1154-81-245 **Michel L Lapidus*** (lapidus@math.ucr.edu), University of California, Riverside, Department of Mathematics, Riverside, CA 92521-0135. *Open Problems in Mathematical Physics: Feynman Integrals, Complex Fractal Dimensions, Origins of Fractality, Scaling Laws and Quantized Number Theory.*

We will discuss several long-term open problems in contemporary mathematical physics. These problems may involve the following topics: (i) The Feynman path integral, quantization and Feynman's operational calculus. (ii) Complex fractal dimensions, oscillations, Riemann surfaces and scaling laws (iii) Quantized number theory, the Riemann hypothesis and phase transitions. (iv) Complex dimensions, fractal cohomology and homology. (v) The possible origins of fractality in Nature.

References: (i) G.W. Johnson & MLL, The Feynman Integral and Feynman's Operational Calculus, Oxford U. Press, 2000. GWJ, MLL & L. Nielsen, Feynman's Operational Calculus and Beyond, ibid, 2016. (ii) MLL & M. van Frankenhuijsen, Fractal Geometry, Complex Dimensions and Zeta Functions, Springer, 2nd edn., 2013. MLL, G. Radunovic & D. Zubrinic, Fractal Drums and Fractal Zeta Functions, Springer, 2017. (iii) H. Herichi & MLL, Quantized Number Theory, Fractal Strings and the Riemann Hypothesis, World Sci., in press, 2020. MLL, Philos. Trans. Royal Soc. A, 2015. (iv) MLL, In Search of the Riemann Zeros, Amer. Math. Soc., 2008. MLL, From Fractal Complex Dimensions and Quantized Number Theory to Fractal Cohomology, World Sci., to appear, (and papers by the author and by MLL & Tim Cobler.) (Received August 26, 2019)