

# Curriculum Vitae of Pavel M. Bleher

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## ***EDUCATION***

- 1970 B. S. (Mathematics), Department of Mathematics of the Moscow State University, Moscow, USSR
- 1971 M. S. (Mathematics), The Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences, Moscow, USSR
- 1974 Ph. D. (Mathematical Physics), The Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences, Moscow, USSR  
Dissertation: ``*Investigation of the second order phase transitions in some models of ferromagnetism*'' (supervisor: Ya. G. Sinai)
- 1984 Habilitation (Mathematics), Vilnius University, Vilnius, Lithuania  
Dissertation ``*Limit theorems with asymptotics of large deviations for strongly dependent random variables*''

## ***ACADEMIC APPOINTMENTS***

- 2005--present Chancellor's Professor, Department of Mathematical Sciences, Indiana University-Purdue University Indianapolis, Indiana
- 1994—2005 Professor, Department of Mathematical Sciences, Indiana University-Purdue University Indianapolis, Indiana
- 1992--1993 Member, Institute for Advanced Study, Princeton, New Jersey
- 1990--1994 Professor, School of Mathematical Sciences, Tel Aviv University, Israel
- 1973--1990 The Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences, Moscow, USSR  
Research Specialist (1973-1984)  
Senior Research Specialist (1984-1988)  
Leading Research Specialist (1988-1990)

## ***VISITING POSITIONS***

- 2010 (August-December) Research Professor at the Mathematical Sciences Research Institute (MSRI), Berkeley, California
- 2008 (October-December) Visiting Professor, Katholieke Universiteit Leuven, Belgium
- 2008 (August-October) Visiting Member of the Centre de Recherches Mathématiques (CRM), Montréal, Canada
- 2007 (May-June) Visiting Professor, Centre de Physique Theorique, Luminy-Marseille, France
- 2006 (May-June) Visiting Professor, Tel Aviv University, Israel
- 2005 (September-October) Member of the Fields Institute for Research in Mathematics, Toronto, Canada. Co-chair of the Program "*Renormalization in Mathematics and Mathematical Physics*", the Fields Institute, Fall Semester, 2005.
- 2003 (August-September) Visiting Research Professor, the Isaac Newton Institute for Mathematical Sciences, Cambridge, U.K.
- 2003 (April-May) Member of MSRI, Berkeley, California
- 2001 (May-July) Visiting Research Professor, Service de Physique Theorique, CEA-Saclay, France
- 2001 (April-May) Visiting Professor, ETH-Zurich, Switzerland
- 2001 (March-April) Visiting Professor, Ecole Normale Supérieure, Paris, France
- 2000 (June) Visiting Professor, Université de la Méditerranée, Luminy-Marseille, France
- 1999 (January-June) Co-Chair of the MSRI Program "*Random Matrix Models and Their Applications*", Berkeley, California
- 1998 (June-July) Visiting Research Professor, Mathematisches Forschungsinstitut, Oberwolfach, Germany

- 1997 (May-June) Visiting Professor, Centre de Physique Theorique, Luminy-Marseille, France
- 1995 (May-June) Visiting Professor, ETH, Zürich, Switzerland
- 1994 (Spring) Visiting Professor, Rutgers University, New Jersey
- 1992 (June-August) Visiting Professor, Rutgers University, New Jersey
- 1992 (January-February) Member, Institute for Advanced Study, Princeton, New Jersey
- 1991 (August-September) Visiting Professor, Rutgers University, New Jersey
- 1991 (June-July) Visiting Professor, SUNY Stony Brook, New York
- 1990 (September-October) Visiting Professor, Courant Institute, NYU, New York
- 1990 (June-July) Visiting Professor, Rutgers University, New Jersey
- 1990 (April-May) Visiting Professor, Centre de Physique Theorique, Luminy, Marseille, France
- 1990 (February—March) Visiting Professor, University of Rome "La Sapienza", Rome, Italy
- 1989 (October—November) Visiting Professor, Mathematical Institute of the Hungarian Academy of Sciences, Budapest, Hungary

## ***RESEARCH INTERESTS***

Mathematical physics, statistical physics, probability theory, random matrix models, quantum mechanics and quantum chaos, random polynomials, renormalization group, critical phenomena and phase transitions, lattice point problems, semiclassical asymptotics.

## ***HONORS & AWARDS***

- 1965 1st prize at the VIII-th International Mathematical Olympiad, Berlin, Germany
- 1973 The Keldysh Institute Prize, Moscow, USSR

Awarded for research on ``Renormalization group and critical phenomena in Dyson's hierarchical models''

- 1990 Barecha Foundation Fellow, Tel Aviv, Israel
- 2000 Bernie Morrel Teaching Award, IUPUI, Indiana
- 2002 School of Science Research Award, IUPUI, Indiana
- 2005 Chancellor's Professor, IUPUI, Indiana

### ***JOURNAL EDITORSHIP***

- 1993-1996 Member of the Editorial Board of the *Journal of Statistical Physics*
- 2000-present Member of the Editorial Board of the journal *Mathematical Physics, Analysis and Geometry*
- 2007-present Member of the Editorial Board of the *Open Mathematics Journal*

### ***MEMBERSHIPS IN PROFESSIONAL ORGANIZATIONS***

- American Mathematical Society
- Moscow Mathematical Society, Russia
- International Association of Mathematical Physics

### ***RESEARCH GRANTS***

- 1996-1999 NSF Grant DMS-9623214 (\$61,386)
- 1997-1999 Purdue Research Foundation Grant
- 1999-2002 NSF Grant DMS-9970625 (\$73,311)
- 2004-2007 NSF Grant DMS 0354962 (\$141,000)

- 2005 NSF Grant to support American participants of the Program “*Renormalization in Mathematics and Mathematical Physics*”, the Fields Institute, Toronto, Canada, Fall Semester, 2005 (\$50,000)
- 2007-2011 NSF Grant DMS 0652005 (\$240,000)
- 2008-2010 NSF Grant to support American participants of the CRM-Montreal Thematic Program: Probabilistic Methods in Mathematical Physics (\$60,000)
- 2010-2013 NSF Grant DMS 0969254 (\$165,000)

## ***CONFERENCES, PROGRAMS ORGANIZED***

1. Co-chair (with A. Its) of the Organizing Committee for the *1996 AMS-SIAM-IMS Summer Research Conference on “Random Matrices, Statistical Mechanics, and Painlevé Transcendents”*, Mount Holyoke College, South Hadley, Massachusetts, June 23-27, 1996.
2. Co-chair (with A. Its) of the Organizing Committee for the Mathematical Science Research Institute (MSRI) *Special Program on “Random Matrix Models and Their Applications”*, MSRI, Berkeley, California, January-June, 1999.
3. Member of the Organizing Committee of the “*Introductory Workshop. Random Matrix Models and Their Applications*”, MSRI, Berkeley, California, January 19-23, 1999.
4. Member of the Organizing Committee of the workshop “*Random Matrices and Their Applications: Quantum Chaos, GUE Conjecture for Zeros of Zeta Functions, Combinatorics, and All That*”, MSRI, Berkeley, California, June 7-11, 1999.
5. Co-organizer (with A. Its and M. Burger) of the workshop on “*Combinatorial Aspects of Random Matrix Models*”, FIM, ETH-Zurich, Switzerland, May 14-19, 2001.
6. Co-organizer (with V. Kazakov and S. Zelditch) of the workshop on “*Large N Limits of U(N) Gauge Theory in Physics and Mathematics*”, CRM, University of Montreal, Canada, January 5-9.
7. Co-organizer (with M. Lyubich and M. Yampolsky) of the *Fields Institute Program on “Renormalization Group in Dynamical Systems and Mathematical Physics”*, the Fields Institute for Mathematical Sciences, Toronto, Canada, September-December, 2005.

8. Co-organizer (with D. Kreimer) of the workshop ``*Renormalization: from Local Interactions to Long Range Phenomena in Statistical Physics and Quantum Fields*'', the Fields Institute for Mathematical Sciences, Toronto, Canada, October 18-22, 2005.
9. Principal coordinator (together with John Harnad, Concordia University and CRM-Montreal, and Steve Zelditch, Johns Hopkins University, Baltimore) of the Thematic Program ``Probabilistic Methods in Mathematical Physics'', Centre de recherches mathématiques (CRM), Montréal, Canada, 2008-2009 (13 months).

## ***PROFESSIONAL SERVICE***

**Referee and Reviewer for:** *Annals of Mathematics, Annals of Physics, Asian Journal of Mathematics, Communications in Mathematical Physics, International Mathematical Research Notices, Journal of Differential Geometry, Journal of Mathematical Physics, Journal of Physics A: Mathematical and General, Journal of Statistical Physics, Letters in Mathematical Physics, Michigan Mathematical Journal, Nonlinearity, Physics Letters A, Probability Theory, Proceedings of the American Mathematical Society, Transactions of the American Mathematical Society, Abdus Salam Centre for Theoretical Physics (Trieste, Italy), Bilkent University (Ankara, Turkey), Commission des theses of Université Paris 7, Institute for Mathematics and Applications (Minneapolis, Minnesota), NATO Science Programme, Max Planck Institute (Leipzig, Germany), NSF Analysis Program, NSF Applied Mathematics Program, NSF Probability Program, Oxford University (Oxford, U.K.), University of Arizona (Tucson, Arizona), U.S. Civilian Research Development Foundation*

## ***PUBLICATIONS***

### ***Journal Articles***

1. P. Bleher, On operators depending meromorphically on a parameter. *Vestnik of the Moscow University, Math. Mech.*, 1969, **5**, 30--36.
2. P. Bleher and M. I. Vishik, On a class of pseudodifferential operators with infinite number of variables and its applications. *Math. Sbornik*, 1971, **86**, 3, 446--494.
3. P. Bleher and Ya. G. Sinai, Investigation of the critical point in models of the type of

- Dyson's hierarchical model. *Commun. Math. Phys.*, 1973, **33**, 23--42.
4. P. Bleher, Study of the second order phase transition in asymptotically hierarchical Dyson's models. *Uspechi Math. Nauk*, 1974, **29**, 1, 163--164.
  5. P. Bleher and Ya. Sinai, Critical exponents for systems with slowly decreasing interaction. *Journ. Experiment. Theor. Phys.*, 1974, **67**, 7, 391--396.
  6. P. Bleher and Ya. Sinai, Critical exponents for Dyson's asymptotically hierarchical models. *Commun. Math. Phys.*, 1975, **45**, 247--278.
  7. P. Bleher, Second order phase transition in some models of ferromagnetism. *Trans. Moscow Math. Soc.*, 1975, **33**, 155--222.
  8. P. Bleher, On second order phase transitions in Dyson's asymptotically hierarchical models. *Uspechi Math. Nauk*, 1977, **32**, 6, 243--244.
  9. P. Bleher and E. Zalyis, Existence of long-range order in the Migdal recursion equations. *Commun. Math. Phys.*, 1979, **67**, 17--42.
  10. P. Bleher, Inversion of Töplitz matrices. *Trans. Moscow Math. Soc.*, 1979, **40**, 207-- 240.
  11. P. Bleher, Analytic continuation of dual Feynman amplitudes. *Coll. Math. Soc. J. Bolyai*, **27**, Random Fields, 1979, 145--170.
  12. P. Bleher and M. Missarov, The equations of Wilson's renormalization group and analytic renormalization. I. General results. *Commun. Math. Phys.*, 1980, **74**, 235-- 254.
  13. P. Bleher and M. Missarov, The equations of Wilson's renormalization group and analytic renormalization. II. Solution of Wilson's equations. *Commun. Math. Phys.*, 1980, **74**, 255—272.
  14. P. Bleher, Analytic continuation of massless Feynman amplitudes in the Schwartz space  $S'$ . *Reports. Math. Phys.*, 1984, **19**, 119--144.
  15. P. Bleher and L. Csirmaz, About truth-tellers, liars and inscrutable people. *Középiskolai Matem. Lapok*, 1981, **62**, 4, 145--150.
  16. P. Bleher, Integration of functions in the space of complex number of dimensions. *Theor. Math. Phys.*, 1982, **50**, 3, 370--382.
  17. P. Bleher, On the Fisher-Hartwig conjecture in the theory of Töplitz matrices. *Funct. Analysis Its Appl.*, 1982, **16**, 2, 1--6.
  18. P. Bleher, Construction of non-Gaussian self-similar random fields with hierarchical structure. *Commun. Math. Phys.*, 1982, **84**, 557--578.
  19. P. Bleher, On a logical problem. *Discrete Math.*, 1983, **43**, 107--110.
  20. P. Bleher, Large deviations theorem in the vicinity of the critical point of the  $\phi^4$ -hierarchical model. *Theor. Probab. Its Appl.*, 1985, **30**, 3, 499--510.

21. P. Bleher and P. Major, Renormalization of Dyson's hierarchical vector-valued  $\phi^4$ -model at low temperatures. *Commun. Math. Phys.*, 1985, **95**, 487--532.
22. P. Bleher, On the stability of a plasma column with hollow current. *Physics of Plasma*, 1984, **10**, 3, 493--503.
23. P. Bleher, Phase separation phenomenon in the  $\phi^4$ -hierarchical model. *Theor. Math. Phys.*, 1984, **11**, 226--240.
24. P. Bleher, On the Alfvén eigen-oscillations of inhomogeneous plasma. *Physics of Plasma*, 1985, **11**, 4, 439--445.
25. P. Bleher, L. Bogomolov and L. Zakharov, Stability conditions for kink and tearing modes in tokamaks. *Nuclear Fusion*, 1987, **27**, 2, 241--253.
26. P. Bleher and P. Major, Critical phenomena and universal exponents in statistical physics. On Dyson's hierarchical model. *Annals of Probab.*, 1987, **15**, 2, 431--477 (Special Invited Paper).
27. P. Bleher and M. Missarov, Invariant manifolds of the Wilson renormalization group. *Theor. Math. Physics*, 1988, **74**, 2, 203--209.
28. P. Bleher and P. Major, The large-scale limit of Dyson's hierarchical vector-valued model at low temperatures. The non-Gaussian case. I. Limit theorem for the average spin. *Ann. Inst. H. Poincaré*, 1988, **49**, 1, 1--85.
29. P. Bleher and P. Major, The large-scale limit of Dyson's hierarchical vector-valued model at low temperatures. The non-Gaussian case. II. Description of the large-scale limit. *Ann. Inst. H. Poincaré*, 1988, **49**, 1, 87--143.
30. P. Bleher and E. Žalys, Limit Gibbs distributions for the Ising model on hierarchical lattices. *Lithuanian Math. Sbornik*, 1988, **27**, 2, 47--60.
31. P. Bleher and E. Žalys, Asymptotics of the susceptibility for the Ising model on the hierarchical lattices. *Commun. Math. Phys.* 1989, **120**, 409--436.
32. P. Bleher and P. Major, The large-scale limit of Dyson's hierarchical vector-valued model at low temperatures. The marginal case  $c = \sqrt{2}$ . *Commun. Math. Phys.*, 1989, **125**, 43--69.
33. P. Bleher and A. Kerimov, The Dyson hierarchical model with random external field at high temperatures. *Trans. Moscow Math. Soc.*, 1990.
34. P. Bleher, Extremity of the disordered phase in the Ising model on the Bethe lattice. *Commun. Math. Phys.*, 1990, **128**, 2, 411--419.
35. P. Bleher and N. Ganihodgaev, On pure phases of the Ising model on the Bethe lattices. *Theor. Probab. Its Appl.*, 1990, **35**, 2, 1--26.
36. P. Bleher, Estimates of Green functions of difference operators in arbitrary domains and their applications. *Sel. Math. Soviet.*, 1990, **8**, 4, 303--321.



37. P. Bleher, The energy level spacing for two harmonic oscillators with golden mean ratio of frequencies. *Journ. Statist. Phys.*, 1990, **61**, 3/4, 869--876.
38. P. Bleher, The Bethe lattice spin glass at zero temperature. *Ann. Inst. H. Poincaré*, 1991, **54**, 1, 89--113.
39. P. Bleher, The energy level spacing for two harmonic oscillators with generic ratio of frequencies. *Journ. Statist. Phys.*, 1991, **63**, 1/2, 261--283.
40. P. Bleher and M. Lyubich, The Julia sets and complex singularities in hierarchical Ising models. *Commun. Math. Phys.*, 1992, **141**, 453--474.
41. P. Bleher, Statistical properties of two-dimensional periodic Lorentz gas with infinite horizon. *Journ. Statist. Phys.*, 1992, **66**, 1/2, 315--373.
42. P. Bleher, J. Lebowitz and E. Speer, Existence and positivity of solutions of a fourth order nonlinear PDE describing interface fluctuations. *Commun. Pure and Appl. Math.*, 1994, **47**, 923--942.
43. P. Bleher, H. Jauslin and J. Lebowitz, Floquet spectrum for two--level systems in quasiperiodic time dependent fields. *Journ. Statist. Phys.*, 1992, **68**, 1/2, 271--310.
44. P. Bleher, On the distribution of the number of lattice points inside a family of convex ovals. *Duke Math. Journ.*, 1992, **67**, 3, 461--481.
45. P. Bleher, Statistical properties of 2D periodic Lorentz gas with infinite horizon, *Helvetica Physica Acta*, **65**, 2/3, 475--476 (1992).
46. P. Bleher, Z. Cheng, F. Dyson, and J. Lebowitz, Distribution of the error term for the number of lattice points inside a shifted circle, *Commun. Math. Phys.*, 1993, **154**, 433--469.
47. P. Bleher, Distribution of the error term in the Weyl asymptotics for the Laplace operator on a two-dimensional torus and related lattice problems, *Duke Math. Journ.*, 1993, **70**, 3, 655--682.
48. P. Bleher and F. Dyson, The variance of the error function in the shifted circle problem is a wild function of the shift, *Commun. Math. Phys.*, 1994, **160**, 3, 493--505.
49. P. Bleher and F. Dyson, Mean square value of exponential sums related to representation of integers as sum of two squares, *Acta Arith.*, 1994, **68**, 4, 71--84.
50. P. Bleher and J. Lebowitz, Energy--level statistics of model quantum systems: Universality and scaling in a lattice--point problem, *Journ. Statist. Phys.*, 1994, **74**, 1/2, 167--217.
51. P. Bleher, Distribution of energy levels of a quantum free particle on a surface of revolution, *Duke Math. Journ.*, 1994, **74**, 1, 45--93.
52. P. Bleher, F. Dyson and J. Lebowitz, Non--Gaussian energy level statistics for some integrable systems, *Phys. Rev. Lett.*, 1993, **71**, 19, 3047--3050.

53. P. Bleher, Semiclassical quantization rules near separatrices, *Commun. Math. Phys.*, 1994, **165**, 3, 621--640.
54. P. Bleher and F. Dyson, Mean square limit for lattice points in a sphere, *Acta Arithm.*, 1994, **68**, 4, 383--393.
55. P. Bleher, D. Kosygin and Ya. Sinai, Distribution of energy levels of quantum free particle on the Liouville surface and trace formulae, *Commun. Math. Phys.*, 1995, **170**, 375--403.
56. P. Bleher and J. Lebowitz, Variance of number of lattice points in random narrow elliptic strip, *Ann. Inst. H. Poincaré: Probabilités et Statistiques*, 1995, **31**, 1, 27--58.
57. P. Bleher, J. Ruiz and V. Zagrebnov, On the purity of the limiting Gibbs state for the Ising model on the Bethe lattice, *Journ. Statist. Phys.*, 1995, **79**, 1/2, 473--482.
58. P. Bleher, J. Ruiz and V. Zagrebnov, One--Dimensional Random Field Ising Model: Gibbs States and Structure of Ground States, *Journ. Statist. Phys.*, 1996, **84**, 5/6, 1077--1093.
59. P. Bleher and X. Di, Correlations between zeros of a random polynomial. *Journ. Statist. Phys.*, 1997, **88**, 1/2, 269--305.
60. P. Bleher and M. Kelbert, All sorts of sorting. *Quantum*, 1997, **7**, no. 6, 13--17.
61. P. Bleher, J. Ruiz and V. Zagrebnov, On the phase diagram of the random field Ising model on the Bethe lattice. *Journ. Statist. Phys.*, 1998, **93**, 1/2, 33--78.
62. P. Bleher and A. Its, Semiclassical asymptotics of orthogonal polynomials, Riemann-Hilbert problem, and universality in the matrix model. *Annals of Mathematics*, 1999, **150**, 185-266.
63. P. Bleher, B. Schifman and S. Zelditch, Poincaré-Lelong approach to universality and scaling of correlations between zeros. *Commun. Math. Phys.*, 2000, **208**, 771--785.
64. P. Bleher, B. Schifman and S. Zelditch, Universality and scaling of correlations between zeros on complex manifolds. *Inventiones Mathematicae*, 2000, **142**, 351--395.
65. P. Bleher, B. Schifman and S. Zelditch, Correlations between zeros and supersymmetry. *Commun. Math. Phys.*, 2001, **224**, 255-269.
66. P. Bleher, J. Ruiz, R. H. Schonmann, S. Shlosman, and V. Zagrebnov, Rigidity of the critical phases on a Cayley tree. *Moscow Math. Journ.*, 2001, **1**, 345-363.
67. P. Bleher and D. Ridzal, SU(1,1) random polynomials. *Journ. Statist. Phys.*, 2002, **106**, 147-171.
68. P. Bleher and A. Its, Double scaling limit in the random matrix model: the Riemann- Hilbert approach. *Commun. Pure Appl. Math.* **LVI** (2003) 433--516.
69. P. Bleher and B. Eynard, Double scaling limit in random matrix models and a nonlinear hierarchy of differential equations. *J. Phys. A: Math. Gen.* **36** (2003) 3085--3105.

70. P.M. Bleher and A.B.J. Kuijlaars, Random matrices with external source and multiple orthogonal polynomials. *Int. Math. Res. Not.*, No. 3 (2004) 109--129.
71. Pavel M. Bleher and Xiaojun Di, Correlations between zeros of non-Gaussian random polynomials. *Int. Math. Res. Not.*, No. 46 (2004) 2443--2484.
72. P.M. Bleher and A.B.J. Kuijlaars, Large  $n$  limit of Gaussian random matrices with external source, part I. *Commun. Math. Phys.*, **252** (2004) 43--76.
73. P.M. Bleher and A.B.J. Kuijlaars, Integral representations for multiple Hermite and multiple Laguerre polynomials. *Ann. Inst. Fourier.*, **55**, 6 (2005) 2001--2014.
74. A.I. Aptekarev, P.M. Bleher, and A.B.J. Kuijlaars, Large  $n$  limit of Gaussian random matrices with external source, part II. *Commun. Math. Phys.*, **259** (2005), 367--389.
75. Pavel Bleher and Alexander Its, Asymptotics of the partition function of a random matrix model, *Ann. Inst. Fourier.*, **55**, 6 (2005), 1943--2000.
76. Pavel Bleher and Vladimir Fokin, Exact solution of the six-vertex model with domain wall boundary conditions. Disordered phase. *Commun. Math. Phys.*, **268** (2006), 223—284.
77. Pavel Bleher and Robert Mallison Jr., Zeros of sections of exponential sums. *Internat. Math. Res. Notices*, **2006** (2006), ID 38937, 1—49.
78. P.M. Bleher and A.B.J. Kuijlaars, Large  $n$  limit of Gaussian random matrices with external source, part III: Double scaling limit. *Commun. Math. Phys.*, **270** (2007), 481—517.
79. P. Bleher and K. Liechty, Exact solution of the six-vertex model with domain wall boundary conditions. Ferroelectric phase. *Commun. Math. Phys.*, **286** (2009), 777---801.
80. P. Bleher and K. Liechty, Exact solution of the six-vertex model with domain wall boundary conditions. Critical line between disordered and ferroelectric phases. *J. Statist. Phys.*, **134** (2009), 463--485.
81. P. Bleher, Lectures on random matrix models. The Riemann-Hilbert approach. arXiv:0801.1858.
82. P. Bleher, Exact Solution of the Six-Vertex Model with Domain Wall Boundary Conditions, *Proceedings of ICMP 2006, Rio de Janeiro Brazil, 2009*.
83. P. Bleher and K. Liechty, Exact solution of the six-vertex model with domain wall boundary conditions. Antiferroelectric phase. *Commun. Pure Appl. Math.*, **63** (2010), 779—829.
84. P. Bleher and K. Liechty, Uniform asymptotics for discrete orthogonal polynomials with respect to varying exponential weights on a regular infinite lattice. *Int. Math. Res. Not. IMRN* **2011** no. 2, 342—386.
85. P. Bleher, A. Kuijllars, and S. Delvaux, Random matrix model with external source and a constrained vector equilibrium problem. *Communications on Pure and Applied Mathematics*, **64** (2011), 116–160.

86. P. Bleher and A. Deaño, Topological expansion in the cubic random matrix model, arXiv:1011.6338
87. P. Bleher, Critical phenomena in the Dyson hierarchical model and renormalization group, arXiv:1010.5855
88. Pavel Bleher, Mikhail Lyubich, and Roland Roeder, Lee-Yang zeros for DHL and 2D rational dynamics, I. Foliation of the physical cylinder, arXiv:1009.4691
89. Pavel M. Bleher and Arno B.J. Kuijlaars, Orthogonal polynomials in the normal matrix model with a cubic potential, arXiv:1106.6168
90. Pavel M. Bleher, Youkwo Honna, Lyndon L. Ji, Roland K. W. Roeder, Jeffrey D. Shen, Nearest neighbor distances on a circle: multidimensional case, arXiv:1107.4134
91. Pavel Bleher, Mikhail Lyubich, and Roland Roeder, Lee-Yang zeros for DHL and 2D rational dynamics, II. Global pluripotential interpretation, arXiv:1107.5764

***Special Lecture Notes (Refereed in Review Mathematical Journals)***

1. P. Bleher, Investigation of a vicinity of the critical point in models of the type of Dyson's hierarchical models. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1973, No. 45.
2. P. Bleher, Critical exponents for long-range models (numerical results). Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1975, No. 3.

3. P. Bleher, Determinants of degenerate Töplitz matrices. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1975, No. 27.
4. P. Bleher, Numerical solution of the equations of the Migdal renormalization group. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1976, No. 48.
5. P. Bleher, Boundary renormalization groups. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1976, No. 87.
6. P. Bleher, Numerical construction of eigenfunctions of two-dimensional Schrödinger operator with periodic potential. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1978, No. 1.
7. P. Bleher, Estimates of Green's functions in domains of arbitrary shape and their applications. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1981, No. 167.
8. P. Bleher, N. Zueva and E. Yurchenko, To the theory of the helical instability in tokamaks. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1981, No. 144.
9. P. Bleher, N. Zueva and E. Yurchenko, Influence of the current profile on the helical instability of the plasma column with free boundary. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1982, No. 106.
10. P. Bleher, N. Zueva and E. Yurchenko, To the theory of the tearing instability of a plasma column. I. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1982, No. 106.
11. P. Bleher, N. Zueva and E. Yurchenko, To the theory of the tearing instability of a plasma column. II. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1982, No. 149.
12. P. Bleher and N. Zueva, Investigation of the spectrum of the linearized Kadomtsev-Pogutse equations. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1984, No. 37.
13. P. Bleher and N. Zueva, On the desruption instability in tokamak. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1984, No. 115.
14. P. Bleher and N. Zueva, Computer simulation of the stochastization of magnetic islands. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1987, N 12.
15. P. Bleher, M. Mikhailova and N. Zueva, Mathematical modelling of nonlinear interaction of chains of magnetic islands. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1988, No. 10.
16. P. Bleher, M. Mikhailova and N. Zueva, Computer simulation of bifurcations of magnetic islands. Preprint, Inst. Appl. Math., USSR Acad. of Sci., 1988, No. 151.

## Book Chapters

1. P. Bleher and M. I. Vishik, Differential and pseudodifferential operators with infinite number of independent variables and their applications. In: *Mechanics of continuous medium and related problems of analysis*. 1972, Nauka, Moscow, pp. 53-61.
2. P. Bleher, The  $\varepsilon$ -expansion for self-similar random fields. In: *Adv. Probab. Related Topics. Vol. 6. Multicomponent random systems*, Eds. R. L. Dobrushin Ya. G. Sinai, Dekker, N.Y., Basel, 1980, pp. 59--117.
3. P. Bleher and D. Surgailis, Self-similar random fields. In: *Theory of Probab. , Math. Statist., Theor. Cybern. Vol. 20 (Achievements of Sci. Techn. VINITI, USSR Acad. of Sci.)*, Moscow, 1983, pp. 3--52.
4. P. Bleher, The Maxwell rule and phases separation in the hierarchical vector-valued  $\varphi^4$ -model. In: *Statist. Phys. Dynam. Systems. Rigorous results. Progress in Physics. Vol. 10.*, Eds. J. Fritz, A. Jaffe, D. Szász, Birkhauser, Boston e.a., 1985, pp. 329--345.
5. P. Bleher and M. Jakobson, Absolutely continuous invariant measures for some maps of the circle. In: *Statist. Phys. Dynam. Systems. Rigorous results. Progress in Physics. Vol. 10.*, Eds. J. Fritz, A. Jaffe, D. Szász, Birkhauser, Boston e.a., 1985, pp. 303--315.
6. P. Bleher, The Thouless effect in the hierarchical model. In: *VIII Int. Congress on Math. Phys., July, 16--25, 1986, Marseille, France*, Eds. M. Mebkhout, R. Sénéor, World Sci. Publ., 1987, pp. 786--788.
7. P. Bleher, Symmetry breaking in the classical N-vector hierarchical model. In: *VIII Int. Congress on Math. Phys., July, 16--25, 1986, Marseille, France*, Eds. M. Mebkhout, R. Sénéor, World Sci. Publ., 1987, pp. 789--795.
8. P. Bleher, Limit theorems for multicomponent hierarchical models. In: *Probab. Theory Math. Statist. Proc. IV. Vilnius Conf., Vilnius, USSR, June, 24--29, 1985*. Eds. Yu. V. Prokhorov e.a., VNU Sci. Press, Utrecht, The Netherlands, 1987, pp. 211--230.
9. P. Bleher and P. Major, Limit theorems in statistical physics. On Dyson's hierarchical model. In: *Proc. 1st World Congress of Bernoulli Soc.*, 1987, VNU Press.
10. P. Bleher, The renormalization group on hierarchical lattices. In: *Stoch. Methods in Maths. Physics. XXIV. Karpacz Winter School on Theor. Physics. Karpacz, Poland, 13--27 Jan., 1988*. Eds. R. Gielerek, W. Karwowski. World Sci., Singapore e.a., 1989, pp. 171--201.
11. P. Bleher and P. Major, Renormalization of Dyson's vector-valued hierarchical model at low temperatures. In: *Probab. Theory Math. Statist. Proc. V. Vilnius Conf., Vilnius, USSR, June, 26 --- July, 1, 1989*.
12. P. Bleher, Statistical properties of a particle moving in a periodic scattering billiard. In: *Stochastic Methods in Experimental Sciences. Proc. 1989 COSMEX Meeting, Sklarska Poreba, Poland 8--14 Sept. 1989*. Eds. W. Kasprzak, A. Weron. World Sci. Singapore e.a. 1990, 43--58.

13. P. Bleher, Quasi-classical expansions and the problem of quantum chaos. *Lecture Notes in Mathematics*, 1991, **1469**, 60--89.
14. P. Bleher, Distribution of energy levels in quantum systems with integrable classical counterpart. Rigorous results. *Proceedings of the X-th IAMP Conference, Leipzig, 1991*, Springer-Verlag, 1992.
15. P. Bleher and P. Major, Phase--transition in statistical physical models with discrete and continuous symmetries, In: *IMA Volumes in Mathematics and its Application 46, New Directions in Time Series Analysis, Part II*. Eds. P. Caines, J. Geweke, M. Taqqu, Springer-Verlag, 1992.
16. P. Bleher and J. Bourgain, Distribution of the Error Term for the Number of Lattice Points Inside a Shifted Ball. *Analytic number theory, Vol. 1 (Allerton Park, IL, 1995)*, 141--153, *Progr. Math. 138*, Birkhauser Boston, Boston, MA, 1996.
17. P. Bleher, Trace formula for quantum integrable systems, lattice-point problem, and small divisors. In: *Emerging Applications of Number Theory. The IMA volumes in mathematics and its applications*; v. **109**, pp. 1--38. Eds. D. Hejhal, J. Friedman, M. Gutzwiller, and A. Odlyzko. Springer-Verlag, N.Y. e.a., 1999.
18. P. Bleher, Universality and scaling in random matrix models and random polynomials. In: *Mathematical Results in Statistical Mechanics. Marseille Conference, 1998*, pp. 379--398. Eds. S. Miracle-Sol'e, J. Ruiz, and V. Zagrebnov. World Scientific, Singapore e.a., 1999.
19. P. Bleher and A. Its, On asymptotic analysis of orthogonal polynomials via the Riemann-Hilbert method. In: *Symmetries and Integrability of Difference Equations. London Math. Soc. Lect. Notes Series 255*, pp. 165--177. Eds. P. A. Clarkson and F. W. Nijhoff. Cambridge University Press, Cambridge, 1999.
20. P. Bleher, B. Schifman and S. Zelditch, Universality and scaling of zeros on symplectic manifolds, *Random matrix models and their applications, 31-69, Math. Sci. Res. Inst. Publ., 40*, Eds. Pavel Bleher and Alexander Its, Cambridge University Press, Cambridge, 2001.
21. P. Bleher, Lectures on random matrix models. The Riemann-Hilbert approach. CRM volume on "Random Matrices and Their Applications", Ed. J. Harnad, Springer, 2011.

### **Books and Monographs**

P. M. Bleher & A. R. Its (editors), *Random Matrix Models and Their Applications*, Math. Sci. Res. Inst. Publ., 40, Cambridge Univ. Press, Cambridge, 2001. x+438 pp.

## *Manuscripts*

1. P. Bleher, Investigation of the second order phase transitions in some models of ferromagnetism. PhD Thesis, Keldysh Inst. Appl. Math., USSR Acad. of Sci., 1973.
2. P. Bleher, Limit theorems with asymptotics of large deviations for strongly dependent random variables. Thesis of the Doctoral Habilitation Dissertation, Vilnius University, 1984.
3. P. Bleher and P. Major, On a conjecture of Dyson. Preprint, 2002 (math-ph/0201014).

## ***INVITED LECTURES, ADDRESSES AND PRESENTATIONS (AFTER 1997)***

### **1997**

1. "Quantum Chaos and Universality of Correlations between Zeros of a Random Polynomial", Seminar in Mathematical Physics, Center for Theoretical Physics, Luminy-Marseille, France, June 19, 1997
2. "Universality in Matrix Model, Asymptotics of Orthogonal Polynomials, and the Riemann-Hilbert Problem", Program on "Disordered Systems and Quantum Chaos", University of Cambridge, the Isaac Newton Institute for Mathematical Sciences, Cambridge, U.K., August 20, 1997
3. "Trace Formula for Quantum Integrable Systems, Lattice-Point Problem, and Small Divisors", Seminar in Probability and Ergodic Theory, Department of Mathematics, Ohio State University, Columbus, November 11, 1997
4. "Scaling Limits and Universality in the Matrix Model" (Special Invited Talk) Conference "Probability and Analysis in the Context of Mathematical Physics and Biology" Mathematisches Forschungsinstitut Oberwolfach, Germany, December 18, 1997

### **1998**

1. "Universality in Matrix Model, Asymptotics of Orthogonal Polynomials, and the Riemann-Hilbert Problem", AMS meeting, Davis, California, April 25, 1998
2. "Quantum Chaos and Universality of Correlations between Zeros of a Random Polynomial", Seminar in Analysis, Johns Hopkins University, May 14, 1998
3. "Universality and Scaling in Matrix Models", Conference on Mathematical Physics,



Luminy-Marseille, France, July 30, 1998

4. "Universality and Scaling in the Theory of Random Polynomials", AMS meeting, Tucson, Arizona, November 13, 1998
5. "Universality and Scaling in Matrix Models", Seminar in Analysis, Johns Hopkins University, December 3, 1998

## 1999

1. "Universality and Scaling in the Theory of Random Polynomials", Workshop "Random Matrices, Statistical Mechanics, and Integrable Systems", MSRI, Berkeley, February 26, 1999
2. "Universality in Matrix Model, Asymptotics of Orthogonal Polynomials, and the Riemann-Hilbert Problem. I", MSRI Lecture Series, MSRI, Berkeley, March 11, 1999
3. "Universality in Matrix Model, Asymptotics of Orthogonal Polynomials, and the Riemann-Hilbert Problem. II", MSRI Lecture Series, MSRI, Berkeley, March 18, 1999
4. "Random Polynomials", Barry Simon's seminar in mathematical physics, Caltech, April 14, 1999
5. "Universality and Scaling in the Theory of Random Polynomials", Colloquium, University of California Irvine, April 22, 1999
6. "Quantum Chaos and Universality of Correlations between Zeros of a Random Polynomial", Colloquium, California Polytechnic Institute, May 14, 1999
7. "Universality and Scaling in the Theory of Random Polynomials", Colloquium, University of California, Davis, May 24, 1999
8. "Double Scaling Limit in Random Matrix Models", PennState -- University of Maryland Conference on Dynamical Systems, University Park, October 21, 1999

## 2000

1. "Universality and Scaling of Correlations between Zeros on Complex Manifolds", Workshop on Isomonodromic Deformations and Applications in Physics, Centre de Recherches Mathématiques, Université de Montréal, May 5, 2000
2. "Universality and Scaling on Complex Manifolds", Analysis Seminar, ETH-Zurich, Switzerland, May 16, 2000
3. "Universality and Scaling on Complex Manifolds", Conference in Mathematical Physics, Centre de Physique Théorique, Marseille-Luminy, June 30, 2000.

## 2001

1. "Universality of Correlations between Zeros on Complex Manifolds", Ecole Normale Supérieure, Paris, France, March 29, 2001.
2. "Universality and Scaling in the Theory of Random Polynomials", Seminar on Mathematical Physics, University Paris VII, Paris, France, June 5, 2001.
3. "Double Scaling Limit in the Matrix Model: Riemann-Hilbert Approach", the Claude Itzykson Conference, CEA-Saclay, France, June 19, 2001.
4. "Scaling and Double Scaling Limits in Matrix Models. I", Centre de Recherches Mathématiques, Université de Montréal, Canada, August 25, 2001.
5. "Scaling and Double Scaling Limits in Matrix Models. II", Centre de Recherches Mathématiques, Université de Montréal, Canada, August 26, 2001.
6. "Scaling and Double Scaling Limits in Matrix Models. III", Centre de Recherches Mathématiques, Université de Montréal, Canada, August 27, 2001.

## 2002

1. "Universality and Scaling of Random Zeros on Complex Manifolds". Conference "Probability and Statistics on Random Algebraic Structures", Mathematisches Forschungsinstitut Oberwolfach, Germany, March 18, 2002
2. "Scaling and Double Scaling Limits in Matrix Models", AMS Meeting, Université de Montréal, Canada, May 5, 2002.
3. "Double Scaling Limit in Matrix Models: Riemann-Hilbert Approach". Workshop "Special Functions in the Digital Age", IMA, University of Minnesota, July 24, 2002.
4. "Critical Phenomena in Random Matrix Models". Workshop "Recent Advances in Random Matrix Theory", MSRI, UC Berkeley, September 25, 2002.

## 2003

1. "Double scaling limit and universality in random matrix models". Program "Semiclassical Asymptotics in Mathematical Physics" at MSRI, Berkeley, May 7, 2003.

2. ``Double scaling limit and universality in random matrix models: Riemann-Hilbert approach". Program "Interaction and Growth in Complex Stochastic Systems" at the Isaac Newton Institute for Mathematical Sciences, Cambridge, England, September 12, 2003.
3. ``Random matrices with external source and multiple orthogonal polynomials". Seminar on mathematical physics, University of Bristol, England, September 14, 2003.
4. ``Random matrices with external source and multiple orthogonal polynomials". Workshop on "Random Matrices", Gregynog, Wales, September 15-19, 2003.
5. ``Random matrices with external source: Riemann-Hilbert approach". Conference on ``Statistical Physics" dedicated to Freeman Dyson on the occasion of his 80th birthday, Rutgers University, New Jersey, December 14-16, 2003.

## 2004

1. ``Large  $N$  limit in the random matrices with external source". Workshop on ``Large  $N$  Limits of  $U(N)$  Gauge Theory in Physics and Mathematics", CRM Montreal, Canada, January 5-9, 2004.
2. ``Double scaling limit in random matrix models''. Colloquium at the Department of Mathematics of Keio University, Yokohama, Japan, February 1, 2004.
3. ``Large  $N$  limits in random matrix models"Conference on ``Spectral Geometry, Asymptotic Analysis and Related Topics", February 3-5, 2004, Keio University, Yokohama, Japan, February 3-5, 2004.
4. ``Scaling and universality of zeros in non-Gaussian ensembles of random polynomials". Conference on ``Asymptotic and Effective Results in Complex Geometry". In honor of Bernard Shiffman's 60th Birthday. Johns Hopkins University. March 15-21 2004.
5. ``Zeros of random polynomials'', Colloquium, College of William and Mary, April 21, 2004
6. ``Random matrix models with external source and multiple orthogonal polynomials, Colloquium, College of William and Mary, April 22, 2004
7. ``Zeros of random polynomials: scaling limits and universality". World Congress of Nonlinear Analysts, Orlando, July 1-7, 2004.
8. ``Double scaling limit in random matrix models". Special Seminar in Mathematical Physics, Katholieke Universiteit Leuven, Belgium, July 20, 2004.
9. ``Double scaling limit in random matrix models and a nonlinear hierarchy of differential equations" . Colloquium, University of Illinois, Urbana-Champaign, December 2, 2004.

## 2005

1. “Large N asymptotics of the partition function of a random matrix model”, AMS Annual Meeting, Atlanta, Georgia, January 5, 2005.
2. “Large N limit of Gaussian random matrices with external source”, AMS Annual Meeting, Atlanta, Georgia, January 6, 2005.
3. “Large N limit in a random matrix model with external source”, Forschungsinstitut für Mathematik, ETH Zurich, Switzerland, May 17, 2005.
4. “Large N asymptotics in random matrices. The Riemann-Hilbert approach”, Centre de Recherches Mathématiques, Montreal, Canada, series of 5 lectures, June 27—July 2, 2005.
5. “The large N limit in random matrix models: the Riemann-Hilbert approach”, 3<sup>rd</sup> Pacific Rim Conference on Mathematics, Shanghai, China, August 18-23, 2005.
6. “Open problems in the theory of random matrix models”, Conference on Chaos and Disorder in Mathematics and Physics, dedicated to the 70<sup>th</sup> birthday of Yakov Sinai. Bressanone, Italy, September 23, 2005.
7. “Random matrix models: Riemann-Hilbert approach”, series of 3 lectures at the program “Renormalization in Mathematics and Mathematical Physics” at the Fields Institute Research in Mathematical Science, Toronto, Canada, October 10-15, 2005.
8. “Large N asymptotics in the six-vertex model with domain wall boundary conditions”, Conference in honor of Michael Jacobson’s 60<sup>th</sup> birthday, Penn State, University Park, October 16, 2005.
9. “Exact solution of the six-vertex model with domain wall boundary conditions”. Workshop “Renormalization in Mathematical Physics” at the Fields Institute Research in Mathematical Science, Toronto, Canada, October 18, 2005.
10. “Exact solution of the six-vertex model with domain wall boundary conditions”. Colloquium at Department of Mathematics of University of Toronto, October 26, 2005.

## 2006

1. “Critical behavior of Gaussian random matrices with external source”, AMS meeting at the University of Notre-Dame, April 8--9, 2006.
2. “Exact solution of the six-vertex model with domain wall boundary conditions”, 95-th Statistical Mechanics Conference dedicated to Michael

Aizenman, Charles Newman and Herbert Spohn, Rutgers University, New Brunswick, May 7--9, 2006.

3. "Exact solution of the six-vertex model with domain wall boundary conditions", Colloquium at Technion, Haifa, Israel, May 29, 2006.
4. "Spectral asymptotics", Seminar on mathematical physics, Tel-Aviv University, Ramat Aviv, Israel, May 30, 2006.
5. "Exact solution of the six-vertex model with domain wall boundary conditions", Colloquium at Tel-Aviv University, Ramat Aviv, Israel, June 5, 2006.
6. "Critical Behavior of Gaussian random matrices with external source", Annual Meeting of the Institute of Mathematical Statistics, IMPA, Rio de Janeiro, Brazil, August 4, 2006.
7. "Exact solution of the six-vertex model with domain wall boundary conditions", International Congress of Mathematical Physics, Rio de Janeiro, Brazil, August 10, 2006.
8. "Exact solution of the six-vertex model with domain wall boundary conditions", CIRM-Luminy Conference on Random Matrices, Luminy-Marseille, France, November 1, 2006.

## **2007**

1. "Exact solution of the six-vertex model with domain wall boundary conditions", Seminar on Mathematical Physics, CRM, Montreal, Canada, February 7, 2007.
2. "Random matrix models", Special seminar, Princeton University, March 14, 2007.
3. "Exact solution of the six-vertex model with domain wall boundary conditions", Colloquium, Princeton University, March 14, 2007.
4. "Critical behavior of Gaussian random matrices with external source", Seminar on "Ergodic Theory and Statistical Mechanics", Princeton University, March 15, 2007.
5. "Exact solution of the six-vertex model with domain wall boundary conditions", Seminar on "Statistical Mechanics and Mathematical Physics", Centre Physique Theorique, Luminy-Marseille, France, May 12, 2007.

6. “Random Matrix Models: Riemann-Hilbert Approach”, HYPATHIE, LATP - CPT - UMPA - ENS Lyon, Joint seminar on “Probability and Statistical Mechanics”, Institut de Mathématiques de Luminy, France, May 25, 2007.
7. “Exact solutions of the six-vertex model”, Conference on “Random and integrable models in mathematics and physics”, Brussels, Belgium, September 12, 2007.
8. “Exact solutions of the six-vertex model”, Joint Colloquium of Universities of Montreal, CRM, Montreal, Canada, December 1, 2007.

## 2008

1. “Exact solution of the six-vertex model with domain wall boundary conditions”, May 22, 2008, workshop “Combinatorics and statistical physics” at the Erwin Schrödinger International Institute for Mathematical Physics, Wien, Austria, May 19-30, 2008.
2. “Large N asymptotics in the six vertex model”, June 20, 2008, conference “Foundations of Computational Mathematics” at the City University of Hong Kong, June 16-23, 2008.
3. “Exact solution of the six-vertex model with domain wall boundary conditions”, July 5, 2008, workshop “Integrable quantum systems and solvable statistical mechanical models”, at CRM-Montréal, Canada, June 30-July 5, 2008.
4. Series of eight lectures on “Random matrix models and exactly solvable models of statistical mechanics” at the program on “Probabilistic Methods in Mathematical Physics”, CRM-Montréal, Canada, August-September, 2008.
5. “Exact solution of the six vertex model with domain wall boundary conditions”, October 17, 2008. Plenary talk. Conference ENIGMA 2008, Trieste, Italy.
6. Series of 14 lectures on “Random matrix models and statistical mechanics”, October-December, 2008, Katholieke Universiteit Leuven, Belgium.
7. “The arctic circle theorem in the six-vertex model”, November 21, 2008, Colloquium at the Katholieke Universiteit Leuven, Belgium.
8. “Zeros of sections of exponential sums”, December 3, 2008, Analysis Seminar at the Katholieke Universiteit Leuven, Belgium.

9. “Exact solutions of the six-vertex model”, December 14, 2008, 100th Statistical Mechanics Conference, Rutgers University, December 13 – 18, 2008.

## 2009

1. “The arctic circle theorem in the six-vertex model”, January 8, 2009, workshop “Random functions, random surfaces and interfaces” at Sainte-Adèle, Canada, January 5-9, 2009.
2. “Exact solution of the six-vertex model with domain wall boundary conditions”, Seminar of Probability, March 16, 2009, University of Toronto, Canada.
3. “Exact solution of the six-vertex model with domain wall boundary conditions”, Seminar of Mathematical Physics, May 13, 2009, University of Florence, Italy.
4. “Exact solution of the six-vertex model with domain wall boundary conditions. Antiferroelectric phase”, May 22, 2009, workshop of NEEDS (Nonlinear evolution equations and dynamical systems) 2009 16--23 May, Isola Rossa, Sardinia, Italy.
5. “Lee-Yang zeros for the diamond hierarchical lattice and 2D rational dynamics”, July 6, 2009, workshop “The renormalization group and statistical mechanics”, Pacific Institute for the Mathematical Sciences, University of British Columbia, Vancouver, Canada, July 6—10, 2009.
6. “Exact solution of the six-vertex model with domain wall boundary conditions. Antiferroelectric phase”, AMS meeting at the PennState University, October 23, 2009.

## 2010

1. “Random matrix model with external source and a constrained vector equilibrium problem”, AMS meeting at the University of Kentucky, Lexington, March 28, 2010.
2. “Uniform Asymptotics for Discrete Orthogonal Polynomials”, Joint Seminar on Applied Mathematics of University of Almeria and University of Granada, Almeria, Spain, May 20, 2010.
3. “Exact solution of the six-vertex model with domain wall boundary conditions”, Program on Random Matrix Theory, Interacting Particle

Systems and Integrable Systems, MSRI, September 8, 2010

4. "Exact solution of the six-vertex model with domain wall boundary conditions. Antiferroelectric phase", Workshop on "Random Matrix Theory and Its Applications", MSRI, September 17, 2010
5. "Topological expansion in the cubic random matrix model", Workshop on "Integrable and stochastic Laplacian growth in modern mathematical physics", Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Canada, November 1, 2010.

### **2011**

1. "Random matrix model with external source and a constrained vector equilibrium problem", Seminar on Mathematical Physics, University Paris VI, France, June 22, 2011.
2. "Random matrix model with external source and a constrained vector equilibrium problem", Workshop on "Special functions and orthogonal polynomials", Conference "Foundations of Computational Mathematics", Budapest, Hungary, July 4, 2011.

### ***PH.D. STUDENTS***

Elmundas Zalys	"Phase Transitions and Limit Theorems in Hierarchical Lattice Spin Systems with Continuous Symmetry", Vilnius State University, Lithuania, PhD 1982.
Mukadas Missarov	"Exact Solution of Equations of the Wilson Renormalization Group Theory", Moscow State University, PhD 1984 (co-supervisor with Ya. G. Sinai)
Xiaojun Di	"Zeros of random polynomials: Universality and scaling", Indiana University-Purdue University Indianapolis, PhD 2003.
Vladimir Fokin	"Six Vertex Model of Statistical Physics: Riemann-Hilbert Approach", IUPUI, Ph.D. 2005.



Robert Mallison            ``Large N Asymptotics of Zeros of Sections of Exponential Sums'',  
IUPUI, PhD 2007

Karl Liechty                ``Exact solutions to the six-vertex model with domain wall  
boundary conditions and uniform asymptotics of discrete  
orthogonal polynomials on an infinite lattice'', IUPUI, PhD 2010.

### ***UNDERGRADUATE RESEARCH ASSOCIATES***

David Lyvers                Independent Research Project on ``Combinatorics of Random  
Graphs'', 1998-1999

Anh-Thu Nguyen            Independent Research Project on ``Combinatorics of Random  
Graphs'', 1999

Bobby Ramsey             Independent Research Project ``Nonlinear String Equations:  
Numerical Solution'' 1998--2000

Denis Ridzal                Independent Research Project on ``Zeros of SU(2) Random  
Polynomials'' 1999--2001

Muris Ridzal                Independent Research Project on ``Combinatorics of Random  
Graphs'' 2000—2003

Tyler Zou                    Independent Research Project on “Geometric and probabilistic  
properties of 3D Lorentz gas”, 2006--2008

Xingping Shen             Independent Research Project on “Geometric and probabilistic  
properties of 3D Lorentz gas”, 2006—2007

Yokkow Homma             Independent Research Project on ``Multidimensional Diophantine  
approximations and the high energy gaps in quantum linear  
oscillators'', 2009--2010

Lyndon Ji                    Independent Research Project on ``Multidimensional Diophantine  
approximations and the high energy gaps in quantum linear  
oscillators'', 2009--2010

Jeffrey Shen                Independent Research Project on ``Multidimensional Diophantine  
approximations and the high energy gaps in quantum linear  
oscillators'', 2009--2010

### ***UNDERGRADUATE MATHEMATICAL CONTESTS***

### **Putnam Mathematical Competition**

1996—2002                      Coaching IUPUI teams for the William Lowell Putnam Mathematical Competition. In 1999 the IUPUI team, Joshua Mattes, Denis Ridzal and Bobby Ridzal was ranked 53-rd among the universities and colleges in North America

### **Indiana College Mathematical Competition**

1996—present                      Coaching IUPUI teams for the Indiana College Mathematical Competition. In 2002 the IUPUI team, Jon Landy, Bobby Ramsey and Muris Ridzal took the first place in ICMC. In 2003 the IUPUI team, Scott Pollam, Charles Tam and Robert Walsman, took the second place.

## **HIGH SCHOOL STUDENTS**

1998—present                      I am running class MATH491 at IUPUI, Seminar on Competitive Problem Solving. Students from different high schools, Carmel, Hamilton Southeastern, Central, Park Tudor, and others, attend the seminar, where they solve problems from past mathematical contests, AIME, USAMO, National and International Olympiads, and study number theory, geometry, algebra. The students from the class were successful in various state, regional and national competitions. Patrick Mihelich, Kenyon Hui, Charles Tam, Scott Pollam made several times to the USA Mathematical Olympiad, Jerry Wu to the National Science Olympiad. Jon Landy and Charles Tam were winners of the IUPUI high school contest. Jon Landy, Scott Pollam, Charles Tam contributed significantly to the success of the IUPUI team at the Indiana College Mathematical Competition.

2006                                  I was a mentor for the Siemens project “Long time correlations in the periodic Lorentz gas with infinite horizon” by Tyler Zou and Xingping Shen (Carmel High School). The project was selected as a finalist among 30 best team projects in the National Siemens Competition in Mathematics, Science, and Technology.

2010                                  I was a mentor (together with Roland Roeder) for the Siemens project “A Study of Nearest Neighbor Distances on a Circle: Multidimensional Case” by Jeffrey Shen (Park Tudor High School), Youkow Homma, and Lyndon Ji (Carmel High School). The project was awarded the 2<sup>nd</sup> prize in the National Siemens Competition in Mathematics, Science, and Technology. In addition, I was mentoring the research project of Caroline

Shouraboura, who became a semifinalist in the National Siemens Competition in Mathematics, Science, and Technology.