKF base length parameter, equal to $L_{\text{base}} = c_{\text{geom}} \cdot S \approx 1.11477\,\text{AU}$.

Pure circular factor:

$$g_{\text{circ}} = \frac{360}{31\varphi^6} \approx 0.64716491614. \tag{6}$$

Local-to-pure-global projection:

$$K_{\text{proj}} = \frac{a_V^{\text{local}}}{g_{\text{circ}}} = \frac{31\varphi^7}{360\sqrt{5}} \approx 1.1181180866 \approx \frac{\sqrt{5}}{2} \quad (\delta \approx 0.0075\,\%). \tag{7}$$

With L_{base} the global Venus address is $a_V^{\text{global}} = g_{\text{circ}} L_{\text{base}}$. The ratio of the two complete projections is

$$\Lambda_{VG} = \frac{a_V^{\text{global}}}{a_V^{\text{local}}} = \frac{L_{\text{base}}}{K_{\text{proj}}}. \tag{8}$$

These are bookkeeping identities of the address hierarchy; they do not replace the local formula of §2.

5 Statement of the correspondence

$$a_V^{\text{local}} = \frac{1}{D(2)}, \qquad \alpha_{\text{UKF}}^{-1} = 137 + \frac{G_{31}}{D(186)}, \quad G_{31} = \frac{31^2}{144}. \tag{9}$$

The same subtraction $-\varphi^{-1}$ closes both denominators. This is an algebraic macro–micro correspondence inside the UKF register language. A physical identification of the two scales is not asserted.

6 Conclusion

Venus supplies an independent macroscopic evaluation of $D(q)$ at $q = 2$. The fine-structure register evaluates the same operator at $q = 186$. The numerical match of α_{UKF}^{-1} to CODATA 2022 at the 0.5 ppb level and the 0.038 % match of a_V^{local} to the Venus semimajor axis are recorded as geometric facts of the construction. Causal unification remains a hypothesis of the framework.

Related Works

This paper forms part of the Universal Kochenov Framework (UKF) series:

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