Communications in

Mathematical Physics

Volume 134 1990

Chief Editor A. Jaffe, Cambridge, MA

Editorial Board M. Aizenman, Princeton, NJ

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

M. Herman, Palaiseau

J. L. Lebowitz, New Brunswick, NJ

N. Yu. Reshetikhin, Cambridge, MA

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publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.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 Barcelona Printers: Brühlsche Universitätsdruckerei, Giessen Printed in Germany — © Springer-Verlag Berlin Heidelberg 1990 Springer-Verlag GmbH & Co KG, 1000 Berlin 33, Federal Republic of Germany

Contents

- Adams, M. R., Harnad, J., Hurtubise, J.: Isospectral Hamiltonian Flows in Finite and Infinite Dimensions. II. Integration of Flows 555
- Albanese, C.: Unitary Dressing Transformations and Exponential Decay Below Threshold for Quantum Spin Systems. Part I and II 1
- Albanese, C.: Unitary Dressing Transformations and Exponential Decay Below Threshold for Quantum Spin Systems. Part III and IV 237
- Arnaudon, D.: Periodic and Flat Irreducible Representations of $SU(3)_q$ 523
- Bakas, I.: The Structure of the W_{∞} Algebra 487
- Bessis, D., Demko, S.: Generalized Apollonian Packings 293
- Common, A. K., Martin, A., Stubbe, J.:
 Preservation of Logarithmic Concavity by the
 Mellin Transform and Applications to the
 Schrödinger Equation for Certain Classes of
 Potentials 509
- Cremmer, E., Gervais, J.-L.: The Quantum Group Structure Associated with Non-Linearly Extended Virasoro Algebras 619
- Demko, S. → Bessis, D. 293
- Enter, A. C. D. van, Miekisz, J.: Breaking of Periodicity at Positive Temperatures 647
- Fairlie, D. B., Nuyts, J.: Deformations and Renormalisations of W_{∞} 413
- Fine, D. S.: Quantum Yang—Mills on the Two-Sphere 273
- Gervais, J.-L. → Cremmer, E. 619
- Harnad, J. → Adams, M. R., et al. 55:
 Haydn, N. T. A.: Gibbs' Functionals on Subshifts 217

- Hurtubise, J. → Adams, M. R., et al. 555
- Itzykson, C., Zuber, J.-B.: Matrix Integration and Combinatorics of Modular Groups 197
- Kirillov, A. N., Reshetikhin, N.: q-Weyl Group and a Multiplicative Formula for Universal R-Matrices 421
- Korotkin, D. A.: Self-Dual Yang-Mills Fieldsand Deformations of Algebraic Curves 397
- La, H., Nelson, P., Schwarz, A. S.: Virasoro Model Space 539
- Lüders, Ch., Roberts, J. E.: Local Quasiequivalence and Adiabatic Vacuum States 29
- Mack, G., Schomerus, V.: Conformal Field Algebras with Quantum Symmetry from the Theory of Superselection Sectors 139
- Martin, A. → Common, A. K., et al. 509
- Matsuo, A.: An Application of Aomoto-Gelfand Hypergeometric Functions to the SU(n) Knizhnik—Zamolodchikov Equation 65
- Miękisz, J. → Enter, A. C. D. van 647
- Mikhalev, V. G.: A Generalization of the Kac-Moody Algebras with a Parameter on an Algebraic Curve and Perturbations of Solitons 633
- Misra, K. C., Miwa, T.: Crystal Base for the Basic Representation of $U_q(\mathfrak{sl}(n))$ 79
- Miwa, T. → Misra, K. C. 79
- Nelson, P. \rightarrow La, H., et al. 539 Nuyts, J. \rightarrow Fairlie, D. B. 413
- Okado, M.: Quantum R Matrices Related to the Spin Representations of B_n and D_n 467
- Reshetikhin, N. → Kirillov, A. N. 421 Roberts, J. E. → Lüders, Ch. 29

Rosen, L., Wright, J. D.: Dimensional Regularization and Renormalization of QED 433

Schomerus, V. → Mack, G. 139 Schwarz, A. S. → La, H., et al. 539 Simon, B.: Absence of Ballistic Motion 209 Smirnov, V. A.: Asymptotic Expansions in Limits of Large Momenta and Masses 109 Stubbe, J. → Common, A. K., et al. 509

Tangerman, F. M. → Veerman, J. J. P. 89

TAN Lei: Similarity Between the Mandelbrot Set and Julia Sets 587

Veerman, J. J. P., Tangerman, F. M.: Scalings in Circle Maps (I) 89

Watling, N. A.: Critical Limit One-Point Correlations of Monodromy Fields on Z² 321
Wright, J. D. → Rosen, L. 433

Zakrzewski, S.: Quantum and ClassicalPseudogroups. Part I. Union Pseudogroupsand Their Quantization 347

Zakrzewski, S.: Quantum and Classical Pseudogroups. Part II. Differential and Symplectic Pseudogroups 371 Zuber, J.-B. → Itzykson, C. 197

Indexed in Current Contents
Evaluated and abstracted for PHYS on STN

Communications in Mathematica **Physics**

Volume 134 Number 3 1990

L. Rosen, J. D. Wright

M. Okado

Dimensional Regularization and Renormalization of QED 433

Quantum R Matrices Related to the Spin Representations of B_n and D_n 467

Virasoro Model Space

I. Bakas

The Structure of the W_{∞} Algebra 487

A. K. Common, A. Martin,

J. Stubbe

Preservation of Logarithmic Concavity by the Mellin

Transform and Applications to the Schrödinger Equation for Certain Classes of Potentials 509

Periodic and Flat Irreducible Representations of $SU(3)_q$

D. Arnaudon

H. La, P. Nelson,

A. S. Schwarz

M. R. Adams, J. Harnad, J. Hurtubise

TAN Lei

E. Cremmer, J.-L. Gervais

V. G. Mikhalev

Isospectral Hamiltonian Flows in Finite and Infinite

Dimensions, II. Integration of Flows 555 Similarity Between the Mandelbrot Set and Julia Sets 587

The Quantum Group Structure Associated with Non-Linearly Extended Virasoro Algebras 619

A Generalization of the Kac-Moody Algebras with a Parameter on an Algebraic Curve and Perturbations of Solitons 633

A. C. D. van Enter, J. Miekisz

Breaking of Periodicity at Positive Temperatures 647

Contents of Vol. 134

Indexed in Current Contents Evaluated and abstracted for PHYS on STN



Springer International

220 Commun. Math. Phys. ISSN 0010-3616 CMPHAY 134 (3) 433-652 (1990) Printed on acid-free paper

523

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, Department of Physics, Jadwin Hall, Princeton University, Princeton, NJ 08544, 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. M. Herman, Centre de Mathématiques Pures, Ecole Polytechnique, F-91128 Palaiseau Cedex, 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. 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 geometry

Dynamical systems

Statistical physics

General statistical mechanics Quantum field theory and statistical mechanics

Classical dynamical systems

Chief Editor

Nonequilibrium statistical mechanics

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. 134-141, (3 issues each) will appear in 1991. North America. Recommended annual subscription rate: US \$ 3046.00, single issue price \$ 152.00 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 48-4505. Members of the International Association of Mathematical Physics (IAMP) are entitled to receive the journal strily for their own personal use at a special reduced rate. The orders must be placed through the IAMP. All Other Countries. Recommended annual subscription rate: DM 4752.00, plus carriage charges: [Federal Republic of Germany: DM 64.20 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 594.00, single issue price: DM 237.60 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, 1000 Berlin 33. Tal. 0.30/8207-17, Telex 01 183319, 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, W-6900 Heidelberg, 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;