Main Speaker — Jana Rodriguez Hertz

Title: Stable Bernoulliness in dimension 3

Nattalie Tamam

Title : Divergent trajectories in arithmetic homogeneous spaces of rational rank two

In the theory of Diophantine approximations, singular points are ones for which Dirichlet's theorem can be infinitely improved. It is easy to see that all rational points are singular. In the special case of dimension one, the only singular points are the rational ones. In higher dimensions, points lying on a rational hyperplane are also obviously singular. However, in this case there are additional singular points. In the dynamical setting the singular points are related to divergent trajectories. In the talk I will define obvious divergent trajectories and explain the relation to rational points. In addition, I will present the more general setting involving Q-algebraic groups. Lastly I will discuss results concerning classification of divergent trajectories in Q-algebraic groups.

Behrang Forghani

Title: Strip approximation and Shannon theorem for locally compact groups

Kaimanovich's *ray* and *strip approximations* are the primary tools to identify Poisson boundaries of random walks on discrete groups. In this talk, I will outline how to extend these geometric criteria to the random walks on *locally compact groups*. In order to do that, a version of *Shannon-McMillan-Breiman* theorem for locally compact groups will be established. In the end, I will discuss some applications to identify the Poisson boundary of locally compact groups which act by isometries on non-positively curved spaces. This is joint work with Giulio Tiozzo.

Mrinal Roychowdhury

Title: Quantization

Quantization for probability distributions refers to the idea of estimating a given probability by a discrete probability supported by a set with no more than n points. It has broad application in signal processing and data compression. Quantization dimension gives the speed how fast the specified measure of the error goes to zero as n approaches to infinity. Quantization dimension is also connected with other dimensions of dynamical systems such as Hausdorff, packing and box counting dimensions. I will talk about it.

Boris Kalinin

Title: Local rigidity of Lyapunov spectrum for toral automorphisms

We will discuss the regularity of the conjugacy between an Anosov automorphism L of a torus and its small perturbation. We assume that L has no more than two eigenvalues of the same modulus and that L^4 is irreducible over rationals. We consider a volume-preserving C^1-small perturbation f of L. We show that if the Lyapunov exponents of f with respect to the volume are the same as the Lyapunov exponents of L, then f is C^1+ conjugate to L. Further, we establish a similar result for irreducible partially hyperbolic automorphisms with two-dimensional center bundle. This is joint work with Andrey Gogolev and Victoria Sadovskaya.

Victoria Sadovskaya

Title : Boundedness and invariant metrics for diffeomorphism cocycles over hyperbolic systems

We consider a Holder continuous cocycle A over a hyperbolic dynamical system with values in the group of diffeomorphisms of a compact manifold M. We show that if the periodic data of A, i.e. the set of its return values along the periodic orbits in the base, is bounded in C^q, q>1, then the set of values of the cocycle is bounded in C^r for each r less than q. Moreover, such a cocycle is isometric with respect to a Holder continuous family of Riemannian metrics on M.

Michael Lin
Title: Double and joint coboundaries of irrational circle rotations

Tushar Das
Title : Dimension games, homogeneous dynamics and metric Diophantine approximation
Schmidt's game is a two-player topological game introduced in a seminal paper of Wolfgang M. Schmidt in 1966 as a technique to analyze Diophantine sets that are exceptional with respect to both measure and category. Schmidt's paper led to a plethora of applications at the interface of dynamical systems, Diophantine approximation and fractal geometry. We present a new variant of Schmidt's game designed to compute the Hausdorff and packing dimensions of any set in a doubling metric space. Problems involving dimension computations of sets, such as Khintchine's singular systems of linear forms, have provided a number of challenges to researchers working at the interface of number theory and homogeneous dynamics. We sketch some resolutions of such problems and end with a brief sample of further directions and questions. This is joint work with David Simmons, Lior Fishman, and Mariusz Urbanski.

Ilya Gekhtman

Title: Invariant random subgroups and their growth rates

Invariant random subgroups (IRS) are conjugacy invariant probability measures on the space of subgroups in a given group G. They arise as point stabilizers of probability measure preserving actions. Invariant random subgroups can be regarded as a generalization both of normal subgroups and of lattices lattices. As such, it is interesting to extend results from the theories of normal subgroups and of lattices to the IRS setting.
Jointly with Arie Levit, we prove such a result: the critical exponent (exponential growth rate) of an infinite IRS in an isometry group of a Gromov hyperbolic space (such as a rank 1 symmetric space, or a hyperbolic group) is almost surely greater than half the Hausdorff dimension of the

boundary. If the subgroup is of divergence type, we show its critical exponent is in fact equal to the dimension of the boundary
If G has property (T) we obtain as a corollary that an IRS of divergence type must in fact be a lattice. The proof uses ergodic theorems for actions of hyperbolic groups.
I will also talk about results about growth rates of normal subgroups of hyperbolic groups that inspired this work.

Thomas Barthelme

Title: Partially hyperbolic diffeomorphisms homotopic to identity.
I will talk about recent progress in the classification of partially hyperbolic diffeomorphisms on 3-manifolds. This is joint work with Steven Frankel, Sergio Fenley and Rafael Potrie.

Diaaeldin Taha

The Three Gap Theorem states that there are at most three distinct gap lengths in the fractional parts of the sequence $\{n\alpha\}{n=0}^{N-1}$, for any integer N and real number α. In this talk, we relate the Three Gap Theorem to the linear flow on two-dimensional tori, and their zippered rectangle decompositions over particular transversals. We also provide the optimal generalization of the Three Gap Theorem to IETs (interval exchange maps) satisfying the Keane condition. Finally, following G. Polanco, D. Schultz, and A. Zaharescu (2015), we show how to interpret the average gap distribution related to the Three Gap Theorem using the statistics of the Farey sequence, and how to explicitly derive the aforementioned distribution using what is now increasingly known as the Boca-Cobeli-Zaharescu (BCZ) map. If time permits, we will allude to current work on generalizing the BCZ map with deriving the gap distributions related to our IET gap theorem as a goal in mind.