

The 60th jubilee of the PAS Institute of Physics

60 Years of World-Class Physics

On the occasion of the 60 jubilee of the PAS Institute of Physics, held under the honorary patronage of Polish President Bronislaw Komorowski, a special session and conference were organized in October 2013 to present the Institute's most important accomplishments and research plans



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This year's 60th anniversary of the PAS Institute of Physics offers an excellent opportunity to reflect on its accomplishments and attempt to define its role in the future

Established by a governmental resolution dated 24 September 1953, the PAS Institute of Physics was formed with a view to implementing research projects and educating specialized personnel. Given that it was tasked with addressing all physics-related issues in Poland, the Institute gathered research teams from all of the country's major higher education establishments: the University of Warsaw, the Jagiellonian University, the Adam Mickiewicz Institute, the Nicolaus Copernicus University, the University of Wrocław, and the Wrocław University of Technology. In addition, the Institute used the laboratories of those universities.

Forming the Institute required a great deal of effort on the part of such prominent professors as Stefan Pieńkowski, father of prewar physics in Poland, Leopold Infeld, one of Einstein's associates, as well as some younger researchers: Marian Mięśowicz, Henryk Niewodniczański, and Andrzej Sołtan.

As a result of exploring new directions in science and separating teams of researchers from its organizational structure, the Institute underwent numerous organizational changes in 1953-1973, spinning off three independent research and development facilities affiliated with the Polish Academy of Sciences: the PAS Institute of Low Temperature and Structure Research in Wrocław (1966), Unipress, currently the Institute of High Pressure Physics (1972), and the PAS Institute of Molecular Physics in Poznań (1975). The Institute that emerged from those transformations was located exclusively in Warsaw and focused its research activity on condensed matter physics, molecular and nuclear physics, quantum optics, and spectroscopy.

Since its establishment, the Institute of Physics has made numerous scientific discoveries of great empirical and practical significance and used them to build up its scientific reputation both in Poland and abroad.

The present paper is too short to accommodate an exhaustive list of the accomplishments made by the Institute's staff, so I will restrict myself to presenting a brief overview of the events crucial to the Institute's activity and development.

From an illustrious past...

Especially noteworthy were pioneering scientific studies that set new directions for global physics. Those included the studies into narrow gap semiconductors initiated by Leonard Sosnowski in the late 1950s and intensively pursued for the following two decades, with the most important papers in this field being coauthored by such leading scientists as Jerzy Kołodziejczak and Włodzimierz Zawadzki. Extensive experimental and theoretical projects were accompanied by intensive technological efforts on the part of such scientists as Witold Girit.

In the early 1970s, Robert Gałazka from the Institute began to examine a new group of semiconductor materials ultimately named semimagnetic semiconductors. Initially, emphasis was placed on narrow gap materials doped with transition metals. After that, a whole array of wide gap materials important in terms of their optical applications were synthesized and studied. Both experimental and theoretical studies were aimed chiefly at working out methods for manipulating the spin of electrons and consequently laying the foundation for a new branch of electronics called spintronics.

Henryk Lachowicz and Henryk Szymczak, in turn, launched studies into magnetic nanostructures in the late 1970s.

But what marked a milestone in the development of spintronics was a paper published by Tomasz Dietl et al. in *Science* in 2000. The authors presented a model description of ferromagnetism in zinc-blende semiconductors doped with transition metal ions, arguing that a magnetically ordered phase could exist in room temperature. This article, one of the most cited papers in the field of semiconductor physics in the last decade (with nearly 5,000 citations), opened up the door to the construction of spintronic devices.

The Institute's outstanding achievements have pertained not only to solid-state physics but also to molecular physics, nonlinear physics, quantum optics, and recently also biological physics.

In the 1960s, Andrzej Tramer and Tadeusz Skaliński began studying the photophysics of molecular compounds. Their work was continued by such scientists as Jerzy Prochorow and Krystyna Szczepaniak. Prof. Kazimierz Rosiński, in turn, was responsible for the development of atomic physics at the Institute.

Andrzej Sobolewski's work on the theory of photophysical reactions has had a great impact on the development of global photophysics. Sobolewski and his associates demonstrated that basic biological structures had a universal mechanism that protected them against the potentially destructive influence of the ultraviolet component of sunlight by turning the absorbed UV quanta into the "harmless" heat of atomic oscillations in a very fast and efficient manner.

In 2004, the Group of Biological Physics was formed under the leadership of Marek Cieplak. It was later transformed into the rapidly growing Laboratory of Biological Physics.

....to a modern future

Today's Institute of Physics carries out international multi- and interdisciplinary scientific projects in such fields as physics and materials technology, quantum nanostructures in semiconductor, magnetic, superconductor, and molecular materials (including biologically active and environmentally important ones) as well as modern scientific methods in condensed matter physics, nuclear physics, and molecular physics (also including functional molecules, extremely important in the light of their future applications). Such findings, in addition to many other accomplishments, not presented in this brief list, have won the Institute a high position in international rankings and worldwide recognition.

One symbol of the Institute's importance was the appointment of Maciej Kolwas as president of the European Physical Society in 2008 and the European Commission's decision to offer Tomasz Dietl membership in the Steering Committee of the European Research Council in 2012. ■

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