

Communications in

# Mathematical Physics

Volume 71 1980

Chief Editor A. Jaffe, Cambridge, MA

Editorial Board H. Araki, Kyoto  
E. Brézin, Saclay  
R. Geroch, Chicago, IL  
J. Ginibre, Orsay  
J. Glimm, New York, NY  
R. Haag, Hamburg  
J. L. Lebowitz, New Brunswick, NJ  
E. Lieb, Princeton, NJ  
J. Moser, New York, NY  
K. Osterwalder, Zürich  
D. Ruelle, Bures-sur-Yvette  
B. Simon, Princeton, NJ  
Ya. G. Sinai, Moscow  
R. Stora, Geneva

Advisory Board M. F. Atiyah, Oxford  
G. 't Hooft, Utrecht  
C. N. Yang, Stony Brook, NY



Springer-Verlag  
Berlin Heidelberg New York

## **Copyright**

It is a fundamental condition that submitted manuscripts have not been published and will not be simultaneously submitted or published elsewhere. 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 or any other reproductions of similar nature, and translations. Photographic reproduction, microform, or any other reproduction of text, figures, or tables from this journal is prohibited without permission obtained from the publisher.

### *Special Regulations for the USA.*

The Article Fee Code on the first page of an article in this journal indicates the copyright owner's consent that in the USA copies may be made for personal or internal use, provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law is paid through the Copyright Clearance Center, Inc., P. O. Box 8891, Boston, MA 02114.

If a code does not appear, copies of the article may be made without charge, provided permission is obtained from the publisher.

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.

Alle Rechte, einschließlich das der Übersetzung in fremde Sprachen und das der fotomechanischen Wiedergabe oder einer sonstigen Vervielfältigung, auch in Mikroform, vorbehalten. Jedoch wird gewerblichen Unternehmen für den innerbetrieblichen Gebrauch nach Maßgabe des zwischen dem Börsenverein des Deutschen Buchhandels e. V. und dem Bundesverband der Deutschen Industrie abgeschlossenen Rahmenabkommens die Anfertigung einer fotomechanischen Vervielfältigung gestattet. Wenn für diese Zeitschrift kein Pauschalabkommen mit dem Verlag vereinbart worden ist, ist eine Wertmarke im Betrage von DM 0,40 pro Seite zu verwenden.

Springer-Verlag Berlin Heidelberg New York

Printers: Brühlsche Universitätsdruckerei, Gießen

Printed in Germany — © by Springer-Verlag Berlin Heidelberg 1980

# Contents

Aref'eva, I. Ya., Nissimov, E. R., Pacheva, S. J.: BPHZL Renormalization of $1/N$ Expansion and Critical Behaviour of the Three-Dimensional Chiral Field . . . . .	213
Ashtekar, A.: On the Relation Between Classical and Quantum Observables . . . . .	59
Benfatto, G., Cassandro, M., Gallavotti, G., Nicoló, F., Olivieri, E., Presutti, E., Scacciatelli, E.: Ultraviolet Stability in Euclidean Scalar Field Theories . . . . .	95
Benguria, R., Lieb, E. H.: ( <i>Erratum</i> ) The Positivity of the Pressure in Thomas-Fermi Theory. Commun. Math. Phys. 63, 193—218 (1978) . . . . .	94
Borchers, H. J., Garber, W. D.: Analyticity of Solutions of the $O(N)$ Nonlinear $\sigma$ -Model . . . . .	299
Brydges, D. C., Fröhlich, J., Seiler, E.: Construction of Quantised Gauge Fields. II. Convergence of the Lattice Approximation . . . . .	159
Cassandro, M., see Benfatto, G., et al. . . . .	95
Clarke, C. J. S., see Slupinski, M. J. . . . .	289
Daniëls, H. A. M., van Enter, A. C. D.: Differentiability Properties of the Pressure in Lattice Systems . . . . .	65
Davies, E. B.: Non-unitary Scattering and Capture. I. Hilbert Space Theory . . . . .	277
Debacker-Mathot, F.: Integral Decomposition of Unbounded Operator Families . . . . .	47
van Enter, A. C. D., see Daniëls, H. A. M. . . . .	65
Fröhlich, J., see Brydges, D. C., et al. . . . .	159
Gallavotti, G., see Benfatto, G., et al. . . . .	95
Garber, W. D., see Borchers, H. J. . . . .	299
Hagedorn, G. A.: Semiclassical Quantum Mechanics. I. The $\hbar \rightarrow 0$ Limit for Coherent States . . . . .	77
Kay, B. S.: Linear Spin-Zero Quantum Fields in External Gravitational and Scalar Fields. II. Generally Covariant Perturbation Theory . . . . .	29
Lieb, E. H., see Benguria, R.: Erratum . . . . .	94
Narnhofer, H., Sewell, G. L.: Equilibrium States of Gravitational Systems . . . . .	1
Nicoló, F., see Benfatto, G., et al. . . . .	95
Nissimov, E. R., see Aref'eva, I. Ya., et al. . . . .	213
Olivieri, E., see Benfatto, G., et al. . . . .	95
Pacheva, S. J., see Aref'eva, I. Ya., et al. . . . .	213
Presutti, E., see Benfatto, G., et al. . . . .	95
Scacciatelli, E., see Benfatto, G., et al. . . . .	95
Seiler, E., see Brydges, D. C., et al. . . . .	159
Sewell, G. L., see Narnhofer, H. . . . .	1
Shlosman, S. B.: Phase Transitions for Two-Dimensional Models with Isotropic Short-Range Interactions and Continuous Symmetries . . . . .	207
Simon, B.: The Classical Limit of Quantum Partition Functions . . . . .	247
Slupinski, M. J., Clarke, C. J. S.: Singular Points and Projective Limits in Relativity . . . . .	289
Srinivas, M. D.: Collapse Postulate for Observables with Continuous Spectra . . . . .	131

Indexed in Current Contents



# Communications in Mathematical Physics

Volume 71 Number 1 1980

- H. Narnhofer, G. L. Sewell Equilibrium States of Gravitational Systems 1  
B. S. Kay Linear Spin-Zero Quantum Fields in External  
Gravitational and Scalar Fields. II. Generally  
Covariant Perturbation Theory 29  
F. Debacker-Mathot Integral Decomposition of Unbounded Operator  
Families 47  
A. Ashtekar On the Relation Between Classical and Quantum  
Observables 59  
H. A. M. Daniëls,  
A. C. D. van Enter Differentiability Properties of the Pressure in  
Lattice Systems 65  
G. A. Hagedorn Semiclassical Quantum Mechanics. I. The  $\hbar \rightarrow 0$   
Limit for Coherent States 77  
*Erratum*  
R. Benguria, E. H. Lieb The Positivity of the Pressure in Thomas-Fermi  
Theory. Commun. Math. Phys. 63, 193–218  
(1978) 94

Indexed in Current Contents



Springer-Verlag  
Berlin Heidelberg New York

# Communications in Mathematical Physics

**Copyright.** It is a fundamental condition that submitted manuscripts have not been published and will not be simultaneously submitted or published elsewhere. 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 or any other reproductions of similar nature, and translations. Photographic reproduction, microform, or any other reproduction of text, figures, or tables from this journal is prohibited without permission obtained from the publisher.

*Special Regulations for the USA.* The Article Fee Code on the first page of an article in this journal indicates the copyright owner's consent that in the USA copies may be made for personal or internal use, provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law is paid through the Copyright Clearance Center, Inc., P. O. Box 8891, Boston, MA 02114. If a code does not appear, copies of the article may be made without charge, provided permission is obtained from the publisher.

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" and send them to:

Prof. H. Araki, Research Institute for Mathematical Sciences, Kyoto University, Kyoto, 606, Japan	Mathematical methods with direct relevance to physics
Prof. E. Brézin, Service de Physique Théorique, CEN Saclay, B.P. 2, F-91190 Gif-sur-Yvette, France	Quantum fields and statistical mechanics
Prof. R. Geroch, E. Fermi Institute, University of Chicago, 933 East 56 Street, Chicago, IL 60637, USA	General relativity, cosmology
Prof. J. Ginibre, Laboratoire de Physique Théorique et Hautes Energies, Université de Paris IX, Batiment 211, F-91405 Orsay, France	Quantum mechanics
Prof. J. Glimm, The Rockefeller University, 1230 York Avenue, New York, NY 10021, USA	Fluid mechanics
Prof. R. Haag, II. Institut für Theoretische Physik, Luruper Chaussee 149, D-2000 Hamburg 50, Federal Republic of Germany	Conceptual structure
Prof. A. Jaffe, Lyman Laboratory of Physics, Harvard University, Cambridge, MA 02138, USA	Chief Editor
Prof. J.L. Lebowitz, Department of Mathematics, Rutgers University, New Brunswick, NJ 08903, USA	Nonequilibrium statistical mechanics
Prof. E. Lieb, Physics Department, Princeton University, P.O. Box 708, Princeton, NJ 08540, USA	Equilibrium statistical mechanics
Prof. J. Moser, New York University, Courant Institute of Mathematical Sciences, 251 Mercer Street, New York, NY 10012, USA	Classical dynamical systems
Prof. K. Osterwalder, E.T.H. Zentrum, CH-8092 Zürich, Switzerland	Constructive quantum field theory and general theory of quantized fields
Prof. D. Ruelle, IHES, F-91440 Bures-sur-Yvette, France	Dissipative dynamical systems
Prof. B. Simon, Jadwin Physics Laboratory, Princeton University, Princeton, NJ 08540, USA	Scattering theory and atomic physics
Prof. Ya. G. Sinai, L. D. Landau Institute for Theoretical Physics, Academy of Sciences, Vorobyevskoe Shosse, 2, 117334 Moscow, USSR	Statistical physics and dynamical systems
Prof. R. Stora, from Sept. 1, 78 to Aug. 31, 80: CERN, Theory Division, CH-1211 Geneva 23, Switzerland	Lagrangian quantum field theory

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.** Volumes 71-77 (3 issues each) will appear in 1980. The price of each volume is DM 164.00 or US \$ 91.00. Information about obtaining back volumes and microform editions available upon request.

**Change of address.** Six weeks should be allowed for all changes to become effective. All communications should include both old and new addresses (with postal codes) and should be accompanied by an address label from a recent issue.

**North America.** Subscription rate: US \$ 660.50, including postage and handling. 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 0023125994.

**Japan.** Subscription rate: DM 1225.00 including postage (Surface Airmail Lifted) and handling.

**All Other Countries.** Subscription rate: DM 1148.00, plus postage and handling.

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.

## Springer-Verlag

Postfach 105280  
D-6900 Heidelberg 1  
Telephone (06221) 487328  
Telex 04-61690

## Springer-Verlag

Heidelberger Platz 3  
D-1000 Berlin 33  
Telephone (030) 8207-1  
Telex 01-83319

## Springer-Verlag New York Inc.

175 Fifth Avenue  
New York, NY 10010, USA  
Telephone (212) 477-8200  
Telex 0023232235