Review of: "Hamiltonian Chaos and the Fractal Topology of Spacetime (Part 2)"

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The author proposed that our universe could have continuous dimensions and fractal topology, which requires a complete overhaul of the fundamental physics law. I would have expected more details in the manuscript on some alternate theory to support such bold suggestions. Instead, after spending all of Part I and the majority of Part II reviewing various aspects of chaos theory, the author jumped to the conclusion right after a very brief discussion of anomalous diffusion. The review part itself is well-written and very readable. I can kind of see where the ideas stem from. However, I don't find any specific theory formulated in the manuscript, whether it is a fundamental theory of quantum gravity accommodating both SM and gravity or a low-energy effective theory in the form of some modified gravity. It is not even clear to me whether the author is thinking about a quantum theory as all the examples are classical. What has been presented so far seems more philosophy than physics.

Based on the limited amount of information in the text, I think the arguments for continuous dimensions leave a lot to be desired. Some of the statements are even puzzling. For example, in Part I the author said that decoherence and the transition to classical behavior occurring far above the electroweak scale is a reasonable assumption. If I understand correctly, he is talking about the ENERGY scale above 200 GeV. In other words, it is an assumption that the microscopic world remains classical, which seems to be in line with the attempt to extend those results in classical phase space but is against the common sense in QM. Moreover, none of the two reasons for continuous dimensions presented in Sec. 6 look convincing to me. The small parameter epsilon in dimensional regularization is just a regulator and should be absent in any physical quantity. It is true that at a fixed point, operators receive anomalous dimensions, which is understood as the consequence of quantum correction. However, they are in general operator-dependent and cannot be uniquely absorbed into the spacetime dimensionality.

In summary, the paper did a good job of reviewing the known results of chaos theory and clearly explaining the author's motivations but offered little beyond that. I cannot make further comments on the validity before seeing more details like some equations.