

Quantum Dynamics: Models and Mathematics

Proceedings of the Symposium "Quantum Dynamics: Models and Mathematics", at the Centre for Interdisciplinary Research, Bielefeld University, Federal Republic of Germany, September 8-12, 1975

The contributions to this volume deal with topics ranging over constructive and general quantum field theory and related algebraic problems, non-renormalizable models, equilibrium statistical mechanics, critical phenomena, and nonlinear equations modelling the onset of turbulence. They are based on lectures intended to provide the 1975/1976 research group "Mathematical Problems of Quantum Dynamics" at the Centre for Interdisciplinary Research (ZiF) of Bielefeld University with an input reflecting important recent developments and presented by leading experts in the pertinent fields of research. They further reflect a situation of unusually active and fruitful exchange not only between various specializations of theoretical physics which deal with the specific problems of large systems but also of a lively two-way interaction with mathematics which stimulates and furthers the progress of both disciplines. Thanks are due to the contributors, to the Preparatory Committee - H. Behncke, P. Blanchard, K. Hepp, O. Steinmann, A.S. Wightman -, to the University of Bielefeld for the sponsorship of these lectures, to the directors and staff of ZiF who made them possible, and to Miss V.C. Fulland and Miss M. Kamper for their calm and competent production of the manuscript.

Jordan Algebras Versus C^* -Algebras.- Decomposition of Families of Unbounded Operators.- Structure of (real-time) $P(\varphi)_2$ Green's Functions.- Asymptotic Perturbation Expansion for the S-matrix in $P(\varphi)_2$ Quantum Field Theory Models.- Time Ordered Operator Products and the Scattering Matrix in $P(\varphi)_2$ Models.- Recent Progress on the Yukawa $P(\varphi)_2$ Quantum Field Theory.- The Cluster Expansion for φ^4 - External Field Dependence of Magnetization and Long Range Order in Quantum Field Theory.- Critical Exponents and Renormalization in the φ^4 Scaling Limit.- An Asymptotic Perturbation Expansion for Multiphase φ^4 .- Renormalization Problem in Massless φ^4 Theory.- Challenging Problems in Singular Dynamical Systems.- Thermodynamic Limit of the Free Energy and Correlation Functions of Spin Systems.- The Lorenz Attractor and the Problem of Turbulence.

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