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Annales Henri Poincaré

Krzysztof Gawędzki 1947–2022

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Krzysztof Gawędzki was a central figure in the mathematical physics community during the past decades. Born in 1947 at Zarki, Poland, he studied at the University of Warsaw where he got his PhD in 1971 and then, continued during 1971–1981 as a researcher at the Department of Mathematical Methods in Physics in Warsaw. When the martial law was declared in Poland in 1981, he was visiting the IHES in France and aided by a CNRS position, the stay in IHES continued till 2001 when he moved to the physics department at ENS Lyon.

Krzysztof's work spanned an astonishing range of topics including geometric quantization, supermanifolds, renormalization group, conformal field theory, turbulence, KAM theory, stochastic thermodynamics, topological insulators and even an experiment. Despite this variety, his approach to research was not superficial, quite the contrary when embarking seriously on a new subject he worked years to reach a deep understanding of it. He was equally comfortable with rigorous proofs as with long and complicated calculations. A unifying theme of all his work is quantum field theory, and he became one of the leading field theorists of the past decades.

In Warsaw, Krzysztof got a solid education in geometry and analysis which was visible in his later career. His work during this time centered around geometric quantization but also included a structural theorem on supermanifolds that was picked up by the community decades later. In the end of 70's, Krzysztof decided to enter the rapidly developing field of constructive quantum field theory where after some work on phase transitions in two-dimensional scalar QFT, he embarked on a rigorous analysis of Wilson's renormalization group. This led to the rigorous analysis of asymptotically free theories both in the context of critical phenomena as well as QFT.

In mid 80's, Krzysztof returned back to his geometric roots and embarked a long project in conformal field theory, in particular the Wess–Zumino–Witten model and the related coset models which were at that time intensely studied due to their connection to string theory. His work culminated to finding explicit integral expressions their correlation functions. After this long project in mid 90's, Krzysztof was ready for a change of topics and an opportunity for this

was offered in the field of statistical theory of turbulence and in particular the Kraichnan model of a passive advection of a scalar field (e.g., temperature) by a turbulent velocity field leading to proof of intermittency for the first time in a nontrivial turbulent system. From his work on turbulence, Krzysztof was led to other questions in non-equilibrium systems including an elegant and comprehensive approach to various fluctuation relations for classical nonequilibrium dynamics described by diffusion processes. Again Krzysztof approached these questions with his characteristic thoroughness, and this led even to an experimental work where he was heavily involved. Finally, Krzysztof embarked on yet another new project where he was able to combine his mastery of conformal field theory and non-equilibrium physics to the study of quantum non-equilibrium systems: heat transport in the Luttinger model and full-counting statistics of energy transfers in conformal field theories. This project was interrupted by his untimely death in January 2022.

Krzysztof served as Editor-in-Chief of Annales Henri Poincaré from the beginning of 2012 till mid 2018. In 2011, he was told that the board of the journal, as well as his predecessor Vincent Rivasseau, would unanimously welcome him as the new Editor-in-Chief, being extremely happy if somebody of such high scientific stature and integrity would accept the job. Rather than simply accepting, he felt it necessary to first state his candidacy for the position, somehow foreshadowing the humility with which he then provided his service. This was though in no contradiction with his strong opinions on how to run the journal, because to him responsibility could not come without leadership. For instance, Krzysztof did not bow to the importance of impact factors, though they rose under his term. He felt that the mathematical physics community is vibrant and that the journal needed an increase in the number of issues and of pages in order to properly reflect much of the very good and diverse research that it generated. In the same vein, he succeeded in inviting contributions from carefully selected authors. As with other Editors-in-Chief, much of the daily work tends to take place silently, by patiently dealing with authors, members of the Editorial Board, and the Publisher. Some health problems interfered with that activity, which Krzysztof, however, resumed as soon as it again became possible to him. Finally, his help and advice were essential in finding his successor, Claude-Alain Pillet.

Krzysztof's passing away was a big loss to the mathematical physics community and a personal loss to many of us, his friends and colleagues. Shortly after the news of this came, we decided that a special issue of AHP with content reflecting the wide range of his research interests should be devoted to his memory. Without exception, the authors we contacted accepted the invitation to contribute to this volume and we believe Krzysztof would find the result satisfying.

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