

Communications in
**Mathematical
Physics**

Volume 103 1986

- Chief Editor A. Jaffe, Cambridge, MA
- Editorial Board H. Araki, Kyoto
J.-P. Eckmann, Genève
M. E. Fisher, Ithaca, NY
J. Fröhlich, Zürich
R. Haag, Hamburg
S. Hawking, Cambridge
J. L. Lebowitz, New Brunswick, NJ
G. Mack, Hamburg
J. Mather, Princeton, NJ
L. Nirenberg, New York, NY
K. Osterwalder, Zürich
G. Parisi, Roma
B. Simon, Pasadena, CA
Ya. G. Sinai, Moscow
T. Spencer, New York, NY
S.-T. Yau, La Jolla, CA
- 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-Verlag Berlin Heidelberg New York Tokyo

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publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.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.

Other regulations:

Authors publishing in this journal can, under certain conditions, benefit from library and photocopy fees collected by VG WORT. Authors of German nationality and those resident in the Federal Republic of Germany or Berlin (West), as well as citizens of Austria, Switzerland and member countries of the European Community, may apply to Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-8000 München 2, for detailed information.

Springer-Verlag Berlin Heidelberg New York Tokyo
Printers: Brühlsche Universitätsdruckerei, Giessen
Printed in Germany — © Springer-Verlag Berlin Heidelberg 1986
Springer-Verlag GmbH & Co KG 1000 Berlin 33

Contents

Allen, B., Jacobson, T.: Vector Two-Point Functions in Maximally Symmetric Spaces	669
Alvarez-Gaumé, L., Coleman, S., Ginsparg, P.: Finiteness of Ricci Flat $N = 2$ Supersymmetric σ -Models	423
Angelis, G. F. De, Falco, D. de, Genova, G. Di: Random Fields on Riemannian Manifolds: A Constructive Approach	297
Barata, J. C. A., Wreszinski, W. F.: Absence of Charged States in the $U(1)$ Higgs Lattice Gauge Theory	637
Bismut, J.-M.: Localization Formulas, Superconnections, and the Index Theorem for Families	127
Bogoyavlensky, O. I.: Integrable Cases of a Rigid Body Dynamics and Integrable Systems on the Ellipsoids	305
Boldrighini, C.: Bernoulli Property for a One-Dimensional System with Localized Interaction	499
Coleman, S., see Alvarez-Gaumé, L., et al.	423
Cordani, B.: Conformal Regularization of the Kepler Problem	403
Deift, P. A., Hempel, R.: On the Existence of Eigenvalues of the Schrödinger Operator $H - \lambda W$ in a Gap of $\sigma(H)$	461
Delyon, F., Petritis, D.: Absence of Localization in a Class of Schrödinger Operators with Quasi-periodic Potential	441
Duistermaat, J. J., Grünbaum, F. A.: Differential Equations in the Spectral Parameter	177
Falco, D. de, see Angelis, G. F. De, et al.	297
Feldman, J., Magnen, J., Rivasseau, V., Sénéor, R.: A Renormalizable Field Theory: The Massive Gross-Neveu Model in Two Dimensions	67
Fisher, M. E., Privman, V.: First-Order Transitions in Spherical Models: Finite-Size Scaling	527
Fontaine, J. R.: Debye-Hückel Limit of Quantum Coulomb Systems. I. Pressure and Diagonal Reduced Density Matrices	241
Friedrich, H.: On Purely Radiative Space-Times	35
Galperin, A., Ivanov, E., Ogievetsky, V., Sokatchev, E.: Hyper-Kähler Metrics and Harmonic Superspace	515
Genova, G. Di, see Angelis, G. F. De, et al.	297
Gerdjikov, V. S., Yanovski, A. B.: Gauge Covariant Theory of the Generating Operator. I	549
Giga, Y.: A Bound for Global Solutions of Semilinear Heat Equations	415
Ginsparg, P., see Alvarez-Gaumé, L., et al.	423
Goddard, P., Kent, A., Olive, D.: Unitary Representations of the Virasoro and Super-Virasoro Algebras	105
Grünbaum, F. A., see Duistermaat, J. J.	177
Hempel, R., see Deift, P. A.	461
Ivanov, E., see Galperin, A., et al.	515
Jacobson, T., see Allen, B.	669
Kent, A., see Goddard, P., et al.	105
King, C.: The $U(1)$ Higgs Model. II. The Infinite Volume Limit	323
Kotecký, R., Preiss, D.: Cluster Expansion for Abstract Polymer Models	491
Laursen, M. L., Schierholz, G., Wiese, U.-J.: 2- and 3-Cochains in 4-Dimensional $SU(2)$ Gauge Theory	693
Magnen, J., see Feldman, J., et al.	67
Mezincescu, G. A.: Internal Lifschitz Singularities of Disordered Finite-Difference Schrödinger Operators	167
Minami, N.: An Extension of Kotani's Theorem to Random Generalized Sturm—Liouville Operators	387
Monastyrsky, M. I., Retakh, V. S.: Topology of Linked Defects in Condensed Matter	445

Newman, C. M.: The Distribution of Lyapunov Exponents: Exact Results for Random Matrices	121
O'Carroll, M., see Schor, R. S.	569
Ogievetsky, V., see Galperin, A., et al.	515
Olive, D., see Goddard, P., et al.	105
Petritis, D., see Delyon, F.	441
Phillips, A., Stone, D.: Lattice Gauge Fields, Principal Bundles and the Calculation of Topological Charge	599
Preiss, D., see Kotecký, R.	491
Privman, V., see Fisher, M. E.	527
Rabin, J. M.: Berezin Integration on General Fermionic Supermanifolds	431
Retakh, V. S., see Monastyrsky, M. I.	445
Rivasseau, V., see Feldman, J., et al.	67
Schierholz, G., see Laursen, M. L., et al.	693
Schor, R. S., O'Carroll, M.: On the Mass Spectrum of the 2 + 1 Gauge-Higgs Lattice Quantum Field Theory	569
Sénéor, R., see Feldman, J., et al.	67
Sokatchev, E., see Galperin, A., et al.	515
Spohn, H.: Equilibrium Fluctuations for Interacting Brownian Particles	1
Stone, D., see Phillips, A.	599
Valli, A., Zajaczkowski, W. M.: Navier-Stokes Equations for Compressible Fluids: Global Existence and Qualitative Properties of the Solutions in the General Case	259
Wayne, C. E.: On the Elimination of Non-Resonance Harmonics	351
Wiese, U.-J., see Laursen, M. L., et al.	693
Wreszinski, W. F., see Barata, J. C. A.	637
Yanovski, A. B., see Gerdjikov, V. S.	549
Zajaczkowski, W. M., see Valli, A.	259

Indexed in Current Contents

Evaluated for Physics Briefs and INKA-PHYS data base

Communications in
**Mathematical
 Physics**

Volume 103 Number 1 1986

- H. Spohn Equilibrium Fluctuations for Interacting Brownian
 Particles 1
- H. Friedrich On Purely Radiative Space-Times 35
- J. Feldman, J. Magnen,
 V. Rivasseau, R. Sénéor A Renormalizable Field Theory: The Massive Gross-
 Neveu Model in Two Dimensions 67
- P. Goddard, A. Kent, D. Olive Unitary Representations of the Virasoro and Super-
 Virasoro Algebras 105
- C. M. Newman The Distribution of Lyapunov Exponents: Exact Results
 for Random Matrices 121
- J.-M. Bismut Localization Formulas, Superconnections, and the
 Index Theorem for Families 127
- G. A. Mezincescu Internal Lifschitz Singularities of Disordered Finite-
 Difference Schrödinger Operators 167

Indexed in Current Contents
 Evaluated for Physics Briefs and INKA-PHYS data base



Springer-Verlag
 Berlin Heidelberg New York Tokyo

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.

Other regulations: Authors publishing in this journal can, under certain conditions, benefit from library and photocopy fees collected by VG WORT. Authors of German nationality and those resident in the Federal Republic of Germany or Berlin (West), as well as citizens of Austria, Switzerland and member countries of the European Community, may apply to Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-8000 München 2, for detailed information.

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. H. Araki, Research Institute for Mathematical Sciences, Kyoto University, Kyoto, 606, Japan

Prof. J.-P. Eckmann, Département de Physique Théorique, Université de Genève, 32, Boulevard d'Ivroy, CH-1211 Genève 4, Switzerland

Prof. M. E. Fisher, Baker Laboratory, Department of Chemistry, Cornell University, Ithaca, NY 14850, USA

Prof. J. Fröhlich, ETH-Hönggerberg, CH-8093 Zürich, Switzerland

Prof. R. Haag, II. Institut für Theoretische Physik, Luruper Chaussee 149, D-2000 Hamburg 50, Federal Republic of Germany

Prof. S. Hawking, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Silver Street, Cambridge CB3 9EW, England

Prof. A. Jaffe, Lyman Laboratory of Physics, Harvard University, Cambridge, MA 02138, USA

Prof. J. L. Lebowitz, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903, USA

Prof. G. Mack, II. Institut für Theoretische Physik, Luruper Chaussee 149, D-2000 Hamburg 50, Federal Republic of Germany

Prof. J. Mather, Department of Mathematics, Fine Hall, Princeton University, Princeton, NJ 08544, USA

Prof. L. Nirenberg, Courant Institute, New York University, 251 Mercer Street, New York, NY, 10012, USA

Prof. K. Osterwalder, E.T.H. Zentrum, CH-8092 Zürich, Switzerland

Prof. G. Parisi, Dipartimento di Fisica, Università di Roma II, Tor Vergata, I-00173 Roma, Italy

Prof. B. Simon, Department of Mathematics, California Institute of Technology, Pasadena, CA 91125, USA

Prof. Ya. G. Sinai, L. D. Landau Institute for Theoretical Physics, ul. Kosygin, dom 2, SU-117334 Moscow, V-334, USSR

Prof. T. Spencer, Courant Institute, New York University, 251 Mercer Street, New York, NY 10012, USA

Prof. S.-T. Yau, Department of Mathematics, University of California at San Diego, La Jolla, CA 92093, USA

Mathematical methods with direct relevance to physics
Dynamical Systems

Statistical physics

General statistical mechanics
Conceptual structure

Gravitation and field theories

Chief Editor

Nonequilibrium statistical mechanics

Quantum field theory and statistical mechanics

Classical dynamical systems

Partial differential equations

Constructive quantum field theory and general theory of quantized fields

General theoretical physics

Schrödinger operators and atomic physics

Statistical physics and dynamical systems

Disordered systems

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. 102-107, (4 issues each) will appear in 1986. **North America.** Annual subscription rate: US \$ 1206.00, single issue price \$ 60.00 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. 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 3252.00, plus carriage charges. Volume price: DM 542.00, single issue price: DM 162.60, plus carriage charges. Airmail delivery on request only. Carriage charges for SAL (Surface Airmail Lifted) to Japan, India, Australia and New Zealand are available on request. — 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. **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 87-3 25, Telex 04 61 723