# Communications in

# Mathematical Physics

## Volume 128 1990

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publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.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

- Alekseev, A., Shatashvili, S.: From Geometric Quantization to Conformal Field Theory 197
- Anghel, N.:L<sup>2</sup>-Index Formulae for Perturbed Dirac Operators 77
- Aspinwall, P.: (2,2)-Superconformal Field Theories near Orbifold Points 593
- Avron, J. E., Howland, J. S., Simon, B.: Adiabatic Theorems for Dense Point Spectra 497
- Beggs, E. J.: Solitons in the Chiral Equation 131
- Berg, M. van den, Dorlas, T. C., Lewis, J. T., Pulé, J. V.: The Pressure in the Huang-Yang-Luttinger Model of an Interacting Boson Gas 231
- Bergshoeff, E., Blencowe, M. P., Stelle, K. S.: Area-Preserving Diffeomorphisms and Higher-Spin Algebras 213
- Bleher, P. M.: Extremity of the Disordered Phase in the Ising Model on the Bethe Lattice 411
- Blencowe, M. P., → Bergshoeff, E., et al. 213
- Dorlas, T. C., → Berg, M. van den, et al. 231
- Eckmann, J.-P., Epstein, H.: Bounds on the Unstable Eigenvalue for Period Doubling 427
- Englisch, H., Kirsch, W., Schröder, M., Simon, B.: Random Hamiltonians Ergodic in All But One Direction 613
- Epstein, H., → Eckmann, J.-P. 427

- Falqui, G., Reina, C.: A Note on the Global Structure of Supermoduli Spaces 247
- Fefferman, C. L., Seco L. A.: Asymptotic Neutrality of Large Ions 109
- Feigin, B. L., Frenkel, E. V.: Affine Kac-Moody Algebras and Semi-Infinite Flag Manifolds 161
- Fernandez, C., Lavine R.: Lower Bounds for Resonance Widths in Potential and Obstacle Scattering 263
- Fisch, J. M. L., Henneaux, M.: Homological Perturbation Theory and the Algebraic Structure of the Antifield-Antibracket Formalism for Gauge Theories 627
- Frenkel, E. V. → Feigin, B. L. 161
- Goderis, D., Verbeure, A., Vets, P.:
  Dynamics of Fluctuations for Quantum
  Lattice Systems 533
- Graffi, S., Parmeggiani: Quantum Evolution and Classical Flow in Complex Phase Space 393
- Hara, T., Slade, G.: Mean-Field Critical Behaviour for Percolation in High Dimensions 333
- Henneaux, M. → Fisch, J. M. L. 627 Howland, J. S. → Avron, J. E., et al. 497
- Jaskólski, Z.: The Polyakov Path Integral over Bordered Surfaces (The Open String Amplitudes) 285
- Kirsch, W., → Englisch, H., et al. 613

Klein, A., Perez, J. F.: Localization in the Ground-State of the One Dimensional X-Y Model with a Random Transverse Field 99

Klein, M., Seiler, R.: Power-Law-Corrections to the Kubo Formula Vanish in Quantum Hall Systems 141

Lavine, R., → Fernandez, C. 263 Lewis, J. T., → Berg, M. van den, et al. 231 Lindström, U., Rŏcek, M.: N=2 Super Yang-Mills Theory in Projective Superspace 191

Marquard, U., → Wit, B. de, et al. 39
Mimachi, K., → Noumi, M. 521
Montgomery, R.: Isoholonomic Problems and Some Applications 565

Nakamura, Y.: Moduli Space of SU(2)

Monopoles and Complex Cyclic-Toda Hierarchy 509 Nicolai, H., → Wit, B. de, et al. 39 Noumi, M., Mimachi, K.: Quantum 2-Spheres and Big q-Jacobi Polinomials 521

Parmeggiani, A., → Graffi, S. 393 Perez, J. F., → Klein, A. 99 Pulé, J. V., → Berg, M. van den, et al. 231

Ramadas, T. R.: Chern-Simons Gauge Theory and Projectively Flat Vector Bundles on M<sub>g</sub> 421
Reina, C., → Falqui, G. 247
Roček, M., → Lindström, U. 191

Schröder, M., → Englisch, H., et al. 613 Seco, L. A., → Fefferman, C. L. 109 Seiler, R., → Klein, M. 141 Series, C. M., Sinai, Ya. G.: Ising Models on the Lobachevsky Plane 63 Shatashvili, S., → Alekseev, A. 197 Simon, B., → Avron, J. E., et al. 497 Simon, B., → Englisch, H., et al. 613 Sinai, Ya. G., → Series, C. M. 63 Slade, G., → Hara, T. 333 Smit, D.-J.: A Quantum Group Structure in Integrable Conformal Field Theories 1 Stelle, K. S., → Bergshoeff, E., et al. 213 Strien, S. van: Hyperbolicity and Invariant Measures for General C<sup>2</sup> Interval Maps Satisfying the Misiurewicz Condition 437

Verbeure, A.,  $\rightarrow$  Goderis, D., et al. 533 Vets, P.,  $\rightarrow$  Goderis, D., et al. 533

Ward, R. S.: Classical Solutions of the Chiral Model, Unitons, and Holomorphic Vector Bundles 319

Wit, B. de, Marquard, U., Nicolai, H.: Area-Preserving Diffeomorphisms and Supermembrane Lorentz Invariance 39

Zhou, X.: Inverse Scattering Transform for the Time Dependent Schrödinger Equation with Applications to the KPI Equation 551

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

# Communications in Mathematical Physics

## Volume 128 Number 3 1990

S. van Strien

Hyperbolicity and Invariant Measures for General  $C^2$  Interval Maps Satisfying the Misiurewicz Condition 437

J. E. Avron, J. S. Howland, B. Simon Adiabatic Theorems for Dense Point Spectra 497

Y. Nakamura

Moduli Space of *SU*(2) Monopoles and Complex Cyclic—Toda Hierarchy 509

M. Noumi, K. Mimachi

Quantum 2-Spheres and Big q-Jacobi Polynomials 521

D. Goderis, A. Verbeure, P. Vets Dynamics of Fluctuations for Quantum Lattice Systems 533

X. Zhou

Inverse Scattering Transform for the Time Dependent Schrödinger Equation with Applications to the KPI Equation 551

R. Montgomery

Isoholonomic Problems and Some Applications 565

P. Aspinwall (2

(2,2)-Superconformal Field Theories near Orbifold Points 593

H. Englisch, W. Kirsch, M. Schröder, B. Simon

Random Hamiltonians Ergodic in All But One Direction 613

J. M. L. Fisch, M. Henneaux

Homological Perturbation Theory and the Algebraic Structure of the Antifield-Antibracket Formalism for Gauge

Theories 627

Contents of Vol. 128 Indexed in *Current Contents* 

Evaluated and abstracted for PHYS on STN



## Springer International

220 Commun. Matn. Phys. ISSN 0010-3616 CMPHAY 128 (3) 437-640 (1990) Printed on acid-free paper

## 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 copyring 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

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

Prof. A. Connes, I.H.E.S., F-91440 Bures-sur-Yvette, France

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

*Prof. M. E. Fisher,* Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, USA

Prof. J. Fröhlich, ETH-Hönggerberg, CH-8093 Zürich, Switzerland Prof. K. Gawedzki, I.H.E.S., F-91440 Bures-sur-Yvette, France

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

Prof. N. Yu. Reshetikhin, Department of Mathematics, Harvard University, 1 Oxford Street, Cambridge, MA 02138, USA

*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. Kosygina, dom 2, SU-117334 Moscow, V-334, USSR

*Prof. T. Spencer,* School of Mathematics, Institute for Advanced Study, Princeton, NJ 08540, USA

Prof. S.-T. Yau, Department of Mathematics, Harvard University, 1 Oxford Street, Cambridge, MA 02138, USA

Statistical physics

Mathematical methods with direct relevance to physics Quantum physics and differential

Dynamical systems

geometry

Statistical physics

General statistical mechanics Quantum field theory and statistical mechanics

Chief Editor

Nonequilibrium statistical mechanics

Classical dynamical systems

Gravitation, field theories and geometry

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. 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) 348-4505. 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 03.20 except for the following countries to which SAL delivery (Gurface Airmail Lifted) is mandatory: Japan DM 228.0, 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 form: 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; FAX (0)6221-487 624