Young Geometric Group Theory XI

Münster, Germany
Feb 13 – 17, 2023

Organizers
Giles Gardam
Kasia Jankiewicz
Yuri Santos Rego
Bakul Sathaye

Scientific Committee
Indira Chatterji (Chair)
Dawid Kielak
Nir Lazarovich
Priyam Patel
Beatrice Pozzetti
Matt Zaremsky

Contents

Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 – 10:00	Andreas Thom	Genevieve Walsh	Andreas Thom	Andreas Thom	Andreas Thom
10:00 – 10:45	Coffee	Coffee	Coffee	Coffee	Coffee
10:45 – 11:45	Genevieve Walsh	Mahan Mj	Genevieve Walsh	Genevieve Walsh	Mahan Mj
11:45 - 12:45	Mahan Mj	Discussions	Discussions	Discussions	Discussions
12:45 - 14:30	Lunch break	Lunch break		Lunch break	Lunch break
14:30 - 15:30	Sam Hughes	Jean Pierre Mutanguha		Mahan Mj	Ignacio Vergara
15:30 - 16:15	Coffee	Coffee		Coffee	Coffee
16:15 - 17:15	Lightning talks	Michelle Chu		Rylee Lyman	Annette Karrer
17:15 - 18:15	Lightning talks			Stephan Stadler	
			Reception / Poster session (18:00 to 19:30)		
20:00 - 21:00	DEI Panel	Jobs Panel			

Mini-Courses

❖ Federica Fanoni

Big mapping class groups
I will introduce infinite-type surfaces and their mapping class groups (called big mapping class groups) and describe some of their basic properties. I will then talk about the classical Nielsen-Thurston classification for surfaces of finite type and discuss the issues that we face if we try to extend it to infinite-type surfaces. I will talk about joint work with Mladen Bestvina and Jing Tao about classifying certain mapping classes with good properties.

❖ Mahan Mj

Cannon-Thurston Maps
We shall start by motivating the relevance of Cannon-Thurston maps from two points of view: geometric group theory and 3-dimensional hyperbolic geometry. We shall then furnish a proof of the existence of Cannon-Thurston maps for hyperbolic normal subgroups and give a description of point pre-images in terms of laminations. Depending on time available, we shall indicate some applications including the following:
a) Scott-Swarup type theorems proving quasiconvexity of subgroups of distorted subgroups
b) Cubulability of some hyperbolic surface-by-free groups

❖ Andreas Thom

Sofic groups, almost homomorphism and stability
In this course I will give an introduction to sofic groups, including examples, applications and open questions. An important role is played by the notions of almost homomorphism and stability.

❖ Genevieve Walsh

Boundaries of hyperbolic and relatively hyperbolic groups
This mini course will explore the many useful, interesting, and beautiful properties of boundaries of hyperbolic and relatively hyperbolic groups.

We will start with the definition of a Gromov boundary of a hyperbolic group and the action of a group on its boundary. We will give some idea why this boundary is a QI invariant and give many examples of the interesting boundaries that can arise. In particular, we will see some boundaries of hyperbolic right-angled Coxeter groups.

Next, we will discuss the metric on the Gromov boundary and some group-theoretical properties that one can see from the boundary. Lastly, we will discuss relatively hyperbolic groups and their boundaries and some relations to Gromov boundaries. Throughout, there will be many examples and applications.

Plenary Talks

- Michelle Chu

Arithmetic hyperbolic manifolds and their finite covers
Arithmetic hyperbolic manifolds are constructed as quotients of hyperbolic space by subgroups of isometries commensurable with integer points in algebraic groups. In this talk, I will introduce arithmetic methods to construct hyperbolic manifolds and describe how the arithmeticity helps us understand the geometry and topology of these manifolds and their finite covers. Throughout the talk, I will mention recent results as well as interesting open questions.

- Sam Hughes

Distinguishing free-by-cyclic groups by their finite quotient groups
One way to try to distinguish two groups up to isomorphism is to enumerate their finite quotients. In this talk we will investigate the question of which

free-by-cyclic groups can be distinguished from each other by their sets of finite quotients. We will pay particular attention to the case where the defining automorphism is irreducible and atoroidal. Based on ongoing joint work with Monika Kudlinska.

- Annette Karrer

From Stallings' Theorem to connected components of Morse boundaries of graph of groups
Every finitely generated group G has an associated topological space, called a Morse boundary. It was introduced by a combination of Cordes and Charney--Sultan and captures the hyperbolic-like behavior of G at infinity.

In this talk, I will first explain Stallings' theorem-- a fundamental theorem in geometric group theory. Afterward, I will explain an analogous statement for Gromov boundaries of Gromov-hyperbolic groups. As Morse boundaries generalize Gromov boundaries, this raises the question whether it is possible to formulate an analog for Morse boundaries. Motivated by this question, we will study connected components of Morse boundaries of graph of groups. We will focus on the case where the edge groups are undistorted and do not contribute to the Morse boundary of the ambient group. Results presented are joint with Elia Fioravanti.

- Rylee Lyman

Groups acting on trees and their deformations
Many groups interesting to geometric group theorists act on trees. For a few examples, free groups, surface groups, many three-manifold groups, Baumslag--Solitar groups, and groups with infinitely many ends or a nontrivial JSJ decomposition. One goal of this talk is to remind you of or introduce you to Bass and Serre's structure theory for groups acting on trees. Here is the other. When a group acts on a tree, it typically acts on many trees in many ways. Work of Culler–Vogtmann, Culler–Morgan, Forester, Clay and Guirardel–Levitt organizes these tree actions into 'deformation spaces.' I would like to introduce you to deformation spaces of tree actions

and how to begin to think about them. I will attempt to state at least one open problem and at least one theorem of mine.

- Jean-Pierre Mutanguha

Canonical forms for free group automorphisms
The Nielsen–Thurston theory of surface homeomorphisms can be thought of as a surface analogue to the Jordan canonical form. I will discuss my progress in developing a similar canonical form for free group automorphisms. (Un)Fortunately, free group automorphisms can have arbitrarily complicated behaviour. This is a significant barrier to translating arguments that worked for surfaces into the free group setting; nevertheless, the overall ideas/strategies do translate!

- Stephan Stadler

CAT(0) spaces of higher rank
A Hadamard manifold – or more generally a CAT(0) space – is said to have higher rank if every geodesic line lies in a flat plane. If a higher rank Hadamard manifold admits finite volume quotients, then it has to be a symmetric space or split as a direct product. This is the content of Ballmann's celebrated Rank Rigidity Theorem, proved in the 80s. It has been conjectured by Ballmann that his theorem generalizes to the synthetic setting of CAT(0) spaces. In the talk I will discuss Ballmann's conjecture and report on recent progress.

- Ignacio Vergara

Uniformly Lipschitz affine actions on subspaces of L^1
I will present a general criterion that ensures the existence of a uniformly Lipschitz affine action of a countable group on a subspace of an L^1 space. This sufficient condition arises in several different contexts, which allows one to construct such actions for various classes of groups, including hyperbolic groups, mapping class groups, and acylindrically hyperbolic groups. For the first two classes these actions are proper, and for the latter they have unbounded orbits.

Lightning Talks

Mon, Feb 13, 4:15 to 6:15 pm

Parallel Session 1 (Botanicum SG3)

1. Amandine Escalier *Quantitative orbit equivalence, or how geometric and measured group theory talk to each other*
2. Tom Ferragut - *Geometry of Horospherical product*
3. Mariam Alhawaj - *Generalized pseudo-Anosov maps from Hubbard trees*
4. Marie Trin - *From counting curves to counting arcs*
5. Federica Bertolotti - *Complexity of a manifold in terms of simplices*
6. Francesco Fournier-Facio - *Hopfian wreath products and the direct finiteness conjecture*
7. Christian Steinhart - *Isometric embeddings of Outer Space*
8. Héctor Jardón-Sánchez - *Kazhdan's property (T) for equivalence relations*
9. Martina Jørgensen - *A higher rank hyperbolicity condition*
10. Hyeran Cho - *Riemannian Metrics with Nonpositive Curvature on Branched Coverings*
11. Matteo Migliorini - *Hyperbolic manifolds fibering over S^1*
12. Naomi Andrew - *Automorphisms meet Bass-Serre theory*
13. Alice Kerr - *Coarse embeddings*
14. Jerónimo García Mejía - *For Sale: Baby shoes, never worn*

Parallel Session 2 (Schloss S2)

1. Michael Zshornack - *Zariski-dense surface groups in SL(n,Z)*
2. Jonathan Fruchter - *Virtual homology, residually free groups and profinite rigidity*
3. Kevin Li - *Combination theorems for finiteness/vanishing conditions*
4. José Pedro Quintanilha - *Sigma-invariants for locally compact groups*
5. Shaked Bader - *CAT(0) Polygonal complexes are 2-median*
6. Bianca Marchionna - *Double-coset zeta functions for groups acting on trees or buildings*

7. Becky Eastham - *Homology of finite regular covers of graphs and the connectivity of 'Whitehead space'*
8. Alexandra Edletzberger - *Quasi-Isometry Problem(s) of Right-Angled Coxeter Groups.*
9. Mireille Soergel - *Dyer groups*
10. Marco Lotz - *Reflection length in non-affine Coxeter groups*
11. Macarena Arenas - *Cohomological vs cubical dimensions*
12. Sami Douba - *A thin flat conformal structure*
13. Yandi Wu - *Marked Length Spectrum Rigidity for Certain Quotients of the Davis Complex*
14. Lewis Molyneux - *An introduction to Homotopic BNSR invariants*
15. Alex Evetts - *Conjugacy growth in virtually nilpotent groups*

Posters

Wed, Feb 15, 6:00 pm in MM Conference Center

- Gemma Crowe - *Conjugacy languages in virtual RAAGs*
- Isobel Davies - *Characterising trees and hyperbolic spaces by their boundaries*
- Jari Desmet - *Non-associative Frobenius algebras for simple algebraic groups*
- Ethan Dlugie - *The Burau Representation and Shapes of Polyhedra*
- Jacob Garcia - *Conicality and Stability in Finitely Generated Groups*
- Giovanni Italiano - *Hyperbolic manifolds fibering over* S^1
- Sanghoon Kwak - *Coarse Geometry of Pure Mapping Class Groups of Infinite Graphs*
- Corentin Le Coz - *Post-quantum hash functions using* $SL_n(F_p)$
- Xabier Legaspi - *Uniform Uniform Uniform exponential growth in small cancellation groups*
- Elyasheev Leibtag - *Images of algebraic groups*
- Marco Linton - *One-relator groups: an overview of recent results*
- Aaron Messerla - *Quasi-isometries of relatively hyperbolic groups with an elementary hierarchy*

- Ismael Morales - *Profinite and L^2 invariants*
- Merik Niemeyer - *Non-commutative Cluster Algebras and Where to Find Them*
- Eduardo Oregon Reyes - *The space of metric structures on hyperbolic groups*
- Jose Andres Rodriguez Migueles - *Periods of continued fractions and volumes of modular knots complements*
- Thomas Titz Mite - *Exotic C2-tilde buildings*
- Katie Vokes - *Thickness and relative hyperbolicity for graphs of multicurves*
- Noam von Rotberg - *Conjugacy classes in affine Coxeter groups*

Panels

There will be two panels during the conference - one addressing professional matters and the other addressing equity and inclusion in our community.

The Jobs Panel will address the professional aspects of mathematics. These can include but are not limited to: finding employment post-PhD, developing a research program, developing collaborations, work-life balance, two-body problems, balancing family + professional obligations, imposter syndrome.

The DEI Panel will address questions of justice and equity in mathematical sciences and society in general. For example, discrimination on the basis of gender, ethnicity, disability, sexual orientation or age, the challenges people face in different geographical locations or because of belonging to particular under-represented groups; how they overcome them, and the success and failures they have experienced.

In both cases we aim to provide a safe environment for participants to raise and discuss whatever issues they would like to.

DEI Panel
(Mon, Feb 13, 8:00 to 9:00 pm, Youth Hostel)

- Indira Chatterji (Université de Nice)
- Alexandra Edletzberger (University of Vienna)
- Yuri Santos Rego (OvGU Magdeburg)
- Genevieve Walsh (Tufts University)

Jobs Panel
(Tue, Feb 13, 8:00 to 9:00 pm, Youth Hostel)

- Giles Gardam (University of Münster)
- Daniel Groves (University of Illinois Chicago)
- Rachel Skipper (ENS Paris)
- Katrin Tent (University of Münster)

General Information

All the lectures will be held at the Botanicum (Schlossgarten 3) in the lecture theatre on the ground floor, accessed via Entrance E.

The coffee breaks are in the Schlossgarten Café (Schlossgarten 4), a 3 minute walk from the lecture theatre.

The discussion sessions will be held both in the lecture theatre of the Botanicum and in the Faculty of Protestant Theology (Universitätsstraße 13-17), an 8 minute walk from the lecture theatre. The rooms used there are ETH 102, 106b, 201, 203 and 302. NB: the building is a "library zone", so you will need to deposit backpacks and jackets in the lockers provided in the basement (requires a €2 coin!). The lockers are big enough to be shared.

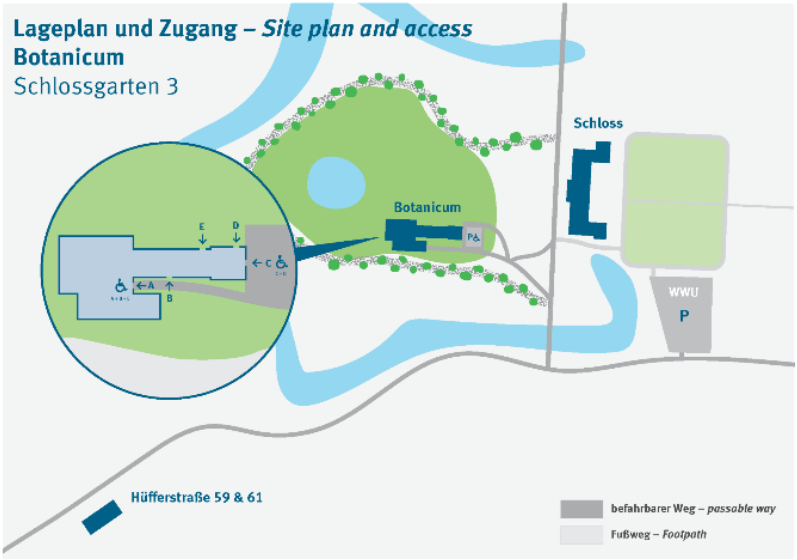
The parallel session of lightning talks will be held in the main building of the university, the Schloss (Schlossplatz 2), in Lecture Theatre S2 on the first floor.

The poster session and reception will be held at Mathematics Münster on the second floor of the Seminarraumzentrum at Orléans-Ring 12.

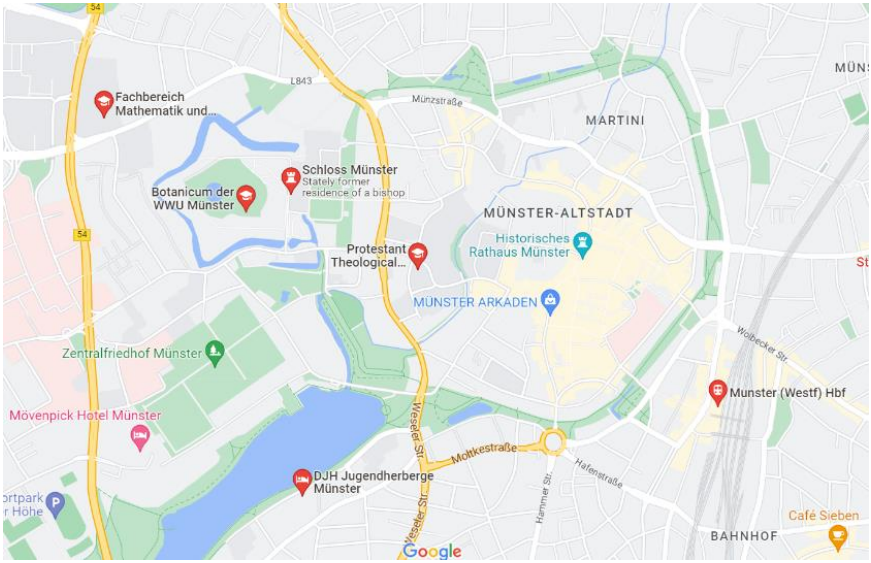
For anyone who wants to have informal mathematical discussions during the free afternoon on Wednesday, the rooms SRZ 115 and 117 are booked at Orléans-Ring 12 from 2pm to 6pm.

A conference photo will be taken on Wednesday at 10 am near the Schlossgarten Café.

Map of Botanicum



Locations

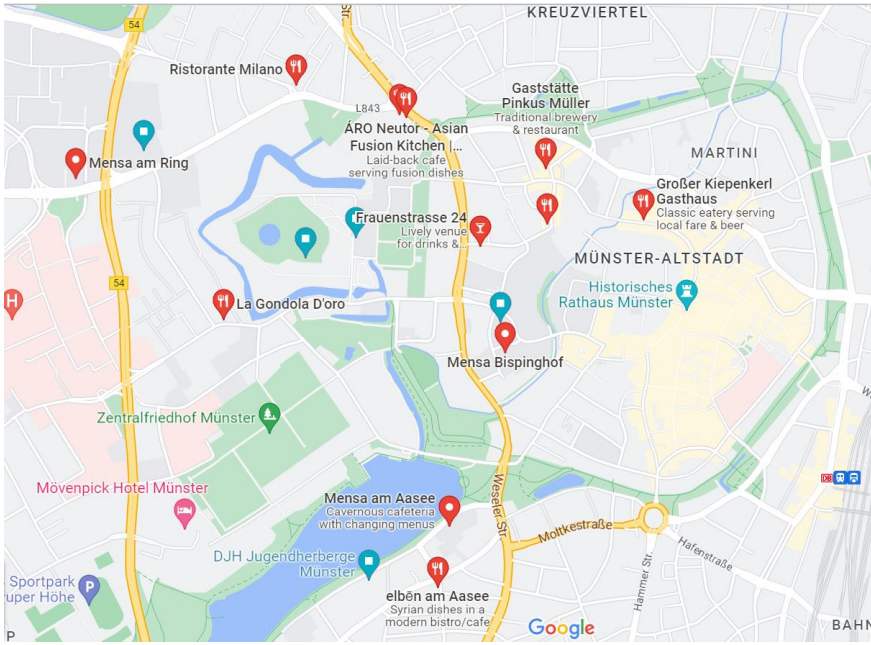


Internet access: We recommend using eduroam. If you have trouble connecting, you can use the guest wifi: Connect to the SSID "GuestOnCampus"and start any web browser. You will automatically be redirected to the login page. Confirm the terms of use and click on "log in for free". 1 GB data volume is available per device and day. Please note that the connection is not encrypted

List of places to eat

- Mensa am Aasee (close to youth hostel)
- Mensa am Ring (close to maths department)
- Mensa am Bispinghof (right next to theology)

- Aro (bowls, meat and vegan options)
- Gustav Grün (wraps and salad boxes, vegetarian+vegan)
- F24 (Turkish, meat and vegan options)
- Großer Kiepenkerl (traditional German cuisine with vegan options)
- Pinkus Müller Gasthaus (traditional German cuisine)
- Royals and Rice (Asian fusion, vegan options)
- Elben am Aasee (Syrian, close to youth hostel)
- Weekly Market, near the Dom (open on Wednesday until 2:30pm)



Meals at the youth hostel:

* Breakfast is every morning 8:00-8:45.
* Dinner is on Monday, Tuesday and Thursday 19:00-20:00.
* There is no dinner provided on Sunday!