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breaking frontiers: submicron structures in physics and biology

Editors of the Proceedings

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LII Zakopane School of Physics

Preface

The Zakopane School of Physics, International Symposium “Breaking Frontiers: Submicron Structures in Physics and Biology was held in Zakopane, Poland, from 22 to 27 of May, 2017. Our tradition of this meeting dates back to 1962 when a small group of students and professors decided to combine science appreciation with skiing, entertainment, and general merriment. Since then the meeting has been moved to Spring, and since skiing is not quite possible in May in the Polish mountains, other activities took its place. Many ideas have been born during hiking trips across Tatra mountains. The School became a gathering where all our participants have the opportunity to learn, share their knowledge and experience, and discuss recent advances and new techniques in physics, chemistry, materials science, biology, and medicine.

Among 80 participants there were 19 top specialists in the field of material science, biology, physics and chemistry and it was a real pleasure to listen their talks. This year we focused on synchrotron and X-ray free electron laser physics since these are the tools which determine the future of research conducted on large scale facilities. All the different topics have been well represented: magnetism of low-dimensional systems, flexible electronics, nanoscale imaging using laser based laboratory sources, ultra-fast phenomena and extreme conditions in matter studied with XFEL photon sources, dynamics of matter and transitions in matter induced by intense X-ray radiation, and broad spectrum of research concerning anticancer studies of cells and tissues.

In addition to the scientific program of the Symposium, there was also time for informal meetings and discussions, for the beginning of collaborations seeding new ideas and friendships. As had been the case of previous schools, much fruitful conversation and exchange occurred during the scientific sessions, the mountain excursions, and over the meals, and coffee breaks that participants shared together.

The organization of the School was a team effort. First and foremost, we wish to acknowledge the International Advisory Board, whose members gave significant input and were always very helpful in their feedback. Special thanks goes to all speakers and chairpersons, who kept all sessions within schedule, while still allowing for the lively debates. A fundamental role in the conference preparation was played by the local organizing committee whose outstanding contribution mustn’t be overlooked. THANK YOU for your determination, commitment, and patience!

The editors wish to thank all 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 Gawryś for their understanding, help, and assistance in the preparation of these proceedings. The Office of International Relations of the Polish Academy of Sciences, as well as the Laserlab-Europe are acknowledged for their generous support which enabled participation of young students in this event.

The continuing success of this Symposium series leaves us full of hope and anticipation for the next event to be held in 2019. We hope the meeting made at least a small contribution to the relations in the community performing interdisciplinary research, beyond the borders of physics and biology.

Conference Chairmen
Marta Marszałek
Wojciech M. Kwiatek
LIST OF LECTURERS

Ferenc Borondics         Gif sur Yvette  State of the art infrared spectromicroscopy
Alexandre M. Dazzi       Orsay         AFMIR : when AFM meets IR
Wojciech Gawelda         Schenefeld  Ultrafast X-ray spectroscopy of transition metal complexes relevant for catalysis
Matthias Hagner          Konstanz     3D nanotomography of superconducting wires
Vaclav Holý              Prague        Processes of self-organization during deposition and growth of nanoparticles
Karol Janulewicz         Warszawa     Phase transitions in solids by femtosecond laser irradiation. Extreme states of matter
Zoltan Jurek             Hamburg      Dynamics of matter induced by high intensity X-rays
Denys Makarov            Dresden      Flexible electronics: from interactive on-skin devices to in vivo applications
Chris Milne              Villigen     Opportunities for research at the SwissFEL X-ray free electron laser
Natalie Müller           Kouto        Synchrotron radiation based evaluation of functional nanomaterials for environmental applications
Jerzy Pelka              Warszawa     XUV and X-ray free electron lasers in biology and medicine: current status and trends
Marek Przybylski          Kraków       Fundamental limits of nanotechnology
Ryszard Sobierański      Warszawa     Scientific opportunities and challenges at free electron lasers
Holger Stiel             Berlin       Nanoscale imaging using laser based laboratory X-ray sources
Jakub Szlachetko         Kielce        Nonlinear interaction of X-rays with matter
Sven Toleikis            Hamburg      X-ray FELs - Ideal photon sources to investigate ultra-fast phenomena and extreme conditions in matter
B. Voisiat               Dresden      Direct laser interference patterning technique as a flexible tool for surface structuring
Przemysław Wachulak      Warszawa     Nanoimaging using soft X-ray and EUV sources
Beata Ziaja-Motyka       Hamburg      Transitions in matter induced by intense X-ray radiation and their diagnostics