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Stefan Schramm · Mirko Schäfer
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New Horizons in Fundamental Physics

 Springer

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FIAS Interdisciplinary Science Series

ISBN 978-3-319-44164-1

ISBN 978-3-319-44165-8 (eBook)

DOI 10.1007/978-3-319-44165-8

Library of Congress Control Number: 2016947749

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The registered company is Springer International Publishing AG Switzerland

Preface

Modern nuclear physics has become a highly complex area of research covering many topics with close connections to a whole array of different fields of physics. Therefore, from time to time, scientists working in this field need to “escape” from their own special topic of research to get a better understanding of the whole field and their interconnections, therewith also to gain new insight and novel ideas to tackle their scientific projects. In this spirit, we organized the Symposium *New Horizons in Fundamental Physics*, which took place at Makutsi Safari Farm in South Africa from November 23 to 27, 2016. The event followed a previous very successful symposium at the same place in 2011. It successfully managed to bring together world-class scientists with reports on cutting-edge research and very valuable and insightful extensive discussions in a wonderful setting, surrounded by South African wilderness.

The topics of the symposium included nuclear structure calculations of cluster states, exotic neutron-rich isotopes, and the search for long-lived new superheavy elements. Relativistic heavy-ion collisions with their wide spectrum of observables and in a vast range of bombarding energies were discussed in detail. The effect of extreme conditions of temperature and density and ultrahigh electric and magnetic fields on nuclear, atomic, and astrophysical systems was investigated. Among many other facets of the general field, the status of highly accurate calculations of quantum electrodynamics effects in atoms was addressed extensively. Demonstrating the relevance of the research for other fields, methods of describing complex systems were translated to modeling the extension of the European electricity grid. These and more highly timely research topics were presented at the symposium and can be found in this volume.

Aside from the many highly valuable contributions by the participants, this symposium could not have succeeded without the tireless work by Ms. Laura Quist and Daniela Radulescu, who were heavily involved in the many tasks before, during, and after the event. We also want to acknowledge the excellent organization and care given to us by Dr. Gerhard Weber, his family, and team from Makutsi

Safari Farm, who were always very helpful and readily available at every point of time during the meeting.

The symposium was held in honor of Prof. Walter Greiners' 80th birthday. Much of the program was inspired by him during the months of preparation of the event. His incredibly varied research in nuclear physics stretching over many decades is reflected by the large range of topics covered at the meeting. In many of these fields, he has contributed with important and seminal work, inspiring numerous follow-up research activities. Therefore, we believe that this symposium with its unique combination of scientific topics is a fitting tribute to Walter Greiners' profound and lasting influence on nuclear physics.

Just as this manuscript was about to go to press, we received very sad news. Walter Greiner has passed away. He was our friend, teacher and mentor over many years, and a source of inspiration for much of the work presented in this volume. He will be dearly missed by all of us.

We hope that this book will serve as a small but heartfelt recognition of Walter's lasting scientific contribution to physics.

Frankfurt am Main, Germany
June 2016

Stefan Schramm
Mirko Schäfer

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