

---

## Index

- aging, 2, 41, 117
- annealed, 7–9, 121, 135, 138
- Bolthausen–Sznitman coalescent, 81, 84, 110–112
- Bouchaud’s trap model, 118, 119
- cavity method, 2, 3, 15, 19, 20, 64, 65, 73, 122
- chaos, 35, 77
- chaotic size dependence, 150, 156, 157, 165, 172
- chaotic temperature dependence, 159, 172
- chinese restaurant process, 111–113
- coalescent, 84, 106, 107, 109, 110, 112
- continuous state process, 81, 84, 85, 104, 108
- correlation inequalities, 5, 171
- CREM, 81, 85, 87, 88, 96, 97, 99, 103, 104, 106, 109, 110
- Cugliandolo–Kurchan’s equation, 135
- Curie–Weiss model, 4, 5, 150
- distribution of overlaps, 30, 51, 147
- dynamical phase transition, 117, 120, 129, 141
- dynamics, 2, 41, 51, 57, 58, 61, 117
- Edwards–Anderson model, 5, 46, 52
- Edwards–Anderson parameter, 131
- empirical distance distribution function, 86, 99, 101, 103, 104, 107, 110
- entropy, 4, 12, 146
- error-correcting code, 57
- experimental spin glass, 47
- free energy, 2, 4–9, 12, 15, 16, 23, 24, 28, 30, 37, 38, 40, 49, 51, 81, 83, 93, 99, 101, 132, 147, 155
- frustration, 5, 46, 47, 169
- Gaussian random variables, 5, 6, 20, 23, 24, 26, 31, 37, 82, 83, 87, 88, 90, 97, 99–101
- genealogical map, 103–107, 110
- genealogies, 81, 85, 103
- generalized random energy model, 2, 21, 26, 82
- Ghirlanda–Guerra identities, 75, 76, 84, 88, 96, 101, 103, 110
- Gibbs measures, 2, 5, 82, 84, 85, 103, 151
- Girsanov’s formula, 133, 138
- Glauber dynamics, 2, 120
- global variables, 145
- GREM, 26, 28, 30, 36–38, 81
- Guerra, 2, 3, 6, 8, 12, 14, 16, 21, 23, 30, 81
- Guerra’s bound, 2, 14, 18, 23, 30, 70
- Guerra’s broken replica-symmetry bound, 70
- Guerra’s interpolation, 2, 3, 6, 16, 21
- Guerra’s replica-symmetric bound, 66

- hamiltonian, 3, 6, 17, 19, 20, 23, 32, 37–40, 47–49, 53, 56, 57, 59, 64, 66, 71, 74, 77, 78, 82, 83, 87, 88, 91, 99, 119, 132, 147–149, 160
- high-temperature region, 8, 64, 65, 67
- Hopfield neural network, 56
- impurities, 45
- integro-differential equation, 119, 122, 134, 135, 141
- intensity measure, 24, 25, 86–88, 90
- (RKKY) interaction, 47
- Ising model, 4, 5, 54, 55, 119, 171
- itinerant spin glass, 53
- Jensen's inequality, 7
- Kahane's theorem, 100
- Langevin dynamics, 59, 117, 120, 121
- lattice spin-model, 3
- macrostates, 51, 57, 59
- magnetic alloys, 45, 56
- magnetization, 4, 47, 51, 146, 148–150
- mean-field model, 1, 3–5, 35, 55
- metastates, 35, 155, 168
- minority game, 60
- neural nets, 39
- Neveu's branching process, 81, 84, 85, 88, 103
- non-linear Kraichnan equation, 139
- optimization, 1, 39, 57
- order parameter, 46–48, 52, 59, 118, 120, 122, 131, 132, 148–151, 160, 162
- overlap, 6, 8, 15, 17, 20, 21, 27, 29, 31–33, 36, 38, 48, 51, 52, 56, 57, 64, 78, 95, 96, 121, 147, 150–154, 160, 162–166, 168
- Parisi, 7, 21, 23, 24, 26, 29, 30, 36, 39, 41, 51, 59, 72, 74, 79, 81, 82, 85, 147, 150, 155, 160, 162
- Parisi Ansatz, 12–14, 30, 50
- Parisi formula, 2, 13, 14, 20
- Parisi overlap distribution, 148, 160
- partition function, 3, 6, 17, 23, 27, 37, 40, 48, 53, 58, 82, 92, 97, 100
- Pastur, 2
- perceptron, 23, 39, 68
- percolation, 169–172
- point process of extremes, 87
- Poisson point process, 24, 25, 28, 86–88, 90
- Poisson–Dirichlet point process, 36
- pure states, 5, 16, 26, 35, 36, 147, 148, 150–152, 156, 159–162, 164–168, 172
- quenched, 7–9, 46, 47, 52, 53, 55–58, 60, 150, 152, 156
- random cluster percolation, 159
- random energy model, 3, 23, 27, 28, 42, 81–85, 87, 98, 103, 109, 119
- random overlap structures, 30
- replica, 1, 2, 8, 14, 30, 41, 48, 49, 52, 55–60, 75, 81, 82, 84, 85, 97, 98, 101, 102, 110, 147, 150, 159, 160, 162–166
- replica computation, 9
- replica symmetry breaking, 1, 2, 13–15, 50, 51, 55–57, 81, 85, 147, 159, 160, 166, 168
- replica-symmetric solution, 2, 13, 15, 19, 22
- Ruelle's probability cascades, 31, 88, 94, 96, 98, 102, 109, 111
- Shcherbina, 2
- Sherrington–Kirkpatrick model, 2, 6, 81, 120, 121, 132, 133, 141
- short-range models, 4, 148, 152, 153, 155, 162, 166, 168
- smart path method, 16
- spherical  $p$ -spin model, 117, 132
- spherical Sherrington–Kirkpatrick model, 119, 121
- spin glass, 1, 45, 63, 82, 84, 85, 88, 110, 117, 145, 159
- spin glass phase, 2, 51, 147, 153, 157, 160, 161, 168
- stochastic dynamics, 2, 60
- superadditivity, 8

- Talagrand, 2, 3, 7, 12–15, 19–21, 23,  
26, 36, 38–40, 81, 84, 98, 132–134,  
141, 142
- thermodynamic limit, 4, 46, 49, 95, 145,  
150, 156, 162–164
- ultrametric, 37, 75, 81, 82, 95,  
98, 99, 101, 102, 106, 120,  
142, 166
- ultrametricity, 2, 21, 35, 52, 60,  
75, 120

# Lecture Notes in Mathematics

For information about earlier volumes  
please contact your bookseller or Springer  
LNM Online archive: [springerlink.com](http://springerlink.com)

- Vol. 1703: R. M. Dudley, R. Norvaiša, Differentiability of Six Operators on Nonsmooth Functions and p-Variation (1999)
- Vol. 1704: H. Tamarai, Elliptic Genera and Vertex Operator Super-Algebras (1999)
- Vol. 1705: I. Nikolaev, E. Zhuzhoma, Flows in 2-dimensional Manifolds (1999)
- Vol. 1706: S. Yu. Pilyugin, Shadowing in Dynamical Systems (1999)
- Vol. 1707: R. Pytlak, Numerical Methods for Optimal Control Problems with State Constraints (1999)
- Vol. 1708: K. Zuo, Representations of Fundamental Groups of Algebraic Varieties (1999)
- Vol. 1709: J. Azéma, M. Émery, M. Ledoux, M. Yor (Eds.), Séminaire de Probabilités XXXIII (1999)
- Vol. 1710: M. Koecher, The Minnesota Notes on Jordan Algebras and Their Applications (1999)
- Vol. 1711: W. Ricker, Operator Algebras Generated by Commuting Projections: A Vector Measure Approach (1999)
- Vol. 1712: N. Schwartz, J. J. Madden, Semi-algebraic Function Rings and Reflectors of Partially Ordered Rings (1999)
- Vol. 1713: F. Bethuel, G. Huisken, S. Müller, K. Steffen, Calculus of Variations and Geometric Evolution Problems. Cetraro, 1996. Editors: S. Hildebrandt, M. Struwe (1999)
- Vol. 1714: O. Diekmann, R. Durrett, K. P. Hadeler, P. K. Maini, H. L. Smith, Mathematics Inspired by Biology. Martina Franca, 1997. Editors: V. Capasso, O. Diekmann (1999)
- Vol. 1715: N. V. Krylov, M. Röckner, J. Zabczyk, Stochastic PDE's and Kolmogorov Equations in Infinite Dimensions. Cetraro, 1998. Editor: G. Da Prato (1999)
- Vol. 1716: J. Coates, R. Greenberg, K. A. Ribet, K. Rubin, Arithmetic Theory of Elliptic Curves. Cetraro, 1997. Editor: C. Viola (1999)
- Vol. 1717: J. Bertoin, F. Martinelli, Y. Peres, Lectures on Probability Theory and Statistics. Saint-Flour, 1997. Editor: P. Bernard (1999)
- Vol. 1718: A. Eberle, Uniqueness and Non-Uniqueness of Semigroups Generated by Singular Diffusion Operators (1999)
- Vol. 1719: K. R. Meyer, Periodic Solutions of the N-Body Problem (1999)
- Vol. 1720: D. Elworthy, Y. Le Jan, X-M. Li, On the Geometry of Diffusion Operators and Stochastic Flows (1999)
- Vol. 1721: A. Iarrobino, V. Kanev, Power Sums, Gorenstein Algebras, and Determinantal Loci (1999)
- Vol. 1722: R. McCutcheon, Elemental Methods in Ergodic Ramsey Theory (1999)
- Vol. 1723: J. P. Croisille, C. Lebeau, Diffraction by an Immersed Elastic Wedge (1999)
- Vol. 1724: V. N. Kolokoltsov, Semiclassical Analysis for Diffusions and Stochastic Processes (2000)
- Vol. 1725: D. A. Wolf-Gladrow, Lattice-Gas Cellular Automata and Lattice Boltzmann Models (2000)
- Vol. 1726: V. Marić, Regular Variation and Differential Equations (2000)
- Vol. 1727: P. Kravanja M. Van Barel, Computing the Zeros of Analytic Functions (2000)
- Vol. 1728: K. Gatermann Computer Algebra Methods for Equivariant Dynamical Systems (2000)
- Vol. 1729: J. Azéma, M. Émery, M. Ledoux, M. Yor (Eds.) Séminaire de Probabilités XXXIV (2000)
- Vol. 1730: S. Graf, H. Luschgy, Foundations of Quantization for Probability Distributions (2000)
- Vol. 1731: T. Hsu, Quilts: Central Extensions, Braid Actions, and Finite Groups (2000)
- Vol. 1732: K. Keller, Invariant Factors, Julia Equivalences and the (Abstract) Mandelbrot Set (2000)
- Vol. 1733: K. Ritter, Average-Case Analysis of Numerical Problems (2000)
- Vol. 1734: M. Espedal, A. Fasano, A. Mikelić, Filtration in Porous Media and Industrial Applications. Cetraro 1998. Editor: A. Fasano. 2000.
- Vol. 1735: D. Yafaev, Scattering Theory: Some Old and New Problems (2000)
- Vol. 1736: B. O. Turesson, Nonlinear Potential Theory and Weighted Sobolev Spaces (2000)
- Vol. 1737: S. Wakabayashi, Classical Microlocal Analysis in the Space of Hyperfunctions (2000)
- Vol. 1738: M. Émery, A. Nemirovski, D. Voiculescu, Lectures on Probability Theory and Statistics (2000)
- Vol. 1739: R. Burkard, P. Deuffhard, A. Jameson, J.-L. Lions, G. Strang, Computational Mathematics Driven by Industrial Problems. Martina Franca, 1999. Editors: V. Capasso, H. Engl, J. Periaux (2000)
- Vol. 1740: B. Kawohl, O. Pironneau, L. Tartar, J.-P. Zolesio, Optimal Shape Design. Tróia, Portugal 1999. Editors: A. Cellina, A. Ornelas (2000)
- Vol. 1741: E. Lombardi, Oscillatory Integrals and Phenomena Beyond all Algebraic Orders (2000)
- Vol. 1742: A. Unterberger, Quantization and Non-holomorphic Modular Forms (2000)
- Vol. 1743: L. Habermann, Riemannian Metrics of Constant Mass and Moduli Spaces of Conformal Structures (2000)
- Vol. 1744: M. Kunze, Non-Smooth Dynamical Systems (2000)
- Vol. 1745: V. D. Milman, G. Schechtman (Eds.), Geometric Aspects of Functional Analysis. Israel Seminar 1999-2000 (2000)
- Vol. 1746: A. Degtyarev, I. Itenberg, V. Kharlamov, Real Enriques Surfaces (2000)
- Vol. 1747: L. W. Christensen, Gorenstein Dimensions (2000)
- Vol. 1748: M. Ruzicka, Electrorheological Fluids: Modeling and Mathematical Theory (2001)

- Vol. 1749: M. Fuchs, G. Seregin, Variational Methods for Problems from Plasticity Theory and for Generalized Newtonian Fluids (2001)
- Vol. 1750: B. Conrad, Grothendieck Duality and Base Change (2001)
- Vol. 1751: N. J. Cutland, Loeb Measures in Practice: Recent Advances (2001)
- Vol. 1752: Y. V. Nesterenko, P. Philippon, Introduction to Algebraic Independence Theory (2001)
- Vol. 1753: A. I. Bobenko, U. Eitner, Painlevé Equations in the Differential Geometry of Surfaces (2001)
- Vol. 1754: W. Bertram, The Geometry of Jordan and Lie Structures (2001)
- Vol. 1755: J. Azéma, M. Émery, M. Ledoux, M. Yor (Eds.), Séminaire de Probabilités XXXV (2001)
- Vol. 1756: P. E. Zhidkov, Korteweg de Vries and Nonlinear Schrödinger Equations: Qualitative Theory (2001)
- Vol. 1757: R. R. Phelps, Lectures on Choquet's Theorem (2001)
- Vol. 1758: N. Monod, Continuous Bounded Cohomology of Locally Compact Groups (2001)
- Vol. 1759: Y. Abe, K. Kopfermann, Toroidal Groups (2001)
- Vol. 1760: D. Filipović, Consistency Problems for Heath-Jarrow-Morton Interest Rate Models (2001)
- Vol. 1761: C. Adelmann, The Decomposition of Primes in Torsion Point Fields (2001)
- Vol. 1762: S. Cerrai, Second Order PDE's in Finite and Infinite Dimension (2001)
- Vol. 1763: J.-L. Loday, A. Frabetti, F. Chapoton, F. Goichot, Dialgebras and Related Operads (2001)
- Vol. 1764: A. Cannas da Silva, Lectures on Symplectic Geometry (2001)
- Vol. 1765: T. Kerler, V. V. Lyubashenko, Non-Semisimple Topological Quantum Field Theories for 3-Manifolds with Corners (2001)
- Vol. 1766: H. Hennion, L. Hervé, Limit Theorems for Markov Chains and Stochastic Properties of Dynamical Systems by Quasi-Compactness (2001)
- Vol. 1767: J. Xiao, Holomorphic  $Q$  Classes (2001)
- Vol. 1768: M.J. Pflaum, Analytic and Geometric Study of Stratified Spaces (2001)
- Vol. 1769: M. Alberich-Carramiñana, Geometry of the Plane Cremona Maps (2002)
- Vol. 1770: H. Gluesing-Luerssen, Linear Delay-Differential Systems with Commensurate Delays: An Algebraic Approach (2002)
- Vol. 1771: M. Émery, M. Yor (Eds.), Séminaire de Probabilités 1967-1980. A Selection in Martingale Theory (2002)
- Vol. 1772: F. Burstall, D. Ferus, K. Leschke, F. Pedit, U. Pinkall, Conformal Geometry of Surfaces in  $S^4$  (2002)
- Vol. 1773: Z. Arad, M. Muzychuk, Standard Integral Table Algebras Generated by a Non-real Element of Small Degree (2002)
- Vol. 1774: V. Runde, Lectures on Amenability (2002)
- Vol. 1775: W. H. Meeks, A. Ros, H. Rosenberg, The Global Theory of Minimal Surfaces in Flat Spaces. Martina Franca 1999. Editor: G. P. Pirola (2002)
- Vol. 1776: K. Behrend, C. Gomez, V. Tarasov, G. Tian, Quantum Cohomology. Cetraro 1997. Editors: P. de Bartolomeis, B. Dubrovin, C. Reina (2002)
- Vol. 1777: E. García-Río, D. N. Kupeli, R. Vázquez-Lorenzo, Osserman Manifolds in Semi-Riemannian Geometry (2002)
- Vol. 1778: H. Kiechle, Theory of K-Loops (2002)
- Vol. 1779: I. Chueshov, Monotone Random Systems (2002)
- Vol. 1780: J. H. Bruinier, Borcherds Products on  $O(2,1)$  and Chern Classes of Heegner Divisors (2002)
- Vol. 1781: E. Bolthausen, E. Perkins, A. van der Vaart, Lectures on Probability Theory and Statistics. Ecole d'Été de Probabilités de Saint-Flour XXIX-1999. Editor: P. Bernard (2002)
- Vol. 1782: C.-H. Chu, A. T.-M. Lau, Harmonic Functions on Groups and Fourier Algebras (2002)
- Vol. 1783: L. Grüne, Asymptotic Behavior of Dynamical and Control Systems under Perturbation and Discretization (2002)
- Vol. 1784: L.H. Eliasson, S. B. Kuksin, S. Marmi, J.-C. Yoccoz, Dynamical Systems and Small Divisors. Cetraro, Italy 1998. Editors: S. Marmi, J.-C. Yoccoz (2002)
- Vol. 1785: J. Arias de Reyna, Pointwise Convergence of Fourier Series (2002)
- Vol. 1786: S. D. Cutkosky, Monomialization of Morphisms from 3-Folds to Surfaces (2002)
- Vol. 1787: S. Caenepeel, G. Militaru, S. Zhu, Frobenius and Separable Functors for Generalized Module Categories and Nonlinear Equations (2002)
- Vol. 1788: A. Vasil'ev, Moduli of Families of Curves for Conformal and Quasiconformal Mappings (2002)
- Vol. 1789: Y. Sommerhäuser, Yetter-Drinfel'd Hopf algebras over groups of prime order (2002)
- Vol. 1790: X. Zhan, Matrix Inequalities (2002)
- Vol. 1791: M. Knebusch, D. Zhang, Manis Valuations and Prüfer Extensions I: A new Chapter in Commutative Algebra (2002)
- Vol. 1792: D. D. Ang, R. Gorenflo, V. K. Le, D. D. Trong, Moment Theory and Some Inverse Problems in Potential Theory and Heat Conduction (2002)
- Vol. 1793: J. Cortés Monforte, Geometric, Control and Numerical Aspects of Nonholonomic Systems (2002)
- Vol. 1794: N. Pytheas Fogg, Substitution in Dynamics, Arithmetics and Combinatorics. Editors: V. Berthé, S. Ferenczi, C. Mauduit, A. Siegel (2002)
- Vol. 1795: H. Li, Filtered-Graded Transfer in Using Non-commutative Gröbner Bases (2002)
- Vol. 1796: J.M. Melenk, hp-Finite Element Methods for Singular Perturbations (2002)
- Vol. 1797: B. Schmidt, Characters and Cyclotomic Fields in Finite Geometry (2002)
- Vol. 1798: W.M. Oliva, Geometric Mechanics (2002)
- Vol. 1799: H. Pajot, Analytic Capacity, Rectifiability, Menger Curvature and the Cauchy Integral (2002)
- Vol. 1800: O. Gabber, L. Ramero, Almost Ring Theory (2003)
- Vol. 1801: J. Azéma, M. Émery, M. Ledoux, M. Yor (Eds.), Séminaire de Probabilités XXXVI (2003)
- Vol. 1802: V. Capasso, E. Merzbach, B.G. Ivanoff, M. Dozzi, R. Dalang, T. Mountford, Topics in Spatial Stochastic Processes. Martina Franca, Italy 2001. Editor: E. Merzbach (2003)
- Vol. 1803: G. Dolzmann, Variational Methods for Crystalline Microstructure – Analysis and Computation (2003)
- Vol. 1804: I. Cherednik, Ya. Markov, R. Howe, G. Lusztig, Iwahori-Hecke Algebras and their Representation Theory. Martina Franca, Italy 1999. Editors: V. Baldoni, D. Barbasch (2003)
- Vol. 1805: F. Cao, Geometric Curve Evolution and Image Processing (2003)
- Vol. 1806: H. Broer, I. Hoveijn, G. Lunther, G. Vegter, Bifurcations in Hamiltonian Systems. Computing Singularities by Gröbner Bases (2003)

- Vol. 1807: V. D. Milman, G. Schechtman (Eds.), *Geometric Aspects of Functional Analysis. Israel Seminar 2000-2002* (2003)
- Vol. 1808: W. Schindler, *Measures with Symmetry Properties* (2003)
- Vol. 1809: O. Steinbach, *Stability Estimates for Hybrid Coupled Domain Decomposition Methods* (2003)
- Vol. 1810: J. Wengenroth, *Derived Functors in Functional Analysis* (2003)
- Vol. 1811: J. Stevens, *Deformations of Singularities* (2003)
- Vol. 1812: L. Ambrosio, K. Deckelnick, G. Dziuk, M. Mimura, V. A. Solonnikov, H. M. Soner, *Mathematical Aspects of Evolving Interfaces. Madeira, Funchal, Portugal 2000*. Editors: P. Colli, J. F. Rodrigues (2003)
- Vol. 1813: L. Ambrosio, L. A. Caffarelli, Y. Brenier, G. Buttazzo, C. Villani, *Optimal Transportation and its Applications. Martina Franca, Italy 2001*. Editors: L. A. Caffarelli, S. Salsa (2003)
- Vol. 1814: P. Bank, F. Baudoin, H. Föllmer, L.C.G. Rogers, M. Soner, N. Touzi, *Paris-Princeton Lectures on Mathematical Finance 2002* (2003)
- Vol. 1815: A. M. Vershik (Ed.), *Asymptotic Combinatorics with Applications to Mathematical Physics*. St. Petersburg, Russia 2001 (2003)
- Vol. 1816: S. Albeverio, W. Schachermayer, M. Talagrand, *Lectures on Probability Theory and Statistics. Ecole d'Été de Probabilités de Saint-Flour XXX-2000*. Editor: P. Bernard (2003)
- Vol. 1817: E. Koelink, W. Van Assche (Eds.), *Orthogonal Polynomials and Special Functions*. Leuven 2002 (2003)
- Vol. 1818: M. Bildhauer, *Convex Variational Problems with Linear, nearly Linear and/or Anisotropic Growth Conditions* (2003)
- Vol. 1819: D. Masser, Yu. V. Nesterenko, H. P. Schlickewei, W. M. Schmidt, M. Waldschmidt, *Diophantine Approximation. Cetraro, Italy 2000*. Editors: F. Amoroso, U. Zannier (2003)
- Vol. 1820: F. Hiai, H. Kosaki, *Means of Hilbert Space Operators* (2003)
- Vol. 1821: S. Teufel, *Adiabatic Perturbation Theory in Quantum Dynamics* (2003)
- Vol. 1822: S.-N. Chow, R. Conti, R. Johnson, J. Mallet-Paret, R. Nussbaum, *Dynamical Systems. Cetraro, Italy 2000*. Editors: J. W. Macki, P. Zecca (2003)
- Vol. 1823: A. M. Anile, W. Allegretto, C. Ringhofer, *Mathematical Problems in Semiconductor Physics. Cetraro, Italy 1998*. Editor: A. M. Anile (2003)
- Vol. 1824: J. A. Navarro González, J. B. Sancho de Salas,  *$\mathcal{C}^\infty$  - Differentiable Spaces* (2003)
- Vol. 1825: J. H. Bramble, A. Cohen, W. Dahmen, *Multiscale Problems and Methods in Numerical Simulations*. Martina Franca, Italy 2001. Editor: C. Canuto (2003)
- Vol. 1826: K. Dohmen, *Improved Bonferroni Inequalities via Abstract Tubes. Inequalities and Identities of Inclusion-Exclusion Type. VIII*, 113 p, 2003.
- Vol. 1827: K. M. Pilgrim, *Combinations of Complex Dynamical Systems. IX*, 118 p, 2003.
- Vol. 1828: D. J. Green, *Gröbner Bases and the Computation of Group Cohomology. XII*, 138 p, 2003.
- Vol. 1829: E. Altman, B. Gaujal, A. Hordijk, *Discrete-Event Control of Stochastic Networks: Multimodularity and Regularity. XIV*, 313 p, 2003.
- Vol. 1830: M. I. Gil', *Operator Functions and Localization of Spectra. XIV*, 256 p, 2003.
- Vol. 1831: A. Connes, J. Cuntz, E. Guentner, N. Higson, J. E. Kaminker, *Noncommutative Geometry*. Martina Franca, Italy 2002. Editors: S. Doplicher, L. Longo (2004)
- Vol. 1832: J. Azéma, M. Émery, M. Ledoux, M. Yor (Eds.), *Séminaire de Probabilités XXXVII* (2003)
- Vol. 1833: D.-Q. Jiang, M. Qian, M.-P. Qian, *Mathematical Theory of Nonequilibrium Steady States. On the Frontier of Probability and Dynamical Systems. IX*, 280 p, 2004.
- Vol. 1834: Yo. Yomdin, G. Comte, *Tame Geometry with Application in Smooth Analysis. VIII*, 186 p, 2004.
- Vol. 1835: O.T. Izhboldin, B. Kahn, N.A. Karpenko, A. Vishik, *Geometric Methods in the Algebraic Theory of Quadratic Forms. Summer School, Lens, 2000*. Editor: J.-P. Tignol (2004)
- Vol. 1836: C. Năstăsescu, F. Van Oystaeyen, *Methods of Graded Rings. XIII*, 304 p, 2004.
- Vol. 1837: S. Tavaré, O. Zeitouni, *Lectures on Probability Theory and Statistics. Ecole d'Été de Probabilités de Saint-Flour XXXI-2001*. Editor: J. Picard (2004)
- Vol. 1838: A.J. Ganesh, N.W. O'Connell, D.J. Wischik, *Big Queues. XII*, 254 p, 2004.
- Vol. 1839: R. Gohm, *Noncommutative Stationary Processes. VIII*, 170 p, 2004.
- Vol. 1840: B. Tsirelson, W. Werner, *Lectures on Probability Theory and Statistics. Ecole d'Été de Probabilités de Saint-Flour XXXII-2002*. Editor: J. Picard (2004)
- Vol. 1841: W. Reichel, *Uniqueness Theorems for Variational Problems by the Method of Transformation Groups* (2004)
- Vol. 1842: T. Johnsen, A.L. Knutsen, *K3 Projective Models in Scrolls* (2004)
- Vol. 1843: B. Jefferies, *Spectral Properties of Noncommuting Operators* (2004)
- Vol. 1844: K.F. Siburg, *The Principle of Least Action in Geometry and Dynamics* (2004)
- Vol. 1845: Min Ho Lee, *Mixed Automorphic Forms, Torus Bundles, and Jacobi Forms* (2004)
- Vol. 1846: H. Ammari, H. Kang, *Reconstruction of Small Inhomogeneities from Boundary Measurements* (2004)
- Vol. 1847: T.R. Bielecki, T. Björk, M. Jeanblanc, M. Rutkowski, J.A. Scheinkman, W. Xiong, *Paris-Princeton Lectures on Mathematical Finance 2003* (2004)
- Vol. 1848: M. Abate, J. E. Fornæss, X. Huang, J. P. Rosay, A. Tumanov, *Real Methods in Complex and CR Geometry*. Martina Franca, Italy 2002. Editors: D. Zaitsev, G. Zampieri (2004)
- Vol. 1849: Martin L. Brown, *Heegner Modules and Elliptic Curves* (2004)
- Vol. 1850: V. D. Milman, G. Schechtman (Eds.), *Geometric Aspects of Functional Analysis. Israel Seminar 2002-2003* (2004)
- Vol. 1851: O. Catoni, *Statistical Learning Theory and Stochastic Optimization* (2004)
- Vol. 1852: A.S. Kechris, B.D. Miller, *Topics in Orbit Equivalence* (2004)
- Vol. 1853: Ch. Favre, M. Jonsson, *The Valuative Tree* (2004)
- Vol. 1854: O. Saeki, *Topology of Singular Fibers of Differential Maps* (2004)
- Vol. 1855: G. Da Prato, P.C. Kunstmann, I. Lasiecka, A. Lunardi, R. Schnaubelt, L. Weis, *Functional Analytic Methods for Evolution Equations*. Editors: M. Iannelli, R. Nagel, S. Piazzera (2004)
- Vol. 1856: K. Back, T.R. Bielecki, C. Hipp, S. Peng, W. Schachermayer, *Stochastic Methods in Finance, Bres-*

sanone/Brixen, Italy, 2003. Editors: M. Fritelli, W. Runggaldier (2004)

Vol. 1857: M. Émery, M. Ledoux, M. Yor (Eds.), Séminaire de Probabilités XXXVIII (2005)

Vol. 1858: A.S. Cherny, H.-J. Engelbert, Singular Stochastic Differential Equations (2005)

Vol. 1859: E. Letellier, Fourier Transforms of Invariant Functions on Finite Reductive Lie Algebras (2005)

Vol. 1860: A. Borisyuk, G.B. Ermentrout, A. Friedman, D. Terman, Tutorials in Mathematical Biosciences I. Mathematical Neurosciences (2005)

Vol. 1861: G. Benettin, J. Henrard, S. Kuksin, Hamiltonian Dynamics – Theory and Applications, Cetraro, Italy, 1999. Editor: A. Giorgilli (2005)

Vol. 1862: B. Helffer, F. Nier, Hypocoelliptic Estimates and Spectral Theory for Fokker-Planck Operators and Witten Laplacians (2005)

Vol. 1863: H. Fürh, Abstract Harmonic Analysis of Continuous Wavelet Transforms (2005)

Vol. 1864: K. Efsthathiou, Metamorphoses of Hamiltonian Systems with Symmetries (2005)

Vol. 1865: D. Applebaum, B.V. R. Bhat, J. Kustermans, J. M. Lindsay, Quantum Independent Increment Processes I. From Classical Probability to Quantum Stochastic Calculus. Editors: M. Schürmann, U. Franz (2005)

Vol. 1866: O.E. Barndorff-Nielsen, U. Franz, R. Gohm, B. Kümmerer, S. Thorbjørnsen, Quantum Independent Increment Processes II. Structure of Quantum Levy Processes, Classical Probability, and Physics. Editors: M. Schürmann, U. Franz, (2005)

Vol. 1867: J. Sneyd (Ed.), Tutorials in Mathematical Biosciences II. Mathematical Modeling of Calcium Dynamics and Signal Transduction. (2005)

Vol. 1868: J. Jorgenson, S. Lang,  $\text{Pos}_n(\mathbb{R})$  and Eisenstein Series. (2005)

Vol. 1869: A. Dembo, T. Funaki, Lectures on Probability Theory and Statistics. Ecole d'Été de Probabilités de Saint-Flour XXXIII-2003. Editor: J. Picard (2005)

Vol. 1870: V.I. Gurariy, W. Lusky, Geometry of Müntz Spaces and Related Questions. (2005)

Vol. 1871: P. Constantin, G. Gallavotti, A.V. Kazhikhov, Y. Meyer, S. Ukai, Mathematical Foundation of Turbulent Viscous Flows, Martina Franca, Italy, 2003. Editors: M. Cannone, T. Miyakawa (2006)

Vol. 1872: A. Friedman (Ed.), Tutorials in Mathematical Biosciences III. Cell Cycle, Proliferation, and Cancer (2006)

Vol. 1873: R. Mansuy, M. Yor, Random Times and Enlargements of Filtrations in a Brownian Setting (2006)

Vol. 1874: M. Yor, M. Émery (Eds.), In Memoriam Paul-André Meyer - Séminaire de Probabilités XXXIX (2006)

Vol. 1875: J. Pitman, Combinatorial Stochastic Processes. Ecole d'Été de Probabilités de Saint-Flour XXXII-2002. Editor: J. Picard (2006)

Vol. 1876: H. Herrlich, Axiom of Choice (2006)

Vol. 1877: J. Steuding, Value Distributions of L-Functions (2006)

Vol. 1878: R. Cerf, The Wulff Crystal in Ising and Percolation Models, Ecole d'Été de Probabilités de Saint-Flour XXXIV-2004. Editor: Jean Picard (2006)

Vol. 1879: G. Slade, The Lace Expansion and its Applications, Ecole d'Été de Probabilités de Saint-Flour XXXIV-2004. Editor: Jean Picard (2006)

Vol. 1880: S. Attal, A. Joye, C.-A. Pillet, Open Quantum Systems I, The Hamiltonian Approach (2006)

Vol. 1881: S. Attal, A. Joye, C.-A. Pillet, Open Quantum Systems II, The Markovian Approach (2006)

Vol. 1882: S. Attal, A. Joye, C.-A. Pillet, Open Quantum Systems III, Recent Developments (2006)

Vol. 1883: W. Van Assche, F. Marcellàn (Eds.), Orthogonal Polynomials and Special Functions, Computation and Application (2006)

Vol. 1884: N. Hayashi, E.I. Kaikina, P.I. Naumkin, I.A. Shishmarev, Asymptotics for Dissipative Nonlinear Equations (2006)

Vol. 1885: A. Telcs, The Art of Random Walks (2006)

Vol. 1886: S. Takamura, Splitting Deformations of Degenerations of Complex Curves (2006)

Vol. 1887: K. Habermann, L. Habermann, Introduction to Symplectic Dirac Operators (2006)

Vol. 1888: J. van der Hoeven, Transseries and Real Differential Algebra (2006)

Vol. 1889: G. Osipenko, Dynamical Systems, Graphs, and Algorithms (2006)

Vol. 1890: M. Bunge, J. Funk, Singular Coverings of Toposes (2006)

Vol. 1891: J.B. Friedlander, D.R. Heath-Brown, H. Iwaniec, J. Kaczorowski, Analytic Number Theory, Cetraro, Italy, 2002. Editors: A. Perelli, C. Viola (2006)

Vol. 1892: A. Baddeley, I. Bárány, R. Schneider, W. Weil, Stochastic Geometry, Martina Franca, Italy, 2004. Editor: W. Weil (2007)

Vol. 1893: H. Hanßmann, Local and Semi-Local Bifurcations in Hamiltonian Dynamical Systems, Results and Examples (2007)

Vol. 1894: C.W. Groetsch, Stable Approximate Evaluation of Unbounded Operators (2007)

Vol. 1895: L. Molnár, Selected Preserver Problems on Algebraic Structures of Linear Operators and on Function Spaces (2007)

Vol. 1896: P. Massart, Concentration Inequalities and Model Selection, Ecole d'Été de Probabilités de Saint-Flour XXXIII-2003. Editor: J. Picard (2007)

Vol. 1897: R. Doney, Fluctuation Theory for Lévy Processes, Ecole d'Été de Probabilités de Saint-Flour-2005. Editor: J. Picard (2007)

Vol. 1898: H.R. Beyer, Beyond Partial Differential Equations, On linear and Quasi-Linear Abstract Hyperbolic Evolution Equations (2007)

Vol. 1899: Séminaires de Probabilités XL. Editors: C. Donati-Martin, M. Émery, A. Rouault, C. Stricker (2007)

Vol. 1900: E. Bolthausen, A. Bovier (Eds.), Spin Glasses (2007)

## Recent Reprints and New Editions

Vol. 1618: G. Pisier, Similarity Problems and Completely Bounded Maps. 1995 – Second, Expanded Edition (2001)

Vol. 1629: J.D. Moore, Lectures on Seiberg-Witten Invariants. 1997 – Second Edition (2001)

Vol. 1638: P. Vanhaecke, Integrable Systems in the realm of Algebraic Geometry. 1996 – Second Edition (2001)

Vol. 1702: J. Ma, J. Yong, Forward-Backward Stochastic Differential Equations and their Applications. 1999. – Corrected 3rd printing (2005)