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Spectral triples and non-commutative fractals

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Self-similar nested fractals are studied from a functional point of view, and this provides a way to quantize them, namely to produce a self-similar noncommutative C-*algebra containing the continuous functions on the fractal as a sub-algebra. For the noncommutative C*\-algebra associated with the Sierpinski gasket, the representations are studied, it is shown that a noncommutative Dirichlet form can be defined, which restricts to the classical energy form on the gasket, and a spectral triple is proposed. Such triple reconstructs in particular the Dirichlet form via the formula $a \to res_{s=\delta}\, tr(|D|^{-s/2}|[D,a]|^2|D|^{-s/2})$, for a suitable δ. Work in progress with F.Cipriani, T.Isola and J-L.Sauvageot.

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