

# **Low Dimensional Actions**

## **Rapport sur les contributions**

ID de Contribution: 1

Type: **Non spécifié**

# First order rigidity of manifold homeomorphism groups

*lundi 29 avril 2024 09:30 (1 heure)*

Two groups are elementarily equivalent if they have the same sets of true first order group theoretic sentences. We prove that if the homeomorphism groups of two compact connected manifolds are elementarily equivalent, then the manifolds are homeomorphic. This generalizes Whittaker's theorem on isomorphic homeomorphism groups (1963) without relying on it. We also establish the analogous result for volume-preserving subgroups. Joint work with Thomas Koberda (UVa) and Javier de la Nuez-Gonzalez (KIAS).

**Orateur:** KIM, Sanghyun

ID de Contribution: 2

Type: **Non spécifié**

## **Minicourse: big mapping class groups**

*lundi 29 avril 2024 11:00 (1 heure)*

This course will introduce mapping class groups of surfaces of infinite types, and present a perspective due to Calegari, that we might use these to study groups acting on (finite type) surfaces.

**Orateur:** MANN, Kathryn

ID de Contribution: 3

Type: **Non spécifié**

## Free IET-Actions

*lundi 29 avril 2024 14:00 (1 heure)*

Hölder's theorem states that a group acting freely by circle homeomorphisms is isomorphic and semi-conjugate to a subgroup of rotations.

In this talk, I will discuss an analogous result, obtained with Nancy Guelman, for groups of interval exchange transformations.

**Orateur:** LIOUSSE, Isabelle

ID de Contribution: 4

Type: **Non spécifié**

## **On the geometry of diffeomorphisms groups in dimension 1**

*lundi 29 avril 2024 15:00 (1 heure)*

In this talk I will discuss some geometric properties of diffeomorphisms groups that are hard to tackle via classical methods because of the lack of local compactness. In particular, I will elaborate on Gromov's notion of distortion in this context. I will mostly concentrate in the case of 1-manifolds, which is surprisingly rich and hard to tackle.

**Orateur:** NAVAS, Andres

ID de Contribution: 5

Type: **Non spécifié**

## Rigidity of big mapping class groups acting on the circle

*lundi 29 avril 2024 16:30 (1 heure)*

Surfaces of infinite type, such as the plane minus a Cantor set, occur naturally in dynamics. However, their mapping class groups are much less understood compared to the mapping class groups of surfaces of finite type. For the mapping class group  $G$  of the plane minus a Cantor set, we show that any nontrivial  $G$ -action on the circle is semi-conjugate to its action on the so-called simple circle. I will also explain what happens in the more general situation where we replace the plane by a once-punctured surface of finite genus. This is mostly based on joint work with Danny Calegari.

**Orateur:** CHEN, Lvzhou

ID de Contribution: 6

Type: **Non spécifié**

## Groups with full limit set vs Lattices

*mardi 30 avril 2024 09:30 (1 heure)*

Based on work in progress with Subhadip Dey.

We discuss the question whether a discrete subgroup in a Lie group of higher rank with full limit set in its boundary is necessarily a lattice. We find some necessary conditions for this to be true and discuss some new and old results pointing towards an affirmative answer. Hopefully, we will also relate this discussion to questions about groups acting by diffeomorphisms in low dimensions.

**Orateur:** HURTADO, Sebastian

ID de Contribution: 7

Type: **Non spécifié**

## **Minicourse: big mapping class groups and dynamics**

*mardi 30 avril 2024 11:00 (1 heure)*

**Orateur:** MANN, Kathryn



ID de Contribution: 8

Type: **Non spécifié**

## Homeomorphism groups of the Airplane and the Basilica Julia sets

*mardi 30 avril 2024 14:00 (1 heure)*

The airplane and the Basilica Julia sets are two compact fractal sets that appear in different parts of group theory. In this talk, we will be interested in their full homeomorphism groups. We will show that these groups can be identified with a specific universal Burger-Mozes group (this was proved by Y. Neretin for the Basilica) and a specific kaleidoscopic group for the Airplane. Kaleidoscopic groups are analogues of Burger-Mozes universal groups where trees are replaced by dendrites.

These identifications will be explained and we will exploit them to prove topological and dynamical properties of these topological groups.

This is a joint work in progress with Matteo Tarocchi.

**Orateur:** DUCHESNE, Bruno

ID de Contribution: 9

Type: **Non spécifié**

## Deformations of $Z^2$ -actions in dimension 1 (joint with Andrés Navas)

*mardi 30 avril 2024 15:00 (1 heure)*

Can any pair of commuting diffeomorphisms of a compact 1D manifold be connected to the trivial pair  $(id, id)$  via a path of such pairs ? This question plays an important role in the classification of foliations of 3-manifolds by surfaces. It can be asked in any differentiability class, and we will see that the phenomena at play and the techniques involved to answer it highly depend on the regularity, focussing on a new result in the intermediate regularity  $C^{1+ac}$  (where « ac » stands for « absolutely continuous »).

**Orateur:** EYNARD-BONTEMPS, Hélène

ID de Contribution: **10**Type: **Non spécifié**

## Around the fine curve graph of the torus

*mardi 30 avril 2024 16:30 (1 heure)*

Lan, Margalit, Pham, Verbene and Yao showed in 2021 that the group of automorphisms of the fine curve graph of a surface of genus at least 2 identifies with the group of homeomorphisms of the surface. With Maxime Wolff, we generalise this result to any surface, and describe the smooth version. The torus case is of special interest since recent work by Bowden, Hansel, Militon, Man, and Webb (generalised by Guihéneuf and Militon) suggests the possibility of a rich dictionary between the fine graph and the dynamical properties of torus homeomorphisms, especially the famous rotation set.

**Orateur:** LE ROUX, Frédéric

ID de Contribution: 11

Type: **Non spécifié**

## Spaces of left-orderings and their Borel complexity

*jeudi 2 mai 2024 09:30 (1 heure)*

In this talk we will discuss the problem of determining the Borel complexity of the space of left-orders  $LO(G)$  of a countable left-orderable group  $G$  modulo the conjugacy  $G$ -action. We will see how this problem is connected to some well-studied topological properties of  $LO(G)$  such as the existence of dense orbits, and condensed orders. We will give an overview of our results showing that certain groups have nonstandard orbit space  $LO(G)/G$ . Time permitting, we will list open problems and discuss future directions.

Most of the results presented are joint work with Adam Clay.

**Orateur:** CALDERONI, Filippo

ID de Contribution: 12

Type: **Non spécifié**

## Minicourse: Dynamics of homeomorphisms of surfaces and fine curve graph

*jeudi 2 mai 2024 11:00 (1 heure)*

The fine curve graph of a closed surface is a Gromov hyperbolic graph on which the group of homeomorphisms of the surface acts faithfully by isometry. In this mini-course, we will explore the links between the dynamics of a homeomorphism of the surface and the isometry type of its action on the fine curve graph. The first talk will be devoted to a dynamical characterization of homeomorphisms which act hyperbolically on the fine curve graph.

During the second talk, we will see examples of homeomorphisms which act parabolically on the fine curve graph and some results about them.

This is joint work with Jonathan Bowden, Sebastian Hensel, Kathryn Mann and Richard Webb for one aspect, and with Pierre-Antoine Guihéneuf for another.

**Orateur:** MILITON, Emmanuel

ID de Contribution: 13

Type: **Non spécifié**

## **The group of germs at infinity of homeomorphisms of the real line has no outer automorphisms**

*jeudi 2 mai 2024 14:00 (1 heure)*

In joint work with Frédéric Le Roux and Kathryn Mann, we prove that every automorphism of the group of germs at infinity of homeomorphisms of the real line is given by the conjugation by some homeomorphism of the line.

**Orateur:** WOLFF, Maxime

ID de Contribution: 14

Type: **Non spécifié**

## Bifoliated planes, Anosov-like actions and rigidity

*jeudi 2 mai 2024 15:00 (1 heure)*

A bifoliated plane is a topological plane equipped with two transverse (possibly singular) foliations. Given a group  $G$ , an Anosov-like action is an action of  $G$  on a bifoliated plane satisfying a few axioms, first among them is the fact that each point in the plane fixed by an element of the group is a hyperbolic fixed point.

Such actions were first introduced as an axiomatization, and generalization, of the natural action induced by a 3-dimensional (pseudo)-Anosov flow on its orbit space. It turns out that a lot of the dynamical behaviors that we see in Anosov flows also appears in this context. In this talk I will describe some of these features, such as recovering basic sets and the Smale order for non-transitive Anosov-like actions, as well as prove a rigidity result: An Anosov-like action is uniquely determined by its induced action on the circle at infinity of the bifoliated plane.

This is joint work with Christian Bonatti and Kathryn Mann.

**Orateur:** BARTHELMÉ, Thomas

ID de Contribution: 15

Type: **Non spécifié**

## Laminar groups and Kleinian groups

*jeudi 2 mai 2024 16:30 (1 heure)*

Thurston showed the universal circle theorem as a first step of the proof of the geometrization conjecture of tautly foliated three manifolds. The theorem says that the fundamental group of a closed three manifold slithering over the circle acts on the circle preserving a pair of laminations. In this talk, I talk about the converse of the universal circle theorem in terms of laminar groups. Also, I will overview recent results about the laminar groups and discuss related open problems. This talk is based on works with Harry Hyungryul Baik and Hongtaek Jung.

**Orateur:** KIM, KyeongRo



ID de Contribution: 16

Type: **Non spécifié**

## Towards the boundary of the fine curve graph

*vendredi 3 mai 2024 09:30 (1 heure)*

The fine curve graph was introduced as a geometric tool to homeomorphism groups of surfaces. One then wishes to establish a dictionary between the underlying surface dynamics and the action of elements on the fine curve graph. For this it is key to have a geometric interpretation of points on the Gromov boundary in analogy to Klarreich's description for classical curve graphs. We describe first steps in this regard with applications to stable commutator lengths and a kind of Tits alternative for subgroups containing pseudo-Anosov diffeomorphisms. (joint with S. Hensel and R. Webb)

**Orateur:** BOWDEN, Jonathan

ID de Contribution: 17

Type: **Non spécifié**

## **Minicourse: Dynamics of homeomorphisms of surfaces and fine curve graph**

*vendredi 3 mai 2024 11:00 (1 heure)*

**Orateur:** MILITON, Emmanuel

ID de Contribution: 18

Type: **Non spécifié**

## Rigidity of Codimension One Higher Rank Actions

*vendredi 3 mai 2024 14:00 (1 heure)*

We classify all closed manifolds admitting a smooth locally free action by a higher rank split simple Lie group with codimension 1 orbits. Namely, if a closed manifold  $M$  admits such an action by a Lie group  $G$  as above,  $M$  is finitely and equivariantly covered by  $G/\Gamma \times S^1$ , for some cocompact lattice  $\Gamma$  of  $G$ , where  $G$  acts by left translations on the first factor, and trivially on  $S^1$ . This result is in the spirit of the Zimmer program. We will focus on the case  $G = \mathrm{SL}(3, \mathbb{R})$  for the talk.

**Orateur:** AROSEMENA, Camilo

ID de Contribution: 19

Type: Non spécifié

## Laminations and structure theorems for group actions on the line (1)

*vendredi 3 mai 2024 15:00 (1 heure)*

A lamination of the real line is a closed collection of pairwise unlinked, finite intervals. They appear naturally when studying certain classes of group actions on the line. More precisely, we will discuss actions of solvable groups, and of locally moving groups (these are subgroups of  $\text{Homeo}(\mathbb{R})$  such that for any open interval  $I$ , the subgroups of elements fixing the complement of  $I$  acts minimally on  $I$ ). A famous example of a locally moving group is Thompson's group  $F$ . Both classes admit "standard models" of actions on the line: solvable groups act by affine transformations, whereas locally moving groups have their defining actions. We prove a structure theorem which says that any minimal faithful action of a finitely generated group in this class is either standard, or preserves a lamination. Moreover, the large scale dynamics of actions preserving laminations can be described in terms of the standard actions. This has a couple of notable applications: 1) every  $C1$  action is actually semi-conjugate to a standard action; 2) under suitable algebraic restrictions on the group, standard actions are locally rigid. This is based on works with N. Matte Bon and C. Rivas.

**Orateur:** TRIESTINO, Michele

ID de Contribution: 20

Type: Non spécifié

## Laminations and structure theorems for group actions on the line (2)

*vendredi 3 mai 2024 16:30 (1 heure)*

A lamination of the real line is a closed collection of pairwise unlinked, finite intervals. They appear naturally when studying certain classes of group actions on the line. More precisely, we will discuss actions of solvable groups, and of locally moving groups (these are subgroups of  $\text{Homeo}(\mathbb{R})$  such that for any open interval  $I$ , the subgroups of elements fixing the complement of  $I$  acts minimally on  $I$ ). A famous example of a locally moving group is Thompson's group  $F$ . Both classes admit "standard models" of actions on the line: solvable groups act by affine transformations, whereas locally moving groups have their defining actions. We prove a structure theorem which says that any minimal faithful action of a finitely generated group in this class is either standard, or preserves a lamination. Moreover, the large scale dynamics of actions preserving laminations can be described in terms of the standard actions. This has a couple of notable applications: 1) every  $C1$  action is actually semi-conjugate to a standard action; 2) under suitable algebraic restrictions on the group, standard actions are locally rigid. This is based on works with N. Matte Bon and C. Rivas.

**Orateur:** BRUM, Joaquin

ID de Contribution: 21

Type: **Non spécifié**

## Stationary measures for groups acting on surfaces

*samedi 4 mai 2024 09:30 (1 heure)*

For a group acting on a surface, one may want to classify orbit closures or invariant/stationary measures. I'll discuss an older result of myself and Rodriguez-Hertz—adapting the exponential drift methods of Benoit-Quint and Eskin-Mirzakhani—to classify stationary measures under certain dynamical hypotheses on the action. I'll also discuss more recent related works, work in progress, and open questions.

**Orateur:** BROWN, Aaron

ID de Contribution: 22

Type: **Non spécifié**

## **Critical regularity for nilpotent group actions in dimension one**

*samedi 4 mai 2024 11:00 (1 heure)*

My talk will follow a joint work with Maximiliano Escayola, devoted to the study of critical regularities for nilpotent group actions. The questions of critical regularities have been studied by many authors in many different contexts: starting from the classical Denjoy theorem and example, there are works by M. Herman, J.-C. Yoccoz, N. Kopell, B. Deroin, A. Navas, C. Rivas, E. Jorquera, Kim, T. Koberda, any many others. We'll be describing the critical regularity in algebraic terms, introducing some new technique for establishing the bounds.

**Orateur:** KLEPTSYN, Victor

ID de Contribution: **23**

Type: **Non spécifié**

## **Registration/ Welcome coffee**

*lundi 29 avril 2024 09:00 (20 minutes)*