

Proceedings of the
XLVIIIth Zakopane School of Physics
International Symposium
Breaking Frontiers:
Submicron Structures in Physics and Biology
Zakopane, Poland, May 20–25, 2013

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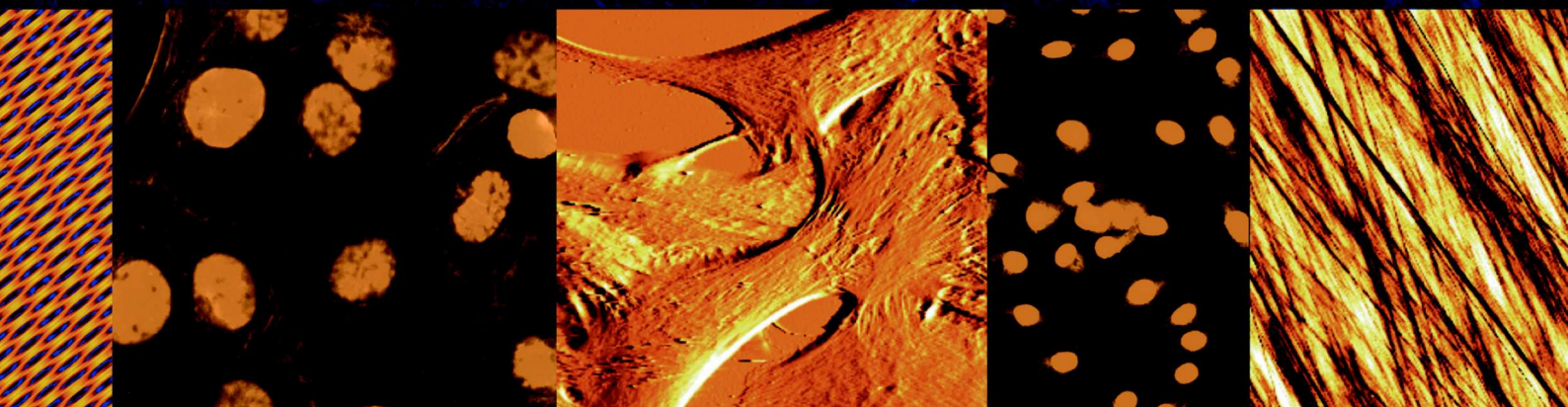
breaking frontiers: submicron structures in physics and biology

20th - 25th May, 2013
Zakopane, Poland



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Preface

The XLVIIIth biennial Zakopane School of Physics, International Symposium “Breaking Frontiers: Submicron Structures in Physics and Biology” was held in Zakopane, Poland on May 20-25, 2013. According to our long tradition which dates back to 1962 when a small group of students and professors decided to combine science with joy, ski, and good entertainment, the School was a place where participants, most of them were students, had many fruitful discussions and exchanges that contributed to the success of the symposium. The School was attended by 98 participants from 15 countries, what was proving the high level of international interest in the subject.

Nineteen invited talks and 17 oral contributions were presented in 9 plenary sessions. All the talks were very impressive for the high scientific level, and in many cases original ideas and activities have been presented. Among the speakers were several young scientists who shown new perspectives in the interdisciplinary research. In many of the 42 posters that were displayed during the poster session the high level of professionalism and enthusiastic passion have been seen. All the different topics have been well represented: magnetism of low-dimensional systems, studies of cells, tissues and biological processes with physical methods, graphene as well as more general aspects related to the field such as the problems of ionizing radiation doses or violation of reciprocity in scattering experiments. As has been the case of previous schools, much fruitful conversation and exchange occurred during the sessions, the mountain excursions, and over the breakfasts, lunches, dinners, and coffee breaks that participants shared together.

These Proceedings are a partial record of the school. They indicate the state of knowledge at the time of the event and we hope it will be valuable help to all participants.

Organizing the school was a team effort. First and foremost, the International Advisory Board whose members gave significant input and were always very helpful for the organizers are acknowledged. A special thanks goes to all speakers and chairpersons, who kept all the sessions in time, but allowing the lively debates. A fundamental role in the conference preparation has been played by the local organizing committee which gave an outstanding contribution. THANK YOU for your determination, commitment and patience! The editors wish to thank also all the authors and referees for their effort in making these proceedings a good record of what was presented. Special acknowledgments are due to Prof. Witold Dobrowolski and Mr. Zbigniew Gawrys for their understanding, help and assistance in the preparation of these proceedings.

Generous support for the conference was provided by the Committee of Physics and the Office of International Relations of the Polish Academy of Sciences, as well as the PREVAC, SHIMPOL and JEOL companies. The funds were greatly appreciated, and permitted us to support a significant number of beginners, students and postdocs.

The continuing success of this symposium series leaves us full of positive emotions which will be helpful in planning the next event to be held in 2015. We hope the meeting added a small ‘brick’ to the mutual relations of the community performing the interdisciplinary research, beyond the borders between physics and biology.

Symposium Chairperson

Assoc. Prof. Marta Marszałek

List of Lecturers:

Robert Barker (Grenoble, France)

From biofactories to general anaesthesia: using neutrons as a probe for biological challenges

Dermot Brabazon (Dublin, Ireland)

Utilisation of laser processing technologies for species separation and surface science applications

Hyeonsik Cheong (Seoul, Korea)

Confocal Raman spectroscopy for investigation of basic properties of graphene

Ludwik Dobrzyński (Otwock-Świerk, Poland)

Big problems with low doses of ionizing radiation

Julia Fedotova (Minsk, Belarus)

Tailored magnetic and electronic states in 3D-metal - insulator films: characterization and applications

Michael Giersig (Berlin, Germany)

Electromagnetic waves interaction with various metallic nanomaterials

Thomas Hauet (Nancy, France)

New schemes for bit pattern media

Stoffel Janssens (Hasselt, Belgium)

Fabrication and properties of nanocrystalline diamond films

Peter Keim (Konstanz, Germany)

Phase transitions and vitrification in two-dimensional colloidal systems

Katarzyna Konopka (Warsaw, Poland)

Engineering materials coded in DNA

Naoto Koshizaki (Tsukuba, Japan)

Fabrication of crystalline submicrometer spherical particles and their optical and medical applications

Dénes Nagy (Budapest, Hungary)

Interchanging source and detector: reciprocity and its violation in scattering experiments

Jacinto Sá (Lausanne, Switzerland)

Where do we come from? What are we? Where are we going? Can TiO₂ be the answer to all this?

Robert D. Shull (Gaithersburg, USA)

Magnetic domain dynamics in nanocomposite materials revealed by real-time images

Jakub Szlachetko (Villigen, Switzerland)

Electronic and geometric structure of matter probed in-situ by means of x-ray spectroscopy techniques

Javier Tejada Palacios (Barcelona, Spain)

Quantum nanomagnetism

Lisa Vaccari (Trieste, Italy)

Lab-On-a-Chip (LoC) devices for infrared spectromicroscopy of live single cells: advantages, disadvantages and future perspectives

Bartel Van Waeyenberge (Gent, Belgium)

Field and spin torque driven dynamics in magnetic nanostructures

Ulf Wiedwald (Duisburg, Germany)

Tailoring magnetic domains by periodic antidots on the nanoscale

