EPSRC Symposium Workshop: Recent advances in modern dynamics

Abstracts

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David Burguet (Université Pierre et Marie Curie)
Symbolic extensions on surfaces in intermediate smoothness
By a symbolic extension of a topological dynamical system (X,T) we mean an extension of (X,T) which is subshift over a finite alphabet. The existence and the entropy of these extensions are related to the convergence of the metric entropy of (X,T) computed at finer and finer scales. T.Downarowicz and S.Newhouse have conjectured that any C^r map on a compact manifold admits symbolic extensions. In this talk we will discuss the case of surface maps.

Yves Coudene (Université de Bretagne Occidentale)
Ergodic invariant measures in non-positive curvature.
Geodesic flows on negatively curved manifolds have lots of invariant measures. K. Sigmund showed that ergodicity is even a generic property in the space of all invariant probability measures, endowed with the weak topology. I will explain recent generalisations of K. Sigmund's result to the case of non compact, non-positively curved manifolds. This is joint work with B. Schapira.

Tanja Eisner (Korteweg-de Vries Institute for Mathematics)
Large values of the Gowers-Host-Kra seminorms
The Gowers-Host-Kra (GHK) seminorms arise naturally in the recent structure theory of dynamical systems and the study of convergence of multiple ergodic averages. In particular, functions with zero GHK seminorm are known as "quasirandom" and have the property that multiple ergodic averages involving one such function converge to zero. We study the opposite case, i.e., for which functions the GHK seminorms are as large as possible. The talk is based on joint work with Terence Tao.

Andrew Ferguson (Bristol)
The dimension of some sets generated by systems with holes
Let (X,d) denote a compact metric space and $T:X \to X$ an open and expanding map. For an non-empty open set $U \subset X$ we define the survivor set X_U to be the set of points which under forward iteration do not enter U.
In this talk I will discuss the dimension theory of these sets for some conformal and non-conformal systems.

Shirali Kadyrov (University of Bristol)
Entropy and escape of mass in Hilbert modular spaces.
We discuss the relation between metric entropy and escape of mass for the Hilbert modular spaces with respect to the action of a diagonal element. A limit of a sequence of probability invariant measures may be the zero measure as the space is non-compact. However, if the entropies of the measures in this sequence are uniformly greater than the half of the maximal entropy then we show that the limit measure cannot be the zero measure. We also give an upper bound for the Hausdorff dimension of the set of points that escape on average.

Thomas Kempton (Utrecht)
Densities of Bernoulli convolutions
Bernoulli convolutions are simple examples of self similar measures with overlaps. Each Bernoulli convolution is associated to some parameter beta, and it is a long standing open question to determine for which parameters the convolution is absolutely continuous.
We consider the case that the Bernoulli convolution is absolutely continuous, and use symmetries in its density to build a simple map which allows us to study the properties of Bernoulli convolutions dynamically. This map preserves Lebesgue measure and serves as a natural extension for both the fat baker transformation and the random beta transformation. We use the map to give a new necessary condition for the absolute continuity of Bernoulli convolutions.

Carlos Matheus (Université Paris 13)
Some examples of cocycles with wild central Oseledets bundle
In the literature, the usual ("skew-product like") examples of cocycles with some zero exponents have a continuous central Oseledets bundle. In this talk, we will see how the so-called KontsevichZorich cocycle can be used to produce examples of cocycles whose central Oseledets bundle are not continuous at all. Here, the geometric mechanism responsible for the zero exponents is very simple (namely, the existence of a non-degenerate pseudo-Hermitian form) despite of the "wildness" of the neutral Oseledets bundle. This is a joint work with Artur Avila and Jean-Christophe Yoccoz.

Vincent Pit (Université Paris 11)
Symbolic coding for hyperbolic surfaces of finite volume.
There are several ways of encoding the action at the infinity of a surface group of finite covolume by a subshift of finite type. One such way is given by the Bowen-Series transform associated with any good fundamental domain for the action of the group on the hyperbolic plane. I will recall how it is constructed and describe how it links indirectly the geodesic flow on the surface with the eigenfunctions of the laplacian.

Felipe Ramirez (University of Bristol)
Higher-degree cohomology for Anosov actions
There is a conjecture due to A. and S. Katok generalizing Livshitz's theorem to higher-rank Anosov actions. Recall that Livshitz's theorem tells us that the obstructions to solving the coboundary equation for an Anosov flow are exactly those coming from periodic orbits. It is conjectured that for an Anosov action by a rank-*d* abelian group, the obstructions to solving the degree-*d* coboundary equation also come from closed orbits of the action. Furthermore, lower-degree cohomology should trivialize, as it is known to do in the first degree, by work of Katok and Spatzier. I will discuss the conjecture, and some cases where it is known.

Emmanuel Roy (Université Paris 13)
Prime Poisson suspensions
Prime maps are those maps whose only factors are the trivial ones. Known examples so far were rather limited: some rank one maps, some factors of simple maps (including the time one of some horocycle flows) and a few constructions based on them. We will show we can also obtain this extremal situation among dynamical systems of probabilistic origin, the Poisson suspensions. Our examples are new in the

sense they are not isomorphic to the previously known examples of prime maps.
Joint work with François Parreau.

Daniel Schnellmann (Ecole Normale Supérieure)
Viana-like maps with singularities in the base dynamics
We consider Viana skew-products with beta transformations or quadratic transformations in the base map and show the existence of a unique absolutely continuous invariant measure and related ergodic properties such as stretched exponential decay of correlations. This corresponds to joint work with J. Alves.

Alexey Teplinsky (Institute of Mathematics NASU, Kiev)
Linear-fractional renormalization related to circle diffeomorphisms with multiple breaks
For a circle diffeomorphism with a single break point, which is the point of jump in the first derivative, the standard renormalization procedure leads to the limiting operator that acts on commuting pairs of linear-fractional functions.
In our recent work (joint with K.Khanin) we have built the hyperbolic horseshoe for that operator, and this allowed us to prove the rigidity results for such diffeomorphisms. One of the crucial points for our proof was the existence of certain involution that conjugates the renormalization operator on linear-fractional commuting pairs with its inverse.
Now, if we look at circle diffeomorphisms with $N \geq 2$ break points, there are different ways to define renormalizations. We found it out that the so-called `self-dual induction' procedure proposed by Ferenczi et al. for certain classes of interval exchange transformations may serve the best as the base for our construction of renormalization operator. A point in the limiting space of renormalizations is made of N pairs of linear-fractional functions, which are all intervened in some N commutational relations. Renormalization operator is non-uniquely defined and changes both functions and the combinatorics of commutations.
For $N=2$ we construct the whole renormalization scheme and find the involution that conjugates the renormalization operator with its inverse. For $N>3$ things become more complicated, so that work is in progress.