

# Curriculum Vitae

## Serge Tabachnikov

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### Education

Ph.D.: Moscow State University, 1987. Advisors: Dmitry Fuchs, Anatoly Fomenko  
Dissertation: Geometrical applications of the cohomology of infinite-dimensional Lie algebras  
M.S.: Moscow State Pedagogical University, 1978, with Honors

### Positions held

#### *Long-term positions*

Mathematics Teacher, Specialized High School for Mathematics and Physics No 2, Moscow, 1978–80  
Instructor and Program Coordinator, School of Mathematics by Correspondence (“Gelfand’s School”), Moscow State University, 1979–88  
Managing Editor for Mathematics, “Kvant” magazine, USSR Academy of Sciences, Moscow, 1988–90  
Assistant, Associate, Full Professor of Mathematics, University of Arkansas, 1990–2000  
Associate, Full Professor of Mathematics and MASS Director (2000-2018), Penn State, 2000–  
Deputy Director, ICERM, Brown University, 2013–15

#### *Visiting positions*

CPT, Luminy: May, September 1992; April 1995; June 2000; May–June 2002  
ENS Lyon: June–July 1992  
Université Louis Pasteur, Strasbourg: October 1992  
IHES: November 1992  
ETH, Zurich: December 1992–January 1993, May–July 2003  
University of Cambridge and I. Newton Institute: 1994-95  
MSRI, Berkeley: May–June 1995; May–July 1997; August–December 2018  
Max-Planck-Institut, Bonn: 1995–96, full year; July–September 1998; May–August 1999; June–  
July 2001; January–June 2006; May–June 2009  
Tel Aviv University: December 1996–January 1997; May 2000; December 2001; January 2004;  
March 2013  
Université de Rennes: January, 1998  
Université Catholique de Louvain: June 1998  
Mathematical Institute at Oberwolfach, RiP program: August 1999; July–August 2003; May  
2004; June–July 2005; July 2006, June–July 2007, July 2010  
Fields Institute, Toronto: May 2001  
Haifa Institute of Technology (Technion): January 2004  
Université Claude Bernard, Lyon: June–July 2006  
Banff International Research Station, RiT program, May 2008: June 2010  
Brown University: January–June 2010  
Hausdorff Institute, RiG program: Bonn, June–August 2011  
Institut H. Poincaré, RiP program: March 2012

Summer@ICERM, Brown University: June-August 2012, June-August 2013  
Université Paris 6: May 2013  
CIRM, Trento, RiP program: July 2014  
Technical University, Berlin: May-June 2016  
ICERM, Brown University: July 2016  
Heidelberg University: May-June 2017, June-August 2019, June-July 2021  
Collaborate@ICERM, Brown University: August 2017

### **Awards and grants**

Fellow of American Mathematical Society (inaugural class of 2012)  
Teresa Cohen Service Award in Mathematics, Penn State, 2013  
Mercator Fellowship, Heidelberg University, 2021-24

#### *Research grants*

UARK Research Incentive Grants, 1992–93, 1993–94, 1997–98, 1998–99  
Arkansas Science and Technology Authority Research Grant, 1993–94  
Wolfson College, University of Cambridge fellowship, 1994–95  
NSF Research Grants, 1994–97, 1998–01, 2003–05, 2006–09, 2011–16, 2015–20, 2020-23 (sole investigator)  
Binational Science Foundation Research Grant, 2001–2004 (with M. Farber and S. Weinberger)

#### *Collaboration grants*

Research in Pairs at Oberwolfach: 1999, 2003 (with V. Ovsienko); 2004 (with E. Gutkin); 2005, 2006, 2007, 2010 (with D. Fuchs)  
Banff International Research Station Research in Teams, 2008 (with V. Ovsienko); 2010 (with V. Ovsienko and S. Morier-Genoud)  
Hausdorff Institute Research in Groups, 2011 (with M. Gekhtman, M. Shapiro and A. Vainstein)  
Simons Foundation Collaboration Grant, 2011–12, 2015, 2020 (cancelled after receiving NSF grants)  
Institute H. Poincaré, Research in Paris, 2012 (with V. Ovsienko)  
CIRM Research in Pairs, 2014 (with V. Ovsienko and S. Morier-Genoud)  
Collaborate@ICERM, 2017 (with M. Arnold, D. Fuchs, and I. Izestiev)

#### *Workforce, mentoring and outreach grants*

SILO Grant (undergraduate research), 1998-99  
MASS Program at PSU, NSF MCTP Grants, 2004–05, 2005–10, 2010–14 (co-PI)  
MAA Dolciani Mathematics Enrichment Grant, 2010-12 (with M. Levi)  
MSRI Math Circle Mini-grant, 2011-12, 2012-13 (with M. Levi)

#### *Conference and workshop grants*

Spring Lecture Series at UARK, 1992, 1997, 1998, 1999; NSF (co-PI)  
Algebra and Topology in Interaction, UC Davis, 2009; NSF (co-PI)  
Penn State – Göttingen International Summer Schools in Mathematics, 2010-12; NSF (co-PI)  
Finite Dimensional Integrable Systems, Luminy 2013; Bedlewo 2015; Barcelona 2017, NSF (PI)

### **Books**

#### *Books and parts of books authored*

1. Polynomials. Phasis, Moscow, 1996 (second edition 2000, third edition 2004) (in Russian)
2. Billiards. Société Mathématique de France, “Panoramas et Synthèses”, No 1, 1995
3. Rational billiards and flat structures (with H. Masur). Handbook of Dynamical Systems, v. 1A, North-Holland, 2002, 1015–1089

4. Projective Differential Geometry, Old and New: from Schwarzian Derivative to Cohomology of Diffeomorphism Groups (with V. Ovsienko). Cambridge Univ. Press, 2005.  
Russian translation, MCCME, Moscow, 2008
5. Geometry and Billiards. Amer. Math. Soc., 2005.  
Russian translation, Moscow-Izhevsk, 2011; German translation, Springer, 2013
6. Mathematical Omnibus (with D. Fuchs), Amer. Math. Soc., 2007.  
Russian translation, MCCME, Moscow, 2011, 2nd edition 2016; German translation, Springer, 2011; Japanese translation, Iwanami, 2012
7. Billiards and Poncelet theorem, in L. Flatto. Poncelet's theorem. Amer. Math. Soc., 2008, 191–211
8. Projective configuration theorems: old wine into new wineskins, in S. G. Dani, A. Papadopoulos (eds.), Geometry in History, Springer, 2019, 401–434

*Books edited*

1. Mathematical olympiads by correspondence, Nauka, Moscow, 1987 (in Russian)
2. Differential and symplectic topology of knots and curves, AMS, 1999
3. Differential topology, infinite-dimensional Lie algebras and their applications (with A. Astashkevich), AMS, 1999
4. Kvant Selecta: Algebra and Analysis I, AMS Math. World, v. 14, 1999
5. Kvant Selecta: Algebra and Analysis II, AMS Math. World, v. 15, 1999
6. Kvant Selecta: Discrete mathematics I, AMS Math. World, v. 17, 2002
7. MASS Selecta: teaching and learning advanced undergraduate mathematics (with S. Katok, A. Sossinsky), AMS, 2003
8. V. Arnold, swimming against the tide (with B. Khesin), AMS, 2014

**Research papers**

1. On invariant differential operators in general position. *Func. Anal. Appl.*, 16, No 3 (1982), 86–87
2. On characteristic classes of homogeneous foliations. *Russ. Math. Surv.*, 39, No 2 (1984), 189–190
3. On homology in general position of the Lie algebra of vector fields on the line. *Soviet Math. Dokl.*, 275, No 2 (1984), 310–314
4. Characteristic classes of Grassman foliations. *Func. Anal. Appl.*, 19, No 1 (1985), 83–84
5. Characteristic classes of parabolic foliations and symmetric functions. *Serdica*, 11 (1985), 86–95
6. Characteristic classes of parabolic foliations of series B, C, D and degrees of isotropic Grassman manifolds. *Func. Anal. Appl.*, 20, No 2 (1986), 84–85
7. Geometrical applications of cohomology of infinite-dimensional Lie algebras. Dissertation, Moscow, 1987 (translation into French: University of Lyon, 1994)
8. An invariant of submanifolds transversal to a distribution. *Russ. Math. Surv.*, 43, No 3 (1988), 193–194
9. Calculation of the Bennequin invariant of a Legendrian curve by the geometry of its front. *Func. Anal. Appl.*, 22, No 3 (1988), 89–90
10. Characteristic classes of Lagrangian foliations. *Func. Anal. Appl.*, 23, No 2 (1989), 90–91
11. Two remarks on the asymptotic Hopf invariant. *Func. Anal. Appl.*, 24, No 1 (1990), 84–85
12. Around four vertices. *Russ. Math. Surv.*, 45, No 1 (1990), 191–192
13. Numerical study of dual billiards: the case of a semicircle (with I. Monroe). UARK Technical Report, 1992
14. Geometry of Lagrangian and Legendrian 2-webs. *Diff. Geom. Appl.*, 3 (1993) 265–284
15. Poncelet's theorem and dual billiards. *L'Enseign. Math.*, 39 (1993), 189–194
16. Outer billiards. *Russ. Math. Surv.*, 48, No 6 (1993), 75–102

17. Commuting dual billiard maps. *Geom. Dedicata*, 53 (1994), 57–68
18. On the dual billiard problem. *Advances in Math.*, 115 (1995), 221–249
19. Asymptotic dynamics of the dual billiard transformation. *J. Stat. Phys.*, 83 (1996), 27–38
20. Invariants of smooth triple point free plane curves. *Knot Theory and Ramifications*, 5 (1996), 531–552
21. Sturm theory, Ghys theorem on zeroes of the Schwarzian derivative and flattening of Legendrian curves (with V. Ovsienko). *Selecta Math. (NS)*, 2 (1996), 297–307
22. Projective connections, group Vey cocycle and deformation quantization. *Int. Math. Res. Notes*. 1996, No 14, 705–722
23. Introducing projective billiards. *Ergod. Theory and Dynam. Syst.*, 17 (1997), 957–976
24. Invariants of Legendrian and transverse knots in the standard contact space (with D. Fuchs). *Topology*, 36 (1997), 1025–1053
25. On zeroes of the Schwarzian derivative. *Topics in singularity theory*, 229–239, AMS Transl., ser. 2, v. 180, 1997
26. Parameterized curves, Minkowski caustics, Minkowski vertices and conservative line fields. *L'Enseign. Math.*, 43 (1997), 3–26
27. On functions with zero mean over a finite group. *Func. Anal. Appl.*, 31, No 1 (1997), 93–94
28. Estimates for the Bennequin number of Legendrian links from state models for knot polynomials. *Math. Research Lett.*, 4 (1997), 143–156
29. Exact transverse line fields and projective billiards in a ball. *Geom. and Funct. Anal.*, 7 (1997), 594–608
30. Geometry of exact transverse line fields and projective billiards. *Differential and symplectic topology of knots and curves*, 131–152, AMS Transl., ser. 2, v. 190, 1999
31. Projectively equivalent metrics, exact transverse line fields and the geodesic flow on the ellipsoid. *Comm. Math. Helv.*, 74 (1999), 306–321
32. Fagnano orbits of polygonal dual billiards. *Geom. Dedicata*, 77 (1999), 279–286
33. Remarks on the geometry of exact transverse line fields. *Differential topology, infinite-dimensional Lie algebras and applications*, 247–260, AMS, 1999
34. Going in circles: variations on the Money-Coutts theorem. *Geom. Dedicata*, 80 (2000), 201–209
35. Projective geometry of polygons and discrete 4-vertex and 6-vertex theorems (with V. Ovsienko). *L'Enseign. Math.*, 47 (2001), 3–19
36. Billiards in Finsler and Minkowski geometries (with E. Gutkin). *J. Geom. and Phys.*, 40 (2002), 277–301
37. Ellipsoids, complete integrability and hyperbolic geometry. *Moscow Math. J.*, 2 (2002), 185–198
38. Topology of cyclic configuration spaces and periodic orbits of multi-dimensional billiards (with M. Farber). *Topology*, 41 (2002), 553–589
39. Periodic trajectories in 3-dimensional convex billiards (with M. Farber). *Manuscripta Mat.*, 108 (2002), 431–437
40. Dual billiards in the hyperbolic plane. *Nonlinearity*, 15 (2002), 1051–1072
41. On polygonal dual billiard in the hyperbolic plane (with F. Dogru). *Reg. Chaotic Dynamics*, 8 (2003), 67–82
42. Topological robotics: motion planning in projective spaces (with M. Farber and S. Yuzvinsky). *Int. Math. Res. Notes*, 2003, No 34, 1853–1870
43. On skew loops, skew branes and quadratic hypersurfaces. *Moscow Math. J.*, 3 (2003), 681–690
44. On three-periodic trajectories of multi-dimensional dual billiards. *Alg. Geom. Topology*, 3 (2003), 993–1004

45. Remarks on magnetic flows and magnetic billiards, Finsler metrics and a magnetic analog of Hilbert's fourth problem. *Dynamical systems and related topics*, Cambridge Univ. Press, 2004, 233–252
46. Tire track geometry: variations on a theme. *Israel J. Math.*, 151 (2006), 1–28
47. Non-existence of  $n$ -dimensional  $T$ -embedded discs in  $\mathbf{R}^{2n}$  (with G. Stojanovic). *Comm. Math. Helv.*, 81 (2006), 877–882
48. Complexity of piecewise convex transformations in two dimensions, with applications to polygonal billiards (with E. Gutkin). *Moscow Math. J.*, 6 (2006), 673–701
49. On configuration space of plane polygons, sub-Riemannian geometry and periodic orbits of outer billiards (with D. Genin). *J. Modern Dynamics*, 1 (2007), 155–173
50. Hyperbolic Carathéodory conjecture (with V. Ovsienko). *Proc. of Steklov Inst.*, 258 (2007), 178–193
51. A proof of Culter's theorem on the existence of periodic orbits in polygonal outer billiards. *Geom. Dedicata*, 129 (2007), 83–87
52. Geodesics on an ellipsoid in Minkowski space (with D. Genin and B. Khesin). *L'Enseign. Math.*, 53 (2007), 307–331
53. Totally skew embeddings of manifolds (with M. Ghomi). *Math. Zeitschrift*, 258 (2008), 499–512
54. On algebraically integrable outer billiards. *Pacific J. Math.*, 235 (2008), 89–92
55. Converse Sturm-Hurwitz-Kellogg theorem and related results. *J. Fixed Point Theory Appl.*, 3 (2008), 121–130
56. Birkhoff billiards are insecure. *Discr. Cont. Dyn. Syst.*, 23 (2009), 1035–1040
57. Quasiperiodic motion for the Pentagon map (with V. Ovsienko and R. Schwartz). *Electron. Res. Announc. Math. Sci.*, 16 (2009), 1–8
58. Self-dual polygons and self-dual curves (with D. Fuchs). *Funct. Anal. and Other Math.*, 2 (2009), 203–220
59. Pseudo-Riemannian geodesics and billiards (with B. Khesin). *Advances in Math.*, 221 (2009), 1364–1396
60. On bicycle tire tracks geometry, hatchet planimeter, Menzin's conjecture and oscillation of unicycle tracks (with M. Levi). *Experimental Math.*, 18 (2009), 173–186
61. Geometry and dynamics of the pentagram map. *Geometric methods in physics, Proceedings of the XXVIII Workshop GMP*, Amer. Inst. Physics, 2009, 172–181
62. Existence and non-existence of skew branes. *J. Fixed Point Theory Appl.*, 7 (2010), 419–431
63. Contact complete integrability (with B. Khesin). *Reg. Chaotic Dynamics*, 15 (2010), 504–520
64. The Pentagon map: a discrete integrable system (with V. Ovsienko and R. Schwartz). *Commun. Math. Phys.*, 299 (2010), 409–446
65. Variations on the Tait-Kneser theorem (with V. Timorin). Preprint
66. Topological aspects of the Dvoretzky Theorem (with D. Burago and S. Ivanov). *J. Topology and Analysis*, 2 (2010), 453–467
67. Periodic trajectories in the regular pentagon (with D. Davis and D. Fuchs). *Moscow Math. J.*, 11 (2011), 1–23
68. Variations on R. Schwartz's inequality for the Schwarzian derivative. *Discr. Comp. Geom.*, 46 (2011), 724–742
69. The Pentagon integrals on inscribed polygons (with R. Schwartz). *Electronic J. of Combinatorics*, 18 (2011), P171
70. Discrete spherical means of directional derivatives and Veronese maps (with A. Belyaev and B. Khesin). *J. Geom. Physics*, 62 (2012), 124–136
71. Higher pentagram maps, weighted directed networks, and cluster dynamics (with M. Gekhtman, M. Shapiro and A. Vainshtein). *Electron. Res. Announc. Math. Sci.*, 19 (2012), 1–17

72. 2-frieze patterns and the cluster structure of the space of polygons (with S. Morier-Genoud and V. Ovsienko). *Ann. Inst. Fourier*, 62 (2012), 937–987
73. Liouville-Arnold integrability of the pentagram map on closed polygons (with V. Ovsienko and R. Schwartz). *Duke Math. J.*, 162 (2013), 2149–2196
74. Periodic trajectories in the regular pentagon, II (with D. Fuchs). *Moscow Math. J.*, 13 (2013), 19–32
75. On fibrations with flat fibers (with V. Ovsienko). *Bull. Lond. Math. Soc.*, 45 (2013), 625–632
76. On the discrete bicycle transformation (with E. Tsukerman). *Publ. Math. Uruguay (Proc. Montevideo Dyn. Syst. Congress 2012)*, 14 (2013), 201–220
77. The equal tangents property (with J. Jeronimo-Castro and G. Ruiz-Hernandez). *Advances in Geometry*, 14 (2014), 447–453
78. Circumcenter of Mass and generalized Euler line (with E. Tsukerman). *Discr. Comp. Geom.*, 51 (2014), 815–836
79. Linear difference equations, frieze patterns and combinatorial Gale transform (with S. Morier-Genoud, V. Ovsienko and R. Schwartz). *Forum of Mathematics, Sigma*, 2 (2014), e22 (45 pages)
80. On curves and polygons with the equiangular chord property (with T. Aougab, X. Sun and Y. Wang). *Pacific J. Math.*, 274 (2015), 305–324
81. Coxeter’s frieze patterns and discretization of the Virasoro orbit (with V. Ovsienko). *J. Geom. and Phys.*, 87 (2015), 373–381
82.  $SL_2(\mathbf{Z})$ -tiling of the torus, Coxeter-Conway friezes and Farey triangulations (with S. Morier-Genoud and V. Ovsienko). *L’Enseign. Math.*, 61 (2015), 71 – 92
83. A baker’s dozen of problems. *Arnold Math. J.*, 1 (2015), 59–67
84. Remarks on the the circumcenter of mass (with E. Tsukerman). *Arnold Math. J.*, 1 (2015), 101–112
85. Introducing supersymmetric frieze patterns and linear difference operators (with S. Morier-Genoud and V. Ovsienko). *Math. Zeitschrift*, 281 (2015), 1061–1087
86. Configuration spaces of plane polygons and a sub-Riemannian approach to the equitangent problem (with J. Jeronimo-Castro). *J. Dyn. Control Syst.*, 22 (2016), 227–250
87. Integrable cluster dynamics of directed networks and pentagram maps (with M. Gekhtman, M. Shapiro, and A. Vainstein). *Advances in Math.*, 300 (2016), 390–450
88. On Lagrangian tangent sweeps and Lagrangian outer billiards (with D. Fuchs). *Geom. Dedicata*, 182 (2016), 203–213
89. Skewers. *Arnold Math. J.*, 2 (2016), 171–193
90. On the bicycle transformation and the filament equation: results and conjectures. *J. Geom. and Phys.*, 115 (2017), 116–123
91. Billiard transformations of parallel flows: a periscope theorem (with A. Plakhov and D. Treschev). *J. Geom. and Phys.*, 115 (2017), 157–166
92. Iterating evolutes and involutes (with M. Arnold, D. Fuchs, I. Izmetiev, and E. Tsukerman). *Discr. Comp. Geom.*, 58 (2017), 80–143
93. Ivory’s Theorem revisited (with I. Izmetiev). *J. Integrable Systems*, 2 (2017), 1–36
94. Iterating evolutes of spatial polygons and of spatial curves (with D. Fuchs). *Moscow Math. J.*, 17 (2017), 667–689
95. Dual numbers, weighted quivers, and extended Somos and Gale-Robinson sequences (with V. Ovsienko). *Algebr. Represent. Theory*, 21 (2018), 1119–1132
96. Introducing symplectic billiards (with P. Albers). *Advances in Math.*, 333 (2018), 822–867
97. Open problems, questions, and challenges in finite-dimensional integrable systems (with A. Bolsinov, V. Matveev, and E. Miranda). *Philosoph. Trans. Royal Society A*, 376 (2018), 20170430 (40 pp)

98. On centro-affine curves and Bäcklund transformations of the KdV equation. *Arnold Math. J.*, 4 (2018), 445–458
99. Tire tracks and integrable curve evolution (with G. Bor, M. Levi, and R. Perline). *Int. Math. Res. Notes*, v. 2020, No 9, 2698–2768
100. Counting periodic trajectories of Finsler billiards (with P. Blagojevic, M. Harrison, and G. Ziegler). *SIGMA* 16 (2020), 022, 33 pages
101. Wire billiards, the first steps (with M. Bialy and A. Mironov). *Advances in Math.*, 368 (2020), 107154, 27 pp.
102. Two variations on the periscope theorem. *Reg. Chaotic Dynamics*, 25 (2020), 11–17
103. Cross-ratio dynamics on ideal polygons (with M. Arnold, D. Fuchs, and I. Izmistiev). *Int. Math. Res. Notes*, online first. pp. 1–84, doi:10.1093/imrn/rnaa289
104. Billiards in ellipses revisited (with A. Akopyan and R. Schwartz). *European J. Math.*, online first (2020). doi.org/10.1007/s40879-020-00426-9
105. Dan Reznik’s identities and more (with M. Bialy). *European J. Math.*, online first (2020), doi.org/10.1007/s40879-020-00428-7
106. Four equivalent properties of integrable billiards (with A. Glutsyuk and I. Izmistiev). *Israel J. Math.*, 241 (2021), 693–719
107. Remarks on Joachimsthal integral and Poritsky property (with M. Arnold). *Arnold Math. J.*, 7 (2021), 483–491
108. Remarks on rigidity properties of conics. *Reg. Chaotic Dynamics*, 27 (2022), 18–23
- 109 Symplectically convex and symplectically star-shaped curves – a variational problem (with P. Albers). *J. Fixed Point Theory Appl.* (Viterbo Festschrift) 24 (2022), no. 2, Paper No. 27.
110. Polygonal symplectic billiards (with P. Albers, G. Banhatti, F. Sadlo, and R. Schwartz). Preprint
111. Self-Bäcklund curves in centroaffine geometry and Lamé’s equation (with M. Bialy and G. Bor). Preprint
112. Open problems on billiards and geometric optics (with M. Bialy, C. Fierobe, A. Glutsyuk, M. Levi, A. Plakhov, and D. Tsodikovich). *Arnold Math. J.*, online first
113. Cusps of caustics by reflection: a billiard variation on Jacobi’s Last Geometric Statement (with G. Bor). Preprint
114. A family of integrable transformations of centroaffine polygons; geometrical aspects (with M. Arnold and D. Fuchs). Preprint
115. On projective evolutes of polygons (with M. Arnold and R. Schwartz). Preprint
116. On conformal points of area preserving maps and related topics (with P. Albers). Preprint

### Other publications

#### *Articles in American Mathematical Monthly*

1. A cone eversion. v. 102 (1995), 52–56
2. The four vertex theorem revisited – two variations on the old theme. v. 102 (1995), 912–916
3. More on paperfolding (with D. Fuchs). v. 106 (1999), 27–35
4. A four vertex theorem for polygons. v. 107 (2000), 830–833
5. The Poncelet grid and the billiard in an ellipse (with M. Levi). v. 114 (2007), 895–908
6. The (un)equal tangents problem. v. 119 (2012), 398–405
7. Tractrices, bicycle tire tracks, hatchet planimeters, and a 100-year-old conjecture (with R. Foote and M. Levi). v. 120 (2013), 199–216
8. The Six Circles Theorem revisited (with D. Ivanov). v. 123 (2016), 689–698
9. Descartes Circle Theorem, Steiner porism, and spherical designs (with R. Schwartz), v. 127 (2020), 238–248

#### *Articles in Mathematical Intelligencer*

1. MASS Program at Penn State (with A. Katok and S. Katok). v. 24 (2002), No 4, 50–56
2. Dual billiards (with F. Dogru). v. 27, No 4 (2005), 18–25.  
Translation into Russian: “Letnyaya konferenciya turnira gorodov: izbrannye materialy”, v. 1. Moscow, MCNMO, 2009, pp. 28–47.
3. Elementary surprises in projective geometry (with R. Schwartz). v. 32 (2010) No 3, 31–34
4. Osculating curves: around the Tait-Kneser Theorem (with E. Ghys and V. Timorin). v. 35 (2013), No 1, 61–66
5. Dragon curves revisited. v. 36, No 1 (2014), 13–17
6. Proofs (not) from The Book. v. 36, No 2 (2014), 9–14
7. The ice cube proof (with P. Deligne and S. Robins). v. 36, No 4 (2014), 1–3
8. Centers of mass of Poncelet polygons, 200 years after (with R. Schwartz). v. 38, No 2 (2016), 29–34
9. Hopf fibrations and Hurwitz-Radon numbers (with V. Ovsienko). v. 38, No 4 (2016), 11–18
10. Polynomials as polygons. v. 39, No 1 (2017), 41–43
11. A four vertex theorem for frieze patterns? v. 40, No 4 (2018), 14–18
12. Kasner meets Poncelet, v. 41, No 4 (2019), 56–59
13. Polar bear or penguin? Musings on Earth cartography and Chebyshev nets (with B. Khesin), v. 43, No 1 (2021), 20–24
14. Variations on the Tait-Kneser theorem (with G. Bor and C. Jackman), v. 43, No 3 (2021), 8–14
15. Loewner’s “forgotten” theorem (with P. Albers). v. 44, No 1 (2022), 7–11

*Articles in “Kvant” magazine (in Russian)*

1. Mathematical radio club. 1983, No 3
2. Mistakes in geometrical proofs. 1984, No 3 (in English: Quantum, 1998, No 6)
3. Considerations of continuity. 1987, No 9. (in English: Quantum, 1990, No 2)
4. Geometry of equations. 1988, No 10
5. On plane curves. 1988, No 11–12
6. On curvature. 1989, No 5
7. On self-referential sentences. 1989, No 6
8. Archimedes’ law from the viewpoint of a mathematician. 1989, No 10 (in English: in “Geometry, Analysis and Mechanics”, World Sci. Publ., 1995, 215–218)
9. Differential geometry around us. 1989, No 11
10. How many roots does a polynomial have? 1989, No 12
11. Polynomials least different from zero. 1990, No 6 (in English: Quantum, 1994, No 1 and Kvant Selecta: algebra and analysis, II, 161–165)
12. Web geometry. 1990, No 7
13. Chebyshev’s nets (with Yu. Kotov). 1990, No 7
14. Segments of constant areas (with D. Fuchs). 1990, No 8 (in English: Quantum, 1992, No 2)
15. Which is larger? 1990, No 10
16. Nazism and mathematics. 1990, No 11. (in Japanese: Basic Sugaku, 1991)
17. Variations on Escher’s theme. 1990, No 12
18. The Sylvester problem (with V. Timorin). 2009, No 5–6
19. Impossible tilings (with D. Fuchs), 2011, No 2

*Oberwolfach reports*

1. Skew and totally skew embeddings and immersions. Geometrie. v.1, No 4 (2004), 2499–2501
2. Tire track geometry and flotation problems. Dynamical Systems. v. 2, No 3 (2005), 1782–1784
3. Configuration space of plane polygons, sub-Riemannian geometry, and periodic orbits of inner and outer billiards. Geometrie. v.3, No 4 (2006), 2742–2744



4. The pentagram map: a discrete integrable system. *Discrete Differential Geometry*. v. 6, No 1 (2009), 99–101
5. The mysterious pentagram map. *Dynamical Systems*. v. 6, No 3 (2009), 1830–1832
6. Arbeitsgemeinschaft Mathematical Billiards (with S. Troubetzkoy). v. 7, No 2 (2010), 955–957
7. Higher pentagram maps, discrete weighted networks, and cluster algebras. *Discrete Differential Geometry*. v. 9, No 3 (2012), 2125–2127
8. Tire track geometry, continuous and discrete bicycle transformation, and the filament equation. *Dynamical Systems*. v. 10, No 3 (2013), 2008–2010
9. The circumcenter of mass. *Discrete Differential Geometry*. v. 12, No 1 (2015), 706–707
10. Three lectures on frieze patterns. *Friezes*. v. 12, No 4 (2015), 2865–2866
11. Introducing symplectic billiards. *Dynamical Systems*. v. 14, No 3 (2017), 2029–2031

*Expository articles, reviews, interviews*

1. Monthly mathematical radio show. All-Union Radio Station, Moscow, 1981–83 (10 scripts)
2. Instructive games (with A. To'om). Moscow State Univ. Math. School by Correspondence, 1987
3. Encyclopedia of mathematical physics, Moscow, 1998. 17 articles on contact geometry
4. Solution to a problem by Coxeter. Summer Geometry Institute Problem Book, Smith College, 1993
6. Problem No 10724, *Amer. Math. Monthly*, 106 (1999); solution: 108 (2001), 472–473
7. Preface to *Kvant Selecta*, AMS Math. World, v. 14 (1999)
8. Personal reflections on D. Fuchs, Differential topology, infinite-dimensional Lie algebras and applications, 309–311, *AMS Transl.*, ser. 2, v. 194, 1999
9. Outer billiards (in Russian). *Mat. Prosv.*, ser. 3, No 5 (2001), 125–135
10. A tale of a geometric inequality. *MASS Selecta*, AMS, 2003, 257–262
11. Bringing Eastern European traditions to North American students (with P. Humke and Yu. Ilyashenko). *Notices of AMS*, 50 (2003), 1250–1254
12. Comments to problems 1976-4, 1976-5, 1976-12, 1979-19, 1981-10, 1983-4, 1987-3, 1994-2, 1994-8, 1994-17. *Arnold's Problems*, Springer-Verlag, & Phasis, 2005
13. Billiards in bounded convex domains. *Encyclopedia of mathematical physics*, Elsevier, 2006, v. 1, p. 296–299
14. Polygonal billiards. *Encyclopedia of mathematical physics*, Elsevier, 2006, v. 4, pp. 84–87
15. “Arnold's problems” book review. *Math. Intelligencer*, v. 29, No 1 (2007), 49–51
16. 27 lines (in Russian). *Mat. Prosv.*, ser. 3, No 12 (2008), 145–160
17. What is ... the Schwarzian derivative (with V. Ovsienko). *Notices of AMS*, 56 (2009), 34–36
18. “Chases and escapes” book review. *Math. Intelligencer*, v. 31, No 2 (2009), 78–79
19. “Outer billiards on kites” book review. *Bull. AMS*, 48 (2011), 285–292
20. International Summer School for Students (with E. Ghys). *Notices of AMS*, 59 (2012), 365
21. Interview to Russian Internet Journal “PostNauka”, June 2012, <http://postnauka.ru/books/1017>
22. Interview to “Strongly Connected Components”, November 2012, <http://www.acmescience.com/?p=1731>
23. Gelfand's School by Correspondence. *Notices of AMS*, 60 (2013), 166–169
24. “Exterior billiards” book review. *Bull. AMS*, 51 (2014), 519–526
25. Comments to “Mathematical Trivium” (with B. Khesin), in “V. Arnold, Swimming Against the Tide”, AMS, 2014. Russian translation in “V. I. Arnold. Problems”, MCCME, Moscow, 2017
26. Preface to V. Arnold's book “Mathematical Understanding of Nature”, AMS, 2014
27. The Institute for Computational and Experimental Research in Mathematics (ICERM) (with J. Pipher and H. Walker), *Notices of AMS*, 63 (2016), 160–161

28. Preface to Arnold’s collection of papers on quaternions, MCCME, Moscow, 2017
29. “A singular mathematical promenade” book review, *Math. Intelligencer*, v. 40, No 2 (2018), 85–88
30. Vladimir Igorevich Arnold. 12 June 1937–3 June 2010 (with B. Khesin), *Biographical Memoirs of Fellows of Royal Society*, 64 (2018), 7–26
31. *Hamiltonian Systems, from Topology to Applications through Analysis* (with Ph. Morrison), *Emissary*, Fall 2018
32. “The Scottish Book. Mathematics from the Scottish Café” book review, *Math. Intelligencer*, v. 42, No1 (2020), 71–74
33. Numberphile video “Frieze patterns” <https://www.youtube.com/watch?v=0mXz-NP-raY&feature=youtu.be>
34. La geometría de trayectorias de bicicletas (with G. Bor), *Ciencias*, UNAM, [https://www.cimat.mx/~gil/research/articulo\\_ciencias.pdf](https://www.cimat.mx/~gil/research/articulo_ciencias.pdf)
35. Fun problems in geometry and beyond (with B. Khesin), *SIGMA* 15 (2019), 097, 21 pages
36. “You Failed Your Math Test, Comrade Einstein” book review, *Math. Intelligencer*, v. 42, No 3 (2020), 83–87
37. Three stories on the importance of putting it on the back burner, “Math in the Time of Corona”, Springer, 2021, [doi.org/10.1007/16618-2020-30](https://doi.org/10.1007/16618-2020-30)

### Curriculum development

Transformational geometry, UARK, 1993  
 Differential topology, UARK, 1999  
 Mathematical methods of mechanics, UARK, 2000  
 Introduction to symplectic topology, Penn State, 2002  
 Intuitive topology, MASS course, Penn State, 2002  
 Geometry and billiards, REU and MASS course, Penn State, 2004 and 2005  
 Differential topology, Penn State, 2008  
 Exploration in convexity, MASS course, Penn State, 2009  
 Geometry of polynomials, REU and MASS course, Penn State, 2010 and 2012, Summer@ICERM 2014, State College High School 2019-20  
 Concepts of geometry, PMASS course, Penn State, 2011, 2016, 2017  
 Knot theory, REU and MASS course 2009 and 2017

### Editorial boards

*Kvant* magazine, 1989–1990  
*American Mathematical Monthly*, 2001–2020; *Notes* Editor, 2011–2016  
 Student Mathematics Library Editorial Committee, AMS, 2012–2020  
 Pure and Applied Undergraduate Texts Editorial Committee, AMS, 2016–2020  
*Mathematical Intelligencer*, *Mathematical Gems and Curiosities* Editor, 2013–2020, Associate Editor 2016–2020, co-Editor-in-Chief 2021–  
*Experimental Mathematics*, Editor-in-Chief, 2013–2019, associate editor 2019–  
*Matematicki Vesnik*, 2016–  
*Arnold Mathematical Journal*, 2018–  
*European Journal of Mathematics*, 2022–

#### *Guest editor:*

V. Arnold memorial materials (with B. Khesin), *Notices AMS*, March and April 2012  
 Special issue of *American Mathematical Monthly* 120 (March 2013) (with D. Schleicher)  
 Special issue of *Journal of Geometry and Physics*, *FDIS* 87 (2015) (with V. Matveev, E. Miranda, V. Rubtsov, San Vu Ngoc)

Special issue of Journal of Geometry and Physics, FDIS 115 (2017) (with V. Matveev, E. Miranda, M. Przybylska, V. Rubtsov)

Special issue of Moscow Mathematical Journal, V. Arnold's 80th anniversary 17 (2017) (with S. Lando)

Special issue of Philosophical Transactions of the Royal Society A "Finite dimensional integrable systems" 376 (2018) (with V. Matveev, E. Miranda)

Special issue of Journal of Geometry and Physics, FDIS III, online (2019) (with A. Bolsinov, V. Matveev, E. Miranda, V. Rubtsov)

Special issue of SIGMA "Algebra, topology, and dynamics in interaction" (2020) (with B. Khesin, F. Malikov, V. Ovsienko)

Special issue of European Journal of Mathematics, "New developments in integrable systems" (2020) (with A. Bolsinov, T. Kappeler, V. Matveev)

Proceedings of the MSRI semester "Hamiltonian Dynamics" (with A. Fathi, P. Morrison, T. Seara), to appear

Celebratio volume for D. Fuchs (with B. Khesin, F. Malikov, V. Ovsienko), to appear

N. Konstantinov memorial materials (with A. Shen), Notices AMS, to appear

### Conference and schools organizing

Symplectic topology, Fayetteville, AR, 1992

Dehn surgery (with Ch. Goodman-Strauss), Fayetteville, 1997

Combinatorial methods in algebra (with M. Johnson and V. Retakh), Fayetteville, 1998

Complex dynamics (with L. Lanzani and V. Retakh), Fayetteville, 1999

Nonholonomic dynamics and integrability (with B. Khesin), Banff, 2007

Billiards and related topics (with R. Schwartz), AMS Meeting, Murfreesboro, 2007

Legendrian knots and related topics (with D. Fuchs and L. Traynor), AIM 2008

Algebra and topology in interaction (with Ya. Eliashberg, M. Mulase, N. Reshetikhin, A. Schwarz, M. Vazirani), UC Davis 2009

Geometry of integrable and non-integrable dynamics (with B. Khesin and M. Levi), AMS Meeting, University Park, 2009

Random dynamics (with A. Novikov, Ya. Pesin, W. Woźczynski), University Park, 2009

Billiards Arbeitsgemeinschaft (with S. Troubetzkoy), Oberwolfach, 2010

Göttingen-Penn State international summer school on dynamical systems (with L. Bartholdi, M. Denker and Ya. Pesin), Göttingen, 2011

International mathematical summer school for high school and college students (with M. Andler, E. Ghys, V. Kleptsyn, D. Schleicher), Bremen, 2011, 2013, 2015, 2017; Lyon, 2012, 2014

Summer@ICERM undergraduate program, ICERM, Brown University, 2012 (with P. Hooper), 2013 (with C. Goodman-Strauss)

Finite-dimensional integrable systems (with C. Duval and G. Valent), Luminy, 2013

Flat dynamics (with J. Athreya, R. Niemeyer, R. Schwartz), AMS Meeting, Albuquerque, 2014

The legacy of Vladimir Arnold (with H. Hofer, B. Khesin, A. Khovanskii, A. Varchenko), Fields Institute, 2014

Finite-dimensional integrable systems in geometry and mathematical physics (with A. Maciejewski, V. Matveev, M. Przybylska), Banach Center, 2015

Integrability and near-Integrability in mechanics and geometry (with B. Khesin, V. Zharnitsky), Casa Matematica Oaxaca (CMO), Mexico, 2016

Finite-dimensional integrable systems in geometry and mathematical physics (with A. Delshams, Yu. Fedorov, E. Miranda, V. Matveev), Barcelona, 2017

V. Arnold's 80th anniversary (with A. Davydov, E. Feigin, S. Lando, V. Timorin, V. Vassiliev), Moscow, 2017

Hamiltonian dynamics (with A. Fathi, V. Kaloshin, R. de la Llave, T. M. Seara, A. Wilkinson), MSRI, Fall 2018

Finite-dimensional integrable systems in geometry and mathematical physics (with V. Matveev, T. Ratiu, X. Zhang, N. Zung), Shanghai, 2019  
 Geometric dynamics (with M. Levi), AMS Meeting, University Park, 2020 (by zoom)  
 Mathematics at the Intersection of Art, Culture, and History (with K. Parshall, M. Strauss), 2021 (by zoom)  
 Finite-dimensional integrable systems in geometry and mathematical physics (with S. Arstein, M. Bialy, V. Matveev, Ya. Ostrover), Tel Aviv, 2021 (postponed until 2022)  
 Differential geometry, billiards, and geometric optics (with A. Glutsyuk, I. Izmistiev, M. Radnovic), Luminy, 2021

### Doctoral students

F. Dogru, Ph.D. 2003; D. Genin, Ph.D. 2005; Yu. Tyurina, Ph.D. 2005; G. Stojanovic, Ph.D. 2007; N. Early, Ph.D. 2016; M. Harrison, Ph.D. 2017; A. Chavez, Ph.D. 2022; N. Sharipova, current

### Undergraduate research supervised, with published results

C. Culter, Penn State REU 2004 program: his result is published in No 51 in my list of publications.  
 V. Cyr, Penn State REU and MASS 2004 programs: A number theoretic question arising in the geometry of plane curves and in billiard dynamics. Proc. Amer. Math. Soc. 140 (2012), 3035–3040.  
 E. Larson, Penn State REU 2007 program: The DNA inequality in non-convex regions. Advances in Geom., 10 (2010), 221–248.  
 S. Howe, M. Pancia, and V. Zakharevich, Penn State REU and MASS 2008 programs: Isoperimetric inequalities for wave fronts and a generalization of Menzin’s conjecture for bicycle monodromy on surfaces of constant curvature. Adv. Geom. 11 (2011), 273–292.  
 D. Rudenko, Penn State MASS 2011 program: On equidissection of balanced polygons. J. Math. Sci. (N.Y.) 190 (2013), 486–495.  
 I. Alevy and E. Tsukerman, Summer@ICERM 2012: program Polygonal bicycle paths and the Darboux transformation. Involve, 9 (2016), 57–66.  
 E. Tsukerman, Summer@ICERM 2012: No 76 in my list of publications is a result of our collaboration.  
 I.-J. Jeong, Summer@ICERM 2012 program: Outer billiards with contraction: attracting Cantor sets. Experimental Math. 24 (2015), 53–64.  
 A. Nesky and C. Redwood, Summer@ICERM 2012 program: On bicycle uni-track path efficiency: bicycle ”unicycle” paths. The College Math. J. 47, 180–189.  
 X. Sun and Y. Wang, Summer@ICERM 2013 program: T. Aougab, X. Sun, S. Tabachnikov, Y. Wang. On curves and polygons with the equiangular chord property. Pacific J. Math, 274 (2015), 305–324.  
 E. Fischer and C. Munteanu, Summer@ICERM 2013 program: F. Dogru, E. Fischer, C. Munteanu. Outer billiards and tilings of the hyperbolic plane. Involve 8 (2015), 637–651.  
 E. Chen and N. Lourie, Summer@ICERM 2013 program: Tripod configurations of curves. J. Geom. Phys. 89 (2015), 1–16.  
 Z. Yao, Summer@ICERM 2013 program: Devil’s Staircase - rotation number of outer billiard with polygonal invariant curves. Dyn. Systems. 31 (2016), 158–172.

### Service and outreach activities

*Department, college, university committees*

Member of committees at UARK: Undergraduate, Hiring, Steering, Library, Spring Lecture Series, Graduate, VIGRE; Department of Mathematics, 1990–2000  
 Honors Director, Department of Mathematics, UARK, 1996–2000  
 Honors Coordinator, Department of Mathematics, Penn State, 2000–  
 Colloquium Chair, Department of Mathematics, Penn State, 2008–11, 2020–  
 Marker Lectures Committee, Chair, Penn State, 2010–11, 2020–  
 Member of committees at Penn State: Student Awards, Undergraduate Studies, VIGRE, Promotion and Tenure, Graduate Studies, GTA Oversight, PSU-PKU Steering, Personnel, Library; Department of Mathematics, 2000–  
 Outreach Council, Eberly College of Science, Penn State 2000–13  
 Promotion and Tenure Committee, Eberly College of Science, Penn State, 2020–  
 Schreyer Scholars Selection Committee, Schreyer Honors College, Penn State 2011–13

*National and international committees and boards*

American Mathematics Competitions, Advisory Panel, member, 2002–2004  
 Young Scholars (Epsilon) Awards Committee, AMS, member, 2007–2010 (Chair, 2009–2010)  
 Frank and Bennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student Committee, AMS-MAA-SIAM, member, 2010–2013  
 International Mathematical Summer School for Students, Scientific Committee, Chair, 2010–2017  
 Illustrative Mathematics Project Advisory Board, AMS representative, 2011–13  
 Heidelberg Laureate Forum Selection Committee, 2013– (Chair, 2022–25)  
 AMS-MAA Mathfest Joint Lecture Committee, 2014–16 (Chair, 2014–2015)  
 London Mathematical Society Undergraduate Summer School, Scientific Committee, 2014–17  
 ICERM Education Advisory Board, Chair, member 2015–2019  
 Cornell University Mathematics Program, External Reviewer, 2015  
 AMS Levi L. Conant Prize Committee, member, 2016–2019  
 Association for Mathematical Research, Board of Directors member, 2021–  
 Heidelberg Laureate Forum Scientific Committee, 2022–

*Refereeing*

Referee for numerous research journals  
 Referee for grant awarding agencies (NSF, NSA, Sloan Foundation, BSF, Simons Foundation, various European and Russian agencies and foundations, etc.)

**Conference, colloquium and seminar talks (since 1991)**

1. Annual AMS/MAA Joint Meeting (Geometry), San Francisco, January 1991
2. Midwest Topology Conference, Lawrence, May 1991
3. Centre de Physique Theorique, Luminy, June 1991
4. University of Texas at Austin, October 1991
5. UC at Davis, December 1991
6. Annual AMS/MAA Meeting (Symplectic topology), Baltimore, January 1992
7. Rencontres Franco-Russe de geometrie, CIRM, Luminy, May 1992
8. Ecole Normale Superieur de Lyon, June 1992
9. Université Louis Pasteur, Strasbourg, October 1992
10. Conference on polygonal billiards, ENS de Lyon, October 1992
11. Université de Rennes, November 1992
12. IHES, Bures-sur-Yvette, November 1992
13. ETH-Zentrum, Zurich, December 1992

14. Penn State University, March 1993
15. UC at Davis, May 1993
16. Stanford University, May 1993
17. Smith College, July 1993
18. Wichita State University, September 1993
19. UC at Riverside, March 1994
20. SUNY at Stony Brook, March 1994
21. Yale University, March 1994
22. Symposium on classical and quantum billiards, Ascona, July 1994
23. Université Louis Pasteur, Strasbourg, April 1995
24. Ecole Normale Supérieure, Paris, April 1995
25. Centre de Physique Théorique, Luminy, April 1995
26. Stanford University, May 1995
27. University of Southern California, May 1995
28. UC Santa Cruz, May 1995
29. Geometry conference, Oberwolfach, October 1995
30. MPIM (Oberseminar), Bonn, November 1995
31. Köln University, February 1996
32. Tel Aviv University, January 1997
33. Combinatorics and knot theory workshop, MSRI, January 1997
34. AMS Meeting (Chaotic dynamics), Memphis, March 1997
35. UC Santa Cruz, June 1997
36. Université de Rennes, January 1998
37. University of Wisconsin, Madison, February 1998
38. AMS Meeting (Geometry and topology of 3-Manifolds), Davis, April 1998
39. Université Catholique de Louvain, June 1998
40. University of Toronto, November 1998
41. Columbia University, December 1998
42. University of Alabama, Birmingham, February 1999
43. Dynamics conference, Oberwolfach, July 1999
44. University of Arizona, Tucson, September 1999
45. Tulane University, October 1999
46. Penn State University, November 1999
47. New Mexico State University, Las Cruces, December 1999
48. AMS Meeting (Finsler and Minkowski geometry), Lowell, April 2000
49. Tel Aviv University, May 2000
50. Centre de Physique Théorique, Luminy, June 2000
51. Ecole Normale Supérieure, Paris, June 2000
52. Georgia Topology Conference, Athens, July 2000
53. AMS Meeting (Dynamics), San Francisco, October 2000
54. Indiana University, Bloomington, February 2001
55. University of Pennsylvania, Philadelphia, March 2001

56. Ruhr University, Bochum, July 2001
57. Dynamical systems conference, Penn State, October 2001
58. Tel Aviv University, December 2001
59. Haifa Institute of Technology (Technion), December 2001
60. Georgia Institute of Technology, Atlanta, April 2002
61. Institut de Mathématiques de Luminy, May 2002
62. Université de Provence, Marseille, May 2002
63. Université Claude Bernard, Lyon, May 2002
64. International workshop on piecewise isometries, Luminy, June 2002
65. University of South Carolina, Columbia, March 2003
66. AMS Meeting (Differential geometry), Bloomington, April 2003
67. AMS Meeting (Applications of Teichmüller theory), Bloomington, April 2003
68. AMS Meeting (Algebraic and topological combinatorics), New York, April 2003
69. University of Florida, Gainesville, April 2003
70. Conference on hyperbolic dynamics, Zurich, June 2003
71. Conference on topology and robotics, Zurich, June 2003
72. Tel Aviv University, January 2004
73. Haifa Institute of Technology (Technion), January 2004
74. University of Toronto, March 2004
75. SUNY at Stony Brook, March 2004
76. University of Pennsylvania, April 2004
77. Ohio State University, Columbus, May 2004
78. Geometry conference, Oberwolfach, September 2004
79. University of Dortmund, July 2005
80. Dynamics conference, Oberwolfach, July, 2005
81. Independent University of Moscow, October, 2005
82. Max-Planck-Institut, Bonn, January 2006
83. Koeln University, February 2006
84. Brussels-Köln Symplectic Seminar, March 2006
85. University of Dortmund, April 2006
86. Max-Planck-Institut, Bonn, April 2006
87. Alexander von Humboldt Foundation conference, Bonn, April 2006
88. University of Lille, May 2006
89. Institut de Mathématiques de Luminy, May 2006
90. Université Claude Bernard, Lyon, June, 2006
91. Geometry conference, Oberwolfach, October 2006
92. University of Toronto, October 2006
93. Dartmouth College, October 2006
94. Brown University, April 2007
95. SUNY Stony Brook, April 2007
96. Hebrew University, Jerusalem, June 2007
97. Different approaches to complexity, Technion, Haifa, June 2007

98. Temple University, October 2007
99. University of Illinois, March 2008
100. University of Southern California, April 2008
101. Low complexity dynamics, BIRS, May 2008
102. University of Chicago, June 2008
103. University of Toronto, November 2008
104. McMaster University, Hamilton, November 2008
105. Discrete differential geometry, Oberwolfach, January 2009
106. University of Arkansas, Fayetteville, March 2009
107. AMS Meeting (The interface between number theory and dynamical systems), Urbana-Champaign, March 2009
108. University of Maryland, April 2009
109. Bloomington Geometry Workshop, Bloomington, April 2009
110. University of Jena, May 2009
111. Jacobs University, Bremen, May 2009
112. Dynamical Numbers, MPIM-Bonn, June 2009
113. University of Dortmund, June 2009
114. University of Dusseldorf, June 2009
115. Max-Planck-Institut, Bonn, June 2009
116. Geometric Methods in Physics, Bialowieza, Poland, June 2009
117. Dynamics conference, Oberwolfach, July 2009
118. Algebra and topology in interaction, Davis, September 2009
119. Temple University, October 2009
120. AMS Meeting (Geometry of integrable and non-integrable dynamics), State College, October 2009
121. Foundations of computational mathematics, Fields Institute, Toronto, November 2009
122. University of Toronto, November 2009
123. Brock University, Ontario, Canada, November 2009
124. Algebres de Lie de dimension infinie: geometrie et cohomologie, Lyon, November 2009
125. Georgia Institute of Technology, Atlanta, February 2010
126. Northeastern University, Boston, February 2010
127. University of North Texas, Denton, March 2010
128. Geometry, Dynamics and Topology Day, Charleston, IL, March 2010
129. SIAM conference: nonlinear waves and coherent structures, Philadelphia, August 2010
130. Moduli spaces in Mathematics and in Physics, Strasbourg, September 2010
131. Geometry, Dynamics, Integrable Systems, Belgrade, September 2010
132. University of South Florida, Tampa, October 2010
133. University of Wisconsin, Madison, November 2010
134. Cornell University, November 2010
135. AMS/MAA Joint Meeting (Math Circles), New Orleans, January 2011
136. Tel Aviv University, March 2011
137. University of Michigan, April 2011



138. Bonn University, July 2011
139. Geometry, Dynamics, Integrable Systems, Sintra, Portugal, September 2011
140. Symplectic Dynamics, IAS, Princeton, October 2011
141. University of Illinois, December 2011
142. Michigan State University, February 2012
143. Scattering by Obstacles and Billiards, University of Aveiro, Portugal, March 2012
144. Carolina Dynamics Symposium, Clemson University, April 2012
145. Discrete Differential Geometry, Oberwolfach, July 2012
146. Dynamical Systems, Montevideo, Uruguay, August 2012
147. Midwest Dynamical Systems, Notre Dame, October 2012
148. Entretiens Jacques Cartier: Adventures in Mathematical Physics, Lyon, November 2012
149. AMS/MAA Joint Meeting (Theory and Interdisciplinary Applications of Dynamical Systems), San Diego, January 2013
150. Discrete Geometry and Dynamical Systems, Kyoto, Japan, January 2013
151. McGill University, Montreal, February 2013
152. Centre de Recherches Mathematiques, Montreal, February 2013
153. Weizmann Institute, Israel, March 2013
154. University of Geneva, Tropical Geometry in Europe, May 2013
155. University Paris 6, May 2013
156. International Mathematical Summer School for Students, Bremen, July 2013
157. Dynamics conference, Oberwolfach, July 2013
158. Finite Dimensional Integrable Systems, Luminy, July 2013
159. Boston University, September 2013
160. Cornell University, October 2013
161. Optimization in the Natural Sciences, Aveiro, Portugal, February 2014
162. University of Coimbra, Portugal, February 2014
163. University of Illinois, February 2014
164. Stony Brook University, March 2014
165. Discrete Geometry and Algebraic Combinatorics, UTexas, Brownsville, April 2014
166. Rutgers University, May 2014
167. Integrability and Cluster Algebras: Geometry and Combinatorics, ICERM, August 2014
168. Symplectic techniques in topology and dynamics, Cologne, September 2014
169. University of North Carolina, October 2014
170. Geometric Dynamics Days, TU Dortmund, November 2014
171. Jacobs University, Bremen, November 2014
172. Stony Brook University, February 2015
173. Discrete Differential Geometry, Oberwolfach, March 2015
174. UC at Davis, May 2015
175. Integrability in Mechanics and Geometry, ICERM, June 2015
176. Topology, geometry, and dynamics. CRM, Montreal, September 2015
177. Discretization in Geometry and Dynamics, Munich, October 2015
178. AMS Meeting (Experimental Mathematics), Athens, GA, March 2016

179. University of Texas, Dallas, March 2016
180. Technical University of Berlin, May 2016
181. ICERM, Brown University, July 2016
182. Geometric and Algebraic Aspects of Integrability, Durham, July 2016
183. Sub-Riemannian Geometry and Celestial Mechanics, Guanajuato, Mexico, August 2016
184. Unusual configuration spaces, ICERM, Brown University, September 2016
185. AMS/MAA Joint Meeting (Discrete Geometry and Convexity), Atlanta, January 2017
186. University of Fribourg, March 2017
187. Bucknell University, April 2017
188. BHKM Symplectic Seminar, University of Heidelberg, June 2017
189. Jacobs University, Bremen, June 2017
190. RTG Asymptotic Invariants of Groups and Spaces, University of Heidelberg, June 2017
191. International Mathematical Summer School for Students, Bremen, July 2017
192. Dynamics conference, Oberwolfach, July 2017
193. Philadelphia Area Topology Seminar, Temple University, October 2017
194. Hamiltonian Systems, Ascona, Switzerland, October 2017
195. Brown University, December 2017
196. University of Toronto, February 2018
197. Bryn Mawr College, March 2018
198. Cluster Algebras: Twenty Years On, CIRM, Luminy, March 2018
199. AMS Meeting (Discretization in Geometry and Dynamics), Boston, April 2018
200. Non-commutative Structures, Cluster Algebras and Applications, Angers, June 2018
201. Symplectic Dynamics, Heidelberg, July 2018
202. MSRI, September 2018
203. UC Davis, October, 2018
204. UC Davis, November 2018
205. Stanford University, November 2018
206. Vanderbilt University, April 2019
207. University of Hannover, June 2019
208. UC Davis, November, 2019
209. Stanford, November, 2019
210. Weizmann Institute, Israel, December 2019
211. Ben Gurion University, Israel, December 2019
212. Carnegie Mellon University, February 2020
213. Brown University, March 2020
214. University of Arizona, April 2020 (via zoom)
215. Vienna University of Technology, May 2020 (via zoom)
216. UCLA, October 2020 (via zoom)
217. Dynamical Systems and PDEs, Moscow-Paris, October 2020 (via zoom)
218. Geometry and Differential Equations, Cambridge-Warsaw, November 2020 (via zoom)
219. Hamiltonian Systems, Arizona-Toronto, November 2020 (via zoom)
220. CIMAT, Mexico, November 2020 (via zoom)

221. Global Poisson Seminar, January 2021 (via zoom)
222. Dynamic Control and Optimization, Aveiro, Portugal, February 2021 (via zoom)
223. Moscow State University, February 2021 (via zoom)
224. Moscow State Technical University, March 2021 (via zoom)
225. Texas A&M University, March 2021 (via zoom)
226. Symplectic and Contact Dynamics, University of Antwerp, May 2021 (via zoom)
227. Technical University of Vienna, June 2021 (via zoom)
228. Heidelberg University, Research Station Geometry & Dynamics inaugural lecture, July 2021
229. Knots + More, KAIST, S. Korea, August 2021 (via zoom)
230. Hamiltonian Systems, Arizona-Toronto, November 2021 (via zoom)
231. Regular & Chaotic Dynamics, Moscow, December 2021 (via zoom)
232. University of Toronto, March 2022
233. IAS, Princeton, May 2022

### **Invited addresses, distinguished lectures**

1. AMS Southeast Meeting, Murfreesboro; invited address, November 2007
2. MAA fall meeting, University of Findlay, OH; invited address, October 2011
3. Topology in Dynamics and Physics Distinguished Lectures, Tel Aviv University, March 2013
4. Distinguished Lecture Series, Georgia Southern University, November 2014
5. Journée Georges de Rham, EPFL Lausanne, March 2017
6. Niven Lectures, University of Oregon, May 2017
7. Leonard M. Blumenthal Lectures in geometry, Tel Aviv University, December 2019
8. CMS Distinguished Lecture Series, Technion, Haifa, January 2020

### **Mini-courses at summer schools and workshops**

1. Geometry conference, Oberwolfach, October 2000 (billiards)
2. Séminaire Sud-Rhodanien, Atelier billiards, Montpellier, June 2001
3. Dynamical systems, mathematical billiards and related problems in complex geometry. Summer school, Cologne, July 2007
4. Novos Talentos em Matemática, Lisbon, Portugal, September 2007 (topics in geometry)
5. International Mathematical Summer School for Students, Bremen, July 2011 (bicycle kinematics)
6. International Summer School on Dynamical Systems, Göttingen, August 2011 (billiards)
7. Integrability, Modern Variations, Hausdorff Institute, Bonn, January 2012 (pentagram map)
8. Discrete Differential Geometry, Technical University, Berlin, September 2013 (pentagram map)
9. Geometry, Dynamics and Integrable Systems, ICTP, Trieste, June 2014 (Poncelet theorem and billiards)
10. Cluster Algebras and Dynamical Systems, Münster, February 2015 (pentagram map)
11. International Mathematical Summer School for Students, Bremen, July 2015 (billiards)
12. LMS Undergraduate Summer School, Loughborough, July 2015 (billiards)
13. Inaugural Geometry Lectures, CIMAT-Merida, Mexico, October 2015 (pentagram map)
14. Friezes, Oberwolfach, November 2015
15. Ecole Normale Supérieure de Lyon, May 2016 (billiards)
16. Summer School, Tsaghkadzor, Armenia, June 2017 (billiards)

17. University of Heidelberg, July 2019 (geometry and complete integrability)

**Outreach (public lectures, undergraduate symposia, math circles, math camps)**

1. Canada/USA Binational Mathematical Summer Program, invited lecturer, summers of 2001 and 2002
2. Mathematical Club for high school students (with J. Duncan), UARK, 1990–93
3. Mathematical Club, Park Forest Middle School, State College, 2002
4. Mathematical Club, Radio Park Elementary School, State College, 2003–05
5. Novos Talentos em Matemática, Luso, Portugal, September 2003
6. Mathematical Club, Primrose Hill Elementary School, Barrington, RI, spring 2010
7. Symposium for Undergraduates in the Mathematical Sciences (SUMS), Brown University, Providence, March 2010
8. Undergraduate Mathematics Symposium (UMS), University of Illinois at Chicago, October 2010
9. Guided Explorations in Mathematics (GEM Seminar), State College High, Park Forest and Mount Nittany Middle Schools, (with M. Guysinsky and M. Levi), State College, 2010–
10. International mathematical summer school for high school and college students, invited lecturer, Bremen, summers of 2011, 2013, 2015, 2017
11. University of Texas, Brownsville, April 2015
12. Junior Colloquium, University of Tennessee, February 2016
13. Berkeley Math Circle, September, October 2018
14. Bay Area Mathematical Adventures, December 2018
15. Math for Everyone, University of Notre Dame, April 2019
16. Potluck Academy, August 2020 (via zoom)
17. Moscow Mathematical Circle, March 2021 (via zoom)
18. May Month of Mathematics in Serbia, May 2021 (via zoom)