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Michel L. Lapidus* (lapidus@math.ucr.edu), Department of Mathematics, University of California, Riverside, CA 92521-0135. *Analysis on fractals, geodesic metric and noncommutative geometry*. Preliminary report.

We plan to discuss several problems related to aspects of analysis on fractals, mathematical physics and noncommutative geometry, eventually leading to what was coined by the author as 'noncommutative fractal geometry' (Topological Methods in Nonlin. Analys., vol. 4, 1994; Comtemp. Math., vol. 208, 1997). Chief among them is to find a suitable analogue of the Dirac operator (corresponding to an appropriate Laplacian), Riemannian volume and geodesic metric. We will discuss recent joint work (Advances in Math., vol. 217, 2008) with Erik Christensen and Cristina Ivan in which we answer all of these questions positively for a class of fractals (and of quantum graphs) including the classic Sierpinski gasket, equipped with its Euclidean metric and the associated Hausdorff measure. If time permits, we will also discuss joint work in progress with Jonathan Sarhad in which we address analogous problems for the Sierpinski gasket, but now in a context that is more directly suitable for standard analysis or probability on fractals. (Received September 10, 2009)