Electrical Moonshine

Francis M. Sanchez

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Abstract. The electrical constant *a* and its Eddington approximation 137 are both 10 ppb connected with the dimension *d* = 26 of bosonic string theory and the 'moonshine entropy' ln*D*. Direct connection between *a*, 137, *d* and *D* = 196883, reveals the string central number 496, about the 20th root of the Monster order, whose square corresponds to 125.6 GeV (BEH Boson), and directly tied to the Monster order entropy via the tau and muon masses. The fifth power of the Monster order is directly connected to *D* and *d* via the number 24 of transverse dimensions, entering the economic number 3^(24²+1). This confirms the arithmetical character of Physical laws.

A bridge was established between two very different mathematical domains : the group theory and the conformal field one, which is related to the string theory [1]. The starting common point is the dimension of the Monster group *D* = 196883. In its treatment of the bosonic string theory, of dimension *d* = 26, Witten [2] considers the corresponding entropy ln*D*, and compare it with the natural term 4π. But there are two 10^{-8} precise relations implying 137 and the electric constant [3] *a* ≈ 137.035999138(31).

$$6d\ln D \approx (137/\pi_1)^2 \approx (a/\pi)^2 - 1$$

π_1 being the classical approximation 355/113, *confirming the arithmetical character* of Physics revealed by the Monster Group [4], Topological Axis [5], and the Eddington number 137 [6][7].

Detailed analysis shows that, in the ppb range :

$$D = 12d(136 + 496 - 1) + 11 \approx 12d(a + 496 - 2) - \sin^2\_ \approx H(8H/a - 1/12)$$

where *H* is the Hydrogen/electron mass ratio, $\sin^2\_ \approx 0.23129(5)$ is the weak-mixing angle [3] and 496 the third perfect number, central in string theory [8], whose square is very close to *s*, the 10th root of the Monster order, corresponding, by respect to the electron energy, to 125.6 GeV, nearly compatible with the BEH mass 125.09(24) GeV [3].

Also the mass ratio Muon/Electron μ and Tau/Electron τ appear in the entropy of the Monster order *M*:

$$\ln \mathbb{M}/137 \approx e/3 \approx \ln \tau/9 \approx 10\mu \ln D/8\tau$$

involving $\ln \mathbb{M}/10 = \ln s$. This shows that τ is tied to the cube of the economic number e^e, which plays a decisive role in the *incredible* connexion (0.2 ppm) of the Monster groupe order with that of the pariah group J_3 [4] :

$$\mathbb{M} \approx J_3^7 d_e \sqrt{(p/6\pi^5)}$$

where $d_e \approx 1.001159652$ is the electron magnetic factor and p the mass ratio proton/electron, $6\pi^5$ being its famous Lenz-Wyler approximation.

The following relation may be useful, since 24 is the number of transverse dimensions, and D+1 appears in the moonshine correlation :

$$(D+1)^{2\times 26} \approx 3^{24^2+1} \approx (e^3 \mathbb{M}/\sqrt{2})^5$$

precise to 5×10^{-5} and 9×10^{-6} on a number of 275 decimal digits. The term $\mathbb{M}/\sqrt{2}$ appears directly in c-free dimensional analysis [4], as well in the relation :

$$\mathbb{M}/\sqrt{2} \approx (a/137)^{3aW^2/4\pi F}$$

inside the imprecision on W, the charged weak boson mass, by respect to the electron one, while F is the Fermi mass, while in the ppb range :

$$a/137 \approx 3^{a/F}$$

This confirms that a/137 is a mathematical ratio.

As well as mathematicians take profit of computer, they could be guided also by those formula, obtained by the *physical approach method* i.e. to look for direct connexions between pertinent numbers.

References

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