

Short note on a neutron-electron mass ratio approximation

F.J. Culetto and W. Culetto*)

Private Research-Associates, Stallhofen 59-60, 9821 Obervellach, Austria

*Electronic address: wuletto@gmail.com

(Dated: January 2026)

Within our 2006ff tentative, heuristic and also constructivistic procedure in tracing a possible role of fractal geometry (this understood in a broader sense) in generating the values electrodynamics' fundamentals happen to have, and only relative quantities in H. Weyl's sense being meaningful at all, a (prototype) approximation formula to the *proton-electron* rest mass ratio m_p/m_e ($= 1836.152673426(32)$, NIST value) was found,

$$\frac{m_p}{m_e} \approx \frac{P \ln(\delta_{2D})}{|c_D| \ln(\delta)} e^{\pi+1} \pi^{e+1}, \quad \text{Eq.(1)}$$

where P is the Thue-Morse constant, c_D the Mandelbrot set's main bifurcation series Myrberg-Feigenbaum point's coordinate ($-1.401155... + 0i$), δ Feigenbaum's universal number and δ_{2D} Feigenbaum's constant for an area-preserving 2-dimensional map (1, 2). Eq.(1) granted substantial enhancement of fit precision when stopping the main sequence's period doubling at the 4th bifurcation, and inserting the accessory upper external angle P_4 ($=106/257$) instead of P , the infinite k -limit. Thus, acceptable precision (m_p/m_e approx $= 1836.152454...$) was achieved. The 2006ff search for some corresponding approximation formula to the *neutron-electron* rest mass ratio m_n/m_e ($= 1838.68366200(74)$, NIST value) – the fitting external angle instead of P_4 would formally have been ≈ 0.413020 but none found – was to no avail. Electron, uud- and bonded udd quark composites likely obeying period 1- oscillation \leftrightarrow particle duality, the situation is more complicated with the free, unstable udd quark composite. As period 3 oscillations are known to be a short cut to chaos, the Großmann-Thomae B_0 - B_1 chaotic band merging point (3), in Pastor et al.'s (4) notion $M_{3,1}$ – the pre-period 3 and period 1 Misiurewicz point at $c = -1.543689012...$ ($= c_{GT}$ in Eq.(2)), got attention. Indeed, the $P_4 \Gamma(|c_{GT}|) / \Gamma(|c_D|)$ correction as "effective" upper external angle inserted into Eq.(1) yields

$$\frac{m_n}{m_e} \approx \frac{P_4 \ln(\delta_{2D}) \Gamma(|c_{GT}|)}{|c_D| \ln(\delta) \Gamma(|c_D|)} e^{\pi+1} \pi^{e+1}, \quad \text{Eq.(2)}$$

the approximated neutron-electron rest mass ratio gotten then being 1838.68064...

- 1) Tabor, M. *Chaos and Integrability in Nonlinear Dynamics: An Introduction*, 255 (Wiley, New York, 1989); a typographical error there corrected according to the value given by Gaidashev & Koch and lit. cit., arXiv:0811.2588v2 (2009)
- 2) Weisstein, Eric W. "Feigenbaum Constant". From MathWorld—A Wolfram Web Resource. <http://mathworld.wolfram.com/FeigenbaumConstant.html>
- 3) Großmann, S., Thomae, S. *Z. Naturforschung* 32a, 1353 (1977)
- 4) Pastor, G., Romera, M., Montoya, F. Misiurewicz points in one-dimensional quadratic maps. *Phys. A* 232, 517-535 (1996)