Communications in Mathematical Physics

Volume 91 1983

Chief Editor A. Jaffe, Cambridge, MA Editorial Board H. Araki, Kyoto J. Fröhlich, Zürich R. Haag, Hamburg S. Hawking, Cambridge O. Lanford, Bures-sur-Yvette J. Lascoux, Palaiseau

J. L. Lebowitz, New Brunswick, NJ

- G. Mack, Hamburg
- J. Mather, Princeton, NJ
- L. Nirenberg, New York, NY
- K. Osterwalder, Zürich
- B. Simon, Pasadena, CA
- Ya. G. Sinai, Moscow
- T. Spencer, New York, NY
- R. Stora, Geneva
- S.-T. Yau, Princeton, NJ

Advisory Board

Board M. F. Atiyah, Oxford A. Connes, Bures-sur-Yvette G. 't Hooft, Utrecht I. Singer, Berkeley, CA

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 the authors and by the responsible authorities — tacitly or explicitly — in the institutes where the work was carried out and that, if accepted, it will not be published elsewhere in the same form, in either the same or another language, without the consent of the copyright holders. By submitting a manuscript, the authors agree that the copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform, electronic data-base, video-disks, or any other reproduction of text, figures or tables from this journal is prohibited without permission obtained from the publishers.

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 nor the editors nor the publisher can accept legal responsibility for errors or omissions that may have been made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special Regulations for the USA

Photocopies may be made for personal or internal use beyond that permitted by Section 107 or 108 of the U.S. Copyright Law, provided a fee is paid. This fee is \$0.20 per page or a minimum of \$1.00 if an article consists of less than five pages. Please pay this fee to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0010-3616, volume, and first and last page numbers of each article copied.

Other Regulations

Authors of this journal can benefit from library and photocopy fees collected by VG WORT if certain conditions are met. If an author lives in the Federal Republic of Germany or in West Berlin it is recommended that he contact 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 GmbH & Co KG Berlin Heidelberg 1983

Contents

Ablowitz, M. J., see Fokas, A. S.	381
Alvarez-Gaumé, L., Freedman, D. Z.: Potentials for the Supersymmetric Nonlinear σ -Model	87
Araki, H., Evans, D. E.: On a C*-Algebra Approach to Phase Transition in the Two-Dimensional	
Ising Model	489
Awada, M. A.: Fibre Bundles and Supergravity	53
Bars, I., Günaydin M.: Unitary Representations of Non-Compact Supergroups	31
Borgs, C., Seiler, E.: Lattice Yang-Mills Theory at Nonzero Temperature and the Confinement	
Problem	329
Botvich, D. D., Malyshev, V. A.: Unitary Equivalence of Temperature Dynamics for Ideal and	
Locally Perturbed Fermi-Gas	301
Brydges, D. C., Fröhlich, J., Sokal, A. D.: The Random-Walk Representation of Classical Spin	
Systems and Correlation Inequalities. II. The Skeleton Inequalities	117
Brydges, D. C., Fröhlich, J., Sokal, A. D.: A New Proof of the Existence and Nontriviality of the	
Continuum φ_2^4 and φ_3^4 Quantum Field Theories	141
Calan, C. de, Rivasseau, V.: A Comment on the Local Existence of the Borel Transform in	
Euclidean Φ_4^4	265
Chorin, A. J.: The Instability of Fronts in a Porous Medium	
Curry, J. H., Garnett, L., Sullivan, D.: On the Iteration of a Rational Function: Computer	100
Experiments with Newton's Method	267
DiPerna, R. J.: Convergence of the Viscosity Method for Isentropic Gas Dynamics	1
Evans, D. E., see Araki, H.	489
Fokas, A. S., Ablowitz, M. J.: On the Initial Value Problem of the Second Painlevé Transcendent	381
Fradkin, E. S., Kozhevnikov, A. A., Palchik, M. Ya., Pomeransky, A. A.: Maxwell Equations in	501
Conformal Invariant Electrodynamics	529
Freedman, D. Z., see Alvarez-Gaumé, L.	87
Friedrich, H.: Cauchy Problems for the Conformal Vacuum Field Equations in General Relativity	445
Fontaine, JR.: Scaling Limit of Some Critical Models	
Fröhlich, J., see Brydges, D. C., et al.	
Fröhlich, J., see Brydges, D. C., et al.	141
Galperin, G. A.: Non-Periodic and not Everywhere Dense Billiard Trajectories in Convex Polygons	141
and Polyhedrons	187
Garnett, L., see Curry, J. H., et al.	
Günavdin, M., see Bars, I.	31
Høegh-Krohn, R., Mebkhout: The $\frac{1}{t}$ Expansion for the Critical Multiple Well Problem	65
Høgen-Klohn, K., Medkhout. The f -Expansion for the Critical Multiple went Floblen	05
	577
Mills Potentials	
Kerner, R.: Graded Gauge Theory	
Kozhevnikov, A. A., see Fradkin, E. S., et al.	
Krámli, A., Szász, D.: Central Limit Theorem for the Lorentz Process via Perturbation Theory	
,,, _,, _	505
Lebedev, D. R., Radul, A. O.: Generalized Internal Long Waves Equations: Construction,	540
Hamiltonian Structure, and Conservation Laws	
Lesniewski, A., see Lang, G.	
• • • •	
Marchioro, C., Pulvirenti, M.: Euler Evolution for Singular Initial Data and Vortex Theory	563
McCarthy, P. J.: The General Exact Bijective Continuous Solution of Feigenbaum's Functional	42.1
	431
Mebkhout, M., see Høegh-Krohn, R.	65
Mourre, E.: Opérateurs conjugués et propriétés de propagation	
Nenciu, G.: Existence of the Exponentially Localised Wannier Functions	81
Newman, C. M.: A General Central Limit Theorem for FKG Systems	75

Ozawa, S.: On a Elaboration of M. Kac's Theorem Concerning Eigenvalues of the Laplacian in a	
Region with Randomly Distributed Small Obstacles	473
Palchik, M. Ya., see Fradkin, E. S., et al.	529
Phelps, R. R.: Generic Fréchet Differentiability of the Pressure in Certain Lattice Systems	557
Pomeransky, A. A., see Fradkin, E. S., et al.	529
Potthoff, J., see Hogreve, H., et al.	573
Pulvirenti, M., see Marchioro, C.	563
Radul, A. O., see Lebedev, D. R.	543
Rivasseau, V., see Calan, C. de	265
Schrader, R., see Hogreve, H., et al.	573
Seiler, E., see Borgs, C.	329
Shatah, J.: Stable Standing Waves of Nonlinear Klein-Gordon Equations	313
Sokal, A. D., see Brydges, D. C., et al.	117
Sokal, A. D., see Brydges, D. C., et al.	141
Sullivan, D., see Curry, J. H., et al.	
Szász, D., see Krámli, A	519
Taubes, C. H.: Stability in Yang-Mills Theories	235
Thomas, L.E., Zhong Yin: Low Temperature Expansions for the Gibbs States of Weakly Interacting	
Quantum Ising Lattice Systems	405
Zhong Yin, see Thomas, L. E	405

Indexed in Current Contents

1

Communications in Mathematica **Physics**

Volume 99 Number 1 1985

The Geometry of Real Sine-Gordon Wavetrains N. M. Ercolani, M. G. Forest B. A. Kupershmidt Mathematics of Dispersive Water Waves 51 T. Bałaban Spaces of Regular Gauge Field Configurations on a Lattice and Gauge Fixing Conditions 75 P. Nelson, L. Alvarez-Gaumé Hamiltonian Interpretation of Anomalies 103 F. Magri, C. Morosi, Reduction Techniques for Infinite-Dimensional Hamiltonian O. Ragnisco Systems: Some Ideas and Applications 115 P. van Nieuwenhuizen, New Compactifications of Ten and Eleven Dimensional Supergravity on Manifolds Which Are Not Direct N. P. Warner Products 141

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



Springer-Verlag Berlin Heidelberg New York Tokyo

220 Commun. Math. Phys. ISSN 0010-3616 CMPHAY 99 (1) 1-152 (1985)

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 the authors and by the responsible authorities — tacitly or explicitly — in the institutes where the work was carried out and that, if accepted, it will not be published elsewhere in the same form, in either the same or another language, without the consent of the copyright holders. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform, electronic data-base, video-disks, or any other reproductions of similar nature, and translations. Photographic reproduction, microform, electronic data-base, video-disks, or any other reproduction of text, figures or tables from this journal is prohibited without permission obtained from the publishers.

While the advice and information in this journal is believed to be true and accurate at the date of going to press, neither the authors nor the editors nor the publisher can accept legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express of implied, with respect to the material contained herein.

Special Regulations for the USA. Photocopies may be made for personal or internal use beyond that permitted by Section 107 or 108 of the U.S. Copyright Law, provided a fee is paid. This fee is \$0.20 per page or a minimum of \$1.00 if an article consists of less than five pages. Please pay this fee to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0010-3616 volume, and first and last page numbers of each article copied.

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

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. 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. O. Lanford, I. H. E. S., F-91440 Bures-sur-Yvette, France *Prof. J. Lascoux,* Physique Théorique, Ecole Polytechnique, F-91120 Palaiseau, France

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

Prof. Ya. G. Sinai, L. D. Landau Institute for Theoretical Physics, Academy of Sciences, Vorobyevskoe Shosse, 2, SU-117334 Moscow, USSR

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

Prof. R. Stora, CERN, Theory Division, CH-1211 Geneva 23, Switzerland *Prof. S.-T. Yau*, School of Mathematics, The Institute for Advanced Study, Princeton, NJ 08540, USA

Mathematical methods with direct relevance to physics Equilibrium statistical mechanics Conceptual structure

Gravitation and field theories

Chief Editor

Dynamical systems

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 Schrödinger operators and atomic physics Statistical physics and dynamical systems

Disordered systems

Lagrangian quantum field theory 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. 87-91, (4 issues each) will appear in 1983. The price of each volume is DM 370.00 or approx. US \$ 154.00. Prices for back volumes are available on request. Correspondence concerning subcriptions should be addressed to the publisher. North America. Annual subscription rate: US \$ 794.00, including carriage charges. Subscriptions are entered with prepayment only. Orders should be addressed to: Springer-Verlag New York Inc., Journal Sales Department, 44 Hartz Way, Secaucus, NJ 07094, USA, Telephone (201) 348-4033, Telex 0023 125994. 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 1850.00, plus carriage charges. Airmail delivery on request only. For Japan, carriage charges (Surface Airmail Lifted) are DM 183.00; for India DM 107.00. Single issue price DM 111.00 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 0-1, Telex 01 183 319. 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. 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 26, Telex 04 61 723