

**Selected Topics in QFT
and
Mathematical Physics**

Proceedings of the V International Conference

Selected Topics in QFT and Mathematical Physics

June 25-30, 1989

Liblice, Czechoslovakia

Editors

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Institute of Physics
Czechoslovak Academy of Sciences



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SELECTED TOPICS IN QFT AND MATHEMATICAL PHYSICS

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Liblice Castle, the venue of the Conference

PREFACE

The V International conference "Selected Topics in Quantum Field Theory and Mathematical Physics" was held in the Liblice Castle in Czechoslovakia from 25 till 30 June, 1989. Its organizers were

- Institute of Physics, Czechoslovak Academy of Sciences, Prague
- Faculty of Mathematics and Physics, Charles University, Prague
- Faculty of Nuclear Science and Physical Engineering, Technical University, Prague
- Institute of Nuclear Physics, Czechoslovak Academy of Sciences, Řež near Prague
- Faculty of Mathematics and Physics, Comenius University, Bratislava
- Institute of Physics, Electro-Physical Research Centre, Slovak Academy of Sciences, Bratislava and
- Union of Czechoslovak Mathematicians and Physicists.

The Conference was sponsored by the International Union of Pure and Applied Physics.

The main subjects discussed at the Conference were

- Gauge theories unifying fundamental interactions (conformal and de Sitter quantum field theories, superstring theories)
- Non-linear problems (linearizability and integrability of non-linear equations)
- Selected topics, as Kac-Moody and Virasoro algebras.

These Proceedings include the invited lectures as well as communications presented at the Conference. In the Contents we list all the contributions presented, specifying those which were not made available for publication in the present volume. The name of the speaker is printed in boldface.

We express our thanks to authors who submitted their papers in camera ready form, and to the World Scientific Publishing Company for their good cooperation in publishing these Proceedings. We hope that in this way also those who had not the possibility to attend the Conference in Liblice will have a chance to read and enjoy the interesting and stimulating series of lectures presented there.

The Organizing Committee

J. Blank, J. Bičák, P. Bóna, J. Dittrich,
J. Fischer, M. Havlíček, V. Kunderát,
J. Niederle (chairman), A. Nogová,
P. Prešnajder, J. Tolar.

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OPENING ADDRESS

Ladies and Gentlemen,

It is my pleasant duty to declare the V International conference "Selected Topics in Quantum Field Theory and Mathematical Physics" opened.

On behalf of the Organizing Committee I would like to cordially welcome all of you who came here, to the Liblice castle, to the castle built by Giovanni Battista Alliprandi in 1699.

The last conference of this series took place in the Bechyně castle – in another castle of the Czechoslovak Academy of Sciences – almost exactly three years ago. During this period, I think, the status of the subjects discussed in the conference did not rapidly change though many new results were obtained. I have in mind constructions and classifications of new classical solutions of fundamental superstring theory, development of methods for calculating superstring amplitudes in perturbation theory, findings that superstring theory is finite, anomaly free and consistent with quantum theory of gravity. I have in mind an enormous effort in the development of $1 + 1$ conformal field theory and of quantum field theory on lattices, development of non-perturbative methods, geometrical formulations of supergravity theories, development and applications of the representation theory of infinite-dimensional Lie algebras and superalgebras, new solutions and properties of various non-linear equations and last but not least the recent penetration of gauge ideas into new domains.

It has been the aim of the present meeting to bring together a number of prominent experts actively working on the problems mentioned so that the present conference can summarize the situation and can contribute to the difficult synthesis of physical facts and mathematical rigour.

On behalf of the Organizing Committee I would like once more to thank all of you who have come to attend the conference and in particular those who have accepted the invitation to give review talks.

Organizing the meeting of this sort would not be possible without kind supports of various organizations. In particular we greatly appreciate the financial support from the International Union of Pure and Applied Physics.

I wish you a pleasant stay, many stimulating discussions and interesting lecture. Thank you.

J. Niederle

Chairman of the Organizing
Committee

ADDRESS OF THE CHAIRMAN OF THE CZECHOSLOVAK LIAISON COMMITTEE OF IUPAP

Ladies and Gentlemen,

Allow me to welcome you, on behalf of the Czechoslovak Liaison Committee of the International Union of Pure and Applied Physics, at this International Conference on Selected Topics in Quantum Field Theory and Mathematical Physics.

We consider it a great honour that this conference obtained a sponsorship from IUPAP. It is the sign of a high scientific level; it means that the conference has a well-defined and topical programme and also that there are a great number of outstanding physicists among its participants.

The use of mathematics in solving physical problems has been of increasing importance during the past decades. Mathematical physics has a great unifying power in connecting problems from various fields of physics which are very different, such as problems of particle physics, solid state physics, plasma physics, etc. A particularly fast development has taken place in the physics of elementary particles and quantized fields. In the last few years the subject of particle physics and unified theory has developed in a way not witnessed in the preceding five decades: a confluence with geometry, topology and algebra at an advanced level. This has very much expanded the horizon of the field and approached the expectation that a true understanding of the fundamental laws of physics may soon be within reach.

Many aspects of this new development are covered by the programme of this conference: theories unifying fundamental interactions, non-linear problems, problems of some special algebras, etc.

It is in the interest of IUPAP to support conferences with promising scientific output. The profile and level of this meeting makes me hope that it will fulfill our expectations.

Allow me to wish you a pleasant stay in Czechoslovakia and every success to your conference.

L. Štourač

Chairman of the
Czechoslovak Liaison Committee
of IUPAP

