Programme

Monday June 24	
9h-9h30	Opening
9h30-10h30	**Alan Reid**
10h30-11h	Coffee break
11h-12h	**Juan Souto**
12h-12h15	Break
12h15-12h45	**Parallel sessions**
12h45-14h15	Lunch break
14h15-14h45	**Parallel sessions**
14h45-15h	Break
15h-16h	**Genevieve Walsh**
16h-16h30	Coffee break
16h30-17h30	**Richard Weidmann**
17h30-17h45	Break
17h45-18h15	**Parallel sessions**

Tuesday June 25	
9h30-10h30	**Tao Li**
10h30-11h	Coffee break
11h-12h	**Hyam Rubinstein**
12h-12h15	Break
12h15-12h45	**Parallel sessions**
12h45-14h15	Lunch break
14h15-14h45	**Parallel sessions**
14h45-15h	Break
15h-16h	**Vincent Colin**
16h-16h30	Coffee break
16h30-17h30	**Yi Ni**
17h30-17h45	Break
17h45-18h15	**Parallel sessions**

Wednesday June 26	
9h-10h	**Ian Agol**
10h-10h30	Coffee break
10h30-11h30	**Jessica Purcell**
11h30-11h45	Break
11h45-12h15	**Parallel sessions**
12h15-12h30	Break
12h30-13h	**Parallel sessions**
13h	Lunch
18h	Reception at the City Hall

Thursday June 27	
9h30-10h30	**Daryl Cooper**
10h30-11h	Coffee break
11h-12h	**Steven Kerckhoff**
12h-12h15	Break
12h15-12h45	**Parallel sessions**
12h45-14h15	Lunch break
14h15-14h45	**Parallel sessions**
14h45-15h	Break
15h-16h	**François Guéritaud**
16h-16h30	Coffee break
16h30-17h30	**Danny Calegari**
17h30-17h45	Break
17h45-18h15	**Parallel sessions**
19h30	Buffet at Upsidum

Friday June 28	
9h-10h	**Stefan Friedl**
10h-10h30	Coffee break
10h30-11h30	**David Gabai**
11h30-11h45	Break
11h45-12h45	**Peter Shalen**
12h45	Lunch

Practical information

Conference site

Talks and coffee breaks will be held in the U4 building. Plenary talks take place in the Shannon Lecture Hall and session talks in the Shannon Lecture Hall, Room 211 and Room 212. For each talk, the room is indicated on the corresponding daily program (on the following pages).

Meals

Lunch will be taken at the cafeteria-style restaurant Upsidum. On Thursday evening, there will be a buffet in the same restaurant.

Reception

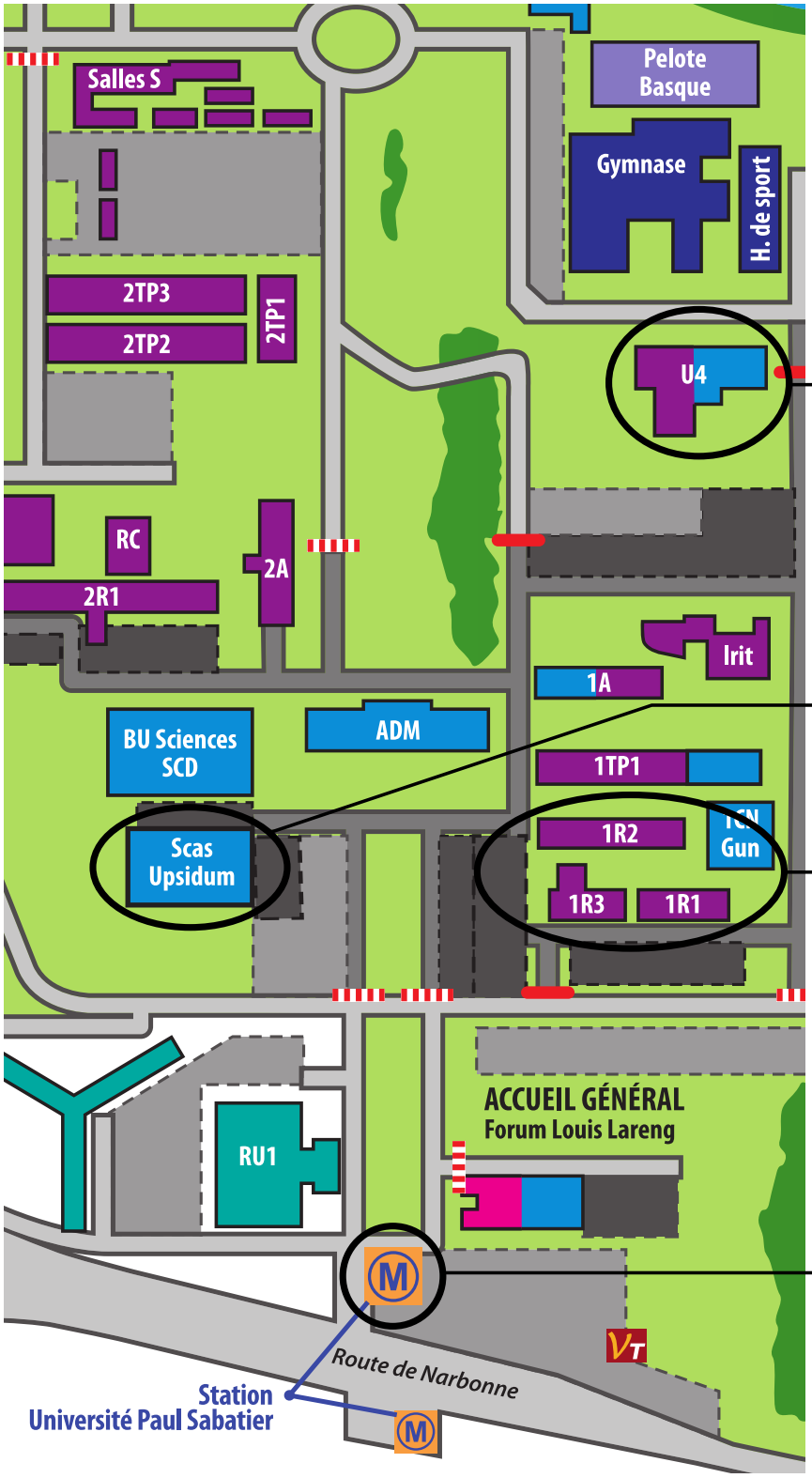
On Wednesday at 6pm, participants and families are invited to a reception at the City Hall (Hôtel de Ville), Salle des Illustres.

The City Hall (Hôtel de Ville) is located place du Capitole (metro station Capitole). There is a passageway in the middle of the building. The entrance is situated inside this passageway, Salle des Illustres is on the first floor (British numbering) and is well indicated.

Wifi

To access the wifi network, connect to the network UPS. Then open any webpage on your usual browser. You should be redirected to a secured webpage where you can input the login and password that were provided with the conference package. Issues may arise between your browser and the certificate of the secured webpage (which you will have to solve by yourself).

Partial map of the campus



Conference site

Restaurant

Toulouse Mathematics Institute

Metro station

Monday June 24

9h-9h30, Shannon Hall **Opening**		
9h30-10h30, Shannon Hall **Alan Reid**		
10h30-11h Coffee break		
11h-12h, Shannon Hall **Juan Souto**		
12h15-12h45, Shannon Hall **Mark Baker**	12h15-12h45, Room 211 **Inasa Nakamura**	12h15-12h45, Room 212 **Thomas Fiedler**
12h45-14h15 Lunch Break		
14h15-14h45, Shannon Hall **Stefano Francaviglia**	14h15-14h45, Room 211 **João Miguel Nogueira**	14h15-14h45, Room 212 **Alexandre Paiva Barreto**
15h-16h, Shannon Hall **Genevieve Walsh**		
16h-16h30 Coffee break		
16h30-17h30, Shannon Hall **Richard Weidmann**		
17h45-18h15, Shannon Hall **Gregor Masbaum**	17h45-18h15, Room 211 **Antonio Salgueiro**	

Abstracts

Alan Reid

Monday, June 24, 9h30-10h30, Shannon Lecture Hall

The geometry of canonical curves

Suppose that M is a 1-cusped hyperbolic 3-manifold. A component of the $\mathrm{SL}(2,\mathbb{C})$ character variety containing the character of a faithful discrete representation is called a canonical component. Thurston proved that a canonical component is a curve (a canonical curve). This talk will discuss various questions about these canonical curves: for example, which curves arise as canonical curves, what are geometric and algebraic features of canonical curves and how do they relate to M. Finally we will discuss a possible connection to expander graphs.

Juan Souto

Monday, June 24, 11h-12h, Shannon Lecture Hall

Virtual homomorphisms from mapping class groups to lattices in $SO(k,1)$

Let Γ be a finite index subgroup of the mapping class group of a surface of at least genus 3, and G a cocompact lattice in $SO(k,1)$. We prove that every homomorphisms $\Gamma \to G$ virtually factors through a homomorphism to a surface group.

Mark Baker

Monday, June 24, 12h15-12h45, Shannon Lecture Hall

Conservative subgroup separability for surfaces with boundary

If F is a compact surface with boundary, then a finitely generated subgroup without peripheral elements of $G = \pi_1(F)$ can be separated from finitely

many other elements of G by a finite index subgroup of G corresponding to a finite cover F with the same number of boundary components as F.

Inasa Nakamura

Monday, June 24, 12h15-12h45, Room 211

On surface links whose link groups are abelian

It is known that the link group of a classical link L is abelian if and only if L is an unknot or a Hopf link, and the link type is determined from the linking number. In this talk, we show that the analog of this fact does not hold for surface links. We study surface links whose link groups are free abelian, and we construct various examples of such surface links with the same link group but with various double linking numbers and triple linking numbers. Here the double and triple linking numbers are link-homotopy invariants of surface links, defined as natural generalizations of the classical linking numbers. This is joint work with Tetsuya Ito (RIMS, Kyoto University).

Thomas Fiedler

Monday, June 24, 12h15-12h45, Room 212

Quantum one-cocycles for knots

We give a method to construct non symmetric solutions of a global tetrahedron equation from solutions of the Yang-Baxter equation. The solution in the HOMFLYPT case gives rise to the first combinatorial quantum 1-cocycle which represents a non trivial cohomology class in the topological moduli space of long knots. We conjecture that the difference of its values on the rotation around the long axis and on Hatchers loop is related to the simplicial volume of the knot complement in the 3-sphere and we prove this for the figure eight knot. Our 1-cocycle applied to 2-string links can very easily distinguish mutants which can not be distinguished neither by the HOMFLYPT nor by the 2-variable Kauffman invariant nor by Kuperbergs g_2-invariant in their corresponding skein modules.

Stefano Francaviglia

Monday, June 24, 14h15-14h45, Shannon Lecture Hall

Branched projective structures with (quasi)-Fuchsian holonomy

We will discuss the following result. If S is a closed compact surface of genus g ş 2, and R is a quasi-Fuchsian representation of the fundamental group of S into PLS(2,C), then the deformation space of branched projective structures on S with given total branching order k and holonomy R is connected, as soon as k >0. Equivalently, two branched projective structures with the same quasi-Fuchsian holonomy and the same number of branch points are related by a movement of branch points. This is joint work with G. Calsamiglia and B. Deroin.

João Miguel Nogueira

Monday, June 24, 14h15-14h45, Room 211

Tunnel number degeneration under the connected sum of prime knots

We study 2-string free tangle decompositions of knots with tunnel number two. As an application, we construct infinitely many counter-examples to a conjecture in the literature stating that the tunnel number of the connected sum of prime knots doesn't degenerate by more than one: $t(K_1\#K_2) > t(K_1) + t(K_2) - 2$, for K_1 and K_2 prime knots.

Alexandre Paiva Barreto

Monday, June 24, 14h15-14h45, Room 212

Generalizations of the Omori-Yau Maximum Principle

Due to the large number of applications it has in geometry and analysis, the Omori-Yau Maximum Principle became a fundamental tool for Geometric Analysis. Along the years, many generalizations of this principle have been proposed. In this talk we prove that the classical generalization of the Omori-Yau maximum principle that was given by Pigola-Rigoli-Setti are logically equivalent to the assumption that the manifold carries a C^2 proper function whose gradient and Hessian (Laplacian) are bounded. In particular, this

result extends the scope of the original Omori-Yau principle, formulated in terms of lower bounds for curvature.

Genevieve Walsh

Monday, June 24, 15h-16h, Shannon Lecture Hall

Coxeter groups, hyperbolic polytopes, and acute triangulations

Let $C(L)$ be the right-angled Coxeter group defined by an abstract triangulation L of the two-sphere. We show that $C(L)$ can be realized as a hyperbolic right-angled reflection group if and only if L can be realized as an acute geodesic triangulation. We prove a more general result for the case when the angles are not necessarily all right. A corollary is that an abstract triangulation of S^2 can be realized as an acute geodesic triangulation exactly when it contains no separating 3- or 4-cycles. This is joint work with Sang-hyun Kim.

Richard Weidmann

Monday, June 24, 16h30-17h30, Shannon Lecture Hall

Nielsen equivalence in a class of random groups

We consider groups given by presentations of type

$$\langle a_1, \dots, a_n, b_1, \dots, b_n | a_i = w_i(b_1, \dots, b_n), b_i = u_i(a_1, \dots, a_n) \text{ for } 1 \leq i \leq n \rangle.$$

We show that for most of these groups the generating tuples $(a_1, \dots, a_n)$ and $(b_1, \dots, b_n)$ do not become Nielsen equivalent after $n-1$ stabilisations, i.e. the $(2n-1)$-tuples $(a_1, \dots, a_n, 1, \dots, 1)$ and $(b_1, \dots, b_n, 1, \dots, 1)$ are not Nielsen equivalent. (this is joint work with Ilya Kapovitch).

Gregor Masbaum

Monday, June 24, 17h45-18h15, Shannon Lecture Hall

TQFT and modular representations of mapping class groups

Together with P. Gilmer, we have used Integral TQFT to construct modular representations in finite characteristic of mapping class groups of surfaces. In this talk, I plan to discuss joint work with Reid in which we use these representations to answer a question of Hamenstaedt about finite quotients of the mapping class group. I will also present Verlinde-like dimension formulas for the irreducible factors of these representations in the case of equal characteristic.

Antonio Salgueiro

Monday, June 24, 17h45-18h15, Room 211

On the degree of a cyclic covering of a link

We prove that if L is a link in S^3 which is not the unknot, then all its strongly cyclic branched coverings are distinct.

Tuesday June 25

9h30-10h30, Shannon Hall **Tao Li**		
10h30-11h Coffee break		
11h-12h, Shannon Hall **Hyam Rubinstein**		
12h15-12h45, Shannon Hall **Bruno Martelli**	12h15-12h45, Room 211 **Dmitry Bolotov**	12h15-12h45, Room 212 **Fathi Ben Aribi**
12h45-14h15 Lunch Break		
14h15-14h45, Shannon Hall **Stephan Tillmann**	14h15-14h45, Room 211 **Makoto Osawa**	14h15-14h45, Room 212 **Peter Feller**
15h-16h, Shannon Hall **Vincent Colin**		
16h-16h30 Coffee break		
16h30-17h30, Shannon Hall **Yi Ni**		
17h45-18h15, Shannon Hall **Sylvain Maillot**	17h45-18h15, Room 211 **Alexander Zupan**	17h45-18h15, Room 212 **Adam Levine**

Abstracts

Tao Li

Tuesday, June 25, 9h30-10h30, Shannon Lecture Hall

Rank and genus of 3-manifolds

We construct a closed orientable hyperbolic 3-manifold with rank of its fundamental group smaller than its Heegaard genus. Moreover, we show that the discrepancy between rank and Heegaard genus can be arbitrarily large for hyperbolic 3-manifolds.

Hyam Rubinstein

Tuesday, June 25, 11h-12h, Shannon Lecture Hall

Efficient triangulations and the index of a cusped hyperbolic 3-manifold

This is joint work with Stavros Garoufalidis, Craig Hodgson and Henry Segerman. The $3D$ index of an ideal triangulation T of an oriented cusped 3-manifold M (a collection of q-series with integer coefficients, introduced by Dimofte-Gaiotto-Gukov, coming from string theory) is shown to be a topological invariant of oriented cusped hyperbolic 3-manifolds. To achieve this, we show that (a) T admits an index structure if and only if T is 1-efficient and (b) if M is hyperbolic, it has a canonical set of 1-efficient ideal triangulations related by 2-3 and 0-2 moves which preserve the 3D index. The results will be illustrated by several examples.

Bruno Martelli

Tuesday, June 25, 12h15-12h45, Shannon Lecture Hall

From cubulations to cusped hyperbolic 4-manifolds

We expose a simple algorithm which transforms any four-dimensional cubulation into a cusped hyperbolic finite-volume 4-manifold tessellated by regular

ideal 24-cells. The algorithm allows to construct easily plenty of cusped hyperbolic finite-volume 4-manifolds, including the first examples of hyperbolic 4-manifolds having only one cusp.

This is joint work with Kolpakov.

Dmitry Bolotov

Tuesday, June 25, 12h15-12h45, Room 211

Foliations of nonnegative curvature on 3-Manifolds

We will describe the topology of nonnegative curvature foliation. Then we will give the classification of closed 3-Manifolds admitting nonnegative curvature foliations and flat foliations.

Fathi Ben Aribi

Tuesday, June 25, 12h15-12h45, Room 212

The L^2-Alexander invariant detects the unknot

The L^2-Alexander invariant is a knot invariant introduced by Li and Zhang in 2006. It can be seen as a L^2-torsion of a certain L^2-chain complex derived from the knot complement. It can also be built from the knot group, with Fox calculus, similarly as the Alexander polynomial, except that the operators act on infinite-dimensional Hilbert spaces. In my talk I will present this construction and show that this invariant detects the unknot.

Stephan Tillmann

Tuesday, June 25, 14h15-14h45, Shannon Lecture Hall

Computing closed essential surfaces in 3-manifolds

Normal surface theory was developed in the 1960's to algorithmically solve decision problems about triangulated 3-manifolds, such as the unknot recognition problem and the homeomorphism problem for 3-manifolds.

Normal surface theory has traditionally been regarded as very slow, both in theory and in practice. Algorithmic complexity and other bounds were

expected to be exponential at best, even for comparatively simple problems like unknot recognition, and with solutions to problems like the 3-manifold homeomorphism problem expected to run with time complexity an iterated exponential in terms of the number of tetrahedra in the input 3-manifolds.

In this talk we will look at how this perception is turning out to be unfounded in many cases. In particular I will discuss recent work with Ben Burton and Alexander Coward that determines which 3-manifolds in the Hodgson-Weeks census are Haken, and which complements of knots up to 12 crossings contain a closed essential surface. Both of these calculations would until recently have been regarded as completely infeasible.

Makoto Ozawa

Tuesday, June 25, 14h15-14h45, Room 211

Essential surfaces of non-negative Euler characteristic in genus two handlebody exteriors

We provide a classification of the essential surfaces of non-negative Euler characteristic in the exteriors of genus two handlebodies embedded in the 3-sphere.

This is joint work with Yuya Koda.

Peter Feller

Tuesday, June 25, 14h15-14h45, Room 212

Adjacency of torus knot singularities

We explore the connection between an algebraic notion of adjacency for singularities of curves in C^2 and a geometric notion of adjacency for smooth knots in S^3.

Vincent Colin

Tuesday, June 25, 15h-16h, Shannon Lecture Hall

An extension of Heegaard Floer homology to higher dimensions

In dimension three, Heegaard Floer homology can be computed from the page and the monodromy of an open book decomposition supporting a contact structure. In a joint work in progress with Ko Honda, we explain how to extend its definition to contact manifolds of arbitrary odd dimension.

Yi Ni

Tuesday, June 25, 16h30-17h30, Shannon Lecture Hall

Genus minimizing knots in rational homology spheres

It has been known that the Donaldson-Floer type invariants for 3- and 4-manifolds can be used to give lower bound to the genus of surfaces representing a given homology class. In this talk, we will discuss a new type of genus bounds from Heegaard Floer homology, which gives a lower bound to the rational genus of all knots in a given torsion homology class. Such genus bounds are related to problems like lens space surgery, one-sided Heegaard splitting, and complexity of 3-manifolds. This talk is based on joint work with Zhongtao Wu and with Josh Greene.

Sylvain Maillot

Tuesday, June 25, 17h45-18h15, Shannon Lecture Hall

Long time behaviour of Ricci flow on open 3-manifolds

Let M be a compact, orientable 3-manifold with toral boundary. Thurston's hyperbolization conjecture, proved by Perelman in the closed case, and Thurston in the non-closed case, states that if M is irreducible and atoroidal, then M is hyperbolic or Seifert-fibered. We give a unified proof of this result by showing that Ricci flow with surgery on the interior of M is well-defined, and converges to a hyperbolic metric when M is not Seifert. This is joint work with Laurent Bessières and Gérard Besson.

Alexander Zupan

Tuesday, June 25, 17h45-18h15, Room 211

Strongly irreducible bridge surfaces versus essential surfaces in knot complements

Borrowing from the theory of Heegaard splittings of 3-manifolds, we characterize the decomposition of a strongly irreducible bridge surface for a knot in a 3-manifold induced by cutting along a collection of essential surfaces. As an application, we prove several new results concerning bridge surfaces, as well as providing alternate proofs of some existing theorems.

Adam Levine

Tuesday, June 25, 17h45-18h15, Room 212

Embeddings of non-orientable surfaces in $L(p,q) \times I$

We use the Heegaard Floer homology correction terms to obstruct finding essential embeddings of closed, non-orientable surfaces in the product of a lens space and an interval. For a non-orientable surface F with sufficiently low genus (and conjecturally any genus), we show that if F embeds essentially in $L(p,q) \times I$, the genus and normal Euler number of the embedding are the same as those of a stabilization of a non-orientable surface embedded in $L(p,q)$.

This is joint work with Danny Ruberman and Saso Strle.

Wednesday June 26

9h-10h, Shannon Hall **Ian Agol**		
10h-10h30 Coffee break		
10h30-11h30, Shannon Hall **Jessica Purcell**		
11h45-12h15, Shannon Hall **David Bachman**	11h45-12h15, Room 211 **Mark Bell**	11h45-12h15, Room 212, **Benjamin Audoux**
12h30-13h, Shannon Hall **Yoav Moriah**	12h30-13h, Room 211 **Darlan Girao**	12h30-13h, Room 212 **Richard Webb**
13h Lunch		
18h Reception at the City Hall Salle des Illustres		

Abstracts

Ian Agol

Wednesday, June 26, 9h-10h, Shannon Lecture Hall

Virtually special cube complexes

We will discuss the proof of a conjecture of Dani Wise, that cube complexes with hyperbolic fundamental group are virtually special. We will spend more time discussing the group theory underlying this result than the application of this result to the virtual Haken conjecture and other properties of 3-manifolds.

Jessica Purcell

Wednesday, June 26, 10h30-11h30, Shannon Lecture Hall

Quasifuchsian state surfaces

In this talk, we will describe surfaces in knot complements that are determined by a Kauffman state of the diagram. We give conditions on the diagram that will ensure the surface is essential. For an essential surface, we show it will never be accidental, and we give conditions on the diagram that determine whether it is quasifuchsian or a fiber. These will be the only cases. Finally, for links with A or B-adequate diagrams, we will see that the geometric type of the surface can be read off of the Jones polynomial. This is joint work with David Futer and Efstratia Kalfagianni.

David Bachman

Wednesday, June 26, 11h45-12h15, Shannon Lecture Hall

Normalizing Topologically Minimal surfaces

Topologically minimal surfaces generalize several well-studied classes of surfaces in 3-manifolds, and provide a topological analogue to geometrically minimal surfaces. We show that there is a normal form for any such surface

with respect to a fixed triangulation. This provides striking analogues with results of Colding and Minicozzi, establishes Hatcher-like finiteness results, and is crucial to understanding how Heegaard splittings are effected by Dehn surgery..

Mark Bell

Wednesday, June 26, 11h45-12h15, Room 211

The classification problem for mapping classes

The Nielsen-Thurston classification theorem characterises mapping classes, isotopy classes of homeomorphisms, of a surface into three types: periodic, reducible and pseudo-Anosov. I will discuss an exponential time algorithm for deciding the type of a mapping class using ideal triangulations. This can be used to show that determining if a mapping class is pseudo-Anosov is a problem in co-NP.

Benjamin Audoux

Wednesday, June 26, 11h45-12h15, Room 212

An application of Khovanov homology to quantum codes

In classical data processing, any transmission of a message is likely to generate errors in this message. An error-correcting code is a means of coating the message so that small errors can be detected and perhaps even corrected. In quantum data processing, the problem is all the more crucial since the simple storage of a data is likely to alter it. Such error-correcting quantum codes have been known for about fifteen years. They are usually compared thanks to three parameters: the length (space taken to code), dimension (length of the initial message) and the minimum distance (roughly the number of elementary errors we expect to correct). In my talk, I will show how Khovanov homology, which comes from knot theory, can lead to some quantum codes with reasonable minimum distance.

Yoav Moriah

Wednesday, June 26, 12h30-13h, Shannon Lecture Hall

Fat train tracks, waves and Heegaard splittings

Fat train tracks are defined and used to give a combinatorial criterion for the Hempel distance of Heegaard splittings for closed orientable 3-manifolds.

Darlan Girao

Wednesday, June 26, 12h30-13h, Room 211

Rank gradient of hyperbolic 3-manifolds

An important line of research in 3-dimensional topology is the study of the behavior of the rank of the fundamental groups of the finite sheeted covers of an orientable hyperbolic 3-manifold. In this talk I will construct what seems to be the first examples of such manifolds which have co-final towers of finite sheeted covers in which the rank of the fundamental groups grow linearly with the degree of the covers.

Richard Webb

Wednesday, June 26, 12h30-13h, Room 212

Slim unicorns and uniform hyperbolicity

The curve graph of a surface has applications in hyperbolic geometry, mapping class groups, Teichmueller theory and 3-manifolds. Hyperbolicity of the curve graph is one of its key properties. We shall give a short proof that arc graphs are 7-hyperbolic and deduce that curve graphs are 17-hyperbolic, using unicorn paths and elementary methods.

This is joint work with Sebastian Hensel and Piotr Przytycki.

Thursday June 27

9h30-10h30, Shannon Hall **Daryl Cooper**		
10h30-11h Coffee break		
11h-12h, Shannon Hall **Steven Kerckhoff**		
12h15-12h45, Shannon Hall **Daciberg Gonçalves**	12h15-12h45, Room 211 **Neil Hoffman**	12h15-12h45, Room 212 **André de Carvalho**
12h45-14h15 Lunch Break		
14h15-14h45, Shannon Hall **Sergey Matveev**	14h15-14h45, Room 211 **Jeffrey Meier**	14h15-14h45, Room 212 **Pere Menal Ferrer**
15h-16h, Shannon Hall **François Guéritaud**		
16h-16h30 Coffee break		
16h30-17h30, Shannon Hall **Danny Calegari**		
17h45-18h15, Shannon Hall **Martin Lustig**	17h45-18h15, Room 211 **Ana Garcia Lecuona**	17h45-18h15, Room 212 **Anastasiia Tsvietkova**
19h30, Upsidum Buffet		

Abstracts

Daryl Cooper

Thursday, June 27, 9h30-10h30, Shannon Lecture Hall

Projective structures on manifolds

A strictly convex orbifold is the quotient of a strictly convex domain in projective space by a discrete group of projective transformations which preserve the domain. The Hilbert metric is a Finsler metric on the domain that is preserved by the group. In the case the domain is an ellipsoid this is the hyperbolic metric. This talk will survey our state of knowledge in the finite volume case.

Steven Kerckhoff

Thursday, June 27, 11h-12h, Shannon Lecture Hall

Bieberbach Soul Theorem

This will be a discussion of a structure theorem for noncompact Euclidean cone manifolds. It can be viewed as a generalization of the Bieberbach theorem for Euclidean manifolds and the soul theorem for noncompact Riemannian manifolds with non-negative curvature. Joint work with Daryl Cooper and Craig Hodgson.

Daciberg Gonçalves

Thursday, June 27, 12h15-12h45, Shannon Lecture Hall

Double covrings of Solmanifolds and the Borsuk-Ulam theorem

Given a closed 3-manifolds which admits Sol-geometry in most cases we describe all classes of free involutions. Then using a recent result by Hillmann we describe for which involutions the Borsuk-Ulam type theorem for maps with values in R^n holds. The answer will depend on the integer n which can be restricted to the values 2 and 3.

Neil Hoffman

Thursday, June 27, 12h15-12h45, Room 211

Generalized Berge knot complements

The Berge Conjecture provides a classification of one cusped manifolds that are known to admit an S^3 and a lens space surgery. A positive solution to this conjecture would say this list is complete. In this talk, I will present a partial classification of one cusped manifolds known to admit at least two lens space surgeries, providing a generalization of the Berge Conjecture. In particular, we will focus on one cusped manifolds that admit exactly three lens space surgeries. This is joint work with Ken Baker and Brandy Guntel Doleshal.

André de Carvalho

Thursday, June 27, 12h15-12h45, Room 212

Convergence in dynamics and hyperbolic geometry

A family of sequences of braids on n strands is presented for which two associated dynamic-geometric structures converge as n goes to infinity: the associated pseudo-Anosov (pA) maps and the associated hyperbolic 3-manifolds. The convergences happen in the uniform and the geometric topology, respectively. However, whereas all sequences of associated pA maps converge to a single generalized pA map (the so-called tight horseshoe), each sequence of associated 3-manifolds converges to a different limiting hyperbolic 3-manifold. We will discuss how to (try to) reconcile these differences using algebraic limits of infinitely generated groups. This is joint work with Sylvain Bonnot.

Sergey Matveev

Thursday, June 27, 14h15-14h45, Shannon Lecture Hall

Prime decomposition of knots in thickened surfaces

We prove that if a nontrivial knot K in a thickened surface $F \times I$ determines the trivial element of $H_1(F; Z_2)$, than K has a unique decomposition into prime factors. The condition $[K]$ in $H_1(F; Z_2)$ is essential, but all counterexamples admit an explicit description.

Jeffrey Meier

Thursday, June 27, 14h15-14h45, Room 211

Seifert fibered surgery on hyperbolic pretzel knots

We will discuss the classification of Seifert fibered surgeries on hyperbolic pretzel knots. This is the last step in the classification of exceptional surgeries on hyperbolic pretzel knots. We will also discuss work in progress to complete the last remaining step in the classification of Seifert fibered surgeries on Montesinos knots, which would complete the classification of exceptional surgeries on arborescent knots.

Pere Menal-Ferrer

Thursday, June 27, 14h15-14h45, Room 212

Torsion of arithmetic hyperbolic 3-manifolds

Given a hyperbolic 3-manifold M and a positive integer n, we can consider n-dimensional complex linear representations of $\pi_1 M$ obtained as the composition of a lift of the holonomy representation of M and the n-th fundamental representation of $\mathrm{SL}(2,\mathbf{C})$. In this talk, motivated by the recent work of Marshall and Mueller, I will discuss the existence and characterization of lattices $L_n \subset \mathbf{C}^n$ that are invariant under $\pi_1 M$; their corresponding homology groups $\mathrm{H}_*(M; L_n)$ will be discussed as well. Not surprisingly, the existence of such lattices is very related to the arithmetic of M; however, it is quite remarkable that the amount of torsion in the groups $\mathrm{H}_1(M; L_n)$ is related to the volume of M. Marshall and Mueller studied these questions when M is closed; in this talk, I will discuss at what extent this can be generalized to cusped manifolds.

François Guéritaud

Thursday, June 27, 15h-16h, Shannon Lecture Hall

Flat spacetimes via the arc complex

Margulis gave examples of properly discontinuous affine actions on R^3 by free groups, answering a question of Milnor. I will show how to interpret

such actions in terms of perturbations of hyperbolic surfaces, via a deformation procedure similar to earthquakes – except that tectonic plates move perpendicularly to (rather than along) fault lines. Such examples are naturally parametrized by the arc complex of a surface with boundary, and I will sketch a proof that there are essentially no others. Joint work with Jeff Danciger and Fanny Kassel.

Danny Calegari

Thuersday, June 27, 16h30-17h30, Shannon Lecture Hall

Random groups contain surface subgroups

A random group contains many quasiconvex surface subgroups. This is joint work with Alden Walker.

Martin Lustig

Thursday, June 27, 17h45-18h15, Shannon Lecture Hall

The fibers of the Cannon-Thurston map for free group automorphisms

For any hyperbolic fully irreducible (= iwip) automorphism $\phi \in \mathrm{Out}(F_N)$ the mapping torus group $G_\phi = F_N \times_\phi \langle t \rangle$ is hyperbolic, and the embedding $\iota : F_N \hookrightarrow G_\phi$ induces a continuous, F_N-equivariant and surjective *Cannon-Thurston map* $\hat{\iota} : \partial F_N \to \partial G_\phi$.

We prove that for any ϕ as above, the map $\hat{\iota}$ is finite-to-one and that the preimage of every point of ∂G_ϕ has cardinality $\leq 2N$.

We also prove that every point $S \in \partial G_\phi$ with ≥ 3 preimages in ∂F_N is rational and has the form $(wt^m)^\infty$ where $w \in F_N, m \neq 0$, and that there are at most $4N - 5$ F_N-orbits of such points in ∂G_ϕ (for the translation action of F_N on ∂G_ϕ).

We show that, by contrast, for $k = 1, 2$ there are uncountably many points $S \in \partial G_\phi$ with exactly k preimages in ∂F_N.

This is joint work with I. Kapovich.

Ana Garcia Lecuona

Thursday, June 27, 17h45-18h15, Room 211

On surgeries between $S^1 \times S^2$ and lens spaces

We consider knots in $S^1 \times S^2$ with a Dehn surgery to a lens space and how this parallels what happens for knots in S^3. The Cyclic Surgery Theorem enables a classification for non-longitudinal surgeries, while Berge's families of doubly primitive knots in S^3 motivate our conjectural classification for longitudinal surgeries. We will compare this conjectural picture with the Berge Conjecture and propose a means of relating the two.

Anastasiia Tsvietkova

Thursday, June 27, 17h45-18h15, Room 212

Invariants of hyperbolic links from link diagrams

W. Thurston demonstrated that every link in S^3 is a torus link, a satellite link or a hyperbolic link and these three categories are mutually exclusive. The talk will briefly introduce an alternative method for computing the hyperbolic structure of the complement of a hyperbolic link, based on ideal polygons bounding the regions of a diagram of the link rather than decomposition of the complement into ideal tetrahedra. We will show how this allows to compute various invariants directly from link diagrams, including the exact hyperbolic volume for some families of links, and some arithmetic invariants (e.g. the invariant trace field).

This is based on joint work with M. Thistlethwaite, and on joint work with W. Neumann.

Friday June 28

9h-10h, Shannon Hall
Stefan Friedl

10h-10h30
Coffee break

10h30-11h30, Shannon Hall
David Gabai

11h45-12h45, Shannon Hall
Peter Shalen

12h45
Lunch

Abstracts

Stefan Friedl

Friday, June 28, 9h-10h, Shannon Lecture Hall

Twisted Alexander polynomials, fiberedness and the Thurston norm

We show that twisted Alexander polynomials detect whether a 3-manifold is fibered and they detect the Thurston norm of most 3-manifolds.

David Gabai

Friday, June 28, 10h30-11h30, Shannon Lecture Hall

Topologies of the curve complex

TBA.

Peter Shalen

Friday, June 28, 11h45-12h45, Shannon Lecture Hall

Diameter and homology of hyperbolic 3-manifolds

The Mostow rigidity theorem implies that the topological type of a closed, orientable hyperbolic n-manifold M determines M up to isometry. Hence any quantitative geometric invariant of a hyperbolic n-manifold is in principle a topological invariant. This raises the question of how these geometrically defined invariants compare with more classical topological invariants. For example, if we define the covering radius of M at a point p to be $\mathrm{cov}_p M = \max_{x\in M} \mathrm{dist}(p,x)$, a standard elementary argument shows that $\mathrm{rank}\pi_1(M) \leq B\exp(2\min_{p\in M} \mathrm{cov}_p M)$ for some universal constant B. (The rank of $\pi_1(M)$ is defined to be its minimal number of generators.) This in particular gives a bound for $\mathrm{diam} M = \max_{p\in M} \mathrm{cov}_p M$ in terms of $\mathrm{rank}(\pi_1(M))$.

Some suggestions for evening meals

Inexpensive (i.e. less than 20 euros)

African Queen (African), 14 Rue des Paradoux, ☎: +33 (0)5 61 25 99 52

Coeur d'Amande (North African), 49 rue Pierre Paul Riquet, ☎: +33 (0)5 34 42 97 15

L'Entrecôte (steacks), 15 Boulevard de Strasbourg, ☎: +33 (0)5 61 21 87 18

La Faim des Haricots (vegetarian), 3 Rue du Puits Vert, ☎: +33 (0) 61 22 49 25

La Gouaille (French), 6 Rue Joutx Aigues, ☎: +33 (0) 61 25 65 66

Le Marrakech (North African), 11 Place Arnaud Bernard, ☎: +33 (0) 61 23 82 52

Le May (French), 4 Rue du May, ☎: +33 (0) 61 23 98 76

La Pastasciutta (Pizzas), 35Bis Rue Gabriel Péri, ☎: +33 (0) 61 62 69 39

Chez Raymond (French), 9 place Jean-Diebold, ☎: +33 (0) 61 42 77 56

Saveurs Vietnam (Vietnamese), 8 rue denfert rochereau, ☎: +33 (0) 61 57 03 89

Vecchio (Pizzas), 22 Allée Jean Jaurès, ☎: +33 (0) 62 73 34 73

More expensive (but still less than 30 euros without wine)

Le Bistrot de l'Etoile (French), 6 Rue de l'étoile, ☎: +33 (0) 61 63 13 43

La Madeleine de Proust (French), 11 Rue Riquet, ☎: +33 (0) 61 63 80 88

Chez Navarre (French), 49 Grande Rue Nazareth, ☎: +33 (0) 62 26 43 06

Ô Boui Boui Lao (Lao), 30 r ue Palaprat, ☎: +33 (0) 62 72 28 03

La Rotisserie des Carmes (French), 38 Rue des Polinaires, ☎: +33 (0) 61 53 34 88

Zio (African), 25 Rue des Moulins, ☎: +33 (0) 61 55 19 02

No limit

Anges et Démons (French), 1 Rue Perchepinte, ☎: +33 (0) 61 52 66 69

La Braisière (French), 42 Rue Pharaon, ☎: +33 (0) 61 52 37 13

Le Genty Magre (French), 3 Rue Genty Magre, ☎: +33 (0) 61 21 38 60

L'Empereur de Hué (Vietnamese), 17 Rue des couteliers, ☎: +33 (0) 61 53 55 72

Le Pic Saint-Loup (French), 7, rue Saint-Léon, ☎: +33 (0) 61 53 81 51

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This conference form part of the scientific activities of the thematic month Topology, Symplectic and Contact Geometry in Toulouse, organised by the International Center of Mathematics and Computer Science in Toulouse (CIMI).

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