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Joe P Chen* (joe.p.chen@cornell.edu), Cornell University, Ithaca, NY 14853. *Spectral zeta function and quantum statistical mechanics on Sierpinski carpets.*

Generalized Sierpinski carpets (GSCs) are a class of infinitely ramified fractals which include the canonical Sierpinski carpet (in 2D) and the Menger sponge (in 3D). Much progress has been made on showing the uniqueness of Brownian motion on GSC and a sharp estimate of the heat kernel trace. As a result, we can now compute the zeta function associated with the Laplacian on GSC, whose poles give the "complex dimensions" of the various spectral volumes; and show that the zeta function can be meromorphically continued to the left half plane. This allows us to compute the grand canonical partition function for any ideal gas confined to a GSC. One implication I will explain is the onset of Bose-Einstein condensation in unbounded GSC, which depends sensitively on the spectral dimension. If time permits I will also discuss the role of vacuum fluctuations (Casimir effect) in GSC. (Received September 10, 2011)