

# Curriculum vitae and publication list

Misha Rudnev

March 9, 2012

# Chapter 1

## Curriculum vitae

### Personal data

Date of Birth: 29 June 1967 in Kaliningrad, U.S.S.R.  
Citizenship: British Citizen  
Office address: School of Mathematics, University Walk, Bristol BS8 1TW  
Office telephone number: 0117 3311664  
Fax: 0117 9287999  
Email address: M.Rudnev@bris.ac.uk  
Web page: <http://www.maths.bris.ac.uk/~maxmr/>  
Home address: 33 Stapleford Close, London SW19 6TG  
Home telephone number: 0203 6020882

### Education and academic qualifications

1974–1984: Specialised (in Maths and Physics) School no. 32, Kaliningrad.  
1985–1991: Undergraduate course at the Moscow Institute of Physics and Technology, Faculty of Problems of Physics and Energy. Graduated with Diploma in Applied Mathematics and Physics, June 1991. Thesis “On the phase conjugation system”; supervisor A. Kh. Pergament, referee A. Timonov.  
1991–1992: PhD programme at the Keldysh Institute of Applied Mathematics, Moscow.  
1992–1997: PhD programme at the California Institute of Technology, Department of Applied Mathematics. PhD conferred 17 May 1998. Thesis “Exponentially small splitting of separatrices and the Arnold diffusion problem”; supervisor S.R Wiggins, referees J.E. Marsden and J.N. Franklin.

### Professional Appointments

1991–1992: Keldysh Institute of Applied Mathematics. Junior Scientist.  
1997–2000: University of Texas in Austin, Department of Mathematics. Bing Instructor in Mathematics.  
1999: Caltech, Department of Control and Dynamical Systems. Visiting Associate.  
2000–2001: University of Missouri–Columbia, Department of Mathematics. Post-doctoral Fellow.  
2001–2007: University of Bristol, Department of Mathematics. Lecturer in Applied Mathematics.  
Since 2007: University of Bristol, Department of Mathematics. Senior Lecturer in Mathematics (member of the Pure<sup>1</sup> Group).

---

<sup>1</sup>Although some of my formal affiliations/appointments have been in Applied Maths, my research, by large, has always been in Pure Mathematics. This concerns in particular my thesis and post-doctoral work related to Arnold diffusion in Hamiltonian mechanics. My current research in geometric and arithmetic combinatorics is 100% Pure.

## Teaching experience

Teaching Assistant in Caltech: Methods of Applied Mathematics (final year), Linear Programming and Fixed-Point Theorems (graduate level), Dynamical Systems (graduate level).

Lecture courses taught at Texas: Calculus (first year), Discrete Mathematics (second year), Probability (third year), Introduction to Algebraic Structures (third year).

Lecture courses taught at Missouri: Discrete Mathematics (second year).

Lecture courses organised and taught at Bristol: Discrete Mathematics (new unit to start in 2012); Linear Algebra (second year), Further Topics in Analysis (first year), Optimisation (second and third years), Mechanics (first, second, and third years), Special Relativity (third year); Post-graduate lectures in Geometric Combinatorics, and on the Szemerédi Theorem; Sixth-former sessions in Combinatorics and Inequalities.

## Post-doctoral supervision

Supervised Research Assistant, Dr. Vladimir Ten. Bristol 2003–2006.

## Post-graduate supervision

Currently supervising two PhD students, Tim Jones and Oliver Roche-Newton, both in their 3rd year.

## Contacts with industry

1991–1992: project with the Russian Ministry of Industry, Science and Technology. Mathematical modeling for nonlinear laser beam distortions.

1996–1997: consultant for Pacific Sierra Research Corporation (PSR) <http://www.psrv.com/>. Mathematical modeling for highway traffic analysis.

## External Funding

2000–2001: NSF Grant DMS – 0072153. USD 60,000.

2002–2004: Nuffield Foundation Grant NAL/00485/A. GBP 3,000.

2003–2006: EPSRC Grant GR/S13682/01, First Grant Scheme. GBP 119,000.

Last funding application: EPSRC standard grant. "On two classical problems of geometric and arithmetic combinatorics," September 2011.

## Honours

2003 and 2007: Miller Scholar at University of Missouri–Columbia.

2005: NSF Focused Research Group in Harmonic Analysis – Distinguished Lecturer.

## External activities

Member of the Editorial Board of International Journal of Mathematics and Mathematical Sciences <http://www.hindawi.com/journals/ijmms/>. Since 2006.

## Academic referees

*Alex Iosevich*: Department of Mathematics, University of Rochester, Rochester, NY 14627, USA, [iosevich@math.rochester.edu](mailto:iosevich@math.rochester.edu)

*Harald Andrés Helfgott*: ENS-DMA, 45 rue d'Ulm, F-75230 Paris, France, [helfgott@dma.ens.fr](mailto:helfgott@dma.ens.fr)

*Igor Shparlinski*: Department of Computing, Macquarie University, North Ryde, NSW 2109, Australia, [igor.shparlinski@mq.edu.au](mailto:igor.shparlinski@mq.edu.au)

## Research areas

Currently, since  $\approx 2003$ : geometric and arithmetic combinatorics in  $\mathbb{R}^d$  and over finite fields, geometric measure theory.

Thesis and post-doctoral research ( $\approx 1995$ –2003): dynamical/Hamiltonian systems.

## Research Collaborators

D. Covert, N.P. Gill, A. Glibichuk, D. Hart, H.A. Helfgott, A. Iosevich, T. Jones, D. Koh, S.V. Konyagin, O. Roche-Newton, V. Ten, I. Uriarte-Tuero, S. Wiggins.

# Chapter 2

## Publications

### Papers in current research area

0. *On new sum-product type estimates*. Preprint arXiv:math/1111.4977, 12pp. Submitted for publication.
1. *On an application of Guth-Katz theorem*, with A. Iosevich and Oliver Roche-Newton. *Math. Res. Lett.* **18** (2011), no. 4, 691-697.
2. *An Improved Sum-Product Inequality in Fields of Prime Order*. *Int. Math. Res. Notices* (2011) doi: 10.1093/imrn/rnr158.
3. *Averages over hyperplanes, sum-product theory in vector spaces over finite fields and the Erdős-Falconer distance conjecture*, with D. Hart, A. Iosevich, D. Koh. *Trans. Amer. Math. Soc.* **363** (2011), no. 6, 3255-3275.
4. *An explicit incidence theorem in  $\mathbb{F}_p$* , with H.A. Helfgott. *Mathematika* **57** (2011), no. 1, 135-145.
5. *Generalized incidence theorems, homogeneous forms and sum-product estimates in finite fields*, with D. Covert, D. Hart, A. Iosevich, D. Koh. *European J. Combin.* **31** (2010), no. 1, 306-319.
6. *On additive properties of product sets in an arbitrary finite field*, with A. Glibichuk. *J. Anal. Math.* **108** (2009), 159-170.
7. *Freiman theorem, Fourier transform and additive structure of measures*, with A. Iosevich. *J. Aust. Math. Soc.* **86** (2009), no. 1, 97-109.
8. *Powder diffraction from a combinatorial and analytic viewpoint*, with A. Iosevich. *Integers* **8** (2008), no. 2, A6, 19 pp.
9. *Erdős distance problem in vector spaces over finite fields*, with A. Iosevich. *Trans. Amer. Math. Soc.* **359** (2007), no. 12, 6127-6142.
10. *Distance measures for well-distributed sets*, with A. Iosevich. *Discrete Comput. Geom.* **38** (2007), no. 1, 61-80.
11. *On the Mattila integral associated with sign indefinite measures*, with A. Iosevich. *J. Fourier Anal. Appl.* **13** (2007), no. 2, 167-173.
12. Iosevich, Alex; Konyagin, S.; Rudnev, M.; Ten, V. *Combinatorial complexity of convex sequences*, with A. Iosevich, S.V. Konyagin, V. Ten. *Discrete Comput. Geom.* **35** (2006), no. 1, 143-158.
13. *Non-isotropic distance measures for lattice-generated sets*, with A. Iosevich. *Publicaciones Matemàtiques*, no 49 (2005), 225-247.
14. *Combinatorial complexity of convex sequences and some other hard Erdős problems*. *Oberwolfach Reports* 2004, 702-705.
15. *A combinatorial approach to orthogonal exponentials*, with A. Iosevich. *Int. Math. Res. Notices* 2003, no. 50, 2671-2685.

### Other papers

16. *Lax pairs for higher-dimensional evolution PDEs and a 3+1 dimensional integrable generalization of the Burgers equation*, with A.V. Yurov and V. A. Yurov. *Proc. Amer. Math. Soc.* **135** (2007), 731-741.

17. *An inverse problem of Hamiltonian dynamics*, with V. Ten. Proc. Amer. Math. Soc. **134** (2006), 3295–3299.
18. *A model for separatrix splitting near multiple resonances*, with V. Ten. Regular and Chaotic Dynamics **11**, no. 1 (2006), 83–102.
19. *Integrability versus topology of configuration manifolds and domains of possible motions*, with V. Ten. Archiv der Mathematik **86**, no 1 (2006), 90–96.
20. *Sharp upper bounds for splitting of separatrices near a simple resonance*, with V. Ten. Regular and Chaotic Dynamics **9**, no 3 (2004), 1–38.
21. *Darboux transformation for classical acoustic spectral problem*, with A. Yurova and A. Yurov. International J. of Math. and Math. Sciences **49**, (2003), 3123–3142.
22. *KAM Theory Near Multiplicity One Resonant Surfaces in Perturbations of A-Priori Stable Hamiltonian Systems*, with S. Wiggins. In *Mechanics: from theory to computation*, 379–411, Springer, New York, 2001.
23. *Errata for the Paper “Existence of Exponentially Small Separatrix Splittings and Homoclinic Connections Between Whiskered Tori in Weakly Hyperbolic Near-Integrable Hamiltonian Systems” (Physica D 114 (1998) 3-80)*, with S. Wiggins. Physica D **145** (2000), 349–354.
24. *On a homoclinic splitting problem*, with S. Wiggins. Regular and Chaotic Dynamics **2**, no 4 (2000), 227–242.
25. *On the dominant Fourier modes in the series associated with separatrix splitting for an a-priori stable, three degree-of-freedom Hamiltonian system*, with S. Wiggins. *The Arnoldfest (Toronto, ON, 1997)*, 415–449, Fields Inst. Commun., 24, Amer. Math. Soc., Providence, RI, 1999.
26. *On a partially hyperbolic KAM theorem*, with S. Wiggins. Regular and Chaotic Dynamics, **4**, no 4 (1999), 39–58.
27. *Existence of Exponentially Small Separatrix Splittings and Homoclinic Connections Between Whiskered Tori in Weakly Hyperbolic Near-Integrable Hamiltonian Systems*, with S. Wiggins. Physica D **114** (1998), 3–80.
28. *KAM Theory Near Multiplicity One Resonant Surfaces in Perturbations of A-Priori Stable Hamiltonian Systems*, with S. Wiggins. J. Nonlinear Science **7** (1997), 177–209.