

Proceedings  
of the XIVth National School on Superconductivity  
SUPERCONDUCTIVITY AND INHOMOGENEOUS  
CONDENSED SYSTEMS

Ostrów Wielkopolski, October 13–17, 2009

*Dedicated to the Memory of Professor Jan Stankowski*

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Institute of Molecular Physics  
Polish Academy of Sciences



Adam Mickiewicz University



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## Preface

National School on Superconductivity continues the 20-year tradition of Polish symposia on the problems of superconductivity. The first meeting took place in Warsaw. It was the “First International Symposium on High-Temperature Superconductivity”, April 1987. The subsequent symposia were held in Kraków, Wrocław, Poznań, Kazimierz Dolny (twice), Bukowina Tatrzańska, Międzyzdroje, Gdańsk-Sobieszew, Krynica Górská, Warsaw, Ustroń and Łądek Zdrój, in chronological order. The last meeting was devoted to giant magnetoresistance and other effects in which strong electron correlations are observed. At this year meeting in Ostrów Wielkopolski, we wanted to maintain the extended range of interest of the School. The aim of the meeting, besides the traditional task of integrating the milieu gathered within the framework of the National Scientific Network: “Strongly Correlated Fermions — from Superconductivity to Giant Magnetoresistance”, was the exchange of information on the recent results of experimental as well as theoretical research of systems with strongly correlated electrons. Another objective of the School, which became a constant point on the list of scientific events in Poland, was to discuss the directions of development in the field of high-temperature superconductivity and related issues.

Invited plenary lecturers of the School were: Prof. Dr. hab. Józef Barnaś, Poznań; Prof. MCSU, Dr. hab. Tadeusz Domański, Lublin; Doc. Dr. hab. Roman Puźniak, Warszawa; Prof. Dr. hab. Andrzej Michał Oleś, Kraków.

Invited lecturers were: Prof. Dr. hab. Karol I. Wysokiński (Lublin); Prof. Dr. hab. Tadeusz Kopeć, Prof. Dr. hab. Jan Klamut, Prof. Dr. hab. Ryszard Gonczarek, Doc. Dr. hab. Krzysztof Rogacki, Doc. Dr. hab. Piotr Wróbel, Doc. Dr. hab. Vinh Hung Tran, [Dr. hab. Tomasz Plackowski], Dr. Piotr W. Klamut (Wrocław); Prof. Dr. hab. Henryk Szymczak, Prof. Dr. hab. Marta Cieplak, Prof. Dr. hab. Piotr Przysługowski, Doc. Dr. hab. Andrzej Wiśniewski (Warszawa); Prof. Dr. hab. Marcin Mierzejewski, Prof. SU, Dr. hab. Maciej Maśka (Katowice); Prof. Dr. hab. Józef Spałek, Prof. Dr. hab. Andrzej Szytuła, Prof. Dr. hab. Andrzej Kołodziejczyk, Dr. Adam Rycerz (Kraków); Doc. Dr. hab. Zbigniew Trybuła, Doc. Dr. hab. Jan Martinek, Dr. hab. Bartłomiej Andrzejewski (Poznań).

It is our sad duty to inform that Professor Jan Stankowski, who was a prime mover of all our meetings, will no longer be with us. He has passed away on the 4th of September 2009. As Professor Jan Stankowski had also been a long-term member of the editorial board of this Journal, we would like to dedicate the present issue of Acta Physica Polonica A to His memory.

R. Micnas, W. Kempniński, L. Piekara-Sady, Z. Trybuła, R. Wojciechowski

## In Memoriam Professor Jan Stankowski (1934–2009)



Professor Jan Stankowski was born in 1934 in Poznań in the Wielkopolska region, died in Poznań on September 4, 2009, at the age of seventy five. He was a pioneer and later Nestor of the Electron Paramagnetic Spectroscopy in Poland, scientist of great accomplishments widely recognized in the world in many fields as magnetic resonances, high temperature superconductors, proton glasses and fullerenes.

Professor Jan Stankowski was elected the Corresponding Member of the Polish Academy of Sciences in 1979 and the Full Member in 1988. He was also the Member of the Slovenian Academy of Sciences and Arts. In 2000 he was elected a fellow of the Institute of Physics, London. Professor Jan Stankowski was the Vice President of the Groupement AMPERE (1996–2002), chairman of Section 5 of the Central Commission for the Degrees and the Scientific Title from 1990, chairman of the Physics Committee of Polish Academy of Sciences (1990–1999), President of the Poznań Division of the Polish Academy of Sciences (1990–1995), President of the Scientific Council of the Institute of Molecular Physics, Polish Academy of Sciences (1993–1998; and from 2003), and member of the many Scientific Councils. His experience and broad knowledge have been recognized by Polish and international scientific

society who asked him to be a member of the editorial boards of journals as *Acta Physica Polonica* (Poland), *Physica B* (Holland), *Ferroelectrics* (USA), *Applied Magnetic Resonance* (Russia–Germany), *Superconductivity Review* (USA), *Bulletin of Magnetic Resonance* (USA), *Physics of Dielectrics and Radiospectroscopy* (Poland, in Polish), and *Molecular Physics Reports* (Poland). Professor Jan Stankowski was awarded many honours and prizes, among them the Gold Cross of Merit and the Polonia Restituta Order.

“Physics makes my life happy, because I can do what I love”. These words were written by our Father, Jan Stankowski in his memoirs, which he had been writing for several years. Besides being an excellent physicist and teacher, he was also a humanist, who realised that only written thoughts could last. He was a very happy person with a positive outlook on life.

When he became ill, he did not despair, downright the opposite; he was saying that he was a fulfilled man and thanked God for everything. He had a wonderful wife Jadwiga, with whom they made a distinctive home. He was surrounded by the loving children, grandchildren and great-grandchildren. However, it was physics that permeated his life.

His adventure with physics began when he took part in the final round of Polish Physics Olympiad years ago. He was lucky enough to be a student of Professor Arkadiusz Piekara at the Adam Mickiewicz University in Poznań. Professor Piekara was his inspiration till the end of his life. During his career, Professor Stankowski published over 350 research papers in collaboration with 759 numerous different co-authors and worked informally with many more. In the period 1971–2004 he promoted 28 Ph.D. students and the topics of their theses reflected his interest in molecular physics and the physics of condensed state.

Professor Jan Stankowski was always fascinated by the great challenges, whose realization he used to embark on, although they might have seemed impossible. Founding in 1975 the Institute of Molecular Physics of the Polish Academy of Sciences in Poznań, of which he was the first managing director, shows how important it is to have dreams and realize them consequently. On the night 1st/2nd of January 1964, together with other members of his team, he put in operation the first ammonia maser in Poland. Before creating the Institute, in the independent Radiospectroscopy Laboratory in Poznań, after great effort in 1967, they finally had set up an electron paramagnetic resonance (EPR) spectrometer from JEOL. It was the beginning of intensive academic research in the area of radiospectroscopy, including high pressure measurements. To meet the demands for more EPR spectrometers, Professor Stankowski together with his team elaborated and constructed an EPR spectrometer. Its serial production was undertaken by Radiopan, a spin-off company founded at the Institute of Molecular Physics of the Polish Academy of Sciences.

Another organizational and scientific challenge was the establishment, within the Institute of Molecular Physics of Polish Academy of Sciences, of the Division of Low Temperatures Physics in Odolanów in 1977. Professor Stankowski's idea was to use the liquid helium produced in Odolanów for the low temperature research. The low temperature research, initiated by Professor Stankowski, has been conducted for over 30 years reaching temperature down to 0.3 K. These studies comprise, e.g., phase transitions in solids, superconductivity in various materials, attributes of electric transport of carbon materials. The research is being conducted using different equipment, namely, the EPR spectrometer, working in the range of temperatures from 300 K to 4.2 K, equipment with the helium 3 cryostat for measuring dielectric permittivity, magnetic susceptibility and transport phenomena, i.e. electric and thermal conduction, in the temperature range from 300 K to 0.3 K, and the scanning tunnel microscope (STM) operating in the range 300 K to 2 K.

During his stay in the USA in 1987, Professor Stankowski investigated the microwave absorption in the high temperature superconductors  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  by the use of EPR spectrometer. He then discovered a novel method for studies of superconductors, the so-called magnetic modulation microwave absorption (MMMA). This method is still being used in research of granular superconductors with the Josephson junctions (J. Stankowski, P.K. Kahol, N.S. Dalal, and J.S. Moodera, *Phys. Rev. B* **36**, 7126 (1987), "Possible Josephson oscillation spectra and electron paramagnetic resonance of  $\text{Cu}^{2+}$  in Y-Ba-Cu-O"). He introduced the concept of the local temperature of the Josephson junctions systems, which has enabled thermodynamic description of the effect of the microwave field on the high temperature superconductors.

Another brain-child of Professor Stankowski was the organization of annual academic workshops "Lato z Helem — Summer with Helium" by the Division of Low Temperature Physics in Odolanów. For the last 26 years these workshops gave high school students a unique chance to participate in experiments and lectures covering such topics as, e.g. the low temperature studies, cryogenics, and superconductor research, delivered by eminent Polish physicists.

Professor Stankowski's outreach activities were highly recognized by the Polish Physical Society, who awarded him in 2009 the Professor Ernst Medal given for achievements in popularization of science and educational activities.

During the celebration of his 70th birthday, our Father had said the words that could serve as a hint for all of us on how to live: *"I would like to see something what would surprise me. Because, all the publications, quotations and the so called career does not bring you happiness, if you are not sure that you didn't waste the time given to you"*.

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