

Meeting: 1001, Evanston, Illinois, SS 12A, Special Session on Iterated Function Systems and Analysis on Fractals

1001-28-42 **Robert S. Strichartz*** (str@math.cornell.edu), Math Dept, Malott Hall, Cornell Univ, Ithaca, NY 14853. *Some good news about those gaps in the spectrum of the Laplacian on certain fractals.*

In 1992, Fukushima and Shima gave an explicit description of the spectrum of the Laplacian on the Sierpinski gasket (SG). In particular, there are infinitely many large gaps. We give 2 rather pleasant consequences of these gaps. First, using results of Duong, Ouhabaz and Sikora (2002), we show that partial sums of Fourier series on SG actually converge, provided we sum up to a gap. (Experimental evidence for this was given by Oberlin, Street and Strichartz (2003).) Second, by showing that the set of ratios of eigenvalues also has gaps, we construct "PDE's" on the product of SG with itself that are not elliptic, but have fundamental solutions, obtained by double Fourier series expansions, that are well-behaved (joint work with Brian Bockelman). These results have no analogs for smooth manifolds. Many other highly symmetric fractals have similar spectral gaps, although in one case, the pentagasket, this is only observed experimentally (Adams, Smith, Strichartz and Teplyaev (2003)). (Received July 15, 2004)