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

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.

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