

## Michael Boshernitzan

### Personal data

Name	Michael Boshernitzan
Born	1950, Chernivtsy, Ukraine (former USSR)
Immigration to US	September 1981. American citizen
	Tel. 713-348-5209. E-mail: michael@rice.edu.

### Education

Ph. D.	Weizmann Inst. of Science, Dept. of Mathematics, Rehovot,	Israel, 1981
M. S.	Hebrew University, Dept. of Mathematics, Jerusalem,	Israel, 1974
B. S.	Moscow University, Dept. of Mechanics and Mathematics,	Russia, 1972

### Professional appointments

Professor, Department of Mathematics, Rice University, Houston, 1993-present  
 Research Position, Max Planck Institute for Math. in Bonn, July 2014 (one month)  
 Visiting Professor, Princeton University, Princeton, December 2009 (two weeks)  
 Research Professor, MSRI, Berkeley, Fall 2008 (3 months, sabbatical)  
 Visiting Professor, Institut de Mathematiques, de Luminy, Marseille, France,  
 1998, 2000, 2001, 2005 (monthly visits)  
 Research Professor, Penn State University, February 1993, 40 days  
 Membership at MSRI, Berkeley, May 1992, two weeks  
 Visiting Associate Professor, Weizmann Inst. of Science, Rehovot, Israel,  
 June & July 1987  
 Associate Professor, Dept. of Mathematics, Rice University, Houston, 1985-1993  
 Visiting Assistant Professor, Weizmann Inst. of Science, Rehovot, Israel,  
 June & July 1984  
 Assistant Professor, Dept. of Mathematics, Rice University, Houston, 1982-1985  
 Membership, Institute for Advanced Study, Princeton, 1981-1982  
 Instructor, School of Agriculture, Hebrew University, Rehovot, Israel, 1977-1981

### Areas of research

Ergodic Theory	Hardy Fields	Dynamical Systems
Number Theory	Combinatorics	ADEs

### Current support

Simon Foundation. Award Number 208492(pC ID) (2014-2019)

## Students

### 1. Jon Chaika.

Graduated March 2010. Received Assistant Professorship at the mathematical department of Utah University, after completing a three-year appointment as L. E. Dickson Instructor/NSF Postdoc at the University of Chicago. Promoted to Associate Professor with tenure in 2015.

### 2. David Ralston.

Graduated May 2008. Received Assistant Professor at the mathematical department of State University of NY (College of Westbury), after completing a two-year research appointment in Israel, Tel-Aviv University, under the supervision of Barak Weiss.

Boshernitzan is currently advising fourth-year graduate student **Daniel Bernazzani** (expected graduation Spring 2018).

## Department service

Chairman, Department Putnam Committee, 1984-present (excluding Fall 2007 and 2015)

Throughout the last 32 years (excluding Fall 2007 and 2015) Boshernitzan has been responsible for the selection and coaching the Rice team (and all interested students) for the Putnam mathematical competition.

Member, Evans (postdoc) selection committee

Member, Graduate students committee

## Selected talks

- Special lecture. IAS, Hebrew University, Jerusalem, Israel. February 9, 2017.
- Invited lecture. Conference **Ergodic theory and its connections with Arithmetics and Combinatorics**. Lumini, Marseille. France. December 13, 2016.
- Invited Lecture. **Geometric and Probability Methods in Group Theory and Dynamical Systems, Texas A&M University**, College Station, TX. November 9-12, 2015
- Colloquium. Université de Rennes-1, Campus de Beaulieu, France. October 6, 2015.
- Invited lecture. **2nd Workshop on Combinatorics, Number Theory, and Dynamical Systems**. IMPA, Rio de Janeiro, Brazil, August 24–28, 2015.
- Invited lecture. Ergodic Theorems and Applications in Probability, **Eilat, Israel**. May 3-8, 2015.
- Two lectures, Max Planck Institute for Mathematics in Bonn, July 2014.
- Invited lecture and 3-hour course, Torun University, Poland, May 2014.
- Colloquium. Institute of Mathematics, National Academy of Science of Ukraine, Kiev, Ukraine. May 25, 2012.
- Invited Speaker. South Padre Island. Fourth Discrete Geometry and Algebraic Combinatorics Conference, April 18-21, 2012.

- Colloquium. University of Chicago. 12/9/2011.
- Special lecture, Ergodic Theory Seminar. University of Illinois Urbana-Champaign, 12/6/2011.
- Invited lecture, BIRS, University of British Columbia. Vancouver, BC, Canada. Workshop Almost Periodic Order: Spectral, Dynamical, and Stochastic approaches, September 2011.
- Invited lecture, Oberwolfach workshop Billiards, Flat Surfaces, and Dynamics on Moduli Spaces, Germany, May 8th - May 14th, 2011.
- Colloquium, Ben-Gurion University, Beer-Sheva, Israel, May 25, 2011.
- Lecture, Workshop, Ergodic Theorems, Group Actions and Applications, Ben-Gurion University of the Negev, Eilat, May 15-20, 2011.
- Special lecture, Ergodic Theory Seminar, Hebrew University, Jerusalem, Israel, June 2, 2011.
- Two lectures, Ergodic Theory Seminar, Princeton University, December 2009.
- Colloquium, Courant Institute, December 2009.
- Dynamical Systems Seminar, Texas A&M University, April 2009.
- Colloquium, SFSU, San-Francisco, October 2008.
- Two lectures, MSRI, Berkeley, October and November 2008.
- Principal Speaker, International Conference in Combinatorics of Words, CIRM, Marseille, France, July 2007.
- Invited Address, International Conference in Dynamics in the Teichmuller Space and Applications to Rational Billiards, Marseille, France, July 2003.
- Minicourse (3 talks), Institut de Mathematiques de Luminy, Marseille, France, June 2002.
- Special AMS session in Geometric and Symbolic Dynamical Systems, San Francisco, CA, October 2000.
- Minicourse (2 talks), IV Joint Meeting AMS-SMM, University of North Texas, Denton, TX, May 1999.
- Colloquium Lecture, University of South California, LA, November 1999.
- Two lectures, Institut de Mathmatiques de Luminy, Marseille, France, June-July 1998.
- Colloquium, Ben-Gurion University, Beer-Sheva, Israel, August 1998.
- Invited Address, International Workshop on Modern Ergodic Theorems, Technion, Haifa, Israel, March 1997.

## Publications

1. An extension of Hardy's class of orders of infinity, *J. d'Analyse Math.* **39**(1981), 235-255.
2. New orders of infinity, *J. d'Analyse Math.* **41** (1981), 130-167.
3. (with A.Fraenkel) Nonhomogeneous spectra of numbers, *Discrete Mathematics* **34** (1981), 325-327.
4. Homogeneously distributed sequences and Poincare sequences of integers of sublacunary growth, *Monatshefte für Mathematik* **96** (1983), 173-181.
5. Orders of infinity generated by difference equations, *Amer. J. Math.* **106** (1984), 1067-1089.
6. Discrete orders of infinity, *Amer. J. Math.* **106** (1984), 1147-1198.
7. (with A. Fraenkel) A linear algorithm for nonhomogeneous spectra of numbers, *Journal of Algorithms* **5** (1984), 187-198.
8. A unique ergodicity of minimal symbolic flows with linear block growth, *J. d'Analyse Math.* **44** (1985), 77-96.
9. A condition for minimal interval exchange maps to be uniquely ergodic, *Duke Math.J.*, **52**(3) (1985), 723-752.
10. Hardy fields and existence of transexponential functions, *Aequationes Mathematicae* **30** (1986), 258-280.
11. Universal formulae and universal differential equations, *Ann. of Math.* **124** (1986), 273-291.
12. (with L. A. Rubel) Coherent families of polynomials, *Analysis* **6** (1986), 339-389.
13. Second-order differential equations over Hardy fields, *J. Lon. Math. Soc.* **35**(2) (1987), 109-120.
14. Rank two interval exchange maps, *Erg. Theory and Dynam. Sys.* **8** (1988), 379-394.
15. Billiards and rational periodic directions in polygons, *Amer. Math. Monthly* **99**(6) (1992), 522-529.
16. A condition for unique ergodicity of minimal symbolic flow, *Erg. Theory and Dynam. Sys.* **12** (1992), 425-428.
17. Dense orbits of rationals, *Proc. AMS*, vol.117, **4** (1993), 1201-1203.
18. Quantitative recurrence results, *Invent. Math.* **113** (1993), 617-632.
19. (with V. Bergelson and J. Bourgain) Some results on non-linear recurrence, *J. d'Analyse Math.*, **62** (1994), 30-46.
20. Uniform distribution and Hardy fields, *J. d'Analyse Math.* **62** (1994), 225-240.
21. (with D. Berend) On a result of Mahler on the decimal expansion of  $(nx)$ , *Acta Arithm.*, **66** (1994), 315-322.

22. Elementary proof of Furstenbergs diophantine result, Proc.AMS, **122** (1994), 67–70.
23. Density mod 1 of dilations of sublacunary sequences, Adv. in Math. **108** (1994), 104–117.
24. (with D. Berend) On sequences of reals with complicate decimal expansions, Acta Math. Hungar. **66** (1994), 97–104.
25. (with D.Berend) Densing sets, Advances in Mathematics **11** (1995), 286-299.
26. (with I.Kornfeld) Interval translation maps, Erg. Theory and Dynam. Sys. **15** (1995), 821-831.
27. (with D.Berend, G.Kolesnik) Distribution modulo 1 of some oscillating sequences II, Israel J. of Math. **92** (1995), 113–129.
28. (with R.Jones and M.Wierdl) Integer and Fractional parts of Good Averaging Sequences in Ergodic Theory, Conference in Ergodic Theory and Probability, Eds.: Bergelson/March/Rosenblatt, by Walter de Gruyter & Co., Berlin, New York 1996.
29. (with M.Wierdl) Ergodic Theorems Along Sequences and Hardy fields, Proc. of Nat. Acad. Sci. U.S.A. **93** (1996), no. 16, 8205–8207. (Presented by Colderön.)
30. (with C. R. Carroll) A generalization of Lagranges theorem to interval exchange tranformations, J.d’Analyse Math. **72** (1997), 21–44.
31. (with G. Galperin, T. Kruger, S. Troubetzkoy) Periodic billiard orbits are dense in rational polygons, Trans. Amer. Math. Soc. **350** (1998), 3523–2535.
32. (with D. Berend, G. Kolesnik) Distribution modulo 1 of some oscillating sequences III, Acta Math Hungar. **95** (2002), 1–20.
33. (with A. Goetz) A dichotomy for a two-parameter piecewise rotation, Erg. Theory and Dynam. Systems, **23** (2003), 759–770.
34. (with D. Berend, G. Kolesnik) Irrational Dilations of Pascal’s Triangle, Mathematika, **48** (2003), 159–168.
35. (Y. Cheung) Hausdorff dimension of the set of nonergodic directions, with an appendix by M. Boshernitzan, Annals of Math. **158**(2) (2003), 661–678.
36. (with A. Nogueira) Generalized eigenfunctions of interval exchange maps. Ergodic Theory Dynam. Systems 24 (2004), no. 3, 697–705.
37. (with G. Kolesnik, A. Quas, M. Wierdl) Ergodic Averaging Sequences, J. d’Analyse Math. **95** (2005), 63–103.
38. (with M. Wierdl) Almost-everywhere convergence and polynomials. J. Mod. Dyn. **2** (2008), no. 3, 465–470.
39. (with D. Damanik) Generic continuous spectrum for ergodic Schrdinger operators. Comm. Math. Phys. **283** (2008), no. 3, 647–662.
40. (with D. Berend) Nilpotent groups are round. Israel J. Math. **167** (2008), 49–61.
41. (with D. Ralston) Continued fractions and heavy sequences. Proc. Amer. Math. Soc. **137** (2009), no. 10, 3177–3185.

42. (with D. Damanik) The repetition property for sequences on tori generated by polynomials or skew-shifts. *Israel J. Math.* **174** (2009), 189–202.
43. (with E. Glasner) On two recurrence problems, *Fund. Math.* **206** (2009), 113–138.
44. (with D. Damanik) Pinned repetitions in symbolic flows: preliminary results, *Discrete Contin. Dyn. Syst., Dynamical Systems, Differential Equations and Applications. 7th AIMS Conference, suppl.* (2009), 869–878.
45. (with J. Chaika) Borel-Cantelli sequences, *Journal d’Analyse Mathématique* **17** (1), (2012) 321–345.
46. A condition for weak mixing of induced interval exchange transformations, *Contemporary Mathematics* **567** (2012), 53–65. (Special volume Dynamical Systems and Group actions, dedicated to Anatoli Stepin on the occasion of his 70th birthday).
47. (with J. Chaika) Diophantine properties of IETs and general systems: Quantitative proximality and connectivity, *Invent. Math.* 192 (2013), no. 2, 375–412.
48. (with A. Besbes, and D. Lenz) Delone sets with finite local complexity: linear repetitivity versus positivity of weights, *Discrete Comput. Geom.* **49** (2013), no. 2, 335–347.
49. (with J. S. Athreya) Ergodic properties of compositions of interval exchange maps and rotations, *Nonlinearity* **26** (2013), 417–421.
50. (with D. Berend and G. Kolesnik) Analytically defined uniformly dense sequences, *J. Number Theory*, **156** (2015), 38–51.
51. Subgroup of interval exchanges generated by torsion elements and rotations, *Proc. Amer. Math. Soc.* **144** (2016), no. 6, 2565–2573.
52. (with J. Chaika) Dichotomy for stable arithmetic progressions in subsets of reals, to appear in *Proceedings of the AMS*, **144** (2016), no. 12, 5029–5034. arXiv:1303.4684.
53. (with Nikos Frantzikinakis and Máté Wierdl) Under recurrence in the Khintchine recurrence theorem, *Israel J. of Math.*, **222**, no.2 (2017), 815–840.
54. (with V. Delecroix) From a packing problem to quantitative recurrence in  $[0, 1]$  and the Lagrange spectrum of interval exchanges, *Discrete Analysis* 2017, paper #10, 35 pages.

## Preprints

55. A dichotomy for projections of planar sets, preprint 2013, arXiv:1203.0669.
56. Approximate embedding of large polygons into  $Z^2$ , preprint 2013, arXiv:1208.1026.