



BRIN MATHEMATICS
RESEARCH CENTER

Partial Hyperbolicity

May 8 - 12, 2023

Speakers

Christian Bonatti, Universite de Bourgogne
Aaron Brown, Northwestern University
Sylvain Crovisier, Universite Paris-Saclay
Lorenzo Diaz, Pontifical Catholic University of Rio de Janeiro, Brazil
Andrei Gogolev, Ohio State University
Boris Kalinin, Penn State University
Cristina Lizana, Universidade Federal da Bahia, El Salvador
Sheldon Newhouse, Michigan State University
Davi Obata, University of Chicago
Yakov Pesin, Penn State University
Raphael Potrie, CMAT, Uruguay
Ali Tahzibi, University of Sao Paolo
Masato Tsujii, Kyushu University
Kurt Vinhage, University of Utah
Zhenqi Wang, Michigan State University
Kadim War, IMPA, Brazil
Disheng Xu, Great Bay University, China
Jiagang Yang, IMPA, Brazil
Zhiyuan Zhang, Universitat Paris 13

Header image provided by Amie Wilkinson



DEPARTMENT OF
MATHEMATICS

About The Workshop

Partial Hyperbolicity introduced about 50 years ago provides a powerful tool for studying high dimensional systems. In the recent year it found powerful applications to chaos theory, rigidity theory, geometry, and number theory.

The goal of the conference is to summarize the achievement of partial hyperbolicity theory and discuss open problems. The conference will also include a special session on the history of hyperbolic dynamics. This conference is a part of special program on partial hyperbolicity which will also include the school at the beginning of June. This workshop is a part of traditional Maryland-Penn State dynamics meetings which are held twice a year since 1991.

Organizers

Dmitry Dolgopyat (Maryland)
Federico Rodriguez Hertz (Penn State)
Amie Wilkinson (Chicago)

BRINMRC.UMD.EDU

CSIC Building 4th Floor
8169 Paint Branch Drive
University of Maryland
College Park, MD 20742



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Schedule at a Glance

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00					
9:00	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
	Raul Ures	Boris Kalinin	Aaron Brown	Davi Obata	Zhiyuan Zhang
10:00	Coffee Break		Coffee Break	Coffee Break	Coffee Break
	Andrey Gogolev	Zhenqi Wang	Sylvain Crovisier	Cristina Lizana	Amie Wilkinson
11:00		Coffee Break			
	Rafael Potrie	Kurt Vinhage	Lunch	Jana Rodriguez Hertz	Federico Rodriguez Hertz
12:00	Lunch	Khadim War		Lunch	Lunch
13:00		Discussions or Trip to the National Mall	Sheldon Newhouse		Hike in Great Falls
14:00	Giovanni Canestrari		Yakov Pesin	Jonathan DeWitt	
15:00	Sebastian Burgos		Coffee Break	Coffee Break	
	Bryce Gollubit		Enrique Pujals	Sebastian Pavez	
16:00	Ignacio Correa			Fan Yang	
17:00	High Tea				

All afternoon sessions Monday and Thursday sessions (starting at noon) will be held in the Brin MRC on the 4th floor of the CSIC Building. All other sessions will be held in Kirwan 3206.

Workshop Overview

Partial Hyperbolicity introduced about 50 years ago provides a powerful tool for studying high dimensional systems. In the recent year it found powerful applications to chaos theory, rigidity theory, geometry, and number theory. The goal of the conference is to summarize the achievement of partial hyperbolicity theory and discuss open problems. The conference will also include a special session on the history of hyperbolic dynamics. This conference is a part of special program on partial hyperbolicity that also includes a summer school at the beginning of June. This workshop is a part of traditional Maryland-Penn State dynamics meetings which are held twice a year since 1991.

Organizing committee

DMITRY DOLGOPYAT, University of Maryland

FEDERICO RODRIGUEZ HERTZ, Penn State University

AMIE WILKINSON, University of Chicago

Workshop Schedule

MONDAY, MAY 8, 2023

- 8:30 - 9:00 BREAKFAST
- 8:55 - 9:00 DORON LEVY (University of Maryland / Director, Brin MRC) *Opening*
- 9:00 - 9:45 RAUL URES (Southern University of Science and Technology, Shenzhen, China)
Accessibility and absence of periodic points
- 9:45 - 10:15 COFFEE BREAK
- 10:15 - 11:00 ANDREY GOGOLEV (Ohio State University)
Rigidity for partially hyperbolic skew products
- 11:15 - 12:00 RAFAEL POTRIE (Universidad de la Republica)
The classification problem of partially hyperbolic diffeomorphisms in dimension 3
- 12:00 - 2:00 LUNCH
- 2:00 - 2:30 GIOVANNI CANESTRARI (Roma Tor Vergata)
Discontinuities cause essential spectrum
- 2:35 - 3:05 SEBASTIAN BURGOS (Penn State University)
Decay of correlations for some non-uniformly hyperbolic attractors
- 3:10 - 3:40 BRYCE GOLLOBIT (City University of New York)
Chain recurrence for linear maps
- 3:45 - 4:15 IGNACIO CORREA (Penn State University)
Cocycle stability of jointly integrable partial hyperbolic diffeomorphisms
- 4:20 - 4:30 DORON LEVY (University of Maryland / Director, Brin MRC)
Introduction to the Brin Center
- 4:30 - 5:30 HIGH TEA

TUESDAY, MAY 9, 2023

- 8:30 - 9:00 BREAKFAST
- 9:00 - 9:45 BORIS KALININ (Penn State University)
Local rigidity results for toral automorphisms
- 10:00 - 10:45 ZHENQI WANG (Michigan State University)
Periodic data and smooth rigidity for hyperbolic automorphisms on torus
- 10:45 - 11:15 COFFEE BREAK
- 11:15 - 12:00 KURT VINHAGE (University of Utah)
Anosov actions of higher-rank Lie groups
- 12:15 - 1:00 KHADIM WAR (IMPA, Brazil)
Proof of Verjovsky conjecture
- 1:00 - 7:00 DISCUSSIONS OR TRIP TO THE NATIONAL MALL
- 7:00 - 10:00 DINNER IN DC

WEDNESDAY, MAY 10, 2023

- 8:30 - 9:00 BREAKFAST
- 9:00 - 9:45 AARON BROWN (Northwestern University)
Measure rigidity and lattice actions
- 9:45 - 10:15 COFFEE BREAK
- 10:15 - 11:00 SYLVAIN CROVISIER (CNRS - Université Paris-Saclay)
Minimality of strong unstable foliations
- 11:00 - 1:00 LUNCH
- 1:00 - 2:00 SHELDON NEWHOUSE (Michigan State University)
A historical survey of hyperbolicity in America
- 2:15 - 3:15 YAKOV PESIN (Penn State University)
50 years of partial hyperbolicity: A story from the Russian side of the iron curtain
- 3:15 - 3:45 COFFEE BREAK
- 3:45 - 4:45 ENRIQUE PUJALS (City University of New York)
Hyperbolic dynamics at IMPA

THURSDAY, MAY 11, 2023

8:30 - 9:00 BREAKFAST

9:00 - 9:45 DAVI OBATA (University of Chicago)
Properties of the strong unstable foliation

9:45 - 10:15 COFFEE BREAK

10:15 - 11:00 CRISTINA LIZANA (Universidade Federal da Bahia)
Intrinsic ergodicity for a certain class of Derived from Anosov

11:15 - 12:00 JANA RODRIGUEZ HERTZ (Southern University of Science and Technology, Shenzhen)
A Livsic-type condition for an mme to be an SRB measure in the DA-case

12:15 - 2:00 LUNCH

2:00 - 2:45 JONATHAN DEWITT (University of Maryland)
Coexistence of measures with simple Lyapunov spectrum

2:45 - 3:15 COFFEE BREAK

3:15 - 3:45 SEBASTIAN PAVEZ (Penn State University)
Generic rotation sets

3:50 - 4:35 FAN YANG (Michigan State University)
Uniqueness of equilibrium states for sectional-hyperbolic flows, including the Lorenz attractor

FRIDAY, MAY 12, 2023

8:30 - 9:00 BREAKFAST

9:00 - 9:45 ZHIYUAN ZHANG (Universite Paris 13)
Newhouse phenomenon in the complex Hénon family

9:45 - 10:15 COFFEE BREAK

10:15 - 11:00 AMIE WILKINSON (University of Chicago)
Centralizer rigidity

11:15 - 12:00 FEDERICO RODRIGUEZ HERTZ (Penn State University)
On recent developments and problems in partially hyperbolic dynamics and its applications.

12:00 - 1:00 LUNCH

1:00 - 5:00 HIKE IN GREAT FALLS

Abstracts of talks

Accessibility and absence of periodic points

RAUL URES

Southern University of Science and Technology, Shenzhen, China

Monday, May 8, 2023 @ 9:00 AM

We prove that three dimensional diffeomorphisms without periodic points have the accessibility property if the fundamental group of the ambient manifold is not (virtually) solvable. This confirms a conjecture by Hertz-Hertz-Ures under these assumptions. This is a joint work with Ziqiang Feng.

Rigidity for partially hyperbolic skew products

ANDREY GOGOLEV

Ohio State University

Monday, May 8, 2023 @ 10:15 AM

We establish smooth rigidity for isometric circle extensions over codimension one volume preserving Anosov diffeomorphisms. Joint work with F. Rodriguez Hertz.

The classification problem of partially hyperbolic diffeomorphisms in dimension 3

RAFAEL POTRIE

Universidad de la Republica

Monday, May 8, 2023 @ 11:15 AM

I will discuss the problem of topological classification of partially hyperbolic diffeomorphisms in dimension 3 building on seminal contributions and questions of Brin-Burago-Ivanov, Pujals and Bonatti-Wilkinson. I will present some recent results that are part of joint works with T.Barthelme, S. Fenley and S. Frankel.

Discontinuities cause essential spectrum

GIOVANNI CANESTRARI

Roma Tor Vergata

Monday, May 8, 2023 @ 2:00 PM

I will introduce transfer operators associated to piece-wise monotone interval transformations and show that, for a large class of Banach spaces, the essential spectrum is large whenever the transformation fails to be Markov. After comparing our results with the literature, we show how to construct a family of Banach spaces which proves that the lower bound on the essential spectral radius is optimal. Indeed, these Banach spaces realize an essential spectral radius as close as desired to the theoretical best possible case.

Decay of correlations for some non-uniformly hyperbolic attractors

SEBASTIAN BURGOS

Penn State University

Monday, May 8, 2023 @ 2:35 PM

A classical problem in smooth dynamical systems is known as *smooth realization problem*. It asks if given a compact manifold M , one can construct a volume preserving diffeomorphism f with prescribed ergodic properties. We study the decay of correlations for certain dynamical systems with non-uniformly hyperbolic attractors, which natural invariant measure is not the volume, but the Sinai-Ruelle-Bowen (SRB) measure. The system g we consider is produced by applying the *slow-down procedure* to a uniformly hyperbolic diffeomorphism f with an attractor. Under certain assumptions on the map f and the slow-down neighborhood, we show that g admits polynomial upper and lower bounds on correlations with respect to its SRB measure and the class of Hölder continuous potentials.

Chain recurrence for linear maps

BRYCE GOLLOBIT

City University of New York

Monday, May 8, 2023 @ 3:10 PM

We discuss the chain recurrent set and a general dynamical decomposition of linear maps on Banach spaces. Examples will include linear maps induced from compact dynamical systems.

Cocycle stability of jointly integrable partial hyperbolic diffeomorphisms

IGNACIO CORREA

Penn State University

Monday, May 8, 2023 @ 3:45 PM

We show that jointly integrable partially hyperbolic diffeomorphisms close enough to a linear automorphism of the torus (with very mild irreducibility conditions) are cocycle stable, meaning that cohomological equations can be solved for cocycles that satisfy the necessary condition of having trivial holonomies along stable-unstable loops.

Introduction to the Brin Center

DORON LEVY

University of Maryland / Director, Brin MRC

Monday, May 8, 2023 @ 4:20 PM

Local rigidity results for toral automorphisms

BORIS KALININ

Penn State University

Tuesday, May 9, 2023 @ 9:00 AM

We study a perturbation f of a hyperbolic or partially hyperbolic toral automorphism L . We will consider various conditions for f and L to be smoothly conjugate. In particular, we will discuss results related to equality of the Lyapunov exponents of f and L , existence of a conjugacy of low regularity between f and L , and regularity of the center foliation of f (in the partially hyperbolic case). The results are from joint works with Andrey Gogolev, Victoria Sadovskaya, and Zhenqi Wang.

Periodic data and smooth rigidity for hyperbolic automorphisms on torus

ZHENQI WANG

Michigan State University

Tuesday, May 9, 2023 @ 10:00 AM

We study the regularity of the conjugacy between an irreducible Anosov automorphism A on torus and its small perturbation f .

We say that f and A have the same periodic data if the derivatives of the return maps of f and A at the corresponding periodic points are conjugate. We show that f is C^∞ conjugate to A if and only if f and A have the same periodic data.

This completes the characterization of the most elementary C^1 -invariant for local C^∞ rigidity. We also give the first example of cocycle rigidity over fibers with conjugate periodic data.

Anosov actions of higher-rank Lie groups

KURT VINHAGE

University of Utah

Tuesday, May 9, 2023 @ 11:15 AM

Special examples of partially hyperbolic transformations occur when continuous group actions admit a hyperbolic splitting transverse to the orbit. The most classical of these examples is Anosov flows, but this phenomenon also occurs for actions of larger groups. In this talk I will discuss rigidity properties of Anosov and partially hyperbolic actions of higher-rank semisimple Lie groups, with a focus on the cocycle problem. Joint with D. Damjanovic, R. Spatzier and D. Xu.

Proof of Verjovsky conjecture

KHADIM WAR

IMPA, Brazil

Tuesday, May 9, 2023 @ 12:15 PM

In the 1970s Alberto Verjovsky conjectured that every codimension one Anosov flow on a manifold of dimension greater than three is orbit equivalent to a suspension of a hyperbolic toral automorphism. In this talk, we prove that this conjecture is true. This, in particular, gives a complete classification of such Anosov flows and gives topological obstruction for a smooth manifold to support such a system.

Measure rigidity and lattice actions

AARON BROWN

Northwestern University

Wednesday, May 10, 2023 @ 9:00 AM

I will discuss a project with Zhiren Wang and Federico Rodriguez Hertz understanding actions of higher-rank lattices on low-dimensional manifolds. For instance, we obtain a classification of actions of $SL(n, \mathbb{Z})$ on $(n-1)$ -dimensional manifolds. The key technical result is a measure rigidity argument for certain invariant non-uniformly hyperbolic measures appearing in a skew extension.

Minimality of strong unstable foliations

SYLVAIN CROVISIER

CNRS - Université Paris-Saclay

Wednesday, May 10, 2023 @ 10:15 AM

The unstable foliation of a mixing Anosov diffeomorphism is minimal. In this talk, we will focus on laminations that are tangent to a strong unstable bundle, for uniformly hyperbolic or partially hyperbolic systems: we will discuss the minimality of the laminations and their stability by perturbation. (Joint work with A. Avila and A. Wilkinson.)

A historical survey of hyperbolicity in America

SHELDON NEWHOUSE

Michigan State University

Wednesday, May 10, 2023 @ 1:00 PM

50 years of partial hyperbolicity: A story from the Russian side of the iron curtain

YAKOV PESIN

Penn State University

Wednesday, May 10, 2023 @ 2:15 PM

I will discuss the development of the partial hyperbolicity theory in the Soviet Union in the 1970-80th.

Hyperbolic dynamics at IMPA

ENRIQUE PUJALS

City University of New York

Wednesday, May 10, 2023 @ 3:45 PM

Properties of the strong unstable foliation

DAVI OBATA

University of Chicago

Thursday, May 11, 2023 @ 9:00 AM

The understanding of invariant foliations is very important in the theory of uniformly and partially hyperbolic dynamics. The main theme of this talk is to study transitive Anosov (or uniformly hyperbolic) systems having a decomposition of the form $E^s + E^c + E^u$, where E^c expands uniformly. There are two foliations that we will consider, the (center) unstable foliation W^{cs} and the strong unstable foliation W^u , tangent to $E^c + E^u$ and E^u , respectively. The foliation W^{cu} is very well understood. It is known that the foliation is minimal, i.e. every leaf is dense, and that there is only one ergodic invariant measure "compatible" with that foliation, the so-called SRB measure. However, the strong unstable foliation is not well understood. In this talk, I will survey some recent progress in the direction of understanding topological and ergodic properties of the strong unstable foliation and how this is related to measure rigidity for u-Gibbs measures.

Intrinsic ergodicity for a certain class of Derived from Anosov

CRISTINA LIZANA

Universidade Federal da Bahia

Thursday, May 11, 2023 @ 10:15 AM

We will talk briefly about some classic examples of Derived from Anosov (DA), that is, homotopic maps to an Anosov diffeomorphism, whose dynamics are partially hyperbolic. We will address some known results related to entropy invariance and the existence (and uniqueness) of measures of maximal entropy for this class of diffeomorphisms. Finally, we will present recent results in collaboration with L. Parra (PUCV) and C. Vásquez (PUCV) for a certain class of DA generated after a Hopf bifurcation previously introduced by [M. Carvalho'93].

A Livsic-type condition for an mme to be an SRB measure in the DA-case

JANA RODRIGUEZ HERTZ

Southern University of Science and Technology, Shenzhen

Thursday, May 11, 2023 @ 11:15 AM

How often does it occur that the measure of maximal entropy of a system is an SRB measure? We study this question for partially hyperbolic diffeomorphisms isotopic to Anosov on \mathbb{T}^3 , and establish a rigidity result: the measure of maximal entropy μ is an SRB measure for a C^{1+} -DA-diffeomorphism f if and only if $h_{top}(f_*) = \Lambda(p)$ for all periodic points p in the support of μ , where $\Lambda(p) = \lambda^u(p)$ if $\lambda^c(f_*) < 0$, and $\Lambda(p) = \lambda^u(p) + \lambda^c(p)$ if $\lambda^c(f_*) > 0$. (λ^* are the Lyapunov exponents.) In that case, μ is also the unique SRB measure.

We show non-Anosov DA-examples, both conservative and non conservative, such that the mme is SRB.

Coexistence of measures with simple Lyapunov spectrum

JONATHAN DEWITT

University of Maryland

Thursday, May 11, 2023 @ 2:00 PM

We say that a linear cocycle has simple Lyapunov spectrum for an ergodic invariant measure if all its Lyapunov exponents with respect to that measure have multiplicity one. In this talk, we consider fiber bunched linear cocycles over a shift. We show that for cocycles satisfying a natural irreducibility condition the following holds: once a nice measure has simple Lyapunov spectrum, then all nice measures have simple Lyapunov spectrum. By "nice" we mean measures with full support and continuous product structure, such as equilibrium states of Hölder potentials. This provides a generalization of a result of Bonatti–Gómez-Mont–Viana to the case of simple spectrum. This is joint work with Daniel Mitsutani.

Generic rotation sets

SEBASTIAN PAVEZ

Penn State University

Thursday, May 11, 2023 @ 3:15 PM

Given a topological dynamical system (X, T) and a continuous vector-valued function F we define its rotation set as the set of all integrals with respect to T -invariant probability measures, which is a convex body. In this talk we are going to present some results about the geometry of the rotation set for a class of dynamical systems. We are going also to propose some open questions about the rotation set and its relation with ergodic optimization.

Uniqueness of equilibrium states for sectional-hyperbolic flows, including the Lorenz attractor

FAN YANG

Michigan State University

Thursday, May 11, 2023 @ 3:50 PM

It has long been conjectured that the classical Lorenz attractor supports a unique measure of maximal entropy. In this talk, we will give a positive answer to this question and its higher-dimensional counterpart by considering the uniqueness of equilibrium states for Hölder continuous functions on a sectional-hyperbolic attractor. We will prove that on every compact manifold with dimension at least three, there exists a C^1 -open and dense family of vector fields that includes the classical Lorenz attractor (when $\dim M = 3$), such that if the point masses at singularities are not equilibrium states, then there exists a unique equilibrium state supported on every sectional-hyperbolic attractor. In particular, there exists a unique measure of maximal entropy. This is joint work with Maria Jose Pacifico and Jiagang Yang.

Newhouse phenomenon in the complex Hénon family

ZHIYUAN ZHANG

Universite Paris 13

Friday, May 12, 2023 @ 9:00 AM

In a work in progress with Avila and Lyubich, we show that there are maps in the complex Hénon family with a stable homoclinic tangency. This is due to a new mechanism on the stable intersections between two dynamical Cantor sets generated by two classes of conformal IFSs on the complex plane.

Centralizer rigidity

AMIE WILKINSON

University of Chicago

Friday, May 12, 2023 @ 10:15 AM

I will present results and conjectures about rigidity phenomena in the symmetry groups of diffeomorphisms. This is joint work in a project with Danijela Damjanovic and Disheng Xu.

On recent developments and problems in partially hyperbolic dynamics and its applications.

FEDERICO RODRIGUEZ HERTZ

Penn State University

Friday, May 12, 2023 @ 11:15 AM

The plan is to discuss some problems (recent and not so recent) related to partially hyperbolic dynamics and related results.

The Brin Mathematics Research Center

The Brin Mathematics Research Center is a research center that sponsors activity in all areas of pure and applied mathematics and statistics. The Brin MRC was funded in 2022 through a generous gift from the Brin Family. The Brin MRC is part of the Department of Mathematics at the University of Maryland, College Park.

Activities sponsored by the Brin MRC include long programs, conferences and workshops, special lecture series, and summer schools. The Brin MRC provides ample opportunities for short-term and long-term visitors that are interested in interacting with the faculty at the University of Maryland and in experiencing the metropolitan Washington DC area.

The mission of the Brin MRC is to promote excellence in mathematical sciences. The Brin MRC is home to educational and research activities in all areas of mathematics. The Brin MRC provides opportunities to the global mathematical community to interact with researchers at the University of Maryland. The center allows the University of Maryland to expand and showcase its mathematics and statistics research excellence nationally and internationally.

List of Participants

AARON BROWN, Northwestern University
ADAM KANIGOWSKI, University of Maryland
ALEXANDRE TRILLES, Jagiellonian University, Krakow
ALEXEY OKUNEV, Penn State University
AMIE WILKINSON, University of Chicago
ANDREY GOGOLEV, Ohio State University
ANGELA FLORES, Penn State University
AXEL KODAT, City University of New York
BASSAM FAYAD, University of Maryland
BILL GOLDMAN, University of Maryland
BORIS HASSELBLATT, Tufts University
BORIS KALININ, Penn State University
BRYCE GOLLOBIT, City University of New York
CRISTINA LIZANA, Universidade Federal da Bahia
DAVI OBATA, University of Chicago
DIJA CHEN, University of Maryland
DIMA DOLGOPYAT, University of Maryland
DORON LEVY, University of Maryland / Director, Brin MRC
EMILIO CORSO, University of British Columbia
ENRIQUE PUJALS, City University of New York
FAN YANG, Michigan State University
FEDERICO RODRIGUEZ HERTZ, Penn State University
FRANCISCO ARANA-HERRERA, University of Maryland
GIOVANNI CANESTRARI, Roma Tor Vergata
GRIGORII DVORKIN, Penn State University
HAN LI, Wesleyan University
IGNACIO CORREA, Penn State University
JAIR BOCHI, Penn State University
JANA RODRIGUEZ HERTZ, Southern University of Science and Technology, Shenzhen
JIANLONG LIU, University of Maryland
JINCHENG WANG, Tufts University
JING ZHOU, Penn State University
JOE AUSLANDER, University of Maryland
JONATHAN DEWITT, University of Maryland
JOSHUA PAIK, Penn State University

KARIN MELNICK, University of Maryland
KATIA SHCHETKA, University of Michigan
KHADIM WAR, IMPA, Brazil
KURT VINHAGE, University of Utah
LIEN-YUNG KAO, George Washington University
LUCAS FURTADO, City University of New York
MARIUSZ LEMANCZYK, Nicolaus Copernicus University, Torun
MATT WELSH, University of Maryland
MICHAEL JAKOBSON, University of Maryland
MISHA BRIN, University of Maryland
MISHA GUYSINSKY, Penn State University
RAFAEL POTRIE, Universidad de la Republica
RAUL URES, Southern University of Science and Technology, Shenzhen, China
RODRIGO TREVINO, University of Maryland
SCOTT SCHMIEDING, Penn State University
SEBASTIAN BURGOS, Penn State University
SEBASTIAN PAVEZ, Penn State University
SHELDON NEWHOUSE, Michigan State University
SNIR BEN OVADIA, Penn State University
SVETA KATOK, Penn State University
SYLVAIN CROVISIER, CNRS - Université Paris-Saclay
TODD ROWLAND, University of Maryland
VICTOR DONNAY, Bryn Mawr College
VICTORIA SADOVSKAYA, Penn State University
YAKOV PESIN, Penn State University
YEOR HAFOUTA, University of Maryland
ZHENQI WANG, Michigan State University
ZHIYUAN ZHANG, Université Paris 13