

Wael Bahoun : On the stability of statistical properties for Lorenz flows

Abstract : The classical Lorenz flow, and any flow which is close to it in the C^2 -topology, satisfies a Central Limit Theorem (CLT). We first prove statistical stability and then prove that the variance in the CLT varies continuously for this family of flows and for general geometric Lorenz flows, including extended Lorenz models where certain stable foliations have weaker regularity properties. This is a joint work with I. Melbourne and Marks Ruziboev.

Hélène Heynard-Bontemps : Smooth times of a flow in dimension 1

Abstract : Consider a one-parameter group of homeomorphisms of an interval I (with or without boundary), i.e. a C^0 flow on I , and assume the time-1 and α maps of this flow, for some irrational number α , are smooth diffeomorphisms. Does this imply that the flow itself is C^∞ ? As we will see, the answer depends on the arithmetic properties of α : it is positive if α is diophantine, and negative otherwise. For flows without fixed points, this follows from the celebrated linearization theorem by Herman and Yoccoz for circle diffeomorphisms, and we will see how to adapt some of the techniques from this context to our situation.

Abed Bounemoura : KAM theory for ultradifferentiable Hamiltonians

Abstract : In this work with Jacques Féjoz, we propose an extension of the KAM theorem to a class of ultra-differentiable Hamiltonians (including analytic and Gevrey Hamiltonians) under an adapted arithmetic condition (corresponding to the Bruno-Rüssmann condition in the analytic case).

Dmitry Dolgopyat : On mixing properties of infinite measure preserving systems

Abstract : We present several new results concerning mixing properties of hyperbolic systems preserving an infinite measure making a particular emphasis on mixing for extended systems. This talk is based on a joint work with Peter Nandori.

Selim Ghazouani : Renormalisation and linearisation of generalised interval exchange transformations

Abstract : A celebrated result of Herman asserts that a circle diffeomorphism whose rotation number satisfies a mild arithmetic condition is smoothly conjugate to its linear model.

One can wonder to what extent the theory of circle diffeomorphisms extends to smooth non-linear (generalised) interval exchange transformations (GIET). In particular, is a smooth GIET of irrational "rotation number" always smoothly conjugate to its linear model?

Building upon the development of Teichmüller dynamics, Forni and later on Marmi-Moussa-Yoccoz brought to light a finite dimensional set of obstructions for this problem. These obstructions are of a pure ergodic-theoretic nature.

In this talk, I will present a linearisation result establishing that these obstructions are indeed the only ones, in the case where the rotation number satisfies a strong arithmetic condition. If time permits, I will discuss elements of the proof which centres around the dynamics of a renormalisation operator.

Jacek Graczyk : From Painlevé problem to Yoccoz' question

Abstract : We will discuss how asymptotically sublinear measures of bounded Menger curvature can be useful to study metric properties of sets which are far away from smooth curves at scales of positive density and their relationships with Painlevé problem about removable sets for bounded analytic functions and the continuity problem of the Hausdorff dimension of attractors/repellers in natural families. These two problems rely on lower bounds for the solution of the analytical Traveling Salesman Problem. The main part of the presentation is based on a joint work with P. Jones and N. Mihalache.

Bernard Host : A short proof of a conjecture of Erdős proved recently by Moreira, Richter and Robertson

Abstract : We give a short proof of a sumset conjecture of Erdős, recently proved by Moreira, Richter and Robertson : every subset of the integers of positive density contains the sum of two infinite sets. The proof uses only elementary ergodic theory.

Martin Leguil : Spectral determination of open dispersing billiards

Abstract : In an ongoing project with P. Bálint, J. De Simoi and V. Kaloshin, we have been studying the inverse problem for a class of open dispersing billiards obtained by removing from the plane a finite number of smooth strictly convex scatterers satisfying a non-eclipse condition. The restriction of the dynamics to the set of non-escaping orbits is conjugated to a subshift of finite type that provides a natural labeling of all periodic orbits. We show that the Marked Length Spectrum determines the curvatures of the scatterers at the base points of 2-periodic orbits, and the Lyapunov exponents of each periodic orbit. Besides, we show that it is generically possible, in the analytic category and for billiard tables with two (partial) axial symmetries, to determine

completely the geometry of those billiards from the purely dynamical data encoded in their Marked Length Spectrum.

Duc-Manh Nguyen : Existence of periodic trajectories through a given point on translation surfaces

Abstract : In this talk we will discuss the following question : given a regular point on a translation surface, does there always exist a periodic trajectory through this point ? We will see how this question is related to the dynamics of the $GL(2, \mathbb{R})$ -action on moduli space of translation surfaces. Using the major breakthrough of Eskin-Mirzakhani and Eskin-Mirzakhani-Mohammadi, together with recent results of Eskin-Filip-Wright and Apisa, we provide effective answers to this question in some situations. This is joint work with Huiping Pan and Weixu Su.

Françoise Pène : Asymptotic expansion of correlation for the \mathbb{Z}^2 -periodic Lorentz gas

Abstract : We are interested in mixing rate and correlations decay for Hölder observables of the \mathbb{Z}^2 -periodic Lorentz gas. This model is a particular case of a general framework of \mathbb{Z}^d -cover of hyperbolic dynamical system. In this context, the rate of mixing is directly related to the local limit theorem of the step function. This enables us to obtain an expansion of every order for the mixing in the case of the collision map, but also for the flow. Contrarily to previous expansions obtained in other contexts of dynamical systems preserving an infinite measure, the coefficients appearing in the expansion we obtain are linearly independent. This provides in particular correlation decays for null integral observables. The result for the flow is a very recent joint work with Dmitry Dolgopyat and Peter Nandori.

Gabriel Rivière : On the value at 0 of twisted Ruelle zeta functions

Abstract : Given a smooth flow on a compact manifold with countably many closed hyperbolic orbits and a representation of the fundamental group, one can define a twisted version of the Ruelle zeta function. For smooth Axiom A flows, this function can be meromorphically continued to the whole complex plane (Ruelle, Rugh, Fried, Giulietti-Liverani-Pollicott, Dyatlov-Zworski, Dyatlov-Guillarmou). In the eighties, Fried conjectured that, when it makes sense, the value at zero of this function can be identified with a topological invariant : the Reidemeister torsion of the representation. He showed that this property holds for various families of flows : nonsingular Morse-Smale flows (under an appropriate condition on the representation), geodesic flows on hyperbolic manifolds, etc. In dimension 3, Sanchez-Morgado proved this conjecture of Fried in the case of analytic and topologically transitive Anosov flows.

In this talk, I will give a new criterium (based on the Ruelle spectrum) in order to show that the value at 0 of twisted Ruelle zeta functions of Anosov flows is locally independent of the choice of the vector field. As an application, I will show how to extend Sanchez-Morgado result to the C^∞ -case in dimension 3 and I will give new examples where Fried conjecture holds true in dimension 5. This is based on a joint work with N.V. Dang (Lyon 1), C. Guillarmou (Orsay) and S. Shen (Jussieu).

Jasmin Raissy : A dynamical Runge embedding of $\mathbb{C} \times \mathbb{C}^*$ in \mathbb{C}^2

Abstract : I will present the construction of a family of automorphisms of \mathbb{C}^2 having an invariant, non-recurrent Fatou component biholomorphic to $\mathbb{C} \times \mathbb{C}^*$ and which is attracting, in the sense that all the orbits converge to a fixed point on the boundary of the component. Such component is obtained by globalizing, using a result of Forstneric, a local construction, which allows to create a global basin of attraction for an automorphism, and a Fatou coordinate on it. Such Fatou coordinate is a fiber bundle map on \mathbb{C} , whose fiber is \mathbb{C}^* , forcing the global basin to be biholomorphic to $\mathbb{C} \times \mathbb{C}^*$. The most subtle point is to show that such a basin is indeed a Fatou component. This is done exploiting Pöschel's results about existence of local Siegel discs and suitable estimates for the Kobayashi distance. This construction gives an example of a Runge embedding of $\mathbb{C} \times \mathbb{C}^*$ in \mathbb{C}^2 , since attracting Fatou components are Runge. (Joint work with Filippo Bracci and Berit Stenonson).

Carlos Matheus Santos : Counting special Lagrangian fibrations on generic twistor families of K3 surfaces

Abstract : Partly motivated by a sort of "analogy" between translation and K3 surfaces, Simion Filip recently extended the classical results of Howard Masur and William Veech for the problem of counting cylinders in translation surfaces by showing that the number $N(V)$ of special Lagrangian fibrations with volume $< V$ on generic twistor families of K3 surfaces is $N(V) = cV^{20} + O(V^{20-a})$ for some constants $c > 0, a > 0$. In this talk, we discuss a joint work with Nicolas Bergeron proving that Filip's theorem is valid for any $0 < a < 4/697633$.

Disheng Xu : Centralizer of partially hyperbolic systems

Abstract : In this talk we will discuss some results and some open problems on the subject the classifications of the centralizer of partially hyperbolic systems. For example, conservative perturbation of discretized geodesic flow over negatively curved surface, partially hyperbolic skew product or DA system on tori, etc. Joint work with D. Damjanovic and A. Wilkinson and joint work with S. Gan, Y. Shi and J. Zhang.