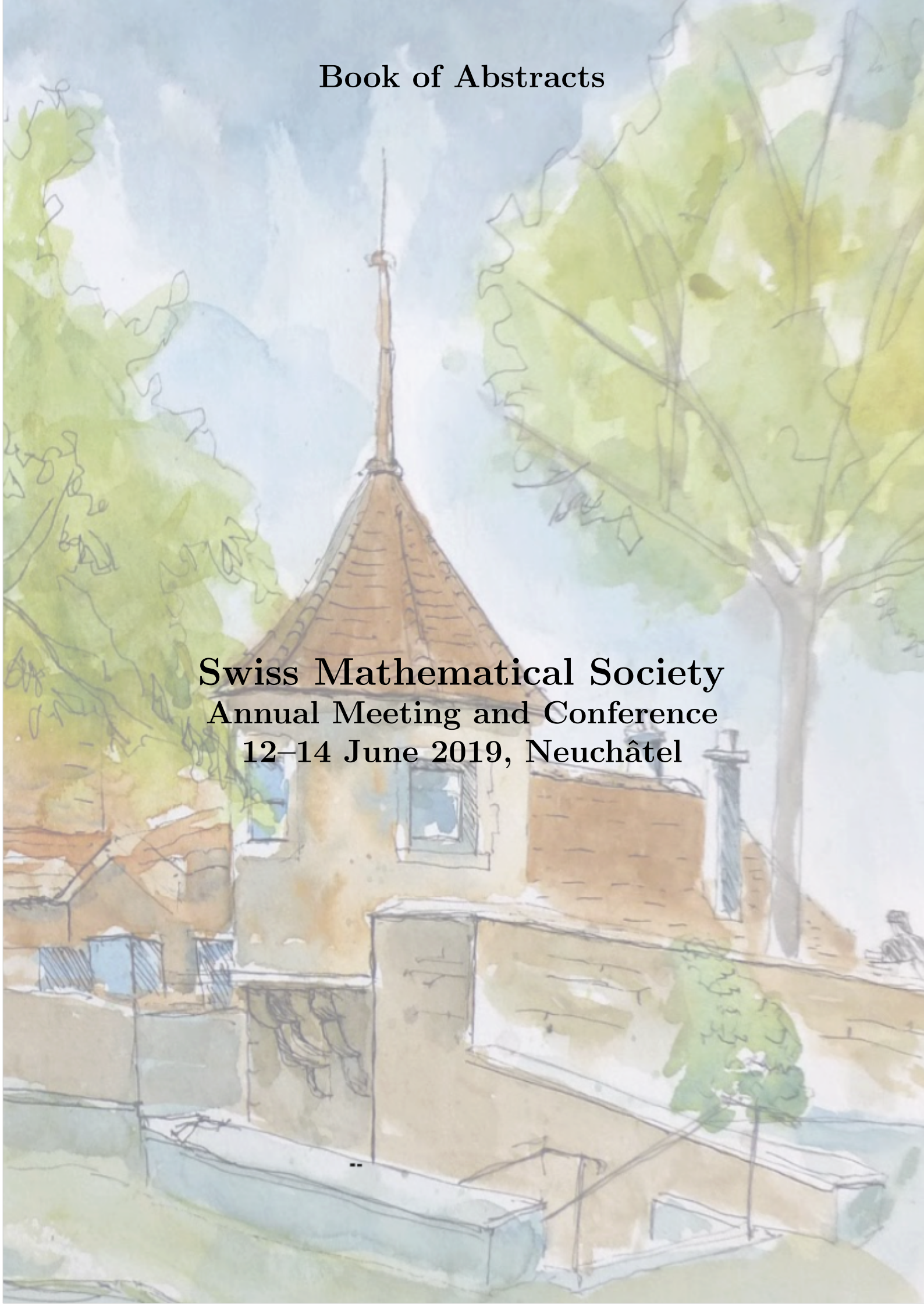
Book of Abstracts



Swiss Mathematical Society

Annual Meeting and Conference

12–14 June 2019, Neuchâtel

Contents

Wednesday, 12 June 2019

Classical homogeneous dynamics in a non-linear setting

10:30am
B-013

Corina Ciobotaru
Université de Fribourg

The automorphisms group of a bi-regular tree contains a rich class of non-linear subgroups G that still share the good properties of linear ones. Given that, classical questions from homogeneous dynamics can be examined and proved.

For example, if H is a discrete subgroup of G, recent results show there is a classification of probability measures on G/H that are invariant under horospherical subgroups. When H is moreover a cocompact lattice, the horospherical action is uniquely ergodic. Or when H is a geometrically finite lattice quantitative recurrence and equidistribution related to the above probability measures on G/H hold true.

This is a joint project with Vladimir Finkelshtein and Cagri Sert.

Combinatorial maps and telescopic groups

11:30am
B-013

Laura Grave de Peralta
Université de Neuchâtel

Maps, hypermaps, pavings, constellations, etc. are combinatorial objects that share a rather useful property : there is a natural correspondence between them and some subgroups of free products. Moreover, the automorphism group of those combinatorial objects relates to the normalizer of the associated subgroup.

Jointly with R. Bottinelli and A. Kolpakov, we prove that for any finite group G, there exists many combinatorial objects of said kind having G as their automorphism group.

In a more group theoretic context, our result can be stated as

Theorem. Let T be a finite free product of cyclic groups, except $\mathbb{Z}_2 * \mathbb{Z}_2$. Then for any finite group G, there exists a finite index free subgroup H of T such that $G \cong N_T(H)/H$.

Hull dynamical systems

2:00pm
B-013

Tobias Hartnick
Justus-Liebig-Universität Gießen

If G is a locally compact group and Γ is a discrete subgroup of G, then dynamical properties of the G-action on the quotient space G/Γ are closely related to properties of the discrete subgroup. In particular, compactness of the quotient and the existence of an invariant measure have important structural consequences for the discrete subgroup.

It turns out that this idea can be extended beyond subgroups to study uniformly discrete subsets of locally compact groups. We will explain how to associate a dynamical system with every uniformly discrete subset of a locally compact group by taking a suitable orbit closure in the Chabauty topology. We will then consider examples and explain some general structural properties of these hull dynamical systems (based on joint works with Michael Björklund and Yaakov Karasik).

As an application, we explain how to establish a version of Borel's density theorem (and its unipotent version due to Dani–Shalom) for approximate lattices using hull dynamical systems (based on joint work with Michael Björklund and Thierry Stulemeijer).

Apéry's constant and hyperbolic volume

3:00pm
B-013

Ruth Kellerhals
Université de Fribourg

I shall discuss various aspects of hyperbolic volume computations ranging from scissors congruence relations, volumes of ideal regular simplices to universal constants such as π, Catalan's constant and Apéry's constant.

Combinatorial cost of some graph sequences

4:30pm
B-013

Tom Kaiser
Université de Neuchâtel

In a 2006 paper Gabor Elek introduces the combinatorial cost of a graph sequence as an analogue of the cost for measured equivalence relations. We will give its definition and prove some analogues of results by Damien Gaboriau in our combinatorial setting.

Take a group Γ, a generating set S and a decending sequence of finite index normal subgroups $(N_k)_{k\in\mathbb{N}}$ with trivial intersection. This is a filtration of Γ. The box space with respect to this filtration is defined as $\square_{N_k}\Gamma = \{Cay(\Gamma/N_k, \overline{S})\}_{k\in\mathbb{N}}$. This is a graph sequence, hence we can calculate its cost. We show that if Λ is a finite index subgroup that contains the filtration, then $[\Gamma : \Lambda](c(\square_{N_k}\Gamma)-1) = c(\square_{N_k}\Lambda)-1$.

Swiss Mathematical Society Public Lecture

Arithmetic of hyperbolic 3-manifolds

June 12
5:30pm
F-200

Alan Reid
Rice University (USA)

Canonically associated to any finite volume orientable hyperbolic 3-manifold M is a number field $k(M)$ (i.e. a finite extension of the rationals). This talk will survey (both old and new) connections between the geometry and topology of M and properties of $k(M)$ as well as other related algebraic invariants.

Thursday, 13 June 2019

The simplicial volume of mapping tori of 3-manifolds

9:00am
B-103

Michelle Bucher
Université de Genève

In the beginning of the 80's, Gromov introduced the simplicial volume of closed oriented manifolds M. It is a topological invariant with interesting consequences on the possible geometries of M. It is still a hard problem to compute or estimate the simplicial volume and results have been obtained only for certain classes of spaces. Most notably the simplicial volume of hyperbolic manifolds is known to be proportional to their volume (Gromov–Thurston).

In this talk, I will show that the simplicial volume of the mapping torus of any 3-manifold vanishes. This is in contrast with mapping tori of surfaces which may admit a hyperbolic structure and hence have positive simplicial volume.

As a group theoretic corollary, I will derive an alternative proof of the fact that the fundamental group G of a mapping torus of a 3-manifold M is Gromov hyperbolic if and only if M is virtually a connected sum of products $\mathbb{S}^2 \times \mathbb{S}^1$ and G does not contain a free abelian group of rank 2.

This is joint work with Christoforos Neofytidis, `arxiv:1812.10726`.

Geometry without space (a hyperbolic parable)

10:30am
B-103

Nicolas Monod
École Polytechnique Federale de Lausanne

We revisit old ideas that are shared by functional analysts and logicians in order to do geometry without bothering with practicalities such as spaces or dimension. Our main interest will be the case of hyperbolic geometry and some relations with group representations.

The Steklov problem on graphs

11:30am
B-103

Hélène Perrin
Université de Neuchâtel

In this talk, I will introduce the Steklov eigenvalues of a graph. They are defined analogously to the eigenvalues of the Steklov problem on a manifold, which has been widely studied. As the eigenvalues of the adjacency matrix or of the Laplacian matrix commonly used in spectral graph theory, the Steklov eigenvalues are related to combinatorial properties of the graph.

In particular, I will give lower bounds for the first non-zero Steklov eigenvalue that depend on the extrinsic diameter of the graph boundary. As the Steklov problem on graphs is a discretization of an eigenvalue problem on manifolds, there are related questions inspired by spectral geometry.

Hyperbolic translation lengths and Salem numbers

2:00pm
B-013

Vincent Emery
Universität Bern

The goal of this talk will be to explain how Salem numbers appear in relation with translation lengths of elements in arithmetic hyperbolic groups of dimensions $n > 1$. This generalizes well-known results in dimension 2.

Haagerup property and actions on infinite measure spaces

3:00pm
B-013

Alexandre Zumbrunnen
Université de Neuchâtel

The Haagerup property is a useful and very interesting subject of study for locally compact second countable groups. During this talk, I will introduce this property, motivate its study and give a few examples of groups with the Haagerup Property. Finally I will present a new characterization of the Haagerup Property in terms of actions on sigma-finite measure spaces.

Friday, 14 June 2019

A K-theoretic Selberg trace formula

9:00am
B-013

Haluk Sengun
University of Sheffield (UK)

The close relationship between index theory and representation theory is a classical theme. In particular, the trace formula has been studied through the lens of index theory by several researchers already.

In joint work with Bram Mesland (Nijmegen) and Hang Wang (Shanghai), we take this connection further and obtain a formulation of the trace formula in K-theoretic terms. The central object here is the K-theory group of the C^*-algebra associated to a locally compact group.

This work is part of a program which explores the potential role that operator K-theory could play in the theory of automorphic forms.

Jörgensen's inequality for Ptolemaic spaces

10:30am
B-013

Viktor Schröder
Universität Zürich

Jörgensen's inequality gives a necessary condition for certain non-elementary two-generator groups to be discrete. We generalize Jörgensen's inequality purely using cross-ratios, which means that we can apply it to generalized Möbius structures. As a consequence, one obtains a Jörgensen inequality for a large class of hyperbolic groups.

Strategies to find hyperbolic manifolds

11:30am
B-013

Simon Drewitz
Université de Fribourg

The volume spectra of hyperbolic orbifolds and manifolds are remarkable. A hyperbolic orbifold is the quotient of hyperbolic space by the discrete action of a lattice subgroup of hyperbolic isometries. This quotient is a manifold if the group is torsion-free.

For example, the volume of a smooth hyperbolic surface is always an integral multiple of $2\,\pi$ and the volume spectrum of hyperbolic 3-manifolds is a well-ordered subset of the real numbers. Siegel's problem asks for the minimal volume hyperbolic n-dimensional orbifolds.

In this talk, I will give an overview on volume minimising hyperbolic manifolds and different strategies to find them. As an outlook, I will explain ongoing work developing new strategies to construct hyperbolic manifolds of small volume as covers of hyperbolic Coxeter orbifolds.

Artin groups and non-positive curvature

2:00pm
B-013

Thomas Haettel
Université de Montpellier

Artin groups are natural generalizations of braid groups, and occur as fundamental groups of complements of complex hyperplane arrangements. General Artin groups are very poorly understood. Regarding the actions of Artin groups on metric spaces of non-positive curvature, several questions are open, even for braid groups: e.g. which Artin groups act properly and cocompactly on a CAT(0) space? On a CAT(0) cube complex? In this talk, we will provide partial answers.

Uniformly finite homology

3:00pm
B-013

Rémi Bottinelli
Université de Neuchâtel

I will try to give a taste of *uniformly finite homology*, a quasi-isometry invariant variation on simplicial homology, introduced by Block and Weinberger in 1992. After the necessary definitions, a sketchy explanation of the equivalence between amenability and vanishing of zeroth uniformly finite homology shall be given, along with our (that is, Tom Kaiser's and mine) musings on a similar characterization for first homology.

Author Index