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PREFACE

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This special issue of the journal is dedicated to the Proceedings of the Conference "Folding and Unfolding: Interactions from Geometry", which was organized in Ischia from 8–12th of June 2011 to honor the 65 Birthday of Giuseppe Marmo. Around 80 participants were registered, friends, students and collaborators of Beppe. It was a very broad audience and the conference talks reflected this richness, although with a common denominator: the role of geometry in otherwise quite different research topics.

Many important achievements of modern theoretical physics rely indeed upon geometry. For example, Einstein unified space and time into the space-time manifold, and realized that gravity is indeed the dynamics of space-time geometry, while quantum gravity is all about understanding quantum geometry; the standard model of particle physics is fully understood when its geometric formulation in terms of connections on fiber bundles is considered; all known field theories, including supergravity, can be classified from properties of Lie brackets of those vector fields on the space of histories that leave invariant the action functional; string theory itself has its roots in the rich geometry of two-dimensional Riemannian manifolds and the geometry of higher-spin fields, while, on the other side, the geometry of Hilbert space is an essential step in the education of theoretical physicists since von Neumann wrote his book on Quantum Mechanics.

The *leit motiv* of the workshop, with more than 30 talks, was to discuss the state-of-the-art of applications of modern geometric methods to theoretical physics, a subject which Beppe has very much contributed to, all along his career. The title of the conference reflects his point of view that geometry is the key to understand complex phenomena, unfolding the complexity (e.g. interactions, non-linearity, singularities) back to simple, fundamental geometric structures: In few words, the manifest world looks complicated while the un-manifest one is often much simpler, and a wise guide in scientific research should always be to proceed towards simplicity.

The topics addressed in this volume range from the Geometry of Quantum Mechanics and the quantum-classical transition, to the algebraic description of geometric and topological structures, naturally evolving into Noncommutative

Geometry, to the problem of the characterization of classical and quantum integrability with the prominent role of symmetries, as well as to Quantum Tomography and Quantum Computing.

All along his career Beppe has formed many young researchers, not only in Napoli, where he is full-time professor of Theoretical Physics since 1986, teaching Quantum Mechanics with dedication and creativity to generations of students, but in many other countries where he has established new and long-lasting collaborations. For many of us Beppe is therefore a distinguished Master of Science and life. As a scientist, he has been developing his own vision of how Geometry and Physics are entangled, generously providing all along his academic career his deep knowledge to his numerous students, contributing to their rigorous formation and irreversibly stimulating their enthusiasm.

As a person, Beppe is the reliable and wise friend always ready to offer good advice ranging from serious academic affairs to the traditional techniques to maintain the freshness of the bufala mozzarella cheese. His remarkable talent to catch the ironic aspect of life events, makes his company a very enjoyable opportunity.

May this special issue be equally enjoyable for the readers of the Journal, and may it lead to further developments in Physics and Geometry.

On behalf of all participants to the Ischia meeting we express warm wishes to Beppe!

Guest Editors

Giampiero Esposito
Antonino Messina
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