Communications in

Mathematical Physics

Volume 126 1989/90

Chief Editor A. Jaffe, Cambridge, MA

Editorial Board M. Aizenman, New York, NY
L. Alvarez-Gaumé, Genève
H. Araki, Kyoto
A. Connes, Bures-sur-Yvette
J.-P. Eckmann, Genève
M. E. Fisher, College Park, MD
J. Fröhlich, Zürich
K. Gawedzki, Bures-sur-Yvette
J. L. Lebowitz, New Brunswick, NJ
J. Mather, Princeton, NJ
G. Parisi, Roma
B. Simon, Pasadena, CA
Ya. G. Sinai, Moscow
T. Spencer, Princeton, NJ
S.-T. Yau, Cambridge, MA

Advisory Board M. F. Atiyah, Oxford
F. Hirzebruch, Bonn
G. 't Hooft, Utrecht
R. Schrieffer, Santa Barbara, CA
I. Singer, Cambridge, MA
C. N. Yang, Stony Brook, NY

Springer International

Copyright
Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.
All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e. g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.
The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.
While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA:
Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. This fee is US $ 0.20 per page, or a minimum of US $ 1.00 if an article contains fewer than five pages. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0010-3616, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Springer-Verlag Berlin Heidelberg New York Tokyo Hong Kong
Printers: Brühlsche Universitätsdruckerei, Giessen
Printed in Germany – © Springer-Verlag Berlin Heidelberg 1990
Springer-Verlag GmbH & Co KG, D-1000 Berlin 33

Contents

Aldaya, V., Navarro-Salas, J.: Quantization on the Virasoro Group 575

Bershadsky, M., Ooguri, H.: Hidden SL(n) Symmetry in Conformal Field Theories 49

Bialy, M. L.: Aubry—Mather Sets and Birkhoff's Theorem for Geodesic Flows on the Two-Dimensional Torus 13

Borgs, Ch., Waxler, R.: First Order Phase Transitions in Unbounded Spin Systems *I*: Construction of the Phase Diagram 291

Borgs, Ch., Waxler, R.: First Order Phase Transitions in Unbounded Spin Systems. II. Completeness of the Phase Diagram 483

Briet, Ph., Combes, J. M., Duclos, P.: Spectral Stability Under Tunneling 133

Chalykh, O. A., Veselov, A. P.: Commutative Rings of Partial Differential Operators and Lie Algebras 597

Combes, J. M., →Briet, Ph., et al. 133

Craig, W.: The Trace Formula for Schrödinger Operators on the Line 379

Duclos, P., →Briet, Ph., et al. 133

Duval, C., Elhadad, J., Tuynman, G. M.: The BRS Method and Geometric Quantization: Some Examples 535

Elhadad, J., →Duval, C., et al. 535

Eyink, G.: Quantum Field-Theory Models on Fractal Spacetime. II. Hierarchical Propagators 85

Fathi, A.: Expansiveness, Hyperbolicity and Hausdorff Dimension 249

Fröhlich, J., King, C.: The Chern-Simons Theory and Knot Polynomials 167

Gerard, C.: Resonance Theory in Atom-Surface Scattering 263

Goldstein, S., Kuik, R., Schlijper, A. G.: Entropy and Global Markov Properties 469

Horst, E.: Symmetric Plasmas and Their Decay 613

Jaffe, A., Klimek, S., Lesniewski, A.: Representations of the Heisenberg Algebra on a Riemann Surface 421

Källström, R.: Meromorphic Extensions of Regular Holonomic Distributions 157

King, C., →Fröhlich, J. 167

Klimek, S., →Jaffe, A., et al. 421

Kuik, R., →Goldstein, S., et al. 469

Laanait, L., Messager, A., Ruiz, J.: Discontinuity of the Wilson String Tension in the 4-Dimensional Lattice Pure Gauge Potts Model 103

LeBrun, C., Poon, Y.-S., Wells, R. O.: Projective Embeddings of Complex Supermanifolds 433

Lesniewski, A., →Jaffe, A., et al. 421

Longo, R.: Index of Subfactors and Statistics of Quantum Fields. I 217

Matsui, T.: Uniqueness of the Translationally Invariant Ground State in Quantum Spin Systems 453

Mel'nikov, V. K.: Interaction of Solitary Waves in the System Described by the Kadomtsev-Petviashvili Equation with a Self-Consistent Source 201

Messager, A., →Laanait, L., et al. 103

Navarro-Salas, J., →Aldaya, V. 575

Ono, M.: Classification of Lattices with Z_m Symmetry 25

Ooguri, H., →Bershadsky, M. 49

Orth, A.: Quantum Mechanical Resonance and Limiting Absorption: The Many Body Problem 559

Poon, Y.-S., →LeBrun, C., et al. 433

Ramadas, T. R., Singer, I. M., Weitsman, J.: Some Comments on Chern-Simons Gauge Theory 409

Ruiz, J., →Laanait, L., et al. 103

Saveliev, M. V., Vershik, A. M.: Continuum Analogues of Contragredient Lie Algebras (Lie Algebras with a Cartan Operator and Nonlinear Dynamical Systems) 367

Schlijper, A. G., →Goldstein, S., et al. 469

Shifman, M. A., Turbiner, A. V.: Quantal Problems with Partial Algebraization of the Spectrum 347

Singer, I. M., →Ramadas, T. R., et al. 409

Thomas, L. E.: Bound on the Mass Gap for Finite Volume Stochastic Ising Models at Low Temperature 1

Todorov, A. N.: The Weil-Petersson Geometry of the Moduli Space of SU ($n \geqq 3$) (Calabi-Yau) Manifolds I 325

Turbiner, A. V., →Shifman, M. A. 347

Tuynman, G. M., →Duval, C., et al. 535

Vershik, A. M., →Saveliev, M. V. 367

Veselov, A. P., →Chalykh, O. A. 597

Waxler, R., →Borgs, Ch. 291

Waxler, R., →Borgs, Ch. 483

Weitsman, J., →Ramadas, T. R., et al. 409

Wells, R. O., →LeBrun, C., et al. 433

Wojtkowski, M. P.: A System of One Dimensional Balls with Gravity 507

Indexed in *Current Contents*
Evaluated and abstracted for *PHYS* on *STN*

A 20414 D

Communications in Mathematical Physics

Volume 126 Number 3 1990

C. LeBrun, Y.-S. Poon, R. O. Wells — Projective Embeddings of Complex Supermanifolds 433

T. Matsui — Uniqueness of the Translationally Invariant Ground State in Quantum Spin Systems 453

S. Goldstein, R. Kuik, A. G. Schlijper — Entropy and Global Markov Properties 469

C. Borgs, R. Waxler — First Order Phase Transitions in Unbounded Spin Systems. II. Completeness of the Phase Diagram 483

M. P. Wojtkowski — A System of One Dimensional Balls with Gravity 507

C. Duval, J. Elhadad, G. M. Tuynman — The BRS Method and Geometric Quantization: Some Examples 535

A. Orth — Quantum Mechanical Resonance and Limiting Absorption: The Many Body Problem 559

V. Aldaya, J. Navarro-Salas — Quantization on the Virasoro Group 575

O. A. Chalykh, A. P. Veselov — Commutative Rings of Partial Differential Operators and Lie Algebras 597

E. Horst — Symmetric Plasmas and Their Decay 613

Contents of Vol. 126

Indexed in *Current Contents*
Evaluated and abstracted for *PHYS* on *STN*

Springer International

220 Commun. Math. Phys.
ISSN 0010-3616 CMPHAY 126 (3) 433-634 (1990)
Printed on acid-free paper

January (I) 1990

Communications in Mathematical Physics

Copyright. Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.
All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e. g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.
The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.
While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.
Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. This fee is US $ 0.20 per page, or a minimum of US $ 1.00 if an article contains fewer than five pages. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0010-3616, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Authors should mark manuscripts according to the "Instructions to Authors." They should be aware that manuscripts which are not properly marked require additional time for publication. Manuscripts should be sent to:

Prof. M. Aizenman, Courant Institute of Mathematical Sciences, 251 Mercer Street, New York, NY 10012, USA	*Statistical physics*
Prof. L. Alvarez-Gaumé, Theory Division, CERN, CH-1211 Genève 23, Switzerland	*Gravitation, field theories and geometry*
Prof. H. Araki, Research Institute for Mathematical Sciences, Kyoto University, Kyoto, 606, Japan	*Mathematical methods with direct relevance to physics*
Prof. A. Connes, I.H.E.S., F-91440 Bures-sur-Yvette, France	*Quantum physics and differential geometry*
Prof. J.-P. Eckmann, Département de Physique Théorique, Université de Genève, 32, Boulevard d'Ivoy, CH-1211 Genève 4, Switzerland	*Dynamical systems*
Prof. M. E. Fisher, Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, USA	*Statistical physics*
Prof. J. Fröhlich, ETH-Hönggerberg, CH-8093 Zürich, Switzerland	*General statistical mechanics*
Prof. K. Gawedzki, I.H.E.S., F-91440 Bures-sur-Yvette, France	*Quantum field theory and statistical mechanics*
Prof. A. Jaffe, Lyman Laboratory of Physics, Harvard University, Cambridge, MA 02138, USA	*Chief Editor*
Prof. J. L. Lebowitz, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903, USA	*Nonequilibrium statistical mechanics*
Prof. J. Mather, Department of Mathematics, Fine Hall, Princeton University, Princeton, NJ 08544, USA	*Classical dynamical systems*
Prof. G. Parisi, Dipartimento di Fisica, Università di Roma II, Tor Vergata, I-00173 Roma, Italy	*General theoretical physics*
Prof. B. Simon, Department of Mathematics, California Institute of Technology, Pasadena, CA 91125, USA	*Schrödinger operators and atomic physics*
Prof. Ya. G. Sinai, L. D. Landau Institute for Theoretical Physics, ul. Kosygina, dom 2, SU-117334 Moscow, V—334, USSR	*Statistical physics and dynamical systems*
Prof. T. Spencer, School of Mathematics, Institute for Advanced Study, Princeton, NJ 08540, USA	*Disordered systems*
Prof. S.-T. Yau, Department of Mathematics, Harvard University, 1 Oxford Street, Cambridge, MA 02138, USA	*Relativity; geometry and physics*

---

100 offprints of each article will be supplied to the author free of charge and additional copies may be obtained at cost price if ordered before the issue goes to press. **Subscription Information.** Vols. 126-133, (3 issues each) will appear in 1990. **North America.** Annual subscription rate: US $ 2505.00, single issue price $ 128.00 including carriage charges. Subscriptions are entered with prepayment only. Orders should be addressed to: Springer-Verlag New York Inc., Service Center Secaucus, 44 Hartz Way, Secaucus, NJ 07094, USA, Telephone (201) 348-4033, Telex 023 125 994, FAX (201)3 48-45 05. Members of the International Association of Mathematical Physics (IAMP) are entitled to receive the journal strictly for their own personal use at a special reduced rate. The orders must be placed through the IAMP. **All Other Countries.** Annual subscription rate: DM 4560.00, plus carriage charges: [Federal Republic of Germany: DM 62.92 incl. value added tax; all other countries: DM 103.20 except for the following countries to which SAL delivery (Surface Airmail Lifted) is mandatory: Japan DM 232.80, India DM 175.20, Australia/New Zealand DM 264.00. Airmail delivery to all other countries is available upon request]. Volume price: DM 570.00, single issue price: DM 228.00 plus carriage charges. Orders for all countries except North America can either be placed with your bookdealer or sent directly to: Springer-Verlag, Heidelberger Platz 3, D-1000 Berlin 33. Tel. 0 30/82 07-1, Telex 01 83 319, FAX (0)30/821 4091. **Changes of Address:** Allow six weeks for all changes to become effective. All communications should include both old and new addresses (with Postal Codes) and should be accompanied by a mailing label from a recent issue. **Back Volumes.** Prices are available on request. **Microform:** Microform editions are available from: University Microfilms International, 300 N. Zeeb Road, Ann Arbor, MI 48106, USA.

Production
Journal Production Department I, Springer-Verlag,
Postfach 10 52 80, D-6900 Heidelberg 1, Federal Republic of Germany,
Tel. 0 62 21/4 87-5 25, Telex 04 61 723, FAX (0)6221/4 39 82