

JOURNÉES DE GÉOMÉTRIE HYPERBOLIQUE – PROGRAMME

The lectures will take place on **Thursday afternoon in Room 2.73** and **during Friday in Room 0.51** of the **Physics Building PER 8**.

<i>Physics 2.73</i>	Thursday	<i>Physics 0.51</i>	Friday
		09:15 - 10:00	Edoardo Dotti <i>On right-angled polygons in hyperbolic space, part I</i>
		<i>Coffee break</i>	<i>Mensa</i>
10:15	<i>Doctoral exam</i> <i>Rafael Guglielmetti</i>	10:30 - 11:15	Anna Felikson <i>Geometric realizations of quiver mutations</i>
		11:30 - 12:15	Simon Drewitz <i>On right-angled polygons in hyperbolic space, part II</i>
		<i>lunch</i>	<i>Mensa</i>
14:15 - 15:00	Ann Kiefer <i>Units in integral group rings fundamental domains and hyperbolic geometry</i>		
<i>Coffee break</i>	<i>Mensa</i>	14:30 - 15:15	Martin Deraux <i>On commensurability classes of non-arithmetic complex hyperbolic lattices</i>
15:30 - 16:15	Olivier Mila <i>On the trace field of hyperbolic manifolds</i>	<i>Coffee break</i>	<i>Mensa</i>
16:30 - 17:15	Vincent Emery <i>Quasi-arithmetic lattices and volumes of hyperbolic manifolds</i>	15:45 - 16:30	Michihiko Fujii <i>The geodesic growth series of Seifert fiber spaces over disks with two cone points</i>
		17:30 - 18:30	<i>Public thesis presentation, Péroilles 2 A230 :</i> Rafael Guglielmetti
19:00	Conference Dinner <i>Restaurant Aigle Noir</i>	18:30	<i>Apéro, Péroilles 2</i>

ABSTRACTS

Martin DERAUX (Grenoble) :

On commensurability classes of non-arithmetic complex hyperbolic lattices

I will present recent joint work with Parker and Paupert giving new examples of non-arithmetic lattices in the isometry group of the complex hyperbolic plane. I will explain some of the methods that allowed us to determine the precise number of commensurability classes among those lattices.

Edoardo DOTTI (Fribourg) and **Simon DREWITZ** (Fribourg) :

On right-angled polygons in hyperbolic space, I, II

Motivated by a recent work of Delgove and Retailleau on right-angled hexagons in hyperbolic 5-space, we will discuss right-angled polygons in hyperbolic spaces of arbitrary dimension. In the first part we will discuss Clifford algebras and how they can be used to model hyperbolic space and its isometries. In the second part we will generalise the aforementioned work presenting an algorithm to construct an n -gon given by $(n - 3)$ parameters living in a Clifford algebra by exploiting the geometric interpretation of the cross ratio.

Vincent EMERY (Bern) :

Quasi-arithmetic lattices and volumes of hyperbolic manifolds

I will explain the definition of a quasi-arithmetic lattice, and will present two applications of this notion to the study of volumes of hyperbolic manifolds.

Anna FELIKSON (Durham) :

Geometric realizations of quiver mutations

A quiver is a weighted oriented graph, a mutation of a quiver is a simple combinatorial transformation arising in the theory of cluster algebras. In this talk we connect mutations of quivers to reflection groups acting on linear spaces and to groups generated by point symmetries in the hyperbolic plane. In particular, we show that any mutation class of rank 3 quivers admits a geometric presentation via such a group and that the properties of this presentation are controlled by the Markov constant $p^2 + q^2 + r^2 - pqr$, where p, q, r are the weights of the arrows in the quiver. This is a joint work with Pavel Tumarkin.

Michihiko FUJII (Okinawa) :

The geodesic growth series of Seifert fiber spaces over disks with two cone points

We consider groups presented as $G(p, q) = \langle x, y \mid x^p = y^q \rangle$, with integers p and q satisfying $2 \leq p \leq q$. The groups are geometrically realized as the fundamental groups of Seifert fiber spaces over 2-dimensional disks with two cone points. In this talk, I present rational function expressions for the geodesic growth series of such groups with respect to the generating set $\{x, y\}$. Moreover, I argue a question whether the growth rates of the series are Perron numbers or not. Here, a Perron number is a real algebraic integer $\tau > 1$ whose algebraic conjugates other than τ itself all have smaller absolute values than τ .

Ann KIEFER (Bielefeld) :

Units in integral group rings via fundamental domains and hyperbolic geometry

In [1], we developed an algorithm to determine generators for discrete subgroups of quater- nion division algebras over quadratic imaginary extensions of \mathbb{Q} or discrete subgroups of 2-by-2 matrices over quadratic extensions of \mathbb{Q} . These groups act discontinuously on hyper- bolic 3-space and the algorithm constructs a fundamental domain to find a set of generators. In this work we generalize this algorithm to 2-by-2 matrices over the group of invertible elements of a Clifford algebra. The group of such matrices acts discontinuously on an n -dimensional hyperbolic space. Via an exceptional isomorphism, we obtain generators of an order in 2-by-2 matrices over the rational quaternion algebra.

[1] E. Jespers, S.O. Juriaans, A. Kiefer, A. De A. E Silva, A.C. Souza Filho, From the Poincaré Theorem to generators of the unit group of integral group rings of finite groups, *Math. Comp.* 84 (293) (2015), 1489-1520.

Olivier MILA (Bern) :

On the trace field of hyperbolic manifolds

We define the trace field of a hyperbolic manifold and state some of its properties. We then explain how to compute it in the case of glueings and interbreedings as defined by Gromov and Piatetski-Shapiro.