

Preface

The Workshop on Geometric Methods in Physics – the Białowieża Workshop is an annual conference in the fields of mathematical physics and mathematics, organized by the Department of Mathematical Physics of the University of Białystok, Poland. The XXXth Workshop was held during the period June 26–July 2, 2011.

Białowieża, the traditional conference site, is a tiny village in the eastern part of Poland. It is famous for its bison reserve and remaining ancient European primeval forest. The beautiful surroundings help the participants maintain close contact and enjoy a variety of activities together, including excursions and the late evening “campfire”, creating a special atmosphere of collaboration and understanding.

The scientific program of the workshop generally covers such subjects as quantization, integrable systems, coherent states, non-commutative geometry, Poisson and symplectic geometry, infinite-dimensional Lie groups and Lie algebras. In 2011, the conference included three special sessions devoted to the achievements of three mathematical physicists: Felix Alexandrovich Berezin, Bogdan Mielnik, and Stanisław Lech Woronowicz, and their impact on present-day research.

Berezin Memorial Session: Representations, Quantization and Supergeometry.

Felix Alexandrovich Berezin (1931–1980) made important contributions to such classical subjects as group representation theory, the spectral theory of operators, quantum mechanics, statistical physics, and constructive quantum field theory. He also created new concepts, such as a general approach to the quantization problem, the formulation of second quantization in terms of functional integrals, and especially what became known as “supermathematics”, i.e., the theory of supermanifolds and Lie supergroups. More than 30 years after his death, his ideas are still alive and play an important role in mathematical physics. These points are discussed in the special paper included in this volume: “Felix Alexandrovich Berezin and his work” by Alexander Karabegov, Yuri Neretin and Theodore Voronov.

Special session devoted to Bogdan Mielnik. Bogdan Mielnik, the outstanding Polish physicist, turned 75 in 2011. His main line of research has been in the foundations of quantum mechanics. Here, he has always taken an unorthodox and very general approach, based on original ideas such as the convex structure of the space of quantum states or the algebraic manipulation of quantum states. Mielnik has been professor at the Institute of Theoretical Physics of the Warsaw University, and since 1981 has been professor at the Centro de Investigación y de Estudios Avanzados in Mexico City, his current position. His research directions and achievements are described in the special paper included in this volume: “Bogdan Mielnik: contributions to quantum control” by David J. Fernández C.

Special session devoted to Stanisław Lech Woronowicz. We also celebrated the 70th birthday of Stanisław Lech Woronowicz, the outstanding Polish mathemati-

cian and mathematical physicist, one of the discoverers of quantum groups (together with V.G. Drinfeld and M. Jimbo). Unlike the algebraic approach to quantum groups, the approach put forward by Woronowicz is based on ideas of functional analysis and operator algebras. Since this volume does not contain a special contribution about Woronowicz's life and activity, we present some information here.

Woronowicz already demonstrated exceptional abilities as an undergraduate student, and was given the position of *Assistant* at Warsaw University even before graduating (M.S.). He joined the Department of Mathematical Methods in Physics, and at the beginning worked on mathematical aspects of quantum theory, axiomatic quantum field theory and operator algebras. In 1968, he received his Ph.D. after presenting the thesis "Causal spaces". In 1972, he received the habilitation (D.Sc.) on the basis of his paper "Foundations of axiomatic quantum field theory". Beginning in 1979, Woronowicz has been mainly interested in the theory of quantum groups, and is regarded as one of its founders.

In 1979, in a talk at the International Conference on Mathematical Physics in Lausanne, he presented the idea and gave the necessary definitions for replacing the commutative C^* -algebra of functions on a compact topological space by a non-commutative algebra, which forms the dual description of the space corresponding to the non-commutative group. Numerous examples implementing these ideas were contained in papers on quantum deformations of groups and spaces published over the next 15 years by Woronowicz and his co-workers. Later Woronowicz also investigated quantum deformations of non-compact groups, such as the group $E(2)$ of motions of Euclidean space, and the Lorentz group. Woronowicz has received many awards, both Polish and international: the Stefan Banach Prize of the Polish Mathematical Society (1972), the Alfred Jurzykowski Prize (New York, 1989), the Prize of the Foundation for Polish Science (1993), and the Humboldt Research Award (2008). Since 1992, he has been a member of the Polish Academy of Sciences. Since 2011, Woronowicz has been professor at the Institute of Mathematics of the University of Białystok.

Acknowledgment. The organizers of WGMP XXX gratefully acknowledge financial support from the University of Białystok, and the European Science Foundation (ESF) Research Networking Programme "Harmonic and Complex Analysis and its Applications" (HCAA). The U.S. National Science Foundation (NSF grant no. 1124929) supported the U.S. participants (which, in particular, allowed a number of young American researchers to attend the meeting). The Russian Foundation for Basic Research (RFBR) supported the participation of mathematicians and physicists from Russia. We would like to thank them all. Last but not the least, the organizers would like to acknowledge the extraordinary amount of work done by students and young researchers from Białystok during the meeting, to make the conference a success.

March 2012

The Editors

Address of Professor Krzysztof Maurin

In 1982, the first Workshop on Geometric Methods in Physics was inaugurated by Professor Krzysztof Maurin, who is the founder of the Department of Mathematical Methods in Physics at Warsaw University. Professor Maurin has been the teacher of many generations of mathematical physicists; his students include Anatol Odziejewicz, the founder of the Białowieża Workshop, and S.L. Woronowicz, the outstanding Polish mathematical physicist.

We invited Professor Maurin to give the opening address at WGMP XXX, but regretfully he was unable to travel due to his fragile health, and consequently could not participate. Nevertheless he sent a special address to the participants, which we include here (translated from the Polish).

Ladies and Gentlemen,

Today we begin the XXXth jubilee conference in Białowieża. Thirty years ago, when I opened the first conference organized by Dr. Anatol Odziejewicz, I could not have known that I was witness to the creation of a very vital structure, a conference series that would become an ongoing meeting point for theoretical physicists and mathematicians.

One other, comparable Polish initiative of this type is the “Copernicus Name Day”, which was initiated by Roman Ingarden and his disciples in Toruń. The most famous European forum for mathematicians and physicists may be the conferences in Oberwolfach in Schwarzwald, where for the whole year there takes place a meeting every week devoted to a different subject of mathematics or mathematical physics. Anyone who has attended such international gatherings will never forget them. The Institute in Oberwolfach has, of course, a wonderful library. Białowieża is grateful to Anatol for the extraordinary “skansen” whose creation he has led – proof of his deep devotion to the beautiful landscape, the ancient forest, and the local culture. And at none of the other conferences are there unforgettable night campfires, or soccer games between the participants.

The present XXXth Workshop also has a special character. Three days of the workshop will be devoted to discussion of the achievements of three mathematical physicists: Felix A. Berezin, Bogdan Mielnik and Stanisław Lech Woronowicz. I hope the program will not be overloaded, and that there will also be time for personal contacts. The large number of participants is proof of how popular and highly valued the Workshop is.

With these words I complete my short address, and wish everyone a fruitful and enjoyable conference.

Geometric Methods in Physics

XXX Workshop, Białowieża, Poland, June 26 to July 2,
2011

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M.; Voronov, T. (Eds.)

2013, XX, 432 p., Hardcover

ISBN: 978-3-0348-0447-9

A product of Birkhäuser Basel