An underdog physicist's philosophical view of what/why there is

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Been/being avoided by the scientific establishment, people like us needn't further preach the mainstream -"truths". Or extrapolate such to the ultra-high energy region, some 11 and even more orders of magnitude off the nowadays accessible ones. There's not much doubt about A. Einstein's, N. Bohr's, W. Heisenberg's, E. Schrödinger's, P.A.M. Dirac's and of all the more recent giants' main results in the range of their validity. Not even about Bohr's then concern whether Heisenberg/(& temporary)Pauli's nonlinear field theory of the elementary particles would be weird enough (this well applying to M-theory too these days) to have a chance to be true which it hadn't, in retrospect. Physics could well turn out to be a more or less hopeless task - with evolving laws of nature, spatiotemporal variations of these as well as of the fundamental constants, phenomena non-explicable within the used set of axioms. Entirely in line with K. Gödel's incompleteness theorem, as far as the maths is concerned. R.P. Feynman, the father of QED-graphology, fully aware of knowledge-gaps there, would recommend worrying about electromagnetic force's coupling. But those who try to do so apparently are sharing the fate of martyrs. And the ubiquitous usage of natural units indeed eases the algebra, but more important, keeps the theorists from reasoning of why/how the (dimensionless) ratios of the constants acquire the values they happen to have…

Once successfully used the powerful methods of QED and/or QCD, one indeed may be tempted to "believe" that these could also be used on much smaller scales. In this context one has to remember the many hurdles overcome in the old days: repairing Schrödinger's equation by replacing its Hamiltonian by a relativistic one with the right minimum coupling, constructing renormalizable/calculable relativistic quantum field theories incl. RG - group method, perturbative approaches, inventing/mastering Yang-Mills-theories, lattice methods, bringing supersymmetry into play, and Euler-Beta function Veneziano-amplitudes too which would eventually lead to string/M-theory. The many repairs & upgrades done considered there likely are much more of these ahead. The extraordinarily meritorious theorist G.'t Hooft is one of just a few celebrities doubting (some of) the foundations of quantum mechanics, so searching for a kind of proto-QM with deeper principles/symmetries. And getting rid of space-time these days is an accepted major goal within the quantum gravity community.

The weirdness of QM – from duality via entanglement to non-locality – seemingly inspires a series of experts to add more of the crazy stuff by brute-force continuation of principles/ results of conventional theory to off its limits. Every possibility is thought of being realized, and there is infinitely many of such at the same time. Together with the $\Delta E \Delta t \geq 1/4$ variant of the uncertainty relation (at that small a scale envisioned maybe not applicable any more) and gravity added (gravitational energy counted negative) the generation of universes gets the "ultimate free lunch" in A. Guth's diction. At least so in a flat space. The Multiverse with (likely eternal) inflation thus is wide awake. And gets massive support too from the zillions of possible/realized(?) string vacua from the "landscape". Because everything goes, there is no need of worrying about the number of space-time dimensions, or about the values of the (dimensionless) fundamental constant ratios, or about the tininess of the cosmological constant. We always knew we were insignificant anyway, us outcast ones. From now on, the whole establishment is too. That's fantastic. Nevertheless, we'll keep on thinking about possible relations amongst the constants of nature and the basic laws/interactions at work.

Emphasizing J.H. Jeans' statement that the dimension of e^2/c (=elementary charge squared divided by speed of light) is an action as is true of Planck's constant h, A. Einstein thought that there must be a connection. As the proportionality factor between the said constants' ratio and the reduced Planck's constant is approx. 1/137, the relation (if any and if a causal one) might indicate that fractional or irrational quanta of action could occur in nature, from W. Culetto's and my own point of view. Every non-point-particle conception sooner or later is going to face the connectivity problem, be this H. Weyl's then imagination of elementary particles (with mass) as general relativity space's inner surfaces, or our tentative/heuristic ansatz when imagining constructing all things & structures existing and/or propagating by Julia set - mediators or their convolutions/aggregates, respectively. According to G. Julia and P. Fatou such sets from iteration theory come either as connected or as disconnected ones, latter being Cantor dusts. For Julia sets $J_{\mathbb{C}}$ produced by the iterative $z \rightarrow z^2 + \mathbb{C}$ map in the complex plane, the connectedness locus is the so-called Mandelbrot set M. In case of (genuine?) fluctuations of the complex $\mathbb{C}$ - parameter, especially to slightly off the main series' bifurcation roots c_k, i.e. to ($c_k \pm i\varepsilon$), $\varepsilon > 0$, or to ($1/4 + \varepsilon$) for the main series' starting point on M's real c-axis, digital transitions from connected to disconnected $J_{\mathbb{C}}(z)$ and reverse occur. Mandelbrot set M's structural stability – also termed universality – as far as conservation of M's sophisticated combinatorial features is concerned, allows for generalization of the before statement to much more complicated 1D (and 2D(?))holomorphic dynamical cases.

Thus, in addition to the well-known consequences of the quadratic relativistic Hamiltonian – particle-antiparticles and spin from double covering of the Lorentz group – new phenomena from control (if such) on connectedness could possibly occur. In the Newtonian limit already. Permanent connectedness of objects' "dynamical cores" could well be as impossible as is simultaneous exact measurement of canonically conjugated variables in QM, i.e. the extended objects just being connected on (temporal and/or spatial) average. Such restrictions could result in a sort of "topological/geometrical" uncertainty relation, which maybe gets relaxed in the permanently disconnected set limit without propagation of any action due to the entire lack of links in the set. Taken together with the conceived existence of the fractional quanta of action case mentioned before, i.e. that finer structures in phase space become relevant which normally are victim of a Planck constant grain-size lattice, ill-considered continuation of the conventional uncertainty relations on to the smallest scales is dangerous. And if the mentioned fluctuations of $\mathbb{C}$ were extremely rapid ones and kind of the conjectured digital uncertainty relation active, then almost all of the vacuum's energy ought to be expended for coping with the connectivity constraints. In case of highly nonlinear, extreme interactions, for vacuum's modes instead of $\sum n$ usually to be regularized, $\sum n^2$ might well occur, whose zeta-function regularization then would give exactly zero. So, at the fundamental level, the vacuum effectively/constantly could face "dire straits", not just being unwilling to spend a short-term energy loan but unable to, the tiny energy budget left reserved for self-replication. On a trillion times larger scale, and for vacuum energy differences there, relativistic quantum field theories would be closer to their (known) validity-range then and maybe work properly.

There seems to be one more sore point in the conventional Big Bang - argumentation. The need for lots of phase transitions (many in the dual reverse Feigenbaum-scenarios context of our hypothetical view) in the very beginning could have unlikely been met in the time span available, even in case of ultrafast processes granted. Thus there something was/is wrong with time then, in all probability. Additionally, quite complicated connectivity conditions of the emerging space(s) maybe are to blame for the overall complexity of the system-state then.

Well, everybody knows that contributions to numerology aren't really beneficial to one's career, no matter if cabbalistic attempts/procedures or just ordinary mathematical ones. There indeed isn't much sense in pursuing such procedure with dimensional quantities. In this context, dimensional analysis was/is a powerful tool (except for a few cases) and correspondingly often done. But in the mathematical situation where a small set of non-linear iterative maps is chosen the basic "genome" of dynamics and structure, the method necessarily fails as complex variables as well as parameters then cannot be dimensional. Instead only relative, dimensionless variables & ratios count and are independent of the used system of units. Thus, looking for "common divisors" in approximate formulae (see such in articles of our culetto.at website) for the dimensionless variables and constants gotten from trial-and-error procedure is kind of "continuation" of dimensional analysis to the dimensionless case. One such "divisor" in factorization e.g. is $\ln(\delta_{2D})/(|c_D|\ln(\delta))$, or its inverse, both comprising (limit-)quantities appearing in 1D and 2D holomorphic dynamics (c_D being the main series Myrberg-Feigenbaum point's coordinate in M, δ and δ_{2D} Feigenbaum's universal number and Feigenbaum's number for an area-preserving 2D map). If results gotten this way were not accidental, one maybe could even learn about details at the smallest scales. A fine-structure constant approximation formula of ours for instance would reveal a natural mass-cutoff at approx. $0.4012\,M_P$, where M_P is the Planck mass, the numeric pre-factor being the above mentioned inverse "divisor" times $\sqrt{\pi P/8}$ with P in it, the Thue - Morse constant (= the upper external angle accessory of the Myrberg - Feigenbaum point c_D). Nature for a quadratic maps set "genome"(if so) maybe makes contact to her binary roots, as $F(z) = (1 - z)F(z^2)$ for $F(z) = \sum t_n z^{-n}$, $n \geq 0$ and t being the Thue-Morse word. For z = 2 the mentioned sum from 0 to ∞ gives the Thue-Morse constant, i.e. F(2) = P. Furthermore, the overall shape of our fine-structure constant expression – resembling the Gaussian distribution-density squared $\varphi(\sigma X; \sigma=\delta)^2$, pretty near its maximum – comes up with a $1/(2\pi\delta^2)$ factor which is quite close to 1/137 and suggests that ratios of successive bifurcation root distances near /in the infinite bifurcation limit likely are involved in giving the infinite distance limit of electrodynamics' effective coupling constant the small value it happens to have. Thus, the common reasoning with accidental constants of nature and accidental coupling constant values of her definitely more than four forces – the intermediate bosons of the 5^{th}'s "weak sector" ante portas – might eventually be proven wrong sometime.

Unity of physics would likely leave "universal" imprints in the quite dissimilar phenomena. For example, tiny so-called elementary quantum particles as well as huge black holes are described by the *same set* of observables: charge, mass and spin /angular momentum. When trying to relate fractal geometry /Mandelbrot set's features to objects/structures & dynamics in nature, Julia set fractals and their control spaces/connectedness loci were thought of being suitable candidates for a much deeper thermodynamical description of all there is (in line with the Thermodynamic Formalism, i.a. by D. Ruelle in multifractal analysis). Meritorious modern mathematical work by A. Avila, M. Lyubich, X. Buff, A. Chéritat, M. Shishikura et al. in the Julia sets/holomorphic dynamics context did ease our J-choice. Already for the quadratic polynomials family, coarse geometric trichotomy of the corresponding quadratic Julia sets comprises "lean" J's (with Hausdorff - dim $D_H(J) < 2$), "balanced" ones ($D_H(J) = 2$, area(J)=0) and "black hole" case ones (area(J) > 0). Once a hypothetical connection between quantum particle dynamics' relative energy and the Hausdorff - dim and/or hyperbolic dim of fitting Julia set mediators made – i.e. $\langle E/E_0\rangle = f(D_H(J), D_{hyp}(J))$, $f(D_H, D_{hyp})$ valid from the Newtonian limit up to the ultra-high relative energies region – Hausdorff - dim 2 limit Julia sets with zero area being about to get a Lebesgue area would witness a radical change. The natural cutoff of the ordinary mass scale at ≈ 0.4012 M_P mentioned in the fine-structure constant approximation formula's context, could possibly come from such a transition (at massive(?) perturbation of the underlying iterative maps). With Julia sets from special quadratic polynomial maps of the complex plane – these undergone a cascade of successive perturbations – indeed a spectral gap is reported in the literature, the hyperbolic dimension $D_{hyp}(J)$, i.e. the supremum of the Hausdorff dimensions over all hyperbolic subsets being strictly less than the full $D_H(J)$. Starting from essentially geometrical considerations – pursuing R.P. Feynman's old idea of electrodynamics' coupling maybe being related to pi or to the base of natural logarithms, and adding a more subtle dependence of $\gamma e^{\pi+1}\pi^{e+1}$ shape, where γ is the Euler - Mascheroni constant – our (archetype version) fine-structure constant approximation formula was found. As $\exp(\gamma^{1/2}e^{\pi/2+1/2}\pi^{e/2+1/2})$ would be realized to be of [Planck mass divided by electron pair rest-mass]'s order of magnitude, a trial-and-error procedure delivered the perfectly fitting pre-factor $(1/\sqrt{\pi P/2})$ times $\ln(\delta_{2D})/(|c_D|\ln(\delta))$, the said "divisor" in factorization. And the exp-function's argument, rewritten in terms of the $M_P/2m_e$ approximation and squared, would then be the rewritten α-approximation's $\ln(CM_P^2/m_e^2)^2/4$ term with the natural mass cutoff $\sqrt{C}M_P$, C being approx. 0.16099. The mentioned $(e^{\pi+1}\pi^{e+1})$ term has "divisor"-character of its own and as such is also found in the proton-electron rest mass ratio approximation formula of ours. According to M. Shishikura one can obtain maps whose Julia sets have $D_H(J)$ arbitrarily close to 2 from "the secondary bifurcation" of a parabolic periodic point, and twice renormalization is enough in order to obtain Hausdorff-dim 2. Furthermore, he states that the renormalization induces a map between old and new dynamical planes which resemble an exponential map. Thus the said term could well come from such a "genome" fitting map's small(?) perturbation.

Concluding, one might conjecture that the topological boundary of the (filled) Julia sets, used as objects/mediators in the period-2^0 oscillation context, carries enough information to account for at least most of the emergent, aggregated dynamical observables for neutral and integer charged quantum particles/composites. With the restriction that only dimensionless quantities & ratios are tractable in the nonlinear iterative maps context. Everybody is waiting/longing for new LHC-data at (hopefully) full design energy. But what if they would see no signs of supersymmetry, no Kaluza-Klein fermion/gluon/graviton modes/resonances, no low scale quantum gravity signs, no missing energy events except for the already known ones, no micro black holes' production/decay to 2-body final states, no fourth family (conventional)particle but *massive leptons* with fractional electric charge quantum numbers – 3/7 and + 4/7, according to the external angles accessory of the *secondary Mandelbrot set* cardioid's cusp? The resonances' $m_{X,Y}$ come close to 5.0 TeV (+ 3‰ rise in estimation's external angle $\xi_0^{X,Y}$= 16/31 of M-antenna's p5 last appearance cardioid used, would boost the values to over 14TeV), our generalized trial-and-error $M_{Planck}/m_i = f(1+\xi_0^{X,Y},\xi(1+\xi_0^{X,Y}))$ ratio fit-relation taken. What if they detect quark-gluon-plasma's real excess degrees of freedom? Likely due to the *quark's* coarsest (hypothetical) compositeness-level, i.e. 5 period-2^2 oscillation particles with + 3/15 and – 2/15 fractional electric charge quantum numbers, these confined new fermions bonded by the 5th force-"glue" field. Or sooner trace the intermediate bosons belonging to the 5th force's "weak sector"? Would experts then be heading toward depression, to QCD2.0 or even to fractal geometry/toy-models with some minimum set of iterative nonlinear complex maps as kind of "genome" for all there is? I really hope that expert's major conceptions with a gigantic effort in M-theory, competing quantum gravity theories, GUTs, supersymmetry etc. could get experimental support. The quantum world is often coined weird, but an even more insane behaviour of nature at the fundamental level is well within the realm of probabilities.