

Max-Planck-Gesellschaft
Informatik/Mathematik/Komplexe Systeme

MPIM ACTIVITY

on

Algebraic and Topological Dynamics



**Max-Planck-Institut für Mathematik
Bonn, Germany, 1 May -- 31 July 2004**

Organized by:

**Christopher Deninger, Eli Glasner, Sergiy Kolyada,
Yuri Manin, Klaus Schmidt, Anatoly Vershik, Tom Ward**

Max-Planck-Institut für Mathematik, Bonn

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*Universität Münster - Tel Aviv University - Institute of Mathematics, Kiev
International Erwin Schrödinger Institute for Mathematical Physics, Vienna
Steklov Institute of Mathematics, St. Petersburg - University of East Anglia, Norwich*

The posters of the [activity](#) and the ESF exploratory [workshop](#)

The scientific-presentation side of the activity consisted of two parts: the MPIM Seminar “Algebraic and Topological Dynamics” was held from 4 May to 2 July; from 12 to 27 July 2004 and the ESF Exploratory Workshop “Dynamical Systems: from Algebraic to Topological Dynamics” was held from 4 to 10 July 2004.

The activity was proposed by Yu. I. Manin. It was financed by the Max-Planck-Institute for Mathematics and the European Science Foundation. A good part of organization was done by S. Kolyada.

A direct outcome of the activity is a proceedings volume, which will be edited by S. Kolyada, Yu. Manin and T. Ward. The submission deadline is October 2004. The proceedings volume is expected to appear in the AMS Contemporary Mathematical series.

About 90 mathematicians were invited for the activity (including the ESF workshop), some of which at own expense. They gave 80 lectures and 2 mini-courses on the activity. The speakers presented the following 20 countries: Australia, Austria(3), Chile, China, Denmark, Fiji, France (12), Germany(8), Israel(4), Italy, Japan, Norway, Poland (3), Russia(6), Slovakia, Spain, Sweden, Ukraine(5), United Kingdom(6), United States (21).



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Final Programme

May 2004

- 04.05 **Franks, John** (Northwestern University, US & MPIM, Germany)
Distortion Elements in Group Actions on Surfaces
- 07.05 **Troitsky, Eugeny** (Lomonosov State University, Russia & MPIM, Germany)
Orbits of action of a discrete group, Hilbert C^* -modules, and conditional expectations
- 11.05 **Fel'shtyn, Alexander** (Universität Siegen & MPIM, Germany)
Counting periodic points in the presence of the fundamental group
- 14.05 **Vershik, Anatoly** (Steklov Institute of Mathematics, St. Petersburg, Russia & MPIM, Germany)
Pairs of dynamical systems, von Neumann coupling constants, and strange factors
- 18.05 **Hofbauer, Franz** (Universität Wien, Austria & MPIM, Germany)
Multifractal dimensions for maps on the interval
- Blokh, Alexander** (University of Alabama, US & MPIM, Germany)
Wandering Triangles Exist
- 21.05 **Rempe, Lasse** (University of Warwick, UK & MPIM, Germany)
Siegel Disks of Entire Functions
- Misiurewicz, Michal** (IUPUI, US & MPIM, Germany)
Semigroups of affine maps of the real line
- 24.05 **Ustimenko, Vasyl** (UKMA, Ukraine & University of South Pacific, Fiji)
Arithmetic constructions in extremal and spectral graph theory and their applications
- 25.05 **Rempe, Lasse** (University of Warwick, UK & MPIM, Germany)
Periodic Rays of Exponential Maps
- van Strien, Sebastian** (University of Warwick, UK & MPIM, Germany)
The Monotonicity Conjecture
- 28.05 **Berestovsky, Valery** (Sobolev Institute of Mathematics, Omsk, Russia & MPIM, Germany)
Continued Fractions, Group $GL(2, \mathbb{Z})$, and Pisot Numbers
(joint work with Yu. G. Nikonorov)



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June 2004

- 08.06 **Danylenko, Oleksandr** (ILT, NASU, Ukraine & MPIM, Germany)
On a class of multipliers for W^\perp
(joint work with M. Lemanczyk)
- 18.06 **Auslander, Joseph** (University of Maryland, US & MPIM, Germany)
An Icer Approach to the Theory of Minimal Flows
(an informal lecture)
- 21.06 **Dooley, Anthony H.** (University of New South Wales, Australia & MPIM, Germany)
The critical dimension: an approach to non-singular entropy
- Blanchard, Francois** (Institut de Mathematiques de Luminy, France & MPIM, Germany)
Dynamics of CA acting on the Besicovitch space
- 22.06 **Boyle, Mike** (University of Maryland, US & MPIM, Germany)
Almost isomorphism of countable state Markov shifts
(joint work with Jerome Buzzi and Ricardo Gomez)
- Grigorchuk, Rostyslav** (Steklov Mathematical Institute, Russia, Texas A&M University, US & MPIM, Germany)
Dynamical systems and spectra of groups
- 24.06 **Hamachi, Toshihiro** (Kyushu University, Japan & MPIM, Germany)
Krieger, Wolfgang (Universität Heidelberg & MPIM, Germany)
Invariants and Embeddings in Symbolic Dynamics - I
- 25.06 **Kwapisz, Jaroslaw** (Montana State University, US & MPIM, Germany)
Geometric coincidence conjecture for tiling spaces of unimodular Pisot substitutions
(joint work with M. Barge)
- Skau, Christian** (NTNU, Dragvoll, Norway & MPIM, Germany)
K-theoretic classification of dynamical systems
- 28.06 **Ye, Xiangdong** (U.S.T.C., China & MPIM, Germany)
On the localization of dynamical properties
- Dooley, Anthony** ((University of New South Wales, Australia & MPIM, Germany)
Constructions of uncountably many cpe actions of amenable groups
(joint work with V. Golodets, D. Rudolph and S. Sinelschikov)
- Hamachi, Toshihiro** (Kyushu University, Japan & MPIM, Germany)
Krieger, Wolfgang (Universität Heidelberg & MPIM, Germany)
Invariants and Embeddings in Symbolic Dynamics - II



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- 29.06 **Einsiedler, Manfred** (University of Washington, US & MPIM, Germany)
Invariant measures for commuting torus automorphisms
(joint work with E. Lindenstrauss)
- Bezuglyi, Sergey** (ILT, NASU, Ukraine & MPIM, Germany)
Approximation of homeomorphisms of a Cantor set
- Zorich, Anton** (Université de Rennes-1 IMAR, France & MPIM, Germany)
Everything you always wanted to know about ... billiards, flat surfaces, and moduli spaces ... and still want to know
- Ferenczi, Sebastian** (Institut de Mathematiques de Luminy, France & MPIM, Germany)
Structure of three-interval exchange transformations - I
- 30.06 **Hamachi, Toshihiro** (Kyushu University, Japan & MPIM, Germany)
Krieger, Wolfgang (Universität Heidelberg & MPIM, Germany)
Invariants and Embeddings in Symbolic Dynamics – III
- Fisher, David** (Lehman College CUNY, US & MPIM, Germany)
Bending group actions and cohomology of arithmetic groups
- Walters, Peter** (University of Warwick, UK & MPIM, Germany)
Regularity conditions and Bernoulli properties of equilibrium states and g-measures

July 2004

- 01.07 **Hubert, Pascal** (Institut de Mathematiques de Luminy, France & MPIM, Germany)
Some remarks about Veech groups
- McMullen, Curtis** (Harvard University, US & MPIM, Germany)
Billiards and spin
- Thomsen, Klaus** (University of Aarhus, Denmark & MPIM, Germany)
On beta-shifts
- Ferenczi, Sebastian** (Institut de Mathematiques de Luminy, France & MPIM, Germany)
Structure of three-interval exchange transformations – II
- 02.07 **Hamachi, Toshihiro** (Kyushu University, Japan & MPIM, Germany)
Krieger, Wolfgang (Universität Heidelberg & MPIM, Germany)
Invariants and Embeddings in Symbolic Dynamics - IV
- Akin, Ethan** (The City College CUNY, US & MPIM, Germany)
Simplicial Dynamical Systems
- Möller, Martin** (Universität Essen & MPIM, Germany)
Comparing Teichmueller curves and Shimura curves

European Science Foundation
Standing Committee for Physical and Engineering Sciences (PESC)

ESF PESC EXPLORATORY WORKSHOP

Dynamical Systems: from Algebraic to Topological Dynamics



**Max Planck Institute for Mathematics
Bonn, Germany, 4-10 July 2004**

**Convened by:
Yuri I. Manin and Sergiy F. Kolyada**

Max-Planck-Institut für Mathematik, Bonn, Germany



ESF PESC Exploratory Workshop:

Dynamical Systems: from Algebraic to Topological Dynamics

Bonn, Germany, 4-10 July 2004

Final Programme

Monday 5 July 2004

- 09.30 - 10.00 **Workshop opening**
Welcome by Professor Dr. **F. Hirzebruch** (Honorary Director of the MPI), Professor Dr. **D. Zagier** (Managing Director of the MPI) and **Convenors**
- Tea break*
- 10.30 - 11.30 **Alseda, Lluís** (Universitat Autònoma de Barcelona, Spain)
Rotation sets for graph maps of degree 1
(joint work with Sylvie Ruelle)
- 11.40 - 12.40 **Bruin, Henk** (University of Surrey, UK)
Unique physical measures for typical unimodal polynomials
(joint work with Weixiao Shen and Sebastian van Strien)
- Lunch*
- 14.30 - 15.30 **Fayad, Bassam** (Université Paris 13, France)
Ergodicity of disc diffeomorphisms and their rotation number on the boundary
- Tea break*
- 16.00 - 17.00 **Avila, Artur** (Collège de France, France)
Weak mixing for interval exchange transformations and translation flow
(joint work with Giovanni Forni)
- 17.10 - 18.10 **Le Calvez, Patrice** (Université Paris 13, France)
Time-one maps of identity isotopies on surfaces
- 18.20 - 19.20 **Schmeling, Joerg** (Lund University, Sweden & MPI, Germany)
Random coverings, shrinking targets and hitting time statistics

Tuesday 6 July 2004

- 09.00 - 10.00 **Auslander, Joseph** (University of Maryland, US & MPI, Germany)
Recurrence in zero-dimensional spaces
- Tea break*
- 10.30 - 11.30 **Deninger, Christopher** (Universität Münster & MPI, Germany)
Leafwise cohomology of algebraic Anosov diffeomorphisms
- 11.40 - 12.40 **Akin, Ethan** (The City College, CUNY, US & MPI, Germany)
Mycielski sets in dynamical systems
- Lunch*
- 14.30 - 15.30 **Ward, Thomas** (University of East Anglia, UK & MPI, Germany)
Orbit counting without hyperbolicity



ESF PESC Exploratory Workshop:

Dynamical Systems: from Algebraic to Topological Dynamics

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Tea break

16.00 - 17.00

Boyle, Mike (University of Maryland, US & MPI, Germany)
The entropy theory of symbolic extensions
(joint work with Tomasz Downarowicz)

17.10 - 18.10

Downarowicz, Tomasz (Wrocław U. of Technology, Poland & MPI, Germany)
Entropy structure

18.20 - 19.20

Przytycki, Feliks (Institute of Mathematics, PAN, Poland)
Entropy conjecture on nilmanifolds
(joint work with W. Marzantowicz)

Wednesday 7 July 2004

09.00 - 10.00

Vorobets, Yaroslav (Pidstryhach Institut, NASU, Ukraine & MPIM, Germany)
Periodic geodesics on generic translation surfaces

Tea break

10.30 - 11.30

Fisher, David (Lehman College – CUNY, US & MPI, Germany)
Effective estimates on invariant metrics and Zimmer's conjecture

11.40 - 12.40

Durand, Fabien (Université de Picardie Jules Verne, France & MPI, Germany)
Eigenvalues of linearly recurrent dynamical systems

Lunch

14.30 - 15.30

McMullen, Curtis (Harvard University, US & MPI, Germany)
Dynamics of $SL_2(\mathbb{R})$ over moduli space

Tea break

16.00 – 17.00

Einsiedler, Manfred (University of Washington, US & University of Vienna, Austria & MPI, Germany)
Invariant measures on $SL(3, \mathbb{R})/SL(3, \mathbb{Z})$ and Littlewood's conjecture
(joint work with A. Katok and E. Lindenstrauss)

17.10 – 18.10

Mirzakhani, Maryam (Harvard University, US & MPI, Germany)
Ergodic theory of the earthquake flow

18.20 –

Open problems session

Thursday 8 July 2004

09.00 - 10.00

Glasner, Eli (Tel Aviv University, Israel & MPI, Germany)
Spatial and non-spatial actions of Polish groups

Tea break

10.30 - 11.30

Schmidt, Klaus (ESI & University of Vienna, Austria & MPI, Germany)
Symbolic representations of toral automorphisms, Mahler measure and equivalence relations on sequence spaces



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Bonn, Germany, 4-10 July 2004

- 11.40 - 12.40 **Pollicot, Mark** (University of Manchester, UK)
Pair correlations for closed geodesics
- Lunch*
- 14.30 – 15.30 **Lemanczyk, Mariusz** (Nicholas Copernicus U., Poland & MPI, Germany)
Dynamical systems of probability origin and flows on surfaces
- Tea break*
- 16.00 – 17.00 **Denker, Manfred** (Georg-August-Universität, Goettingen, Germany)
Sierpinski walks
- 17.10 – 18.10 **Hoffman, Christopher** (University of Washington, US & MPI, Germany)
Multiple invariant measures for C^1 -expanding maps and g- functions
- 18.20 – 19.20 **Lind, Douglas** (University of Washington, US & MPI, Germany)
Amoebas and algebraic dynamics
- 20.00 – **Workshop Dinner**

Friday 9 July 2004

- 09.00 - 10.00 **Keller, Gerhard** (Universität Erlangen, Germany & MPI, Germany)
Sharkovsky-type theorem for minimally forced interval maps
(joint work with R. Fabbri, R. Johnson and T. Jäger)
- Tea break*
- 10.30 - 11.30 **Liverani, Carlangelo** (University of Rome Tor Vergata, Italy)
Banach spaces adapted to Anosov systems
- 11.40 - 12.40 **Mayer, Dieter** (Institut für Theoretische Physik, Clausthal, Germany)
Transfer operators for geodesic flows on modular surfaces and Hecke operators for period functions
- Lunch*
- 14.30 – 15.30 **Baladi, Viviane** (Institut de Math. de Jussieu, France)
Anisotropic Sobolev spaces and transfer operators for Anosov diffeomorphisms
- Tea break*
- 16.00 – 17.00 **Weiss, Barak** (Ben Gurion University, Israel & MPI, Germany)
Minimal sets for the horocycle flow and characterization of lattice
(joint work with J. Smillie)
- 17.10 – 18.10 **Vdovina, Alina** (Universität Bonn, Germany)
Shift operators on buildings and noncommutative spaces
(joint work with Matilde Marcolli)
- 18.20 – 19.20 **Sarig, Omri** (Pennsylvania State University, US & MPI, Germany)
Invariant Radon measures for horocycle flows on regular covers
(joint work with F. Ledrappier)



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- 12.07 **Kleinbock, Dmitry** (Brandeis University, US & MPIM, Germany)
Dynamics on homogeneous spaces and badly approximable vectors on fractals
- Kosyak, Alexandre** (Institute of Mathematics, NASU, Ukraine)
Representations of infinite-dimensional groups and the Ismagilov conjecture
- Kulikov, Mikhail** (Lomonosov State University, Ukraine & MPIM, Germany)
Horocycle flow without minimal sets
- 13.07 **Maass, Alejandro** (Universidad de Chile, Chile & MPIM, Germany)
Sequence and complexity pairs for a measure
- Thouvenot, Jean-Paul** (Université Paris VI, France & MPIM, Germany)
The decomposition of positive entropy transformations
- Kitchens, Bruce** (SUNY at Stony Brook, US & MPIM, Germany)
Families of piecewise isometries of \mathbb{R}^n and bounded orbits
- 14.07 **Ledrappier, Francois** (University of Notre Dame, US & MPIM, Germany)
Distributions results for closed orbits
- Sullivan, Michael** (University of Colorado, US & MPIM, Germany)
Equivariant flow equivalence
(joint work with Mike Boyle)
- Tomanov, George** (University Claude Bernard-Lyon 1, France & MPIM, Germany)
Actions of split tori and unipotent subgroups on the space of lattices
- 15.07 **Keller, Gerhard** (Universität Erlangen & MPIM, Germany)
The Denjoy type-of argument for quasiperiodically forced circle diffeomorphisms
(joint work with T. Jäger)
- 16.07 **Aaronson, Jon** (Tel Aviv University, Israel & MPIM, Germany)
Mixing coefficients of stationary processes generated by Lasota-Yorke type maps
(joint work with H. Nakada)
- Weiss, Barak** (Ben Gurion University, Israel & MPIM, Germany)
Distribution of lattice orbits on homogeneous varieties
(joint work with A. Gorodnik)
- Martin, Schmoll** (Penn State University, US & MPIM, Germany)
Arithmetic translation surfaces (in genus 2)
- 20.07 **Aaronson, Jon** (Tel Aviv University, Israel & MPIM, Germany)
Exchangeable measures for subshifts
(joint work with H. Nakada and O. Sarig)

- 21.07 **Downarowicz, Tomasz** (Wroclaw University of Technology, Poland & MPIM, Germany)
The 'Jewett-Krieger' type of problem for non-uniquely ergodic topological systems
- 22.07 **Troubetskoy, Serge** (Institute de Mathematiques de Luminy, France & MPIM, Germany)
Periodic billiard orbits in right triangles
- 23.07 **Keane, Mike** (Wesleyan University, US & MPIM, Germany)
Coefficient dynamics
- 26.07 **Keane, Mike** (Wesleyan University, US & MPIM, Germany)
Finitary orbit equivalence of odometers
- 27.07 **Belolipetsky, Mikhail** (Hebrew University of Jerusalem , Israel & Sobolev Institute of Mathematics, Russia)
Finite groups and hyperbolic manifolds
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