1077-81-785 **Eric Akkermans*** (eric@physics.technion.ac.il), Physics Department, Technion Israel Institute, Haifa, Israel. *Statistical mechanics and quantum field theory on fractal structures.*

Fractals define a new and interesting realm for a discussion of basic phenomena in Quantum Electrodynamics and Statistical Mechanics. This interest results from specific properties of fractals, e.g., their dilatation symmetry and the corresponding absence of Fourier mode decomposition. Moreover, the existence of a set of distinct dimensions characterizing the physical properties (spatial or spectral) of fractals make them a useful testing ground for dimensionality dependent physical problems.

We shall start by noting that the absence of Fourier transform on a fractal implies necessarily different notions of volume in direct and reciprocal spaces and thus the need to modify the Heisenberg uncertainty principle. Implications for field quantization and the definition of the notion of photon on a fractal will be further addressed.

We shall address specific problems including the behavior of the heat kernel and zeta functions on fractals and their importance in the expression of spectral properties in quantum field theory. Finally, we shall apply these results to specific problems such as thermodynamics of radiation by a fractal blackbody and a conjecture regarding the behavior of the non diagonal heat kernel. (Received September 12, 2011)