

On the Emergence of Dark Matter from Coherent Quantum States

Ervin Goldfain

Abstract

Recent work suggests that Dark Matter behaves as large-scale dimensional condensate of *Cantor Dust*, a topological structure arising from the minimal fractal geometry of spacetime above the electroweak scale. Here we show that the spectrum of the quantum harmonic oscillator in the $|n\rangle$ basis stands in a one-to-one correspondence with the formation of Cantor Dust. The correspondence becomes exact upon applying an unbounded number of scaling iterations to a generic fractal set ($n \gg 1$).

Key words: Coherent quantum states, Fock states, Dark Matter, Minimal Fractal Manifold, Cantor Dust, Fractal sets.

1. Introduction.
2. Mono-fractals and the spectrum of coherent states.
3. Extension to multifractals and their partition function.
4. Standard Model as self-contained multifractal set.
5. Asymptotic transition from coherent states to Cantor Dust.
6. Concluding remarks.

Appendix A: Brief survey of the number and coherent bases in Quantum Mechanics.

Appendix B: Brief survey of fractal measures and their singularities.

References

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