Contributed Talks

Jean Bellissard (Georgia Institute of Technology):

"The quantum Hall effect"

Raffaela Capitanelli (La Sapienza, Rom):

"Robin boundary condition on scale irregular fractals"

Abstract: We consider mixed Dirichlet-Robin problems on scale irregular domains. In particular, we study the asymptotic convergence of the solutions of elliptic problems with Robin boundary conditions on the prefractal curves approximating the scale irregular fractals.

Jonathan Fraser (St. Andrews):
"The visibility conjecture"

Lukasz Grabowski (Uni Göttingen):

"On Turing machines, dynamical systems and the Atiyah problem"

Abstract: Motivated by classical Turing machines, we develop a notion of a Turing dynamical system. We relate dynamical properties of such system (phrased in terms of attractors, flows, etc.) to, on the one hand, certain analytical properties (i.e. spectra of operators) of the associated von Neumann algebra; and, on the other hand, to real numbers which are computed by a Turing machine. Both those relations enable us to obtain a significant new information on the so called Atiyah problem in group theory: what are the possible values of the l2-Betti numbers (a.k.a. von Neumann dimensions of kernels of elements of group rings)?

Michael Hinz (FSU Jena):
"Limit chains on the Sierpinski gasket"

Xue-Ping Huang (Uni Bielefeld):

"A note on stochastic completeness for graphs and weak Omori-Yau maximum principle"

Nishu Lal (UCR):
"Spectral analysis on self-similar sets"

Tuomas Sahlsten (University of Helsinki):

"Local structure of measures"

Anthony Samuel (St. Andrews):

"The non-commutative torus"

Jean Savinien (Lyon 1):
"Transverse Laplacian for substitution tilings"

Abstract: Pearson and Bellissard recently built a spectral triple – the data of Riemanian

noncommutative geometry - for ultrametric Cantor sets. They derived a family of Laplace–Beltrami like operators on those sets. Motivated by applications to specific examples and the physics of quasicrystals, we revisit their work for the transversals of tiling spaces, which are particular self-similar Cantor sets. We use Bratteli diagrams to encode the self-similarity, and Cuntz–Krieger algebras to implement it. We show that the abscissa of convergence of the zeta-function of the spectral triple yields the exponent of complexity of the tiling. We determine completely the spectrum of the Laplace–Beltrami operators, give an explicit method of calculation for their eigenvalues, compute their Weyl asymptotics, and a Seeley equivalent for their heat kernels. This is joint work A. Julien.

Florian Sobieczky (FSU Jena):

"Amenability of horocyclic products of trees"

Abstract: The lamplighter-group on the integers is amenable although is has exponential growth. The Cayley graph of this group with respect to a natural set of generators is the so called horocyclic product of two homogeneous trees. The talk summarizes results about the stability of amenability of this type of graph under modifications. These include random perturbations (`Percolation', [1, 2]), horocyclic products of periodic, and uniformly growing trees. The latter include `quasi-periodic' trees generated by Sturmian sequences, as well as trees belonging to simple substitution systems. Open questions regarding other types of trees are discussed.

[1] F.S.: `Amenability of horocyclic products of percolation trees', http://arxiv.org/abs/0903.3140

[2] V. Kaimanovich, F.S.: `Stochastic homogenization of horospheric tree products', arXiv:0906.5296

Ben Steinhurst (University of Connecticut):

"Diffusions and Laplacians on Laakso Spaces"