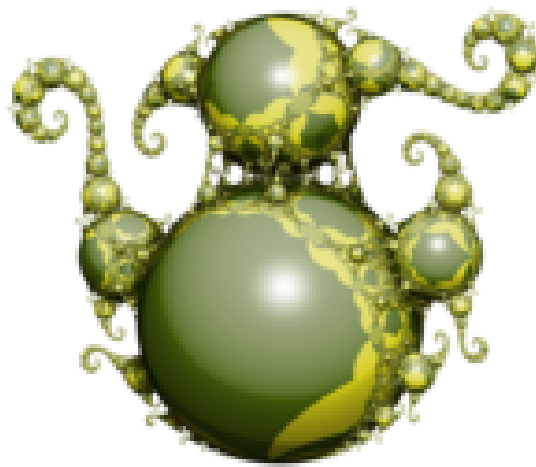


Workshop: Low-dimensional phenomena: geometry and dynamics



Rapport sur les contributions

ID de Contribution: 1

Type: **Non spécifié**

The bending lamination conjecture for hyperbolic 3-manifolds

lundi 23 juin 2025 10:00 (1 heure)

Convex co-compact hyperbolic manifolds contain a smallest non-empty geodesically convex subset, called their convex core. The “pleating” of the boundary of this convex core is recorded by a measured lamination, called the bending lamination, and Thurston conjectured that convex co-compact hyperbolic 3-manifolds are uniquely determined by their bending lamination. We will describe a proof of this conjecture (joint with Bruno Dular) and then explain how the statement is part of a broader picture concerning convex domains in hyperbolic manifolds.

Orateur: SCHLENKER, Jean-Marc (Université du Luxembourg)

ID de Contribution: 2

Type: **Non spécifié**

Selberg, Ihara and Berkovich

lundi 23 juin 2025 11:30 (1 heure)

We use the Selberg zeta function to study the limit behavior of resonances of a degenerating family of Kleinian Schottky groups. We prove that, after a suitable rescaling, the Selberg zeta functions converge to the Ihara zeta function of a limiting finite graph associated with the relevant non-Archimedean Schottky group acting on the Berkovich projective line.

An application of our techniques is to obtain an exponential error term about the asymptotics for the vanishing rate of the Hausdorff dimension of limit sets of certain degenerating Schottky groups generating symmetric three-funnel surfaces. Here, one key idea is to introduce an intermediate zeta function that captures both Archimedean and non-Archimedean information (while the traditional Selberg resp. Ihara zeta function concerns only Archimedean resp. non-Archimedean properties). This is a joint work with Jialun Li, Carlos Matheus, and Zhongkai Tao.

Orateur: PAN, Wenyu (University of Toronto)

ID de Contribution: 3

Type: **Non spécifié**

Geometry of hyperconvex representations of surface groups

lundi 23 juin 2025 16:00 (1 heure)

A quasi-Fuchsian representation of a surface group in $\mathrm{PSL}(2, \mathbb{C})$ is a discrete and faithful representation that preserves a Jordan curve on the Riemann sphere. These classical objects have a very rich structure as they lie at the crossroad of several areas of mathematics such as complex dynamics, Teichmüller theory, and 3-dimensional hyperbolic geometry. The invariant Jordan curve, which is typically a very fractal circle, captures the complexity of the representation and key dynamical and geometric features. In groundbreaking work, Bowen showed that the Hausdorff dimension of such a curve is always strictly greater than 1 except when it is a round circle and the representation factors through a copy of $\mathrm{PSL}(2, \mathbb{R})$. In this talk, I will describe how this phenomenon persists for hyperconvex representations of surface groups in $\mathrm{PSL}(2, \mathbb{C})$ a much larger class of representations that shares many striking similarities with quasi-Fuchsian ones. This is joint work with Beatrice Pozzetti and James Farre.

Orateur: VIAGGI, Gabriele (Sapienza Università di Roma)

ID de Contribution: 4

Type: **Non spécifié**

Anosov representations of cubulated hyperbolic groups

lundi 23 juin 2025 14:30 (1 heure)

An Anosov representation of a hyperbolic group Γ quasi-isometrically embeds Γ into a semisimple Lie group in a way which imitates and generalizes the behavior of a convex cocompact group acting on a rank-1 symmetric space; it is unknown whether every linear hyperbolic group admits an Anosov representation. In this talk, I will discuss joint work with Sami Douba, Balthazar Flechelles, and Feng Zhu, which produces new examples of Anosov representations by showing that every hyperbolic group that acts geometrically on a CAT(0) cube complex admits a 1-Anosov representation into $SL(d, \mathbb{R})$ for some d . Mainly, the proof exploits the relationship between the combinatorial CAT(0) geometry of right-angled Coxeter groups and the projective geometry of a convex domain in real projective space on which a Coxeter group acts by reflections.

Orateur: WEISMAN, Theodore (Max Planck Institute for Mathematics in the Sciences)

ID de Contribution: 5

Type: **Non spécifié**

Atoroidal Surface Bundles

mardi 24 juin 2025 10:00 (1 heure)

I will discuss recent work with C. Leininger in which we produce purely pseudo-Anosov surface subgroups of mapping class groups, obtaining the first compact atoroidal surface bundles over surfaces. We do this by constructing a type-preserving representation of the figure eight knot group into the mapping class group of the thrice-punctured sphere.

Orateur: KENT, Autumn (University of Wisconsin - Madison)

ID de Contribution: 6

Type: **Non spécifié**

Hyperbolic and relatively hyperbolic groups with 2-sphere boundary.

mardi 24 juin 2025 11:30 (1 heure)

We define a “drilling” of a hyperbolic group along a maximal infinite cyclic subgroup, which results in a relatively hyperbolic group pair. This procedure is inspired by drilling a hyperbolic 3-manifold along an embedded geodesic. We show that, under suitable circumstances, drilling a hyperbolic group with 2-sphere hyperbolic boundary results in a relatively hyperbolic group with 2-sphere relatively hyperbolic boundary. This is joint work with D. Groves, P. Haissinsky, D. Osajda, and A. Sisto. If time permits, I will discuss a somewhat related result with E. Stark which implies that a hyperbolic space which admits a geometric action and admits a relatively hyperbolic action with rank 2 abelian peripheral subgroups is quasi-isometric to \mathbb{H}^3 .

Orateur: WALSH, Genevieve (Tufts University)

ID de Contribution: 7

Type: **Non spécifié**

The pressure metric on quasi-Fuchsian space

mardi 24 juin 2025 14:30 (1 heure)

We show that the pressure metric on quasi-Fuchsian space has finite diameter. The talk is based on joint work with E. Fioravanti, U. Hamenstädt and Y. Zhang.

Orateur: JÄCKEL, Frieder (Universität Bonn)

ID de Contribution: 8

Type: **Non spécifié**

Anosov representations of amalgams

mardi 24 juin 2025 16:00 (1 heure)

Anosov representations form a stable and rich class of discrete subgroups of semisimple Lie groups that today is recognized as the correct higher rank generalization of rank 1 convex cocompact subgroups of Lie groups. In this talk, after surveying what is known on classes of hyperbolic groups admitting Anosov representations, I will discuss some joint work with Subhadip Dey on constructing new classes of Anosov groups arising from amalgamations and HNN extensions. No previous knowledge on Anosov representations will be required for this talk.

Orateur: TSOUVALAS, Konstantinos (Max Planck Institute for Mathematics in the Sciences)

ID de Contribution: 9

Type: **Non spécifié**

The shape of the limit cone for positive representations

mercredi 25 juin 2025 09:30 (1 heure)

We discuss the problem of computing the limit cone of a positive representation of a surface group into a real-split, semi-simple Lie group G . This is a closed cone in the positive Weyl chamber recording the range of possible spectral behavior achieved by the representation; it is convex with non-empty interior, assuming the representation is Zariski-dense. To compute it, one needs a way to certify that a particular point lies in the boundary, and to that end, we focus on the problem of identifying which curves and geodesic currents are able to find the boundary. We compute some explicit examples in the case $G = (\mathrm{PSL}_2\mathbb{R})^3$, including some for which the limit cone has finitely many sides, and others for which the limit cone is strictly convex. Joint work with François Guéritaud and Fanny Kassel.

Orateur: DANCIGER, Jeffrey (University of Texas at Austin)

ID de Contribution: 10

Type: **Non spécifié**

Local minimization of fuzziness under high symmetry

mercredi 25 juin 2025 11:00 (1 heure)

For a given hyperbolic 3-manifold M with Fuchsian ends, it is a question of Canary and Taylor whether M minimizes the Hausdorff dimension of the limit set among its convex co-compact deformations. In this talk we will show how this holds locally if M is sufficiently symmetric. Based in work in progress with Sami Douba and Andrés Sambarino.

Orateur: VARGAS PALLETE, Franco (IHES)

ID de Contribution: 11

Type: **Non spécifié**

Geometrical finiteness in strictly convex projective geometry

mercredi 25 juin 2025 12:00 (1 heure)

Roughly speaking, a complete real hyperbolic manifold is geometrically finite if its convex core is the union of a compact set and finitely many ends that are isometric to ends of manifolds with elementary parabolic holonomy. This notion admits many different characterizations, and has been generalized to much broader settings such as rank-one symmetric spaces, Hadamard manifolds, or even convergence group actions.

A decade ago, Crampon and Marquis extended this notion to (strictly) convex (real) projective geometry. A domain in the real projective space is properly convex if it is contained in some affine chart, where it is bounded and convex.

Crampon–Marquis introduced two distinct notions geometrical finiteness for quotients of convex domain that are round, i.e. strictly convex with differentiable boundary. One notion is more restrictive than the other, and they proved that most of the usual characterizations of geometrical finiteness are equivalent to their strong definition. Unfortunately a mistake slipped into the proof and the situation is more complex than expected, hence more interesting.

We will review their work, evoke the link with relative Anosov groups through work of Zhu–Zimmer and Fléchéllles, and see an example in $SL(5, \mathbb{R})$ where the finite volume characterization of geometrical finiteness fails.

Orateur: BLAYAC, Pierre-Louis (Université de Strasbourg)

ID de Contribution: 12

Type: **Non spécifié**

Convex coaffine structures

jeudi 26 juin 2025 10:00 (1 heure)

I will discuss recent joint work with Martin Bobb, in which we study surface subgroups of $\mathrm{PGL}(4, \mathbb{R})$ that act convex cocompactly on \mathbb{RP}^3 as well as their degenerations. I will focus on surface subgroups of the general coaffine group (the stabilizer of a line in \mathbb{R}^4). If time permits, I will also construct Zariski dense “bending lines” as an application.

Orateur: FARRE, James (Max Planck Institute for Mathematics in the Sciences)

ID de Contribution: 13

Type: **Non spécifié**

Quasi isometry of free groups in $SL_3(\mathbb{R})$

jeudi 26 juin 2025 11:30 (1 heure)

Can quasi-isometric embeddings of the free group (or surface groups) into $SL_3(\mathbb{R})$ be described? Can one get information about their deformations? I will present some examples and partial answers to these questions contained in joint work with L. Carvajales and P. Lessa.

Orateur: POTRIE, Rafael (Universidad de la República)

ID de Contribution: 14

Type: **Non spécifié**

Degenerations in convex projective geometry and non-archimedean ordered fields

jeudi 26 juin 2025 14:30 (1 heure)

I will explain how convex projective geometry over ordered non-archimedean fields may be used to study large scale properties of individual real Hilbert geometries and degenerations of convex projective actions. For example, by studying the case of polytopes, we obtain an explicit description of the asymptotic cones of real polytopes.

This is joint work with Xenia Flamm.

Orateur: PARREAU, Anne (Université Grenoble-Alpes)

ID de Contribution: 15

Type: **Non spécifié**

Epstein's construction and holography of Loewner energy and Schwarzian action

jeudi 26 juin 2025 16:00 (1 heure)

The group $\mathrm{PSL}(2, \mathbb{C})$ acts on the hyperbolic three-space \mathbb{H}^3 as the group of isometries and on the boundary identified with the Riemann sphere S^2 as conformal automorphisms. The holographic principle looks to encode the conformally invariant quantities on the Riemann sphere into geometric quantities in \mathbb{H}^3 and vice versa. In one lower dimension, we may also study the correspondence between \mathbb{H}^2 and the circle S^1 , where the group $\mathrm{PSL}(2, \mathbb{R})$ acts.

The Loewner energy is a conformally invariant quantity that measures the roundness of Jordan curves on the Riemann sphere and has close links to the geometry of universal Teichmüller space and SLE loop measures. We show that the Loewner energy equals the renormalized volume of a submanifold of the hyperbolic \mathbb{H}^3 constructed using a truncation introduced by Epstein. Applying Epstein's truncation in one lower dimension, we show that the renormalized area of \mathbb{H}^2 coincides with minus the Schwarzian action of circle diffeomorphisms.

This is based on joint works with Martin Bridgeman, Ken Bromberg, Franco Vargas Pallete and Catherine Wolfram.

Orateur: WANG, Yilin (IHES)

ID de Contribution: 16

Type: **Non spécifié**

Global topology of the space of d -pleated surfaces

vendredi 27 juin 2025 10:00 (1 heure)

The notion of a d -pleated surface is a higher rank generalization of (abstract) pleated surfaces in three dimensional hyperbolic space. We give a description of the global topology of the space of conjugacy classes of d -pleated surfaces. We also prove that every connected component of the character variety contains exactly one connected component of the space of d -pleated surfaces. This is joint work with Sara Maloni, Giuseppe Martone, and Filippo Mazzoli.

Orateur: ZHANG, Tengren (National University of Singapore)

ID de Contribution: 17

Type: **Non spécifié**

Exotic maximal surface group representations into $\text{Diff}(\mathbb{S}^1)$

vendredi 27 juin 2025 11:30 (1 heure)

The Euler class of a surface group representation into $\text{Diff}(\mathbb{S}^1)$ satisfies the Milnor—Wood inequality, and representations with maximal Euler class are semi-conjugated to Fuchsian representations by a theorem of Matsumoto. In higher regularity, Ghys proved a stronger rigidity theorem: for $k \geq 3$, a maximal circle action by diffeomorphisms of class C^k is C^k -conjugated to some Fuchsian action. In particular it is minimal, dilating, and Hölder conjugated to any Fuchsian action. I will explain that all these results fail in regularity C^1 , by associating « exotic » maximal C^1 actions to discrete and faithful surface group representations into $\text{PSL}(2, \mathbb{C})$. This is based on discussions with Selim Ghazouani and Françoise Dal'bo.

Orateur: THOLOZAN, Nicolas (ENS-PSL)