

Preface

The Summer School *Geometric, Algebraic and Topological Methods for Quantum Field Theory* has been taking place in Villa de Leyva (Colombia) every second year since 1999. In a world of ever-increasing academic specialization, the organizers of this school have sought over the years to provide an environment where students and researchers working in various areas of pure mathematics and theoretical physics may find a real chance to communicate with each other and to learn about subjects which at first sight would appear either irrelevant to their field of study or simply too remote in terms of prerequisites and language.

Not only does E. Wigner's remark¹ (1960) about the "*the unreasonable effectiveness of mathematics in physics*" remain valid, more so, it has gained in significance in a much broader context: Following M. Atiyah, R. Dijkgraaf and N. Hitchin² (2010), one may be tempted to exchange the role of the words *physics* and *mathematics* in the previous sentence, and it would still make sense! It is also in this spirit that the 9th edition of the school was planned. It comprised six courses, delivered by experts, as well as several contributed research talks, all of which revolved around one (or more) of the broad themes *Quantization, Geometry and Noncommutativity*.

Following the tradition of the previous editions to publish the lectures delivered during the school, this volume presents contributions by the lecturers of the school but it differs from traditional proceedings in so far as it comprises chapters on related topics based on the lectures, with a special effort put in achieving a pedagogical presentation. The present volume, we hope, will reflect the effort the authors made during the school to adapt the lectures to the needs of the participants.

The book is therefore intended for curious readers eager to get acquainted with one of the above-listed topics, namely *Quantization, Geometry, and Noncommutative Structures*, and the relations between them. It is addressed to a broad readership ranging from master students to advanced researchers, who will

¹Wigner, Eugene P., *Communications on Pure and Applied Mathematics* (1960) 13, 1–14.

²Atiyah, M., Dijkgraaf, R. and Hitchin, N., *Phil. Trans. R. Soc. A* (2010) 368, 913–926.

find in this volume both the necessary prerequisites and the openings to active areas of research as well as links between these closely related fields of mathematical physics. We hope this volume will be of interest to both physicists and mathematicians, and that it will serve as an introduction to ongoing research in very active areas of mathematics and physics at the border line between geometry, topology, algebra, and quantum field theory. In spite of the diversity of the topics, the reader will find a coherent and homogeneous presentation, reflecting the strong ties between the various topics. For the lay reader, it should serve as a smooth first encounter with some of them.

We are indebted to various institutions for their financial support for this school. Let us first of all thank *Universidad de los Andes* in Colombia, which has been from the very beginning our main source of financial support. We also warmly thank Universidad Nacional de Colombia, Pontificia Universidad Javeriana, Universidad Sergio Arboleda, and Institut de Recherche Mathématique Avancée de Strasbourg for their financial support and their contribution to the success of this school.

Special thanks to the administrative staff at Universidad de los Andes, particularly to Silvia Restrepo (Vice Rector for Research), Ferney Rodríguez (Dean of the Faculty of Sciences), Adolfo Queiroz (Director of the Mathematics Department), and Gabriel Téllez (Director of the Physics Department), for their constant encouragement and support. We also would like to thank Leidy Castillo and Luisa Fernanda Amarillo, who did a great job for the practical organization of the school, the quality of which was very much appreciated by participants and lecturers. We are also very indebted to Marbel Galindo and Paola Pardo for their help in various essential tasks needed for the successful development of the school.

We also want to express our gratitude to the editorial staff of Springer. Aldo Rampioni guided us during the initial stages of this project. His advice was decisive and helped us achieve our initial editorial project. Kirsten Theunissen guided us throughout the whole editorial process. We thank them both for their excellent job and also for their patience.

Without the people named here, all of whom helped in the organization in some way or another, before, during, and after the school, this scientific event would not have left such vivid memories in the lecturers' and participants' minds. Last but not least, thanks to all the participants who gave us all, lecturers and editors, the impulse to prepare this volume through the enthusiasm they showed during the school, and thanks to all the contributors and referees for their participation in the realization of this volume.

Bogotá, Colombia

Austin, USA

Cali, Colombia

Potsdam, Germany

Bogotá, Colombia

Alexander Cardona

Pedro Morales

Hernán Ocampo

Sylvie Paycha

Andrés F. Reyes Lega

Quantization, Geometry and Noncommutative

Structures in Mathematics and Physics

Cardona, A.; Morales, P.; Ocampo, H.; Paycha, S.; Reyes

Lega, A.F. (Eds.)

2017, X, 341 p. 6 illus., Hardcover

ISBN: 978-3-319-65426-3