

PREFACE

Modern physics is delicately balanced as it undergoes continuous technical advancement as well as self-examination. For example, the recent measurement of gravitational waves provides new cosmological evidence for the accuracy of general relativity, yet dark matter and dark energy challenge the established theories. Is there a need for new physics or is there a need for new mathematics? How can new ideas extend quantum theory? These questions provided the context for the Nineteenth International Conference on Geometry, Integrability and Quantization, which was held in Varna, Bulgaria at the Koral Hotel in Sts. Constantine and Elena resort on June 2-7, 2017. It is with great pleasure for us to introduce here the Proceedings of the Conference which maintained the tradition of providing an international forum for the presentation of modern developments of geometrical ideas in Mechanics, Physics and Biology. The Conference enabled speakers to present their works from a diverse range of disciplines and facilitated the discussion of topics by participants during meals and informal meetings. This Nineteenth edition in the series contains the contributions by participants from many different countries. Presentations were given in the form of lecture courses, plenary talks and research papers.

Dr John Snigg has delivered a lecture course on Clifford's Geometric Algebra. Plenary talks were given by

- Mayeul Arminjon on Charge Conservation in a Gravitational Field
- Daniela Doneva on Neutron Star Oscillations in Alternative Theories of Gravity
- Janusz Grabowski on Graded Geometry in Mechanics and Field Theory.

During the Conference Special sessions on Gravitation, Cosmology and Relativistic Astrophysics were held and these sessions enabled respective participants to present their recent research findings.

Following the Conference at the same place there was conducted an International Summer School on Hypercomplex Numbers, Lie Groups, and Applications at which Dr Dmitry Shirokov presented a lecture course on Clifford Algebras and Applications to Lie Groups and Spinors.

Our appreciation and gratitude go to the participants and the many people who assisted with the conference and in the publication of these Proceedings. In particular, special thanks go to Dr Mariana Hadzhilazova and Dr Vladimir Pulov for their devoted support in the overall organization of the conference. In addition, we thank the referees for astute observations and supplying prompt and constructive reports. Many thanks go to the Bulgarian team of participants and organizers

for their continued support and hospitality. The many contributions provided participants with ample time to make new friendships and to discuss their work and plans. In addition, the local excursion and conference dinner were two excellent occasions for participants to interact and enjoy each others company while sharing in the local culture, history and scenery of Varna. Warm thanks also go to the Bulgarian Academy of Science and to the Tokyo University of Science, for providing the necessary research framework for the organizers to make the conference possible. In addition, we are looking forward to the Twentieth International Conference on Geometry, Integrability and Quantization which will be held in June 2-7, 2018 at the same venue in Varna, Bulgaria. We will be endeavouring to make next year's meeting as interesting and enjoyable as all previous Conferences.

The Editors