## Communications in



## Volume 121 Number 11989

B. Booss-Bavnbek, K. P. Wojciechowski
E. Y. Lerner, M. D. Missarov ..... 35G. Auberson, G. MennessierDing Xiaxi, Chen Gui-Oiang,Luo Peizhu
Pseudo-Differential Projections and the Topology of CertainSpaces of Elliptic Boundary Value Problems 1

Y.-G. Oh Stability of Semiclassical Bound States of Nonlinear
Schrödinger Equations with Potentials ..... 11 Schrödinger Equations with Potentials
Analytic Extrapolation in $L^{\infty}$-Norrn: An Alternative Approach to "QCD Sum Rules" ..... 49
Convergence of the Fractional Step Lax-Friedrichs Scheme and Godunov Scheme for the Isentropic System of Gas Dynamics ..... 63
H. Garland, M. K. Murray Why Instantons are Monopoles ..... 85R. Fernández, J. Slawny
Inequalities and Many Phase Transitions in Ferromagnetic Systems ..... 91
G. Toscani On the Cauchy Problem for the Discrete Boltzmann Equation with Initial Values in $L_{1}^{+}(\mathbb{R})$ ..... 121
R. Illner, M. Pulvirenti
Global Validity of the Boltzmann Equation for Two- and
Global Validity of the Boltzmann Equation for Two- and Three-Dimensional Rare Gas in Vacuum: Erratum and Improved Result ..... 143
J.-P. Eckmann, C. E. Wayne The Largest Liapunov Exponent for Random Matrices and Directed Polymers in a Random Environment ..... 147
Indexed in Current Contents
Evaluated and abstracted for PHYS on STN
Springer International

## Communications in Mathematical Physics

Copyright. Submission of a manuscrıpt ımplıes: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, revıew, or thesis); that it is not under consıderation for publıcatıon 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publication, the authors agree to automatic transfer of the copyright to the publisher, and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.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 artıcle (e.g, as offprints), as well as all translatıon rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronıc data bases, video disks, etc., without first obtaining written permıssion from the publisher.
The use of general descriptıve names, trade names, trademarks, etc., in this publicatıon, even if not specifically identified, does not ımply 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 materıal 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, promotıon, 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. L. Alvarez-Gaumé, Theory Division, CERN, CH-1211 Genève 23, Switzerland
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, Departement de Physique Théorique, Université de Genève, 32, Boulevard d'lvoy, 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. G. Parısi, 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. 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

Gravitation, field theories and geometry
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
Chief Editor
Nonequilibrium statistical mechanics
Classical dynamical systems
General theoretical physics
Schrödinger operators and atomic physics
Statistical physics and dynamicalsystems
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 119-125, (4 issues each) will appear in 1989. North America. Annual subscription rate: US $\$ 2387.00$, single issue price $\$ 105.00$ 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 125994, 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 subscriptıon rate DM 4249 00, plus carriage charges: |Federal Republic of Germany- DM 62.92 incl. value added tax; all other countries DM 12180 except for the following countries to which SAL delivery (Surface Airmall Lifted) is mandatory: Japan DM 268 80, India DM 203.00, Australia/New Zealand DM 30380 Airmall delivery to all other countries is available upon request| Volume price: DM 607.00, single issue price DM 18210 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. $030 / 8207-1$, Telex 0183319 , FAX ( 0 ) $30 / 8214091$ 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 maling label from a recent issue Back Volumes. Prices are available on request Microform: Microform editıons are available from: University Microfilms Internatıonal, 300 N. Zeeb Road, Ann Arbor, MI 48106, USA

## Production

Journal Production Department I, Springer-Verlag,
Postfach 1052 80, D-6900 Heidelberg 1, Federal Republic of Germany,
Tel. 062 21/4 87-5 25, Telex 0461 723, FAX (0)6221/4 3982

