MOSTLY DYNAMICS LIVE OVERLAY SECTION OF VIRTUAL ICM - ABSTRACTS

Contents

1. Miklos Abert

Title: Groups, manifolds and graph limits.

Abstract. I will talk about recent notions, results and open problems in the topic.

2. Jon Chaika

Title: Ergodicity of Rel with respect to Masur-Veech measure.

Abstract. The rel foliation is a foliation defined on strata of translation surfaces with at least two cone singularities. We show how measure rigidity for the upper triangular subgroup of $SL(2,\mathbb{R})$, on products of strata, (and a tiny bit of geometry) can prove the ergodicity of the rel foliation in every such strata with respect to the natural measure. This strengthens earlier work of McMullen; Calsamiglia, Deroin, and Francaviglia; Hammenstädt; and Winsor.

This is joint work Barak Weiss.

3. Romain Dujardin

Title: Random algebraic dynamics in complex dimension 2.

Abstract. I will review some results obtained in the past few years on the dynamics of groups of automorphisms of real and complex projective surfaces: classification of stationary and invariant measures, orbit closures, and finite orbits. Some basic examples and open problems will also be discussed. This relies on a variety of techniques from complex and algebraic geometry, as well as random, holomorphic, and arithmetic dynamical systems.

4. DAVID FISHER

Title: Rigidity and invariant measures beyond homogeneous dynamics.

Abstract. I will discuss the role that invariant measures play in the proofs of rigidity theorems. After providing some historical motivation in terms of Margulis' superrigidity theorem and Zimmer's notion of amenable actions, I will discuss two recent works and the role played in both by studying invariant measures outside the context of homogeneous dynamics while using tools from homogeneous dynamics. The two works concern, respectively, Zimmer's Conjecture and totally geodesic submanifolds of real and complex hyperbolic manifolds.

5. ALEXANDER GAMBURD

Title: Arithmetic and dynamics on varieties of Markoff type.

Abstract. The Markoff equation $x^2 + y^2 + z^2 = 3xyz$, which arose in his spectacular thesis (1879), is ubiquitous in a tremendous variety of contexts. After reviewing some of these, we will discuss (briefly) Hasse principle, asymptotics of integer points, and (in some detail) recent progress towards establishing forms of strong approximation on varieties of Markoff type, as well as ensuing implications, diophantine and dynamical.

6. MICHAEL LARSEN

Title: Character estimates for finite simple groups and applications.

Abstract. Let G be a finite simple group, χ an irreducible character of G, and g an element of G. I will discuss upper bounds, old and new, for $|\chi(g)|$ in terms of $\chi(1)$, particularly bounds of the form $\chi(1)\alpha$, where $\alpha \leq 1$ depends on the size of the centralizer of g compared to $|G|$. I will also indicate some applications for finite simple groups G, such as estimating mixing times for random walks on G, determining when products of conjugacy classes cover G, and estimating the number of homomorphisms from a Fuchsian group to G.

7. Mariusz Lemańczyk

Title: Furstenberg disjointness, Ratner properties and Sarnak's conjecture.

Abstract. In 2010 Peter Sarnak formulated the celebrated conjecture on the orthogonality of the arithmetic Möbius function with all continuous observables in deterministic topological dynamical systems. In the talk I will present an account on a recent research around the conjecture staying most of the time on the ergodic theory aspects of it.

8. Michela Procesi

Title: Stability and recursive solutions in Hamiltonian PDEs.

Abstract: In the context of Hamiltonian Partial Differential Equations on compact manifolds (mainly tori), I shall discuss the existence of special recursive solutions, close to an elliptic fixed point, which are superposition of oscillating motions, together with their stability/instability properties. One can envision such equations as chains of harmonic oscillators coupled by a small non-linearity, thus one expects a complicated interplay between chaotic and recursive phenomena due to resonances and small divisors, which are studied with methods from KAM theory. I shall concentrate mainly on the stability properties close to the fixed point as well as the existence and stability of quasi-periodic and almost-periodic solutions.

9. Pablo Shmerkin

Title: Slices and distances: two problems of Furstenberg and Falconer.

Abstract. I will survey the history and recent developments around two old problems: the slicing $\times 2$, $\times 3$ conjecture of H. Furstenberg in ergodic theory, and the distance set problem in geometric measure theory introduced by K. Falconer. While these two problems are on the surface rather different, I will discuss a common viewpoint that involves "multiscale projections" and analyzing fractals through a combinatorial description in terms of "branching numbers".

10. Corinna Ulcigrai

Title: Dynamics and 'arithmetics' of higher genus surface flows.

Abstract. We survey some recent advances in the study of (area-preserving) flows on surfaces, in particular on the typical dynamical, ergodic and spectral properties of smooth area-preserving (or *locally Hamiltonian*) flows, as well as recent breakthroughs on *linearization* and *rigidity* questions in higher genus. We focus in particular on the *Diophantine-like conditions* which are required to prove such results, which can be thought of as a generalization of *arithmetic conditions* for flows on tori and circle diffeomorphisms. We

will explain how these conditions on higher genus flows and their Poincaré sections (namely generalized interval exchange maps) can be imposed by controlling a renormalization dynamics, but are of more subtle nature than in genus one since they often exploit features which originate from the non-uniform hyperbolicity of the renormalization.

11. Barak Weiss

Title: The horocycle flow on the moduli space of translation surfaces.

Abstract. This is the virtual ICM lecture of Jon Chaika and Barak Weiss, which will be given by Barak Weiss. We survey some results on the dynamics of the horocycle flow on the moduli space of translation surfaces. We outline proofs of some recent results, obtained by the authors in collaboration with John Smillie, and pose some open questions.