ISSUE 18, WINTER 2025

NEWSLETTER

OF THE INSTITUTE OF MATHEMATICS OF THE POLISH ACADEMY OF SCIENCES

BANACH CENTER UPCOMING EVENTS IN 2026

Title	Date	Place
Invariant Structures in Group Actions	12-16.01.2026	Będlewo
Is there an analogue of the Nielsen-Schreier theorem for skew braces?	26-31.01.2026	Będlewo
Ergodic group actions and unitary representations III	2-6.02.2026	Warszawa
Focused Workshop on Erdős-Pósa problems	15-20.03.2026	Będlewo
RAMiCS'26: 22nd International Conference on Relational and Algebraic Methods in Computer Science	7-10.04.2026	Będlewo
Continued fractions everywhere	26.04-1.05.2026	Będlewo
Metric Geometry of Singularities	4-10.05.2026	Będlewo
Probability and Analysis 2026	10-15.05.2026	Będlewo
Discrete Random Structures II	17-22.05.2026	Będlewo
Ergodic theory, fractal geometry and Diophantine approximation	18-22.05.2026	Warszawa
Berlin-Poznań-Hamburg-Warsaw Seminar in Discrete Mathematics 2026	28-30.05.2026	Będlewo
Conference on Gödel's Program	31.05-6.06.2026	Będlewo
Calculus of Variations in Materials Science	7-12.06.2026	Będlewo
Workshop in geometric analysis	8-12.06.2026	Warszawa
Operator Theory in Quantum Physics – OTQP 2026	14-16.06.2026	Będlewo
A conference in Geometric Analysis to honor Piotr Hajłasz' 60th birthday	21-27.06.2026	Będlewo

Continued on p.25

For more information, please see: https://www.impan.pl/en/bc-conferences.

On the cover: Four-corner Cantor set and its projections. This self-similar set is a classical example of a purely unrectifiable set, that is, a set of finite length whose intersection with any rectifiable curve is negligible. If K_n denotes the n-th set from the construction, then the Besicovitch projection theorem implies that the average (with respect to direction) of the lengths of the orthogonal projections of K_n converges to zero with n, but estimating the precise rate of convergence remains an important open question.

Photographs of Będlewo on pages 2 and 23. Credit: IM PAN.

Damian Dąbrowski awarded an ERC Starting Grant

Interview conducted by Yonatan Gutman

Damian Dąbrowski from the Warsaw branch of the Institute of Mathematics of the Polish Academy of Sciences has been awarded an ERC Starting Grant entitled *Quantitative Projection Problems in Geometric Measure Theory* for the period 2025–2030. This is the third ERC grant awarded to a member of IM PAN. Previously, ERC Starting Grants were awarded to Piotr Nowak (*Rigidity of Groups and Higher Index Theory*; 2016–2022) and Piotr Achinger (*Homotopy Theory of Algebraic Varieties and Wild Ramification*; 2019–2026).

Y.G.: Congratulations! Please tell us about your academic itinerary leading up to this summit.

D.D.: Thank you. I did my undergraduate and master's studies in mathematics at the University of Warsaw. My advisors there were Marta Szumańska and Paweł Strzelecki, to whom I am extremely grateful for introducing me to Geometric Measure Theory. After that, I pursued doctoral studies at Universitat Autònoma de Barcelona under the supervision of Xavier Tolsa. I defended my PhD in 2021, and the following four years I spent as a postdoc at the University of Jyväskylä, where my mentor was Tuomas Orponen. Both Xavi and Tuomas are incredible mathematicians and fantastic mentors; I was very lucky.

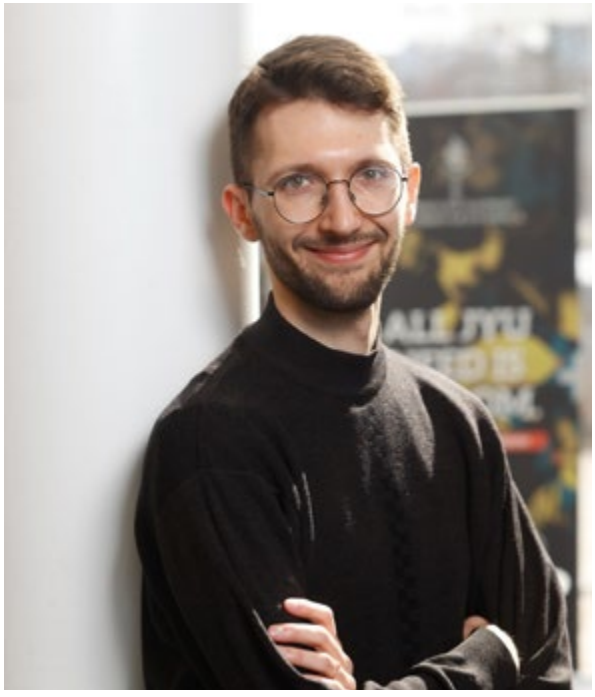
Y.G.: What is geometric measure theory?

D.D.: Geometric measure theory (GMT) is a branch of mathematical analysis that aims to solve geometric problems using the tools of measure theory. The primary focus of GMT is sets and measures of low regularity, to which differential geometry may not apply. It draws on a wide range of modern mathematics, with subfields rooted in the calculus of variations, PDEs, fractal geometry, dynamical systems, and harmonic analysis.

Much of GMT's spectacular development over the last century was propelled by two fundamental questions: the Plateau problem and the Painlevé problem. The Plateau problem is firmly rooted in the calculus of variations: given a fixed curve Γ, what is the surface of least area whose boundary is precisely Γ? Such area-minimizing surfaces are called minimal surfaces, and they model soap films. The key difficulty lies in the fact that minimal surfaces may contain singularities and self-intersections; thus, instead of smooth manifolds, one must consider more general models of surfaces, such as currents or varifolds.

Y.G.: You also mentioned Painlevé's problem. Could you please tell us about it?

D.D.: The Painlevé problem is concerned with sets removable for bounded holomorphic functions—roughly speaking, sets negligible from the point of view of such functions. For example, Riemann's theorem on removable singularities states that singletons are removable. The Painlevé problem asks for a geometric characterization of removable



Dr. Damian Dąbrowski. Credit: University of Jyväskylä.

sets. This question is closely connected to the study of the Cauchy transform, or more broadly, singular integral operators and harmonic analysis.

In the late 1960s, Anatoli Vitushkin conjectured the following solution: a set is removable if and only if its typical orthogonal projection has zero length. This became known as Vitushkin's conjecture, and it was proved for sets of finite length by Alberto Calderón and Guy David. For sets of infinite length, one implication turned out to be false, but the opposite implication remains an open problem. Much of my recent research has been dedicated to this question, which is one of the main goals of my ERC project.

Y.G.: This sounds very interesting. Please tell us more about your ERC project.

D.D.: Thanks to Xavier Tolsa's work on the Painlevé problem, the open implication of Vitushkin's conjecture can be reformulated in purely geometric terms: given a set with large orthogonal projections, prove that this set is either quite large or quite flat at most scales. If we know a priori that our set has finite length, we can invoke a result of Besicovitch from 1939, which states that a non-trivial part of our set can be covered by a finite-length curve (i.e., the set is quite flat).

Thus, the heart of the matter lies in proving a sufficiently strong, quantitative version of Besicovitch's theorem, applicable to general sets. Last year, I managed to prove a quantitative version of Besicovitch's theorem for a fairly broad class of sets: Ahlfors 1-regular sets. The plan is to build on that result and proof techniques and, with some luck, finally settle the conjecture.

Y.G.: That would be groundbreaking. Good luck! Finally, let me thank you for sharing in this Newsletter your advice for prospective ERC applicants.

D.D.: It is my pleasure.

Advice from an ERC Laureate

Damian Dąbrowski

Here are a few general tips on preparing an ERC application, based on my own experience and conversations I have had over the past year.

As with any grant application, it is crucial to demonstrate to the panel members that your project is, firstly, important, and secondly, feasible. The unique nature of the ERC is that the project must also be very ambitious. Meeting all these somewhat conflicting expectations is a delicate balancing act.

It is good to start with one to three large, challenging problems around which to build your application. Ideally, there should be some connections between these problems. A *medley* of many loosely connected, highly specialised problems might not work well. The point is to impress the panel members and reviewers immediately. To advance through the first phase of the competition, your project must attract the attention of panel members who most likely work in different areas of mathematics and need to evaluate many applications. The project should present an ambitious, convincing programme for tackling these big problems, potentially by breaking them into smaller, more specialised sub-problems or tasks.

At the same time, you need to convince the panel members and reviewers that you truly have a chance to achieve a breakthrough on these important problems. To do this, one should already have a strong track record working on these problems or closely related topics. Earlier articles can serve as a "proof of concept" for new ideas and tools that will be developed within the project. In my case, it was very helpful that I had a recent article making significant progress on one of the problems and introducing new tools to the area.

This allowed me to argue in the proposal how these tools could be further developed to settle the full problem. Whenever possible, mention a plausible strategy or approach for each proposed problem or task.

The project should be feasible, but not *too* feasible either—it is important that it does not appear to be a safe continuation of previous research. The project is supposed to be innovative and groundbreaking. There is no need to hide the fact that the proposed strategy carries risk; in fact, this is expected. A good way to mitigate this risk is to outline an alternative strategy in case the primary

one fails. It is also acceptable to say openly that one does not yet know how to prove certain statements and that new ideas will be necessary.

There are certainly differences between the Starting (StG), Consolidator (CoG), and Advanced Grants (AdG), and I only feel competent commenting on the Starting level. At the CoG and AdG levels, expectations are undoubtedly higher concerning track record, ambition, and probably past mentoring experience. At the Starting level, it is crucial to demonstrate that one is an independent, mature researcher. In fact, my panel concluded all interviews by asking: "*How have you demonstrated your scientific independence?*" This is best shown through single-author papers, a diverse group of collaborators, or experience as a PI on another project. If all of one's articles were co-authored with their PhD advisor, this may raise a red flag.

Another general piece of advice is to study carefully the official materials provided by the ERC. They contain many useful tips and instructions on the application process. At the very least, you should examine the panel and reviewer evaluation forms - they contain the specific questions that panel members and referees must answer. Your proposal should make it easy for them to respond. You may even include implicit answers to these questions in your proposal (though do not be too explicit; they should fit naturally into the narrative). These questions should serve as guiding principles for writing the entire proposal.

When working on an application, it is worth asking for help. Consult colleagues about your project ideas early on. It can also be helpful to read a successful application, or at least a few abstracts of funded projects, to get a sense of what the panel is looking for. When you prepare your first draft, consult multiple colleagues again, ideally from different areas of mathematics. In addition to fellow mathematicians, it is worth seeking assistance from the National Contact Point (NCP) at the National Centre for Research and Development (Krajowy Punkt Kontaktowy w NCBR) and from the Excellence in Science Department of the Polish Academy of Sciences (Biuro Doskonałości Naukowej PAN).

Both units advise on non-scientific aspects of the application (e.g., structure and clarity) and organise mock interviews for applicants selected for the second round. It is worth contacting them early in the process, perhaps even before drafting the proposal. Also noteworthy is the ERC Mentoring Initiative (coordinated by the NCP), which connects applicants with people who have already received an ERC grant or who have served on panels.

This may seem like a lot, and indeed preparing a good proposal is a laborious and sometimes painful process. Do not be discouraged, however. Even if the application is ultimately not successful, the time invested may help you structure your long-term research plans and prepare stronger future grant applications. And, of course, if the application is successful, it will certainly have been worth the effort.

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Banach Medal Awarded to Vitaly Bergelson at Conference Celebrating His Work and Impact

Florian Richter

From Monday, June 23rd to Friday, June 27th, 2025, mathematicians working in ergodic theory and related areas gathered at the IM PAN headquarters on Śniadeckich Street in Warsaw for a week filled with scientific activity and shared celebration. The central event was the conference *Perspectives on Ergodic Theory and its Interactions*, which brought together leading researchers to exchange ideas and discuss recent advances in the field. A second major occasion was the award ceremony for the 2024 Stefan Banach Medal, presented to Vitaly Bergelson in recognition of his profound contributions to ergodic theory and its applications. As it happened, Vitaly's 70th birthday fell in close alignment with the conference and the medal ceremony, adding the celebration of his round jubilee to the week's agenda and giving the community a chance to recognize the lasting impact of his work on the field.

Perspectives on Ergodic Theory and its Interactions

The aim of the conference was to showcase the rich interplay between ergodic theory and other areas of mathematics. The field has long been known for its fruitful connections with number theory, combinatorics, harmonic analysis, and several other disciplines, and in recent years it has been particularly active, with many striking developments emerging along these interfaces.

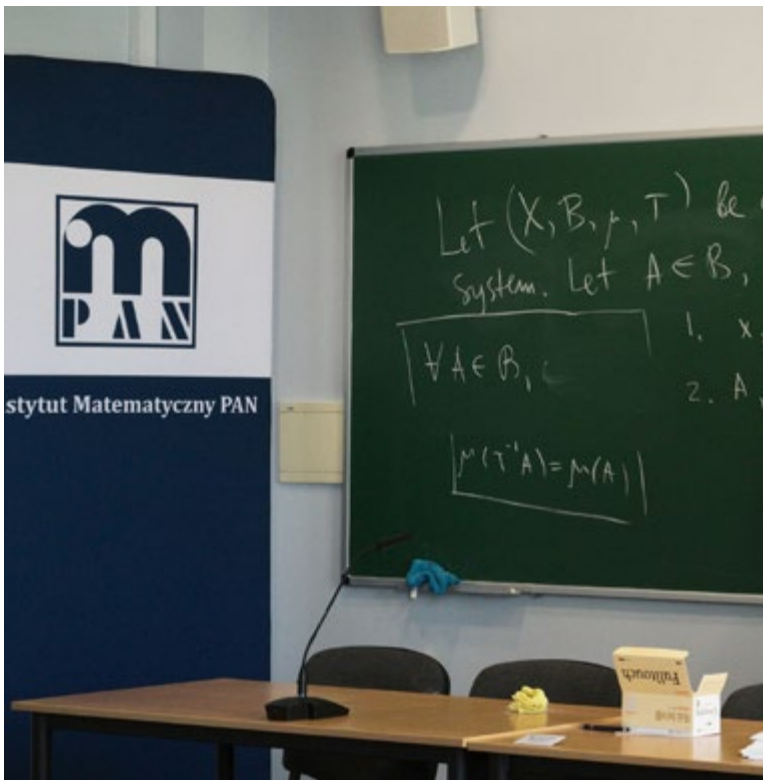
The scientific program featured 18 talks, covering a broad spectrum of topics. In addition to the lectures, the conference included a dedicated problem session in which open problems were collected and contemporary challenges in the field were discussed. This sparked lively conversations and led several groups of participants to continue working informally on individual problems afterward. The IM PAN building, with its many group work rooms, provided an ideal environment for these discussions.

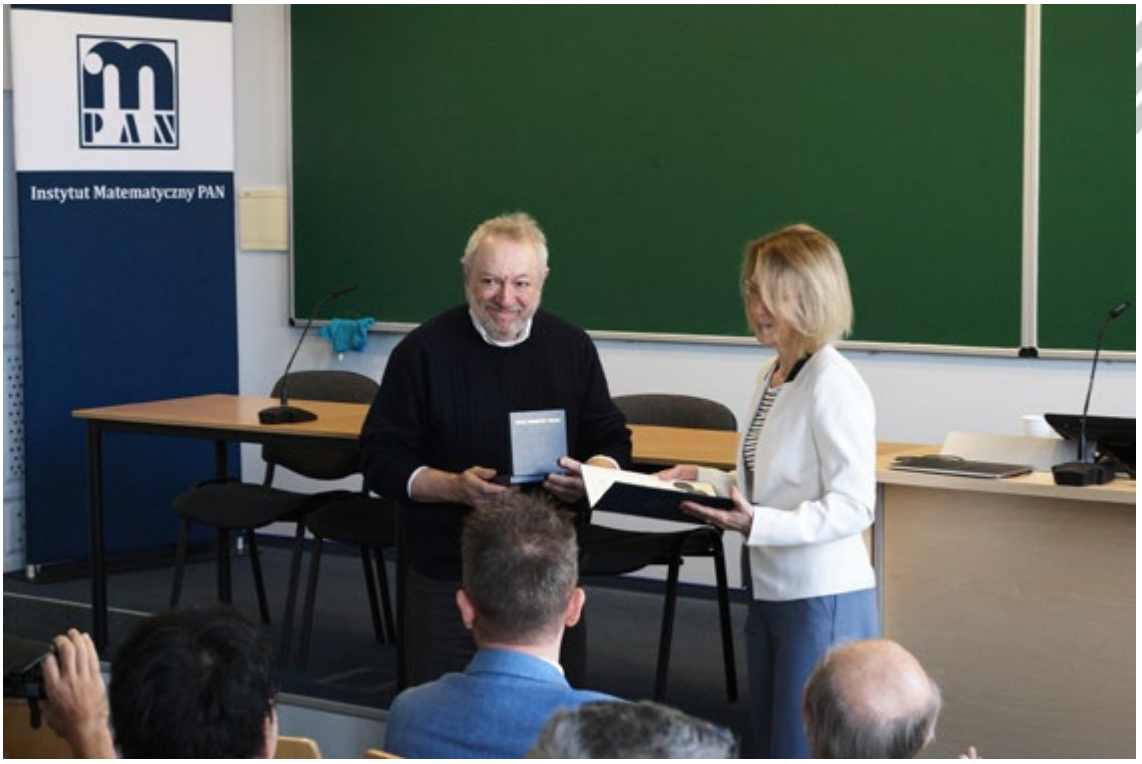
The conference will also result in a proceedings volume to be published by Springer, expected in 2026. The collection of open problems gathered during the problem session will appear there alongside a wide range of research and survey articles focused on ergodic theory and its connections.

Besides its scientific impact, the meeting also provided a welcome chance to reunite with old colleagues and friends, and to meet new members of the community. Particularly noteworthy was the large number of graduate students and early-career researchers in attendance, indicating a thriving field with new ideas and energy on the horizon. The social highlight of the week was the conference dinner at Browar Warszawski, where participants enjoyed Polish food and drinks during a relaxed evening together.

Banach Medal Awarded to Vitaly Bergelson

The award ceremony for the Stefan Banach Medal was held on Wednesday morning, June 24, marking



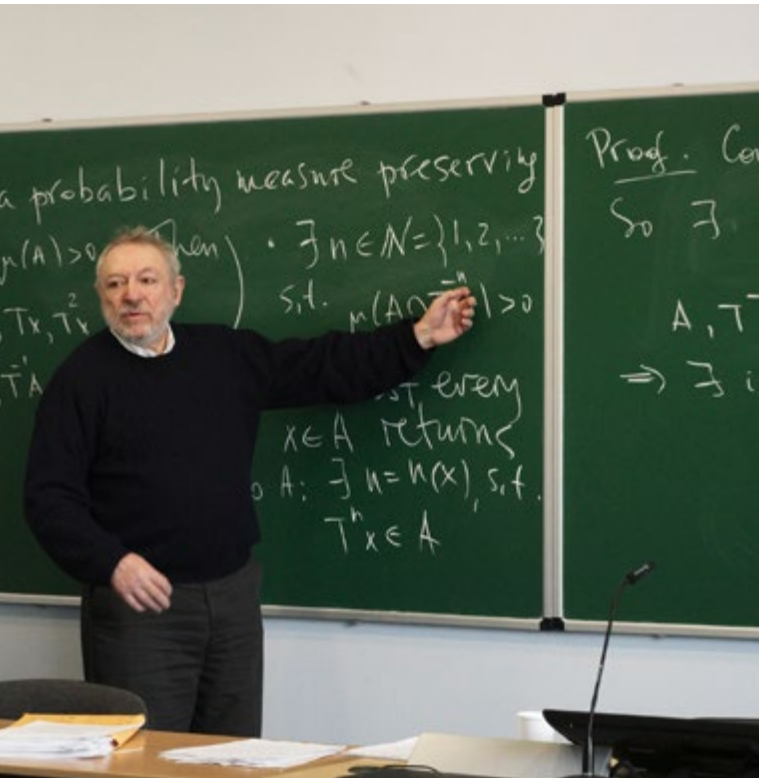


Prof. Vitaly Bergelson receives the Banach Medal from Prof. Mirosława Ostrowska, Vice President of the Polish Academy of Sciences. Credit: IM PAN.

the midpoint of the conference. The medal is awarded by the Presidium of the Polish Academy of Sciences, and Vitaly Bergelson is its 2024 recipient in recognition of his outstanding contributions to ergodic theory, Ramsey theory, and combinatorial number theory.

Vitaly received his M.Sc. from Gorky State University in 1972 and his Ph.D. from the Hebrew University of Jerusalem in 1984. Immediately afterward, he joined the Ohio State University (OSU), where he was a postdoctoral researcher from 1984 to 1986 and has served as a professor since 1986. During his time at OSU, he has built a remarkable legacy, helping to cultivate a thriving community in dynamical systems and ergodic theory and inspiring multiple generations of young mathematicians. To date, he has supervised 32 Ph.D. students, with more already in the pipeline.

Vitaly is widely known for shaping what is now called *ergodic Ramsey theory*, which concerns the use of ergodic methods in arithmetic combinatorics and Ramsey theory. His work on recurrence laid the groundwork for many later developments, and he was the first to systematically study multiple polynomial ergodic averages, opening an entire line of research that continues to flourish. Together with collaborators, he introduced nilsequences and clarified their importance as basic structural objects in ergodic theory and additive combinatorics. He extended classical combinatorial results into the realm of topological dynamics, greatly expanding their scope, and he pioneered the dynamical study of multiplicative structures, revealing new connections between dynamics, number theory, and combinatorics. His papers are known for their depth, originality and for introducing ideas that have since become standard tools in the field.



Prof. Vitaly Bergelson lecturing. Credit: IM PAN.

The Assembly of Directors of the Scientific Institutes of the Polish Academy of Sciences

Interview conducted by Maciej Dołęga

Karol Palka, the director of the Institute of Mathematics of the Polish Academy of Sciences (IM PAN), has been elected Chairman of the Assembly of Directors of the scientific institutes of the Polish Academy of Sciences. In this interview we discuss this new body, its role within PAN, and the potential impact it may have on the institutes, particularly IM PAN.

Maciej Dołęga: Thank you for agreeing to this interview. I would like to ask about the Assembly of Directors of the scientific institutes, but first, let me note that to a scientist working in one of these institutes, the structure of the Polish Academy of Sciences may seem rather complex. Could you briefly explain how it works?

Karol Palka: In the Polish Academy of Sciences (PAN), there are three main components: the corporation, the committees, and the institutes. New members of the corporation are elected by the current members of the corporation from among all Polish scientists; there are no more than 350 national members, and the membership is for life. There are several dozen scientific and problem-oriented committees, which bring together researchers from all scientific institutions in Poland. One of them is the Committee of Mathematics. Currently, there are 68 institutes of the Polish Academy of Sciences, employing roughly 9,500 people. Their core budget, provided by the Ministry of Science and Higher Education, amounts to 1.2 billion PLN. They operate across all scientific disciplines — from history, through biology, chemistry, and engineering to medicine. They differ from universities in having limited teaching obligations and a somewhat different range of duties. The institutes form a network supervised by PAN, but they are legally and financially independent. Finally, the corporation is divided into five divisions. The Institute of Mathematics (IM PAN) belongs to Division III – Exact Sciences and Earth Sciences.

M.D.: What is the current relationship between the institutes and the Academy, and how does this structure affect them? How does it influence the Institute of Mathematics in particular?

K.P.: There are many interconnections. For example, members of the Polish Academy of Sciences automatically become members of the scientific councils, the bodies overseeing scientific activity within the institutes, if they wish so. PAN also appoints committees that select directors through competitions and evaluate the activities of the institutes. Recently, we had such an evaluation at IM PAN — it went very well. The structure of the Academy has no direct influence on the research conducted by individual scientists, but indirectly it affects the working environment - its quality, stability, and funding. Also, the network formed by the institutes allows them to be more visible. Institutes, operating under the common PAN brand, rank first in Poland in international comparisons in terms of the quality of scientific output. We therefore have every reason to be proud.

M.D.: Some of our readers may not be familiar with the Assembly of Directors of the scientific institutes of the Polish Academy of Sciences. Could you explain what the Assembly is and how you became its Chair?

K.P.: The Assembly of Directors is a permanent advisory body to the President of the Polish Academy of Sciences, formally included in the Academy's statute from June 2024. Its predecessor was the Council of Directors. Within the Academy, there is now a general consensus that these bodies have proven highly effective, and in the upcoming amendment to the PAN Act, soon to be submitted to Parliament, the Assembly of Directors is expected to become an official organ of PAN, with a significant influence on the functioning of the Academy. I was quite quickly elected to the twelve-member Council of Directors, which preceded the Assembly, and later to the Presidium of the Assembly of Directors.

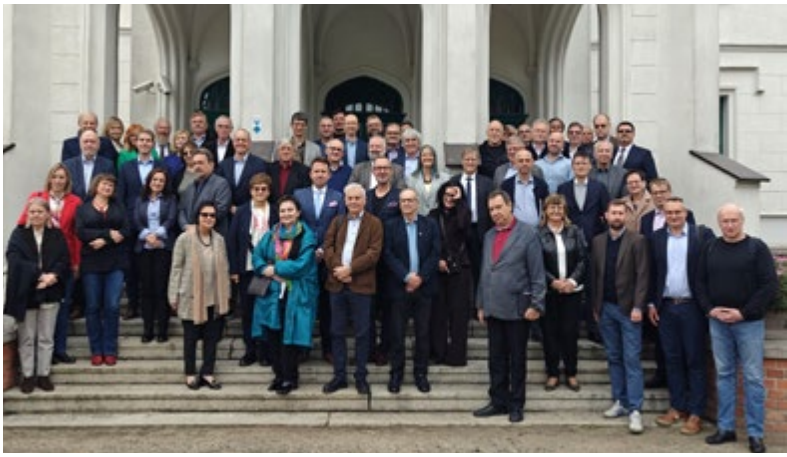
I have been actively involved in issues concerning the institutes, particularly their funding. Directors of other institutes have also learned about the changes and modernization initiatives that I have been implementing at IM PAN. I was elected the first Chair of the Assembly. It is a great honor, but also a great responsibility. I encourage you to visit the Assembly's website at https://www.instytutypan.pl/ [MD: website in Polish]. There you can find the Assembly's official statements, as well as interesting information on statistics, specific achievements of the institutes, and press articles.

M.D.: What are your goals as Chair? What kinds of issues would you like to address within the Assembly, and why do you think such a body is necessary?

K.P.: First and foremost, I want the Assembly to serve as a forum for discussion among the directors of the institutes and a place for mutual learning. That was one of the key goals behind its establishment. Even though we operate in many different fields, we have a great deal in common. We therefore exchange information about problems and solutions related to management, staffing, finances, digitalization, legal frameworks, and so on. Chairing the Assembly also provides an opportunity to represent the shared interests of all institutes — internally, in relation to other bodies of the Academy, and externally, in cooperation with the President of PAN, for example during parliamentary committee meetings or in dealings with the ministry. These actions have proven highly successful: they have increased the visibility of the institutes and their challenges, also in the press, and have helped to secure additional funding to supplement the core subsidy. Interestingly, the clear and structured style of reasoning I learned as a mathematician has turned out to be effective in more political and financial discussions.

M.D.: Are there any benefits for our Institute and its future resulting from your role as Chair of the Assembly?

K.P.: As Chair, I act in the common interest of all institutes, expressed primarily in the resolutions of the Assembly and its Presidium, which are adopted democratically. Indirectly, however, the Institute of Mathematics clearly benefits as well. For instance, from the perspective of a director, the key issue is the lack of growth in IM PAN's permanent (core) funding — with the exception of the salary increases in 2024. This is the case, even though IM PAN consistently holds the highest scientific category, A+. It is, of course, possible to obtain additional funds from grants, ministerial programs, and European or U.S. sources, and in this respect both our researchers and the current directorate have recently been very successful. However, I quickly realized that this is only a temporary solution — what is needed are long-term systemic changes. The problem lies in the funding allocation algorithm and in the insufficient recognition of top-quality institutions, so action at the level of a single institute is not enough. These issues must be articulated within broader groups and accompanied by pressure to create general, quality-oriented support mechanisms. We have already had several successes in this regard, which our staff have felt directly as salary increases. I also hope that the Minister will keep his promise to launch an excellence program for the institutes, similar to the one established for universities. I have been working towards this for quite some time. At the same time, IM PAN has become more visible within PAN — for instance, in this and the previous year, two major directors' meetings were held at our Research and Conference Center in Będlewo. IM PAN has also gained greater recognition in the Ministry and in Parliament, where I naturally refer in discussions to the solutions developed in our institute. This concerns, in particular, our quality-oriented HR policies, internationalization efforts, the Institute's role within the scientific community, and employee evaluation practices. And that brings me to another example — representatives of the Assembly of Directors took an active part in the work on the amended PAN Act, and I had the pleasure of leading the delegation of directors. I believe the amendment will strengthen the Academy and will be beneficial for the institutes. It includes several provisions inspired by IM PAN's good practices.



A meeting of the Assembly of Directors in Będlewo.
Credit: Jakub Paulus.

Simons Semesters in Banach Center - New Energies

Wojciech Kryński and Adam Skalski

In December 2024 the institute applied to the Simons Foundation under the scheme Targeted Grants to Institutes for the third edition of the program of focused activities supported by the Foundation. One month later a positive reply arrived — we can proudly announce a new program: *Simons Semesters in Banach Center: New Energies (2025– 2027)*.

It should be mentioned that in the 2025 round the Simons Foundation offered only eight such grants, and the supported institutions included the Rényi Institute in Budapest, CIMPA in Nice, ICTP Trieste and CERN. IM PAN receives support from the Simons Foundation for the third time, following previous awards in 2015 and 2021.

The new program will consist of twelve five-week thematic activities (mini-semesters). Each of these will last five weeks and, apart from the organizers and three senior Simons Leaders, will involve a core group of 10–12 early career researchers (Simons Fellows) who will participate throughout the duration of the activities. These will be naturally accompanied by short-term experienced visitors as well as additional postdocs and PhD students. Our experience has shown that running shorter programs significantly increases the chances of convincing top experts to spend the full duration of the planned activities in the Banach Center. Conversations with previous organizers and leaders suggested that five weeks is an ideal length for a concentrated activity.

Each mini-semester will include a graduate school and a conference. In general the school will be the opening event and the conference the concluding one, though some flexibility will be offered in special cases. The team of organizers will consist of two to four people, with at least one based in Poland and a designated contact person at IM PAN.

The Simons Foundation grant, following the scheme of the first two editions, will cover the salaries of the Simons Leaders as well as local expenses of the Simons Fellows participating in the program. The entire project will be further supported by a dedicated grant of the Polish Ministry of Science, awarded following an independent application submitted by IM PAN. The Polish funding will primarily enable the organizers to support additional participants of conferences and graduate schools.

The program formally started on July 1st, 2025, but the first scientific activities will commence in early 2026. In the two open calls announced so far the following applications were selected, following the recommendations of the International Scientific Council of the Banach Center:

- Invariant structures in groups, spaces and algebras (winter 2026)
- Continued fractions, fractals, ergodic theory and dynamics (spring 2026)
- Geometric analysis (summer 2026)
- Gödel's program (late summer 2026)
- Twistor theory and applications to geometry, physics and integrable systems (autumn 2026)
- Beyond hydrodynamic equations (late autumn 2026)
- Quantum groups and operator algebras (spring 2027)
- Combinatorial structures, integrable probability and topological recursion (spring 2027)

Another call for the final four semesters will be announced next spring.

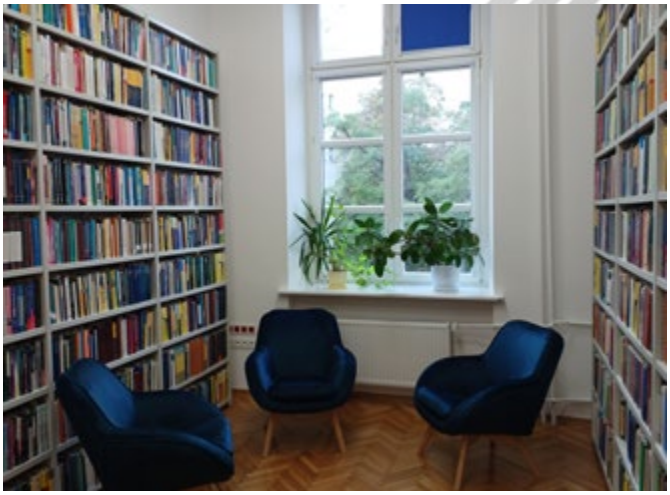
The Central Mathematical Library

Grzegorz Święćkowski

The origins of the Library of the Institute of Mathematics of the Polish Academy of Sciences (also known as the Central Mathematical Library) date back to the mid-20th century. In 1948, the State Mathematical Institute was established (operating under its current name since 1952), and the library was formed alongside it. In its early years, the library acquired the collections of the Mathematical Cabinet of the Warsaw Scientific Society, which were relocated to the institute's headquarters at 8 Śniadeckich Street in Warsaw. This collection primarily consisted of books donated in 1914 by Samuel Dickstein (1851–1939), a mathematician, educator, and historian of science, to the Warsaw Scientific Society, as well as volumes from his friend Alexander Czajewicz (1843–1926), also a mathematician. As a testament to the importance of the collections of both mathematicians, by virtue of the Regulation of the Minister of Culture and Art of November 24th, 1998, these collections were incorporated into the National Library Resources (*Narodowy Zasób Biblioteczny*), a category defined in Polish law as library holdings of exceptional value and significance for the national heritage.

The library was officially granted the status of a *central library* under Order No. 1 of the Minister of Culture and Art, Science, Higher Education and Technology, and the Scientific Secretary of PAN, dated April 26th, 1979.

In fulfilling its mission, the Central Mathematical Library collects, processes, preserves, and provides access to resources in mathematics and its applications. Its holdings now include nearly 200,000 printed books and journals, making it the biggest mathematical library in Poland. Alongside historically significant works from the turn of the 19th and 20th centuries, such as an original copy of Camille Jordan's *Cours d'analyse de l'École polytechnique* (1882), the library continuously updates and expands its collection with the latest mathematical publications from leading academic publishers, including Springer, Wiley, Oxford University Press, Cambridge University Press, SIAM, and De Gruyter.



The Central Mathematical Library. Credit: IM PAN.

In addition to printed materials, the library provides access to extensive collections of electronic journals and books, allowing users to consult the full text of thousands of both archival and recent scientific publications. It also offers access to major reference databases, including SCOPUS, Web of Science, and the mathematical abstract database MathSciNet. The library's printed and electronic collections are available not only to Polish and international researchers and students but also to anyone interested, regardless of academic affiliation.

On February 14th, 2024, following a positive assessment by the relevant department of the Ministry of Culture and National Heritage and by the National Library, the Central Mathematical Library was formally incorporated into the National Library Network (Ogólnokrajowa Sieć Biblioteczna). Under Article 27 of the Library Act of June 27th, 1997, this nationwide network was established to ensure uniform library and information services, enabling online access to library materials and other information resources.

In 2025, the library underwent a major renovation. The wooden floor was restored to its original beauty, enhancing both warmth and acoustics. New shelving was installed, increasing storage capacity and improving accessibility. The reading room was refurbished to create a brighter, more comfortable environment, with new armchairs and dedicated spaces for scientific work, further enhancing the experience for readers.

New Professors at IM PAN

Feliks Przytycki

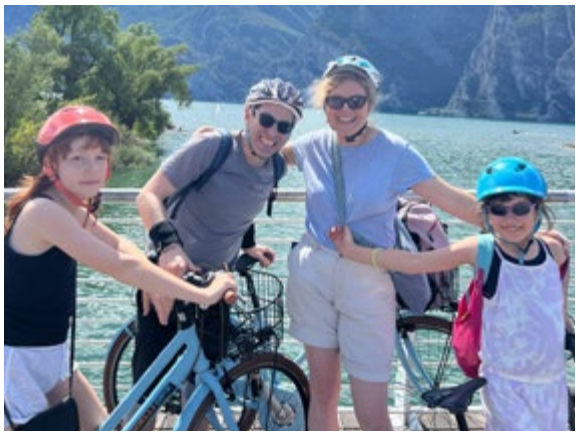
Prof. Jarosław Buczyński — Head of the Department of Algebra and Algebraic Geometry — works in algebraic geometry and related fields. He earned his M.Sc. and PhD under the supervision of Prof. Jarosław Wiśniewski at the University of Warsaw and obtained his habilitation in 2015. Before joining IM PAN, he held positions at Warwick, Kent, Texas A&M, Institut Fourier (Grenoble) and the Mittag-Leffler Institute. He is a recipient of grants from NCN, FNP and the Marie Curie programme, and has supervised a number of students and postdocs. He serves on the editorial boards of Dissertationes Mathematicae and Experimental Mathematics. Outside mathematics, he enjoys rock climbing.

Prof. Jarosław Buczyński. Credit: Małgorzata Michałkiewicz.

Prof. Yonatan Gutman is Head of the Department of Dynamical Systems at IM PAN and has been with the Institute since 2012. His research spans topological dynamics and ergodic theory, with particular emphasis on mean dimension and nilspaces. He received a B.A. in mathematics and physics from the Technion (2001), an M.Sc. in Mathematics from Stanford University (2003), and a PhD from the Hebrew University of Jerusalem (2009). He has held postdoctoral positions at Tel Aviv University, Université Paris-Est, Oxford and Cambridge. He has supervised three PhD students, and his work has been supported by grants including an EU Marie Curie fellowship and NCN projects. In 2021 his work was recognized with a National Science Centre Award in physical sciences and engineering. He enjoys cycling.

Prof. Jarosław Mederski. Credit: IM PAN.

Prof. Jarosław Mederski is a full professor in the Department of Differential Equations at IM PAN and has been employed there since 2016. His research focuses on variational and topological methods in nonlinear PDEs, including Schrödinger and Maxwell equations, Born–Infeld theory, and mathematical physics. He received M.Sc. degrees in mathematics (2005) and computer science (2006) from Nicolaus Copernicus University in Toruń. He completed his PhD at the same university in 2009 under the supervision of Prof. Wojciech Kryszewski, and obtained his habilitation in 2018. Prof. Mederski was awarded the Sierpiński Prize by the Sciences Department of PAN in 2020, held a Humboldt Research Fellowship at Karlsruhe Institute of Technology (KIT) (2018–2021), and is a recipient of several NCN grants. He serves on the editorial board of Topological Methods in Nonlinear Analysis. Outside work, he follows financial markets and enjoys hiking.



Prof. Yonatan Gutman cycling with family. Credit: private archive.

New Permanent Faculty at IM PAN

Adam Skalski

As a result of an open competition which took place in the first half of 2025, and following the recommendation of the Hiring Committee, the decision of the Director, and the approval of the Scientific Council, two applicants were offered and subsequently accepted permanent full-time positions at IM PAN. We offer our sincere congratulations.

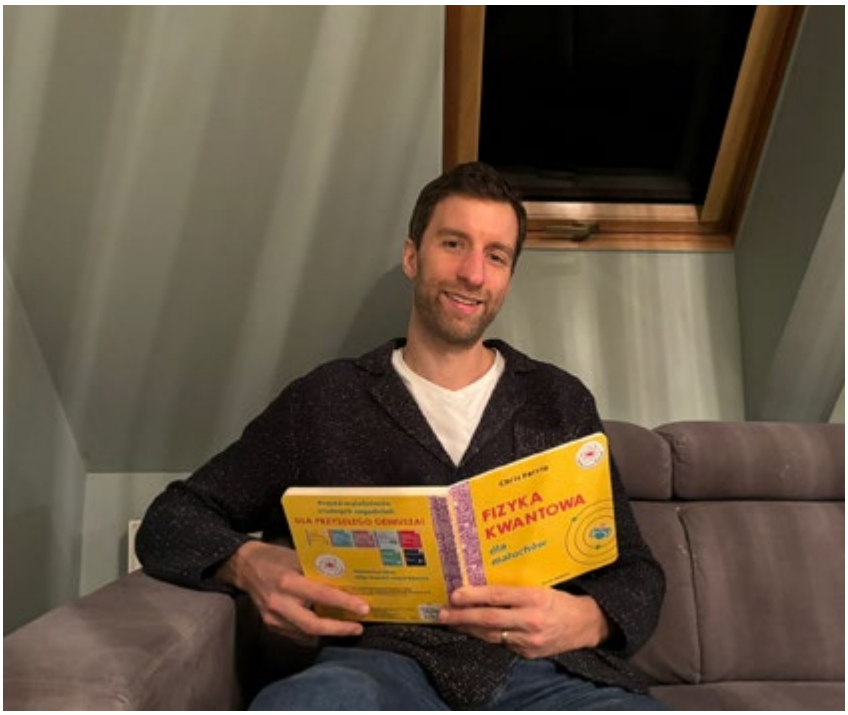
Jan Rozendaal currently works in a mixture of harmonic analysis and microlocal analysis, with applications to partial differential equations. He is also interested in functional analysis and operator theory, which were the mathematical areas of his PhD thesis.

He started working at IM PAN in 2015, immediately after defending his PhD at TU Delft. After about one and a half years he went to Australia for a three-year postdoc, then returned to IM PAN, winning a contest for a five-year position. In 2022 he completed his habilitation at IM PAN. He has already run several grants at IM PAN (in particular the NCN Sonata grant).

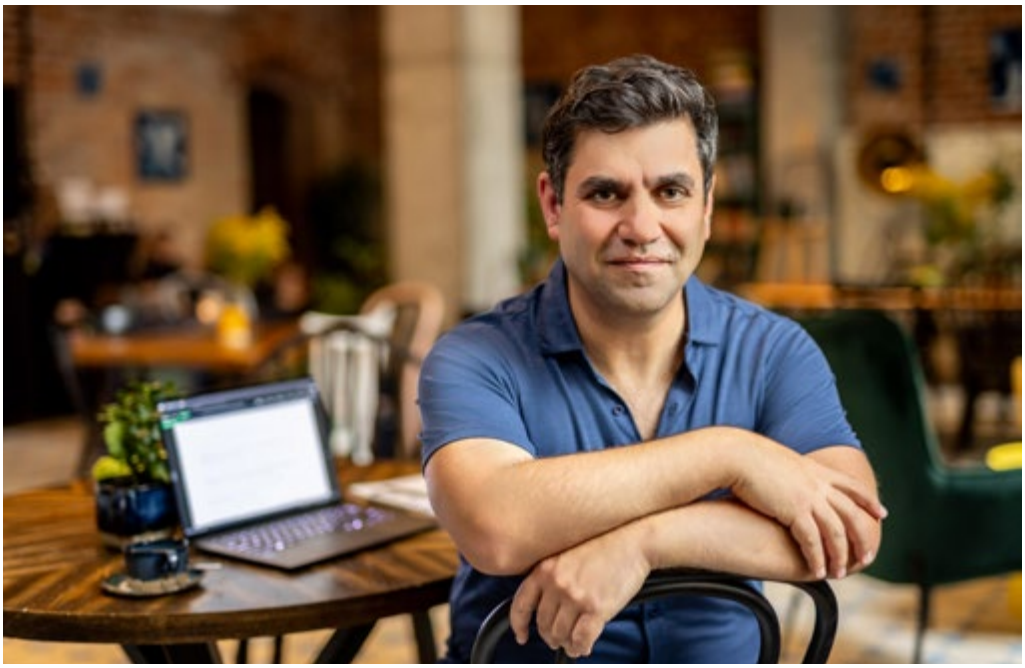
Together with co-authors, Jan Rozendaal developed in recent years a set of techniques that led to an extension of a powerful result from 1991 in harmonic analysis. The easiest way to describe the statement is that it provides a quantitative bound for how much waves can focus. The original theorem was proved for wave equations on smooth manifolds, and the extension yielded an analogue valid for rough metrics. The tools developed when studying the problem subsequently found applications to other problems in harmonic analysis and PDEs.

Jan says that he knew quickly after starting at IM PAN that he wanted to stay here long term, both because he really liked the institute and because he liked Warsaw. The postdoc in Australia was an opportunity to expand his research, but he already knew at the time that he wanted to come back to IM PAN.

His plan is to establish his own research group by obtaining grants, encouraging people to apply for positions at IM PAN, and attracting students. However, his current immediate goal is to have his daughter attend daycare without being sick, so that he can have time to work on the aims listed above.



Prof. Jan Rozendaal. Credit: Anna Rozendaal.



Prof. Grigor Sargsyan. Credit: Łukasz Bera, NCN.

Grigor Sargsyan works in set theory. He is interested in inner model theory, descriptive set theory, large cardinals, and forcing axioms, and is mostly working on establishing connections between these areas of set theory.

Grigor obtained his PhD from the University of California, Berkeley. His PhD thesis received the Alexander Prize of the Mathematics Department of UC Berkeley and the Sacks Prize of the Association for Symbolic Logic. He then moved to UCLA as an NSF Postdoc, and in 2012 began a tenure-track position at Rutgers University. In 2018 he was tenured at Rutgers. In 2021 he won a five-year position at IM PAN's Gdańsk branch. In 2023 he acquired a habilitation, and in 2025 moved to Warsaw.

In his PhD thesis, Grigor Sargsyan developed the theory of layered HOD extender models, which are basic building blocks of models of the Axiom of Determinacy. Later, around 2020, he and his collaborators used this theory to show that the Continuum Hypothesis together with the existence of a dense ideal on the first uncountable cardinal is equiconsistent with the Axiom of Determinacy for reals with an inaccessible successor of the continuum, publishing the result in the Journal of the American Mathematical Society. More recently, he developed the theory of Nairian Models and showed that one can create many exotic models of set theory by forcing over Nairian Models. He hopes that further development of Nairian Models will uncover deep connections between various foundational frameworks such as determinacy axioms and forcing axioms. His research has been funded by several NSF and NCN grants, including the NSF Postdoctoral Fellowship, the NSF CAREER Award, and NCN Maestro grants.

Outside research, Grigor spends his time educating the next generation of set theorists. He is currently working with five PhD students and two master's students.

Grigor chose to apply for a permanent position at IM PAN because of the institute's rich mathematical history and tradition, and because IM PAN gives researchers complete freedom to concentrate on their research and on supervising graduate students.

New Faculty in 2025

Piotr Nowak and Jakub Paulus

The following new employees were hired at IM PAN in 2025:

1. Dr Alimzhan Amanov (1 year)
   Combinatorics, Representation Theory
2. Dr Ioannis Arkoudis (2 years)
   Analysis of PDEs, Classical Analysis and ODEs, Mathematical Physics
3. Dr Arturo Espinosa Baro (2 years)
   Algebraic Topology, Group Theory and Geometric Topology
4. Dr Yenni Cherik (2 years)
   Mathematical Physics, Operator Algebras
5. Dr Valentina Ciccone (2 years)
   Classical Analysis and ODEs, Functional Analysis, Number Theory
6. Dr Damian Dąbrowski (7 years)
   Classical Analysis and ODEs, Analysis of PDEs
7. Dr Stephane Geudens (2 years)
   Differential Geometry, Symplectic Geometry
8. Dr Paul Alexander Helminck (2 years)
   Number Theory, Algebraic Geometry
9. Dr Prem Nigam Kar (2 years)
   Operator Algebras, Quantum Algebra, Combinatorics
10. Dr Antonio Maglio (2 years)
    Differential Geometry, Mathematical Physics
11. Dr Alexis Marchand (2 years)
    Group Theory, Geometric Topology
12. Mgr Marta Marszewska (1,5 years)
    Algebraic Topology, Numerical Analysis
13. Dr Gustavo Pessil (2 years)
    Dynamical Systems
14. Dr Joeri Ludo De Ro (2 years)
    Operator Algebras, Quantum Algebra, Category Theory
15. Dr Diptesh Kumar Saha (2 years)
    Functional Analysis, Operator Algebras, Dynamical Systems
16. Dr Divya Setia (2 years)
    Representation Theory, Algebraic Combinatorics
17. Dr Tim Seynnaeve (2 years)
    Algebraic Geometry, Representation Theory, Combinatorics
18. Dr hab. Kamil Szpojankowski (1 year)
    Probability, Combinatorics, Operator Algebras
19. Dr Adam Śpiewak (5 years)
    Dynamical Systems
20. Dr Xulei Wang (2 years)
    Dynamical Systems, Probability
21. Dr Dario Weißmann (2 years)
    Algebraic Geometry

List of new Grants at IM PAN in 2025

Anna Skiba

NCN Grants:

Topology of polynomial mappings
OPUS
prof. dr hab. Zbigniew Tadeusz Jelonek
2025-2029

Fourier-Mukai transforms in explicit algebraic geometry
OPUS
dr hab. Michał Jakub Kapustka
2025-2029

Application of stochastic analysis in determining scaling limits in some models in mathematical physics
OPUS
prof. dr hab. Tomasz Andrzej Komorowski
2025-2029

Nonstandard stochastic control problems with applications
OPUS
prof. dr hab. Łukasz Stettner
2025-2028

Standing Waves Under Constraints in Nonlinear Partial Differential Equations
OPUS
prof. dr hab. Jarosław Szymon Mederski
2025-2029

Quantum Groups, Topology and Algebras I
OPUS
prof. dr hab. Adam Grzegorz Skalski
2026-2030

Modern geometrical aspects of linear operators: matrix representations, numerical ranges and related matters
WEAVE-UNISONO
prof. dr hab. Yuriy Tomilov
2025-2028

Variational problems from image processing and crystal models
SONATA
dr Michał Łasica
2025-2028

European Research Council (ERC)

Quantitative projection problems in geometric measure theory
dr Damian Marek Dąbrowski
2025-2030

Ministry of Science and Higher Education

Scholarship of the Minister of Science and Higher Education for outstanding young scientists
dr Mateusz Wasilewski

SPUB & SPUBi – special grant of the Ministry of Science and Higher Education to support scientific gear and infrastructure (7.5 million PLN for three-year financing of the Stefan Banach International Center, along with its Research and Conference Center in Będlewo)

Ministerstwo Nauki i Szkolnictwa Wyższego

European Research Council
Established by the European Commission

NARODOWE CENTRUM NAUKI

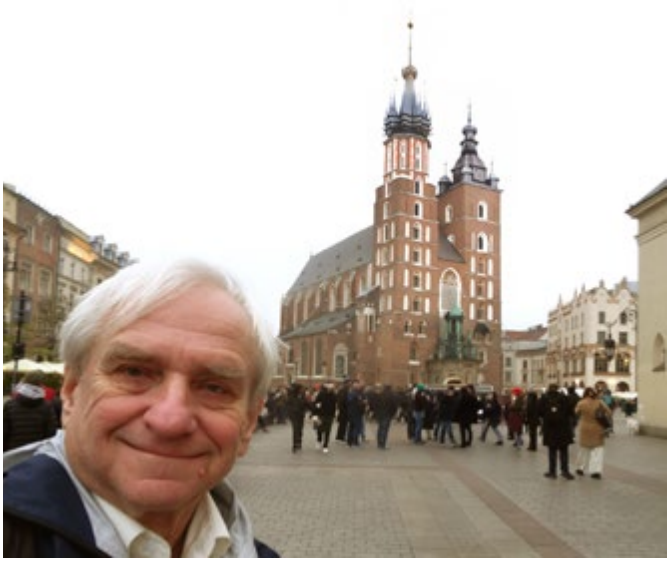
Prof. Feliks Przytycki elected Corresponding Member of PAU

Maciej Dołęga

We are pleased to announce that on June 14th, 2025 the General Assembly of the Polish Academy of Arts and Sciences (Polska Akademia Umiejętności, PAU) elected Professor Feliks Przytycki as a Corresponding Member of Division III: Exact and Technical Sciences. On November 15th, 2025, PAU held its Scientific Session in Kraków, at which all the newly elected members were officially welcomed and presented with diplomas by the Director, Prof. Jan Ostrowski.

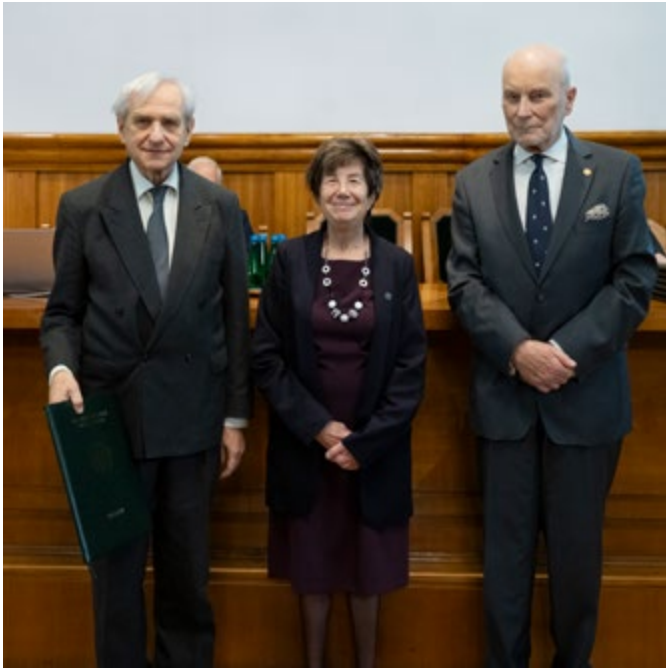
Rooted in the nineteenth-century Kraków Learned Society (1815), reorganized as the Academy of Arts and Sciences in 1872 and, following World War I, as the Polish Academy of Arts and Sciences, the Academy was reactivated in 1989 to continue its mission of advancing scholarship and culture across disciplines. Today PAU brings together eminent scholars in its divisions and commissions, convenes scientific sessions and public lectures, supports research initiatives and international cooperation, and publishes scholarly works and yearbooks that document the life of Polish science.

Professor Feliks Przytycki is an expert in dynamical systems and complex dynamics. His work has been published in leading journals, including *Annals of Mathematics* and *Inventiones Mathematicae*, and he was an invited speaker in the Section "*Dynamical Systems and Ordinary Differential Equations*" at the International Congress of Mathematicians in 2018. He has been associated with the Institute of Mathematics of the Polish Academy of Sciences (IM PAN) for most of his career, where he served as Director from 2010 to 2018 and currently chairs the Scientific Council. His academic leadership and research contributions have helped shape the Institute's profile, and his election to PAU recognizes these achievements and his long-standing service to the mathematical community.



Prof. Feliks Przytycki. Credit: private archive.

On behalf of the Institute of Mathematics of the Polish Academy of Sciences, we congratulate Professor Przytycki on this distinction.



Prof. Feliks Przytycki, Prof. Ewa Brocławik (Director of Division III: Technology and Sciences of PAU) and Prof. Jan Ostrowski (President of the Polish Academy of Arts and Sciences). Credit: Paweł Mazur.

Mateusz Kwaśnicki awarded the 2025 IM PAN Prize for Outstanding Scientific Achievements

Krzysztof Bogdan

The laureate of the IM PAN Prize for Outstanding Scientific Achievements in Mathematics in 2025 is Mateusz Kwaśnicki from the Wrocław University of Science and Technology, recognized for his works linking probability theory with various branches of mathematical analysis.

The prize was awarded by a jury consisting of Krzysztof Bogdan (chair), Piotr Hajłasz, Tadeusz Januszkiewicz, Wojciech Kucharz, Krzysztof Oleszkiewicz, Karol Palka, and Anna Zdunik.

Mateusz Kwaśnicki is the author or co-author of more than 45 research papers, published among others in *Duke Math. J., Math. Ann., Ann. Probab., J. Funct. Anal., Trans. Amer. Math. Soc., Probab. Theory Relat. Fields, J. Spectr. Theory, Stochastic Process. Appl., Electron. J. Probab., Calc. Var. Partial Differential Equations, J. Lond. Math. Soc., and Studia Math.* His work has been widely recognized within the mathematical community.

One of his major achievements was the proof that the discrete Hilbert transform on ℓ^p has the same norm as the classical Hilbert transform on L^p, thus solving a problem posed ninety years earlier by M. Riesz and E. C. Titchmarsh.

Another notable achievement was the characterization of bell-shaped distributions—those whose nth derivative of the density changes sign exactly n times. This result parallels S. Bernstein's characterization of completely monotone functions. Mateusz Kwaśnicki also proved that random walks and Lévy processes are uniquely determined by their traces on a half-line, settling a recent conjecture of L. Chaumont and R. Doney and an earlier one of V. Vigon from 2004.

Another important line of research concerned the boundary potential theory of nonlocal operators, with new notions, explicit formulas, and regularity results. In particular, his work established the existence of boundary limits of ratios of harmonic functions and the Martin representation of nonnegative harmonic functions for jump processes.

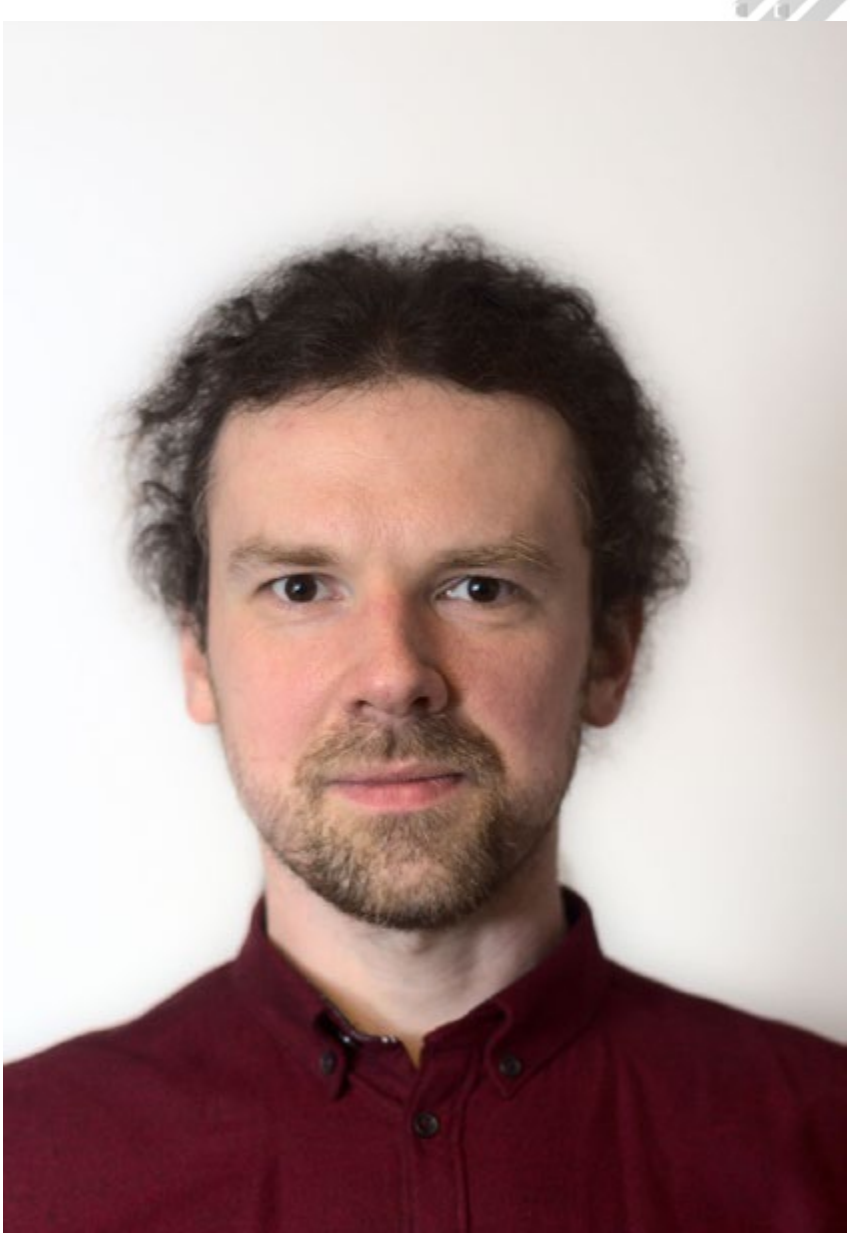
Further results dealt with Lévy processes and their fluctuation theory. These results included a Wiener–Hopf factorization for processes with completely monotone Lévy density, extending the 1983 theorem of L. C. G. Rogers. The laureate and his co-authors also obtained general estimates for the distribution of the supremum of the process and, using spectral methods, derived explicit formulas for symmetric Lévy processes with completely monotone jumps and asymptotic descriptions of first-passage-time distributions.

Another group of results concerned spectral properties of nonlocal operators, including explicit formulas for generalized eigenfunctions of transition operators of symmetric and nonsymmetric stable processes on the half-line, as well as two-term asymptotic formulas for the eigenvalues and eigenfunctions of fractional and related nonlocal operators.

Some results dealt with explicit formulas and spectral properties of the fractional Laplacian under radial symmetry. The authors derived a general expression for the fractional Laplacian applied to a Meijer G-function of $|x|^2$ and to its product with a homogeneous harmonic polynomial, encompassing many previously known explicit formulas. Using these results, they resolved a conjecture of T. Kulczycki on the shape of the second eigenfunction in low dimensions.

Another contribution by the laureate and a co-author was the construction of a discrete analogue of the Hermite basis for the discrete Fourier transform.

Yet another group of results developed the Caffarelli–Molchanov–Ostrowski–Silvestre method of harmonic extensions, allowing certain nonlocal operators to be represented as Dirichlet–Neumann operators associated with local elliptic operators in a



Prof. Mateusz Kwaśnicki. Credit: private archive.

half-space. This work addressed a question posed in the seminal paper of L. Caffarelli and L. Silvestre and identified Lévy processes with completely monotone jumps as boundary traces of reflected diffusions in a half-plane.

A further line of research concerned semigroups generated by nonlocal operators, providing semi-explicit formulas and criteria for hypercontractivity and ultracontractivity of their Schrödinger perturbations.

Additional results addressed the first eigenfunction of small liquid oscillations, sufficient conditions and counterexamples for nonlocal Liouville theorems, the proof of infinite lifetime in a Fleming–Viot model, and the proof of the Beurling–Deny formula for Bregman–Sobolev forms.

These results, authored and co-authored by Mateusz Kwaśnicki, form a coherent and influential body of work that has significantly advanced the analysis of nonlocal operators and Markov processes. They combine probabilistic insight with analytic precision, leading to new methods, explicit formulas, and far-reaching generalizations that have shaped current research in probability and analysis.

Juliusz Banecki awarded the 2025 Kuratowski prize

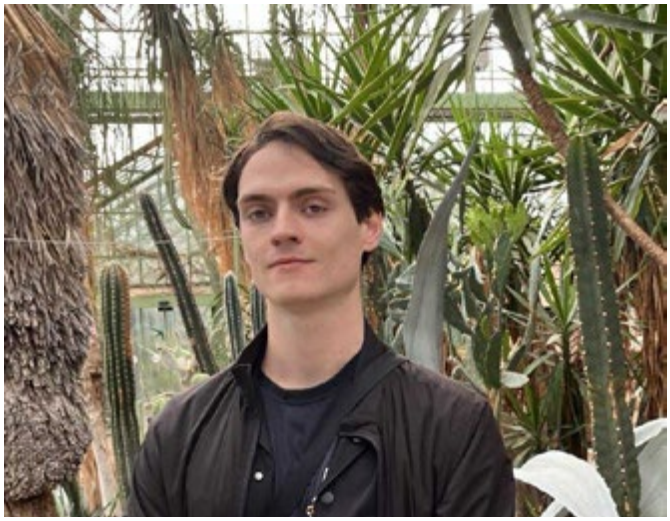
Joachim Jelisiejew

Juliusz Banecki, a master's student at the Jagiellonian University, was awarded the Kazimierz Kuratowski Prize for the year 2025. The distinction was given for a series of important results at the intersection of real algebraic geometry and algebraic topology, as well as in other parts of mathematics, such as dynamical systems.

Real algebraic geometry is built using the notions of classical algebraic geometry but over the real field $\mathbb{R}$. In this setting, a function $U \subset \mathbb{R}^n \to \mathbb{R}$ is called regular if it is a quotient of polynomial functions. A regular mapping is one given locally by n-tuples of regular functions.

In the single-authored work *Algebraic homotopy classes*, Journal des Mathématiques Pures et Appliquées, 187 (2024), the laureate investigates whether every homotopy class of maps $S^n \to S^k$ of spheres admits a regular representative. He shows that the answer is affirmative in several cases, in particular when $k=3, k=7$, or $n \leq k+5$. The method is a beautiful interplay between real algebraic techniques and algebro-topological ones, including advanced tools such as cobordism and the J-homomorphism. This line of research on approximation also led to another article, *Approximation of maps between real algebraic varieties*, Journal für die reine und angewandte Mathematik (Crelle), 821 (2025).

The article *Extensions of k-regulous functions from two-dimensional varieties*, Mathematische Annalen, 391 (2025) deals with a foundational problem. A *k-regulous function* on a smooth real subvariety $X \subseteq \mathbb{R}^n$ is a function $f: X \to \mathbb{R}$ of class C^k such that $f|_U$ is regular for some Euclidean-open $U \subseteq X$. It is natural to ask whether every such function is a restriction of a k-regulous function on $\mathbb{R}^n$. The article provides an affirmative answer for $\dim X = 2$. The method is an impressive tour de force. This result has since been generalized to arbitrary dimension by the laureate, *Extension of k-regulous functions from varieties of arbitrary dimension*, arXiv:2412.14412.



Juliusz Banecki. Credit: private archive.

The Kuratowski Prize is awarded annually, jointly by IM PAN and the Polish Mathematical Society, to mathematicians under the age of 30 who are affiliated with a Polish academic institution or maintain significant connections to the mathematical community in Poland.

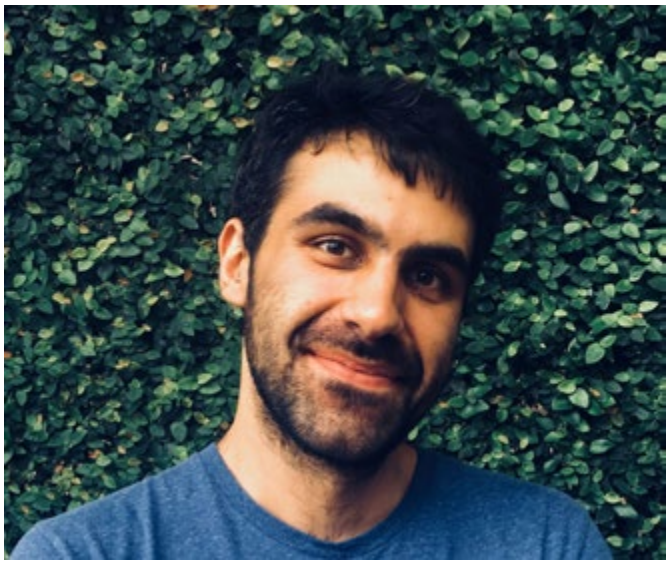
Alexandros Eskenazis Awarded the 2025 Zemánek Prize

Yuri Tomilov

The Barbara and Jaroslav Zemánek Prize in functional analysis, with emphasis on operator theory, has been awarded in 2025 to Alexandros Eskenazis (Sorbonne Université) for his outstanding contributions to metric and convex geometry obtained through functional-analytic methods. In particular, the Prize recognizes his breakthrough results within the Ribe program. The jury highlighted Eskenazis's remarkable proof, with Mendel and Naor, of the existence of a metric space that does not admit a coarse embedding into any Alexandrov space of nonpositive curvature, thereby settling a 1993 conjecture of Gromov. They also emphasized his significant development of the Ribe program with Naor, by providing a purely metric formulation of the notion of p-uniform smoothness.

Beyond these achievements, the jury noted a series of exceptionally strong results revealing an intricate interplay between probability theory, functional analysis, and convex geometry.

Eskenazis received his PhD in 2019 from Princeton University under the supervision of Assaf Naor. He is currently a CNRS Junior Researcher at the Institut de Mathématiques de Jussieu-Paris Rive Gauche (IMJ-PRG) and a Junior Research Fellow at Trinity College, Cambridge.



Dr. Alexandros Eskenazis. Credit: private archive.

The Barbara and Jaroslav Zemánek Prize was founded in 2018 by the Institute of Mathematics of the Polish Academy of Sciences to encourage research in functional analysis, operator theory, and related areas. The Prize is awarded to mathematicians under thirty-five years of age who have made important contributions to the field.

The 2025 Prize Jury consisted of F. Gesztesy (Baylor University), S. Grivaux (Université de Lille), N. Nikolski (University of Bordeaux), G. Pisier (Texas A&M University), A. Skalski (IM PAN), Y. Tomilov (IM PAN), and S. Vaes (KU Leuven).

Feliks Rączka awarded the 2025 International Stefan Banach Prize

Piotr Achinger

Dr. Feliks Rączka is the recipient of this year's International Stefan Banach Prize, awarded annually for a doctoral dissertation in the mathematical sciences by the Polish Mathematical Society. In addition, the jury awarded two distinctions to Dr. Damian Głodkowski and Dr. Maciej Kucharski.

Feliks Rączka's dissertation *D-modules on rigid analytic varieties*, written under the joint supervision of Piotr Achinger and Adrian Langer and defended with distinction at IM PAN in October 2024, addresses questions lying at the intersection of algebraic geometry and geometric theory of differential equations. It establishes the finiteness of de Rham cohomology groups of D-modules on non-archimedean manifolds in *equal characteristic zero*. It is a foundational result in this setting, paving the way toward index theory on degenerating algebraic varieties.

Informally, a D-module over a space X (for example a real or complex manifold) is a module over its ring of differential operators. It is a sheaf-theoretic version of a system of linear partial differential equations, in the same way in which a finitely presented module over a ring encodes a system of linear equations over that ring. A class of D-modules of particular geometric interest is that of *maximally overdetermined*, also known as *holonomic*, D-modules. A natural example of a holonomic D-module is a vector bundle endowed with an integrable (that is, flat) connection. To such an object, one can associate a 'twisted' version of the de Rham complex, resulting in its de Rham cohomology groups. In good situations (such as holomorphic differential operators on compact complex manifolds, or on algebraic varieties of characteristic zero) these spaces are known to be finite-dimensional. This allows us to measure the complexity of a system of linear PDEs and relate it to topology using index formulas.

Rączka's thesis studies holonomic D-modules not on complex manifolds or algebraic varieties, but on non-archimedean manifolds (also called *smooth rigid-analytic varieties*).

Such spaces were first considered by John Tate in the context of p-adic analytic geometry, and differential equations on them are of particular interest in number theory. However, the corresponding de Rham cohomology groups are typically infinite-dimensional. In contrast, Rączka's results show that the de Rham cohomology groups are finite-dimensional in equal characteristic zero, for example over the non-archimedean field $\mathbb{C}((t))$ with the t-adic absolute value.

In September, Feliks Rączka assumed a postdoctoral position at the Institute for Advanced Study in Princeton.

Dr. Feliks Rączka. Credit: private archive.

IM PAN Director Prize for Publications in 2024

Piotr Nowak

Prof. Lech Tadeusz Januszkiewicz
Lech T. Januszkiewicz, J. Dymara
"Tautological characteristic classes II: the Witt class",
Math. Ann. 390 (2024), no. 3, 4463–4496.

Prof. Yonatan Gutman
K. Barański, Y. Gutman, A. Śpiewak
"Prediction of dynamical systems from time-delayed measurements with self-intersection",
J. Math. Pures Appl. (9) 186 (2024), 103–149.

Prof. Grigor Sargsyan
D. Adolf, G. Sargsyan, N. Trang, T. Wilson, M. Zeman
"Ideals and strong axioms of determinacy",
J. Amer. Math. Soc. 37 (2024), no. 4, 1203–1273.

Dr hab. Jan Rozendaal
N. Liu, J. Rozendaal, L. Song, L. Yan
"Local smoothing and Hardy spaces for Fourier integral operators on manifolds",
J. Funct. Anal. 286 (2024), no. 2, Paper No. 110221, 72 pp.

Prof. Yuryi Tomilov
V. Müller, Y. Tomilov
"Matrix representations of arbitrary bounded operators on Hilbert space",
J. Reine Angew. Math. 808 (2024), 111–141.

Dr hab. Wojciech Kryński
W. Kryński, O. Makhmali
"A characterization of chains in dimension three",
Ann. Scuola Norm. Sup. Pisa Cl. Sci. 23.

Dr hab. Tomasz Adamowicz
T. Adamowicz, G. Veronelli
"Isoperimetric inequalities and regularity of A-harmonic functions on surface",
Calc. Var. Partial Differential Equations 63 (2024), no. 2, Paper No. 48, 31 pp.

Tadeusz Figiel (1948–2025)

Tomasz Szarek

Tadeusz Figiel was born on July 2nd, 1948, in Gdańsk. In high school, he was a three-time winner of the International Mathematical Olympiad, winning a gold medal at the Olympiad in Moscow in 1964, a bronze medal in Berlin in 1965, and a silver medal in Sofia in 1966.

In 1970, he graduated in mathematics from the University of Warsaw, and two years later, at the same university, he defended his doctoral thesis entitled *The application of product constructions in the ℓ_p sense to certain problems of isomorphic Banach space theory*, supervised by Prof. Aleksander Pełczyński.

Tadeusz Figiel obtained his habilitation in 1975 on the basis of his dissertation entitled *On Modules of Convexity and Smoothness*. In 1983, he was awarded the title of professor, and in 1990, he became a full professor at the Institute of Mathematics of the Polish Academy of Sciences. Professor Figiel worked at universities in the United States for many years; he was a visiting professor at Ohio, Berkeley, and Texas A&M, among others.

From 1972 until his retirement in 2018, Tadeusz Figiel worked at the Institute of Mathematics of the Polish Academy of Sciences, Sopot branch. In 1999, he replaced Professor Zbigniew Ciesielski as head of the branch of the IM PAN in Sopot and worked in this position until his retirement. From 2002 to 2006, he served as deputy director for scientific affairs at IM PAN, and for many years he was the editor in-chief of Studia Mathematica.

Professor Tadeusz Figiel received many prestigious awards and distinctions for his scientific achievements. Noteworthy among these are the Wacław Sierpiński Scientific Award, granted by the Third Division of the Polish Academy of Sciences in 1975, the Stefan Banach Award, granted by the Polish Mathematical Society in 1976, and the Gdańsk Scientific Society Award in 1975. A special distinction, which few of the best mathematicians receive, was an invitation to deliver a lecture at the International Congress of Mathematicians in Warsaw in 1983. The list of awards is much longer; suffice it to say that Professor Figiel received most of Poland's major awards for scientific research in mathematics.

Tadeusz Figiel was an outstanding mathematician and a specialist in functional analysis, in particular in the local theory of Banach spaces, which studies the structure of finite-dimensional Banach spaces and the relation between an infinite-dimensional Banach space and its finite-dimensional subspaces. He was the author of many fundamental results in this direction. Many of his works address issues related to the famous result of A. Dvoretzky: for every integer $k \geq 2$ and every $\varepsilon > 0$, there exists an $N = N(k, \varepsilon)$ such that every normed space $(X, \|\cdot\|)$ with $\dim X \geq n$ contains a k–dimensional subspace Y that is ε–Euclidean, i.e. there exists an inner–product norm, say $|\cdot|$, and a constant $C > 0$ such that $C(1-\varepsilon)|x| \leq \|x\| \leq C|x|$ for all $x \in Y$. Tadeusz Figiel gave a short proof of this result (*A short proof of Dvoretzky's theorem on almost spherical sections of convex bodies*, Compositio Mathematica, **33** p. 297-301). In their now classic publication (co-authored with J. Lindenstrauss and V.D. Milman), the authors examine the relationships between the parameters N, k, ε (*The dimension of almost spherical sections of convex bodies*, Acta Math. **139** (1977), no. 1–2, 53–94).

Finally, let us mention another well-known theorem of Figiel obtained jointly with W.J. Davis, W.B. Johnson and A. Pełczyński: any weakly compact operator $T : X \to Y$ between Banach spaces, factors through a reflexive space, i.e., there are a reflexive space R and continuous linear mappings $S : X \to R$ and $L: R \to Y$ such that $T = LS$ (*Factoring weakly compact operators*, J. Functional Analysis **17** (1974), 311–327).

Professor Figiel has enriched mathematics with many other significant results. It is impossible to list them all in this short obituary. He achieved them in collaboration with many outstanding mathematicians. Indeed, the list of his collaborators

Prof. Tadeusz Figiel. Credit: private archive.

is impressive: Aleksander Pełczyński, William B. Johnson, Vitali D. Milman, Joram Lindenstrauss, Lior Tzafriri, Nicole Tomczak–Jaegerman, Jean Bourgain (Fields medal; 1994), Gilles Pisier, Gideon Schechtman, William J. Davis, Kenneth J. Dykema, Mariusz Wodzicki. His papers have been published in highly prestigious journals: *Acta Mathematica*, *Compositio Mathematica*, *Mathematische Annalen*, *Advances in Mathematics*, T*ransactions of the American Mathematical Society*, J*ournal of Functional Analysis*, *Israel Journal of Mathematics, Studia Mathematica*.

The late Professor Figiel was a person of high moral standards and extremely high scientific expectations. But at the same time, he was a very kind person, somewhat lost in today's world. Mathematics was a passion to which he devoted his entire life. We will miss him greatly in Sopot.

Łukasz Kuciński (1980-2025)

Piotr Miłoś

Łukasz Kuciński was born and lived his entire life in Warsaw. His career stood as testament to the power of mathematics and computer science to shape both theory and practice. After studying mathematics at the University of Warsaw, he joined our institute to pursue a PhD under the supervision of Prof. Lesław Gajek, focusing on the optimal management of financial surplus in insurance. Shortly afterward he joined the Polish Financial Authority, where he first led the internal modeling unit and later became Vice-Director. The methods developed by his team were adopted at both national and European levels, a rare achievement that highlighted his ability to translate abstract ideas into tangible impact. He remained deeply connected to academia, actively participating in the Methods of Mathematics of Finance seminar. This dual commitment, to rigorous theory and to practical implementation, defined his career.

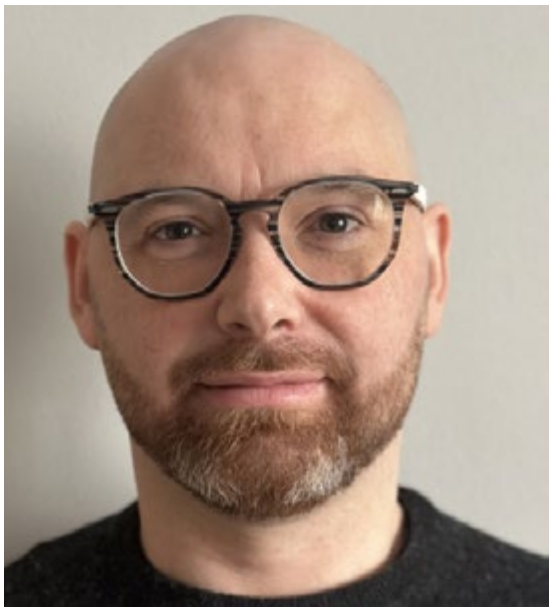
Around 2017 and 2018 Łukasz pivoted his interests to machine learning, a field where he would make remarkable strides in just a few years. By the time he returned to our institute as an assistant professor, he had become one of Poland's foremost experts in reinforcement learning and related disciplines. He co-founded and co-led AWARElab, a machine learning group whose mission was to advance AI research by designing algorithms for automated problem solving. Due to his efforts, reinforcement learning—previously absent from Polish institutions—flourished into a thriving research area, resulting in papers at top international conferences and a growing network of global collaborations.

Łukasz was equally devoted to sharing knowledge. He launched Poland's first reinforcement learning seminar and later co-authored a course on the subject at the University of Warsaw, initiatives that were unique within the country. His lectures were passionate, insightful, and consistently rated among the very best by students.

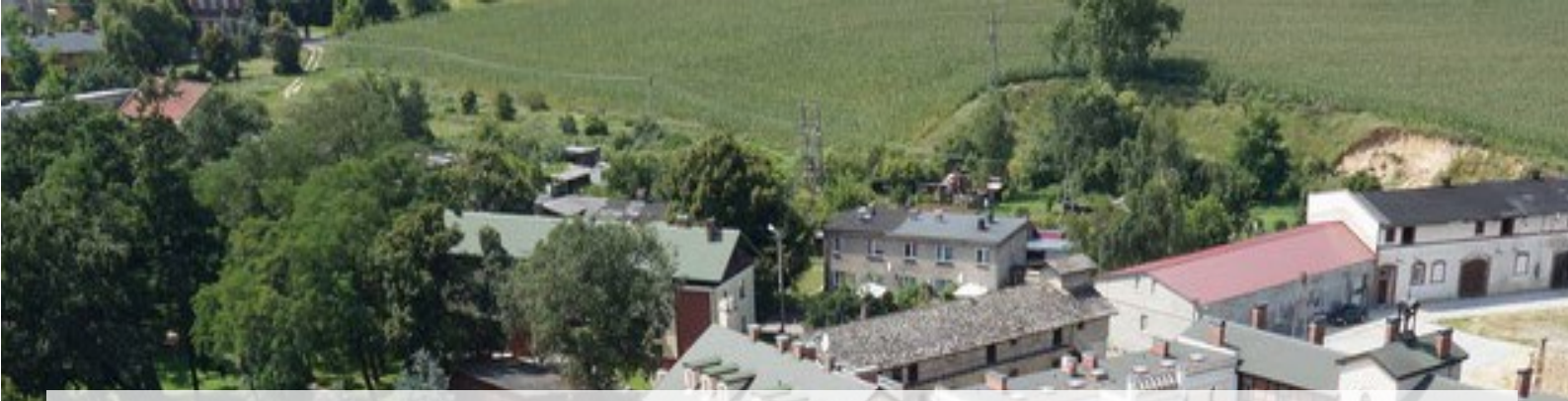
In recent years he joined IDEAS NCBR, a research-and-development centre in Poland specializing in artificial intelligence and the digital economy, established by NCBR (the National Centre for Research and Development), as a Senior Research Scientist. He also advised the biotech startup Ingenix and played a pivotal role at the University of Warsaw, where he helped organize the Olympiad in Artificial Intelligence and mentored master's and PhD students.

What Łukasz will be remembered for most, however, is his indomitable spirit. Even as illness cast a shadow over his final years, he refused to let it define him. He continued working at full speed, inspiring everyone around him with his resilience and humor. Sharp-witted and endlessly curious, he could dissect a complex idea with irony one moment and lose himself in the beauty of an elegant proof the next. It is telling that he once considered studying art before choosing mathematics. Whether refining a paper, polishing code, or delivering a talk, he sought excellence and clarity.

Łukasz passed away in September, leaving behind his wife and daughter. The mathematical and machine learning communities will remember him not only for the depth and influence of his research, which will continue to shape these fields, but also for his unwavering strength and devotion. To those who knew him he was a brilliant mind, a generous mentor, and a friend whose warmth, laughter, and insight will be deeply missed.



Prof. Łukasz Kuciński. Credit: private archive.



BANACH CENTER UPCOMING EVENTS IN 2026

Continued from p.1

Title	Date	Place
Differential geometric methods in modern physics	1-11.07.2026	Będlewo
Recent trends in differential geometry	5-12.07.2026	Będlewo
New trends in elliptic PDEs	12-18.07.2026	Będlewo
Recent developments in complex geometry	26.07-1.08.2026	Będlewo
The 12th Conference of the Polish Society on Relativity	2-7.08.2026	Będlewo
Building Bridges: 7th EU/US Summer School on Automorphic Forms and Related Topics	10-15.08.2026	Będlewo
Building Bridges: 7th EU/US Workshop on Automorphic Forms and Related Topics	17-21.08.2026	Będlewo
EMYA Workshop	24-28.08.2026	Będlewo
Geometry and Integrability	24-28.08.2026	Będlewo
Complex Differential and Difference Equations III	6-12.09.2026	Będlewo
Twistor theory and applications	14-19.09.2026	Warszawa
11th Polish Combinatorial Conference	20-26.09.2026	Będlewo
GROW 2026 11th Workshop on Graph Classes, Optimization, and Width Parameters	27.09-1.10.2026	Będlewo
Fluid equations: old and new	19-23.10.2026	Warszawa

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