Spacetimes as Attractors

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We propose that from an atomistic structure of spacetime could follow a variability of spacetime dimensions. This is hypothesized in analogy to period doubling as a route to chaos in collective systems of interacting components.

The application of concepts from complex systems theory to other areas of physics is an active field of research [1]. It is well known that chaotic phenomena can occur in collective interacting systems [2]. Often the route to chaos is via period doubling bifurcations.

Another very active field is the research on the quantization of gravity: it has been proposed that spacetime is composed of entangled qubits [3], and that it could have an atomistic structure [4].

We conjecture that, in analogy with what can be observed in fluids, “spacetime atoms” can interact with each other, and that the interaction is nonlinear.
The assumed nonlinear process regulates the transition from a noisy uncorrelated behavior to an ordered one, in a period doubling route to chaos as the order parameter varies.
At present time it is not yet clear to us what plays the role of the order parameter in the proposed analogy.

This conjecture could provide a theoretical justification for a preon model that we presented in previous articles [5]. Spacetime dimensions are exactly the attractors of the alleged process, which explains why they present themselves in powers of two.

Let us remember that in the literature one can find other proposals on the number of spacetime dimensions as a dynamic variable [6].

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