

Proceedings of the
50th Zakopane School of Physics
International Symposium
Breaking Frontiers:
Submicron Structures in Physics and Biology
Zakopane, Poland, May 18–23, 2015

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50th Zakopane School of Physics

Preface

The *Zakopane School of Physics* is a series of meetings, organized since 1962 by the Henryk Niewodniczański Institute of Nuclear Physics Polish Academy of Sciences, devoted to recent achievements in physics, chemistry, material science, biology and medicine. The aim of this conference was to disseminate and share the knowledge in the field.

The Institute of Nuclear Physics Polish Academy of Sciences has been organizing since more than 40 years the International Symposium, traditionally called “Zakopane School of Physics”. Our Symposium “Breaking Frontiers: Submicron Structures in Physics and Biology” has been dedicated to physics and biology issues studied by nuclear physics and ion beam methods. This year we celebrated 50th anniversary of the event graced by the special session devoted to the history and evolution of the conference. This time we had 99 participants. The programme included the morning invited lectures, each 45 minutes long, after lunch free time for mountains, and evening sessions dedicated for student presentations. The symposium covered the following topics:

1. Low dimensional materials: from design, characterization to applications.
2. Biophysics and medical applications.
3. Towards protection of natural environment.
4. Recent technical achievements in submicron structure investigations.

Breaking frontiers: sub-micron structures in physics and biology because it was about:

- Analytical technologies, microscopes, sources, detectors. . .
- S and H X-Rays, Raman, IR, e^- /ion/proton beams, lasers and plasmas. . .
- Nanoworld: NPs, nanotubes. . .
- Materials, organic and inorganic, synthetic and raw. . .
- Structures in all shapes: alloys, films, tubes, fluids, gas, gems, ϕ , tissues. . .
- Biomedical applications: toxicity, pathologies

Lectures and posters mostly interdisciplinary presented cutting-edge technologies, excellent methods and useful samples and all of them were hot subjects.

Basic ingredients of a successful scientific research

- frontiers: wedding of physical methods with the conventional biomedical ones
- frontiers: addressing material/biological questions useful for such end-users
- meaningful interpretation from specific data is the main issue

The conference program included 33 plenary and section lectures, 12 communications as well as above 60 posters. A measurable result of conference is this Issue that contains selected 28 papers on the research work presented at the Zakopane School. The papers cover a wide range of research topics connected with the physics and biology.

The presentations aimed to include the recent technical achievements in submicron structure investigations and had a high scientific quality together with a pedagogical scope accessible and useful to young students and scientists. As it was expected, the School also provided a forum to explore and discuss new scientific initiatives.

The very successful and remarkable event which was the 50th Zakopane School of Physics that could combine scientific purpose with the opportunity for rest was possible due to all lecturers, contributors and participants from fourteen countries: Austria, Canada, Czech Republic, France, Germany, Italy, Japan, Poland, South Africa, Singapore, Spain, Switzerland, United States of America, and The Netherlands. We would like to thank the lecturers for wonderful atmosphere they have created. It is a pleasure for us to announce that the next Symposium “Breaking Frontiers: Submicron Structures in Physics and Biology” will be held in 2017 in the same place and you all are welcome!

Acknowledgments

The financial support from the Polish Academy of Sciences (Division III: Mathematics, Physics, Chemistry and Earth Sciences, and Office of International Relations) and our industrial sponsors such as PREVAC and Renishaw is highly acknowledged. Needless to say, the success of the Zakopane School 2015 would not be possible without hard work of International Advisory Board, Scientific Committee, and Local Organizing Committee to whom should be given the special warm thankfulness.

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