ANATOLE KATOK'S 70th BIRTHDAY BANFF CONFERENCE

TIME	MON	TUES	WED	THUR	FRI
9:30 - 10:20	François Ledrappier	Omri Sarig	Benjamin Weiss	Andrew Török	Viorel Niţică
10:20 - 11	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
11 - 11:50	Alistair Windsor	Huyi Hu	Renato Feres	Ilie Ugarcovici	Vadim Kaloshin
12 - 1:30	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
2 - 2:50	Alexander Gorodnik	Andrey Gogolev	FREE	Raphaël Krikorian	
2:50 - 3:30	COFFEE BREAK	COFFEE BREAK	FREE	COFFEE BREAK	
3:30 - 4:20	Vaughn Climenhaga	Keith Burns	FREE	Zhiren Wang	
4:40 - 5:30	Manfred Einsiedler	Aaron Brown	FREE	Mariusz Lemańczyk	

MONDAY 8:45am: WELCOME TALK.
MONDAY 1 - 2pm: TOUR OF THE BANFF CENTRE.

WEDNESDAY 1:30pm: GROUP PHOTO (meet in the TCPL foyer).
WEDNESDAY 6 - 10pm: BANQUET in the MACLAB BISTRO.

DINNER STARTS AT 5:30pm AND GOES ON TILL 7:30pm.

ABSTRACTS

Aaron Brown

Title: Measure rigidity for random surface diffeomorphisms

Abstract: Consider a group acting on a surface by C^2 diffeomorphisms. We consider invariant and stationary measures for such an action. For a hyperbolic, ergodic, stationary measure we prove the following trichotomy: either the measure is finitely supported, the stable distribution is non-random, or the measure is SRB. In proving the above results, we also prove a related result for skew products with surface fibers defined over measurable base dynamics. We also derive a number of corollaries for groups of measure preserving diffeomorphisms. This is joint work with Federico Rodriguez Hertz.

Keith Burns

Title: Ergodicity of the WP geodesic flow.

Abstract: TBA

Vaughn Climenhaga

Title: Unique equilibrium states for some robustly transitive systems.

Abstract: Examples of robustly transitive systems that are not uniformly hyperbolic were given by Mañé, and later by Bonatti and Viana. Recently it has been shown by Buzzi, Fisher, Sambarino, and Vásquez that these examples have unique measures of maximal entropy. We show that for a certain class of Hölder continuous potential functions these systems have unique equilibrium states. This class includes the geometric potentials and yields the SRB measure as an equilibrium state for these systems. The techniques are quite general and have applications to other classes of non-uniformly hyperbolic systems. This is joint work with Todd Fisher and Dan Thompson.

Manfred Einsiedler

Title: Joinings of higher rank actions, Integer points on spheres and their orthogonal complement

Abstract:Consider the collection of all primitive integer vectors in $\mathbb{Z}^3$ on a particular sphere. It was shown by Duke (after a breakthrough of Iwaniec and initial progress by Linnik) that the directions of these vectors equidistribute to the area measure on the sphere. A related question is how the lattice in the orthogonal complement of the vector looks like. W. Schmidt showed that these lattices equidistribute if one considers all vectors up to a particular length (instead of just the vectors of a given length). As it turns out the joint equidistribution problem of the vector on the sphere (as in Duke's theorem) and the shape of the lattice in the orthogonal complement can be attacked, under additional congruence conditions, by a classification of joinings of higher rank diagonalisable actions. This is joint work with M.Aka and U.Shapira. We will discuss the connection of the above problem to the joinings classification and parts of the proof of the latter, which is a joint work with E.Lindenstrauss.

Renato Feres

Title: Statistical mechanics of random billiard Systems

Abstract: We consider stochastic processes derived from Hamiltonian systems on manifolds with boundary (billiard-like systems). By fixing the statistical state of part of the system we obtain Markov chains that describe simple thermodynamic processes, which we then investigate from the viewpoint of random dynamics.

Andrey Gogolev

Title: Anosov bundles

Abstract: An Anosov bundle is a fiber bundle which is equipped with a fiberwise Anosov diffeomorphism or a flow. In this talk we will study properties of Anosov bundles and explain two applications:
1. Rigidity of negatively curved bundles (joint work with Tom Farrell);
2. New examples of partially hyperbolic diffeomorphisms (joint work with Pedro Ontaneda and Federico Rodriguez Hertz).

Alexander Gorodnik

Title: Smooth factors of flag manifolds

Abstract: A well-known theorem of Margulis classifies measurable factors of flag manifolds, and an analogous result in the continuous category has been established by Dani. In this talk we discuss classification of smooth factors under some hyperbolicity assumptions. This is a joint work with R. Spatzier.

Huyi Hu

Title: Quasi-stability and quasi-shadowing for partially hyperbolic diffeomorphisms

Abstract : The motivation of the work is to study topological properties of partially hyperbolic systems which are similar to those of uniformly hyperbolic systems. We try to obtain some properties similar to these of uniformly hyperbolic systems by "ignoring" the motions along the center direction.
We show that any partially hyperbolic systems (1) are quasi-stable in the sense that for any homeomorphism g C^0-close to f, there exist a continuous map π from M to itself and a family of locally defined continuous maps $\{\tau_x\}$, which send points along the center direction, such that

$$\pi \circ g = \tau_{fx} \circ f \circ \pi;$$

and (2) have quasi-shadowing property in the sense that for any pseudo orbit $\{x_k\}_{k\in\mathbb{Z}}$, there is a sequence of points $\{y_k\}_{k\in\mathbb{Z}}$ shadowing it in which y_{k+1} is obtained from $f(y_k)$ by a motion τ along center direction.
In particular, if f has C^1 center foliation, then we can make the τ along the center foliation. As application we obtain some continuity properties for topological entropy. Also, we show that if the center foliation is uniformly compact, then there is an analogue of spectral decomposition for center nonwandering set.

Vadim Kaloshin

Title: On Arnold diffusion for convex Hamiltonians in any dimension.

Abstract: In 1964 Arnold conjectured that generic nearly integrable systems posses instabilities (diffusing orbits). Due to techniques developed by Mather, Fathi, Bernard, Cheng-Yan in order to construct diffusing orbits for convex nearly integrable systems it is nearly sufficient to construct two dimensional normally hyperbolic invariant cylinders. For systems of 2.5 degrees of freedom such cylinders were constructed by Bernard-Kaloshin-Zhang for single resonances and by Kaloshin-Zhang for double resonances. In the latter work diffusing orbits were also constructed. During the talk I will describe the construction of two dimensional normally hyperbolic invariant cylinders in arbitrary degrees of freedom using dominant Hamiltonan systems. For 3.5 degree of freedom we also prove existence of diffusing orbits. This is joint work with Ke Zhang.

Raphaël Krikorian

Title: TBA

Abstract: TBA

François Ledrappier

Title: Local Limit Theorem in negative curvature

Abstract: We give an equivalent, as t goes to infinity, for the heat kernel on the universal cover of a compact manifold with negative curvature. This is the continuous time extension of a similar result by S. Gouëzel for random walks on hyperbolic groups. Joint work with Seonhee Lim.

Mariusz Lemańczyk

Title: Invariant measures for B-free systems and Möbius disjointness

Abstract: A description of the set of invariant measures for dynamical systems arising from so called B-free numbers (square-free numbers are particular case of such) will be presented. In particular, intrinsic ergodicity property will be proved. We will also show how to use an old result of A. Katok concerning ergodicity of cocycles over irrational rotations to obtain the validity of Sarnak's conjecture on Möbius disjointness for some smooth maps of the torus. The talk is based on my joint results with J. Kulaga-Przymus and B. Weiss.

Viorel Niţică

Title: Stable transitivity of Heisenberg group extensions of hyperbolic systems

Abstract: We consider skew-extensions with fiber the standard real Heisenberg group of a uniformly hyperbolic dynamical system. We show that among the C^r extensions that avoid an obvious obstruction, those that are topologically transitive contain an open and dense set. More precisely, we show that a Heisenberg group extension is transitive if and only if the abelian extension given by the abelianization of the Heisenberg group is transitive.

Omri Sarig

Title: Katok's Horseshoe Theorem and structural consequences of positive entropy

Abstract: TBA

Andrew Török

Title: Almost sure invariance principle for sequential and non-stationary dynamical systems

Abstract: We establish almost sure invariance principles, a strong form of approximation by Brownian motion, for non-stationary time-series arising as observations on dynamical systems. Our examples include observations on sequential expanding maps, perturbed dynamical systems, non-stationary sequences of functions on hyperbolic systems as well as applications to the shrinking target problem in expanding systems. This is joint work with Nicolai Haydn (USC), Matthew Nicol (UH), Andrew Török (UH) and Sandro Vaienti (Marseille)

Ilie Ugarcovici

Title: Fuchsian groups and generalized boundary maps

Abstract: Bowen and Series (1979) constructed a Markov map on the unit circle that is orbit equivalent to the action of a given co-finite Fuchsian group. Such a construction relies on a well chosen fundamental domain of the Fuchsian group (in the Poincar disk model) and a partition of the boundary circle by the endpoints of the isometric circles of the group generators. We investigate a generalized version of this type of maps associated to a class of partitions of the boundary circle. We show how several dynamical properties can be obtained from geometric considerations about the two-dimensional extensions of these circle maps. This is joint work with Svetlana Katok.

Zhiren Wang

Title: Rigidity of hyperbolic lattice actions

Abstract: We will discuss several recent joint works with Aaron Brown and Federico Rodriguez Hertz on actions by higher rank lattices on nilmanifolds. If the action lifts to the covering nilpotent Lie group and contains an element that acts hyperbolically on the fundamental group, then it allows a continuous semiconjugacy to an action by automorphisms. When the action contains an Anosov element, it turns out that the semiconjugacy is a smooth conjugacy.

Benjamin Weiss

Title: On the classification of measure preserving diiffeomorphisms of the torus

Abstract: Together with Matt Foreman and Dan Rudolph we showed that the isomorphism relation for ergodic measure preserving transformations of a standard measure space is not Borel and is in fact a complete analytic set. This is a formal way of saying that there is no meaningful way to determine if two such ergodic transformations are isomorphic. Since the problem of smooth models remains wide open it is of interest to study the isomorphism relation restricted to ergodic diffeomorphisms of the torus that preserve Lebesgue measure. I will describe a recent result obtained jointly with Matt Foreman which shows that this restricted relation is also complete analytic. Heavy use is made of the Anosov-Katok method of constructing examples of the diffeomorphisms in question.

Alistair Windsor

Title: A Characteristic Factor for the 3-term IP-Roth Theorem.

Abstract: Let $\Omega = \bigoplus_{i=1}^{\infty} \mathbb{Z}_3$ and $e_i = (0, \ldots, 0, 1, 0, \ldots)$ where the1 occurs in the i-th coordinate. Let $\mathcal{F} = \{\alpha \subset \mathbb{N} : \emptyset \neq \alpha \text{ is fininte}\}$.
There is a natural inclusion of $\mathcal{F}$ into Ω where $\alpha \in \mathcal{F}$ is mapped to $e_\alpha = \sum_{i \in \alpha} e_i$. We give a new proof that if $E \subset \Omega$ with $d^*(E) > 0$ then there exist $\omega \in \Omega$ and $\alpha \in \mathcal{F}$ such that

$$\{\omega, \omega + e_\alpha, \omega + 2e_\alpha\} \subset E.$$

Our proof establishes that for the ergodic reformulation of the problem there is a characteristic factor that is a one step compact extension of the Kronecker factor.