

# Newsletter of IMPAN



DEPARTMENTS  
continuation

BANACH CENTER  
history and the  
present

SCIENTIFIC  
EVENTS



# Departments

## LIST OF DEPARTMENTS AND LABORATORIES AT IMPAN:

**Departments:** (1) Algebra and Algebraic Geometry, (2) Biomathematics, (3) Differential Equations, (4) Dynamical Systems, (5) Foundations of Mathematics, (6) Functional Analysis, (7) Mathematical Physics and Differential Geometry, (8) Mathematical Statistics, (9) Number Theory, (10) Probability Theory and Mathematics of Finance, (11) Topology.

**Laboratories:** (1) Hilbert Spaces, (2) Noncommutative Geometry, (3) Numerical Analysis.

Departments: (1), (4), (6), (7), (8), (9), (10) were presented in the first issue of the IMPAN Newsletter. The department of Biomathematics and the laboratory of Hilbert Space Operators will be presented in the next issue.

## Foundations of Mathematics Head: Zofia Adamowicz (since 1994)



The department exists since the foundation of the Institute in 1948. The description below concerns years 1994–2011. Since 1994 up to now permanent members of the department have been Zofia Adamowicz and Ryszard Frankiewicz. Long term members were also: Henryk Kotlarski (from 1995 to 2004), Zbigniew Lipecki (till 2003), Michał Morayne (till 2001), Ludomir Newelski (till 2002), Adam Obtułowicz (till 2010), Leszek Pacholski (till 2004, former head), Grzegorz Plebanek (from 1995 till 2002), Czesław Ryll-Nardzewski (from 2003 till 2007), Antoni Wiweger (till 2000), Konrad Zdanowski (from 2004 till 2011).

There were many short term members: Teresa Bigora-Jaska, Jakub Gismatulin, Aleksander Iwanow, Andrzej Kisielewicz, Krzysztof Krupiński, Marcin Kysiak, Maciej Malicki, Tomasz Nowik, Damian Niwiński, Aleksander Ruktowski, Marcin Sabok, Zenon Sadowski, Agata Smoktunowicz, Mariusz Woźniak, Piotr Zakrzewski.

Now the department consists of: Zofia Adamowicz, Ryszard Frankiewicz, Piotr Koszmider, Henryk Michalewski, Marcin Sabok.

The members of the department have mainly been working in two fields: set theoretic methods in analysis (KBN grants 2P30104307 and 2PO3A 018 13 in 1994–2000) and foundations of arithmetic and computational complexity.

**Main awards:** invited lectures at the International Congress of Mathematics by Ludomir Newelski Berlin 1998 and by Agata Smoktunowicz in Madrid in 2006; award of the Polish Science Foundation for Ludomir Newelski (2001).

**Books:** Ryszard Frankiewicz and Paweł Zbierski, *Hausdorff Gaps and Limits*, North Holland 1994; Zofia Adamowicz and Paweł Zbierski, *Logic of Mathematics*, John Wiley and Sons 1997.

### MAIN RECENT PUBLICATIONS:

- Z. Adamowicz i K. Zdanowski, *Lower bounds for the provability of Herbrand consistency in weak arithmetics*, *Fundamenta Mathematicae* vol. 212(3), 2011, 191–216.
- Z. Adamowicz, L. Kołodziejczyk, *A note on the Sigma1 collection scheme and fragments of bounded arithmetic*, *Mathematical Logic Quarterly* 56 (2010), 126–130.
- M. Sabok, J. Zapletal, *Forcing properties of ideals of closed sets*, *Journal of Symbolic Logic* 76(3), 2011, 1075–1095.
- K. Zdanowski, H. Kotlarski, *On a question of Andreas Weiermann*, *Mathematical Logic Quarterly* 55(2), 2009, 201–211.
- K. Zdanowski, *On the second order intuitionistic propositional logic without universal quantifier*, *Journal of Symbolic Logic* 74(1), 2009, 157–167.

# Topology

## Head: Henryk Toruńczyk

The department exists since 1949; its first head was Karol Borsuk.

Fundamental achievements include: Founding of theory of retracts and founding of shape theory, by Karol Borsuk. Characterization of infinite-dimensional manifolds modelled on Hilbert cube or Banach space, by Henryk Toruńczyk. Theory of simplicial non-positive curvature, by Tadeusz Januszkiewicz and Jacek Świątkowski.

The Department has currently 7 full time employees: Professors Tadeusz Januszkiewicz, Zbigniew Jelonek, Józef Krasinkiewicz, Stanisław Spież and Drs Michał Lasoń, Piotr Nowak, Piotr Przytycki; 2 part time employees Dr. Robert Dryło and Prof. Henryk Toruńczyk and 6 Ph. D. students: Z. Ambroży, M. Farnik, A. Kwela, J. Maksymiuk, J. Przewocki, K. Strzałkowski.

Topics of current research include:

1. Polynomial maps: fixed points of automorphisms of  $k^n$ , affine manifolds.
2. Cryptography: constructions of special Abelian manifolds, Jacobians of curves of genus 2 and cryptographic protocol.
3. Compact metric spaces, embeddings in the same dimension.
4. Game theory and related topological questions.
5. Fixed point properties for continua.
6. Spaces with non-positive curvature, cube complexes, Coxeter groups.
7. 3-manifolds: linearity and separability.

### SELECTED RECENT PUBLICATIONS:

- P.-E. Caprace, P. Przytycki, *Bipolar Coxeter groups*, J. Algebra 338 (2011), 35-55.
- F. Dahmani, V. Guirardel, P. Przytycki, *Random groups do not split*, Math. Ann. 349.3 (2011), 657-673.
- M. Davis, J. Dymara, T. Januszkiewicz, J. Meier, B. Okun, *Compactly supported cohomology of buildings*, Commentarii Math. Helvetici Volume 85 (3) (2010), 551-582.

- R. Dryło, *On constructing families of pairing-friendly elliptic curves with variable discriminant*, Lecture Notes in Computer Sciences 7107 (2011), 310-319.

- P. Frąckiewicz, *Application of the Eisert-Wilkens-Lewenstein quantum game scheme to decision problems with imperfect recall*, Journal of Physics A: Mathematical and Theoretical 44 (2011).

- S. Hensel, P. Przytycki, *The ending lamination space of the five-punctured sphere is the Nöbeling curve*, J. Lond. Math. Soc. (2) 84 (2011), 103-119.

- T. Januszkiewicz, J. Świątkowski, *Nonpositively curved developments of billiards*, J. Topology 3(1), 63-80.

- Z. Jelonek, *On the Russell Problem*, J. of Algebra 324 (2010), 3666-3676.

- J. Krasinkiewicz, A. Koyama and S. Spież, *Generalized manifolds in products of curves*, Trans. Amer. Math. Soc. 363 (2011), 1509-1532.

- M. Lasoń, *A generalization of Combinatorial Nullstellensatz*, Electronic J. of Combinatorics 17.1 (2010), Note 32.

- M. Lasoń, M. Michałek, *On the full, strongly exceptional collections on toric varieties with Picard number three*, Collect. Math. 62 (2011), 275-296.

- R. Mańka, *On generalized methods of successive approximations*, Nonlinear Analysis, 72 (2010), 1438-1444.

- P. Nowak, R. G. Douglas, *Every finitely generated group is weakly exact*, Journal of Functional Analysis 261 (2011), 3723-3734.

- P. Przytycki, G. Schmihusen, F. Valdez, *Veech Groups of Loch Ness Monsters*, Annales de l'institut Fourier 61, no 2 (2011), 673-687.

- T. Schick, R. S. Simon, S. Spież and H. Toruńczyk, *A parameterized version of the Borsuk-Ulam theorem*, Bull. London Math. Soc. 43 (6) (2011), 1035-1047.

- Schinzel, S. Spież i J. Urbanowicz, *Admissible Tracks in Shamir's Scheme*, Finite Fields and Their Applications 16 (2010), 449-462.



## Differential equations

### Head: Bronisław Jakubczyk



The department was established shortly after the creation of the Institute in 1948. His first head was Tadeusz Ważewski followed, after his death in early 70-ties, by Andrzej Pliś and then by Bogdan Ziemian.

Current permanent employees of the department are professors Stanisław Janeczko, Grzegorz Łysik, Guillaume Valette, Wojciech Zajączkowski, long term employees are doctors Tomasz Cieślak, Wojciech Kryński, Joanna Renclawowicz (on leave) and short term employees are dr Bernard Nowakowski, Aneta Wróblewska-Kamińska, Jan Burczak (Phd student) and Piotr Kowalski (Phd student). Professors emeriti, active in the Institute, are: Bogdan Bojarski, Jan Kiszyński and Czesław Olech.

The main areas of current research include:

- Nonlinear partial differential equations, with special emphasis on Navier-Stokes equations and equations of magneto-hydro-dynamics
- Geometric control theory and non-holonomic geometry
- Singularities in differential equations and symplectic geometry
- Analytic methods and summability of formal solutions

The department runs four weekly seminars:

1. Geometry and Differential Equations (B. Jakubczyk)
2. Partial Differential Equations (W. Zajączkowski and T. Cieślak)
3. Singularity Theory (S. Janeczko)
4. Analytic Theory of Differential Equations (G. Łysik).

#### SELECTED RECENT PUBLICATIONS:

- B. Bojarski, V. Gutlyanski and V. Ryazanov, *On Integral Conditions for the General Beltrami Equations*, Complex Anal. and Operator Theory 5 (2011), 835–845.
- J.P. Gauthier, B. Jakubczyk and V. Zakalyukin, *Motion planning and fastly oscillating controls*, SIAM J. on Control and Optimiz., Vol. 48 (2010), 3433–3448.
- S. Janeczko and P.J. Giblin, *Geometry of curves and surfaces through the contact map*, Topology and Its Applications, 159 (2012), 466–476.
- W. Kryński and I. Zelenko, *Canonical frames for distributions of odd rank and corank 2 with maximal Kronecker index*, J. Lie Theory, 21 (2011), 307–346.
- G. Łysik, *Formal solutions of second order evolution equations*, Z. Anal. Anwend., 30 (2011), 95–104.
- W. Zajączkowski and J. Renclawowicz, *Existence of global weak solutions for the Navier-Stokes equations with large flux*, J. of Differential Equations, 251 (2011), 688–707.
- W. Zajączkowski and I. Pawłow, *Unique solvability of a nonlinear thermoviscoelasticity system in Sobolev spaces with a mixed norm*, Discrete Cont. Dyn. Syst. Ser. S, 4 (2011), 441–466.
- J. Burczak, T. Cieślak and C. Morales-Rodrigo, *Global existence vs. blowup in a fully parabolic quasilinear 1D Keller–Segel system*, Nonlinear Analysis: T.M.A. 75 (2012), 5215–5228.
- G. Valette,  *$L^\infty$  cohomology is intersection cohomology*, Advances in Mathematics 231 (2012), 1818–1842.

## IMPAN WINS KNOW

KNOW abbreviates Krajowy Naukowy Ośrodek Wiodący – Leading National Research Center. The Warsaw Center for Mathematical Sciences, created jointly by IMPAN and MIMUW (Faculty of Mathematics, Informatics and Mechanics of the University of Warsaw), has won the competition for the title of Leading National Scientific Center (KNOW) in the mathematical sciences, organized by the Ministry of Science and Higher Education of Poland.

The award comes with a substantial grant which will provide financing of the Center for the next five years. The money will be used for enhancing the research potential of both participating institutions.



## Noncommutative geometry

Head: Piotr M. Hajac

Noncommutative geometry entered the research programme of IMPAN in 1999. Five years later, with the help of the EU Transfer of Knowledge grant “Quantum Geometry”, held at the University of Warsaw and IMPAN, this branch of IMPAN’s mathematics gained an international dimension. Since 2004, there are about 10–20 visitors per year who contribute their research experience and give talks at the weekly Noncommutative Geometry Seminar held in the Institute. Among our invitees were Alain Connes and Maxim Kontsevitch, and the seminar talks are announced to about 200 mathematicians worldwide.

The aforementioned scientific activity helped to cristalize a local research team consisting of Piotr M. Hajac, Ulrich Krähmer, Tomasz Maszczyk and Bartosz Zieliński. Ulrich Krähmer was a Marie Curie fellow in the years 2005–2007. In January 2008, the Noncommutative Geometry Research Unit was formally created at the Institute. In October 2008, the team was enlarged by Emily Burgunder, who chose IMPAN for her European Postdoctoral Institute fellowship.

Another chapter of Noncommutative Geometry at IMPAN opened in 2009 with the EU project Geometry and Symmetry of Quantum Spaces. Co-sponsored by the Polish Government, this 4-year international research staff exchange programme established a transcontinental network of 12 nodes with IMPAN as the co-ordinating node. In particular, we welcomed in our group Paul F. Baum who joined us as a Visiting Professor working at IMPAN a month each year. Our mathematical environment was further enriched by Adam Skalski who came as another Marie Curie Postdoctoral Fellow for the years 2010–2012. Together with Paweł Kasprzak, Andrzej Sitarz, and Piotr M. Sołtan employed on short-term position, our Research Unit got top expertise in topological quantum groups and spectral geometry. On the other hand, a Ph.D.-student Jan Rudnik started his collaboration with Baum and Hajac on computing the K-theory of triple-pullback  $C^*$ -algebras.

The key words characterizing IMPAN’s research in noncommutative geometry are: K-theory of operator algebras and free actions of compact quantum groups on unital  $C^*$ -algebras, multi-pullback  $C^*$ -algebras and free distributive lattices of ideals, index theory of Fredholm modules and spectral geometry of Dirac operators, locally compact quantum groups and universal (free) quantum groups, Hopf-cyclic homology with coefficients and Chern-Galois character, corings and monoidal categories.

The assumed research strategy is to explore the feedback between solving concrete difficult problems and developing new mathematical structures. The proposed approach is to unite rather than separate different fields of mathematics by taking advantage of complementary tools that they offer. To this end, a large scale and intensive international collaboration is currently sustained and planned for the future.

### SELECTED PUBLICATIONS:

- P. F. Baum, P. M. Hajac, R. Matthes, W. Szymański, *The K-theory of Heegaard-type quantum 3-spheres*, *K-Theory* (2005) 35:159–186.
- P. M. Hajac, M. Khalkhali, B. Rangipour, Y. Sommerhaeuser, *Hopf-cyclic homology and cohomology with coefficients*, *C. R. Acad. Sci. Paris, Sér. I* 338 (2004) 667–672.
- T. Brzeziński, P. M. Hajac, *The Chern-Galois character*, *C. R. Acad. Sci. Paris, Sér. I* 338 (2004) 113–116.
- P. M. Hajac, R. Matthes, W. Szymański, *Noncommutative index theory of mirror quantum spheres*, *C. R. Acad. Sci. Paris, Sér. I* 343 (2006) 731–736.
- P. M. Sołtan, *Examples of non-compact quantum group actions*, *J. Math. Anal. Appl.* 372 (2010), 224–236.
- P. M. Hajac, A. Kaygun, B. Zieliński, *Quantum complex projective spaces from Toeplitz cubes*, *J. Noncommutative Geometry*, 6: 3 (2012) 603–621.



## Laboratory of Numerical Analysis

### Head: Teresa Regińska



This laboratory has been existing since 1973, when it replaced the Section of Numerical and Graphic Analysis. The laboratory was chaired by dr Andrzej Wakulicz till 2004.

The main areas of research are: numerical analysis in abstract spaces, ill-posed problems and regularization methods, inverse problems for partial differential equations.

The Laboratory was involved in Task 3 entitled "Operator theory methods for numerical analysis of differential equations" of the EU 6FP Marie Curie Actions project TODEQ (2006-2010) (coordinated by prof. J. Zemánek). Recently, in the frame of cooperation with Inverse Problems Research Group in Johann Radon Institute for Computational and Applied Mathematics (Linz Austria) and with Faculty of Mathematics in Chemnitz University of Technology, the Laboratory organized two schools: Regularization methods for ill-posed problems of analysis and statistics – lectures of S. Pereverzyev, (2007), Course on inverse and ill-posed problems – lectures of Andreas Neubauer (2008) and the international conference IP-TA 2010 Inverse Problems: Developments in Theory and Applications.

The traditional Seminar on Numerical Analysis organized by the laboratory during the last 40 years

covered a wide scope of numerical methods and attracted attention of mathematicians from other institutes.

#### SELECTED RECENT PUBLICATIONS:

→ W. Arendt and T. Regińska, *An ill-posed boundary value problem for the Helmholtz equation on Lipschitz domain*, Journal of Inverse and Ill-Posed Problems, 71 (2009), 7003–7011.

→ T. Regińska and U. Tautenhahn, *Conditional stability estimates and regularization with applications to Cauchy problems for the Helmholtz equation*, Numerical Functional Analysis and Optimization, 30(9–10), (2009) 1065–1097.

→ A. Pokrzywa, *Regularization methods for unbounded linear operators*, Journal of Inverse and Ill-Posed Problems 18 (2010) 647–653.

→ A. Wakulicz, W. Grzesikiewicz, A. Zbiciak, *Constraints as models of bodies possessing non-smooth constitutive characters*, Mathematical Methods in Continuum Mechanics, A series of Monograph, Technical University of Łódź, (2011), 3–18.

→ T. Regińska, *Regularization methods for mathematical model of laser beams*, to appear in Proceedings of the 8th Congress of the ISAAC.

## NEWLY EMPLOYED

1. Tomasz Komorowski: full professor, permanent position; differential equations and stochastic processes.
2. Guillaume Valette: 7-years associate professor (joint with Jagiellonian University); real algebraic geometry, singularities.
3. Adam Skalski: 7 years adiunkt position (joint with University of Warsaw); operators, quantum groups.
4. Adam Bobrowski: full professor, 1 year; operator semigroups, applications in biology.
5. Weronika Buczyńska: 3-years adiunkt positions; algebraic geometry.
6. Karol Palka: 3-years adiunkt positions; algebraic geometry.

Seven 1–2 years postdoc positions:

- Balázs Bárány (dynamical systems),
- Piotr Frąckiewicz (mathematical physics),
- Mateusz Michatek, Michał Lasoń (algebra, algebraic geometry, combinatorics),
- Bernard Nowakowski, Aneta Wróblewska-Kamińska (partial differential equations),
- Piotr Żebrowski (probability theory).

# Banach Center

## 1972–2012

### *Stefan Banach International Mathematical Center*

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**Stefan Banach International Mathematical Center** was created in 1972 as a part of the Institute of Mathematics of the Polish Academy of Sciences. It was a visionary idea of Polish mathematicians to establish strong research bridge between mathematicians from Central and Eastern Europe and the rest of the world.

The founding agreement for the Center and its Scientific Council was signed by the Academies of Sciences of Poland, Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Romania, and USSR. Later the Academies of Vietnam (1979), Cuba (1984) and North Korea (1986) joined the agreement.

First twenty years of its activity (1972–1992) brought the world-wide recognition as a real Center of collaboration for mathematicians from all over the world. During these twenty years there were forty semesters organized. They were very successful and covered practically all branches of mathematics with significant contribution to the development of the respective field.

In 1993 the agreement between the Academies was terminated and the new Letter of Intent on Cooperation was signed with the European Mathematical Society adding new perspectives and forms of activity to the Center, including intensive workshops and symposia, conferences and research groups. A special emphasis was laid on the interaction of different fields of mathematics and on multi-disciplinary and interdisciplinary meetings. The specific aims of this agreement (with EMS) are to cooperate in planning and promoting the various scientific activities held at the Banach Center; in encouraging scientific exchange and visits at the Center; stimulating and promoting international scientific cooperation in mathematics and in assisting the Banach Center in its efforts to secure the material means for all activities.

Both organizations agreed that having an international Scientific Council of the Banach Center is necessary to achieve these aims successfully. Its purpose

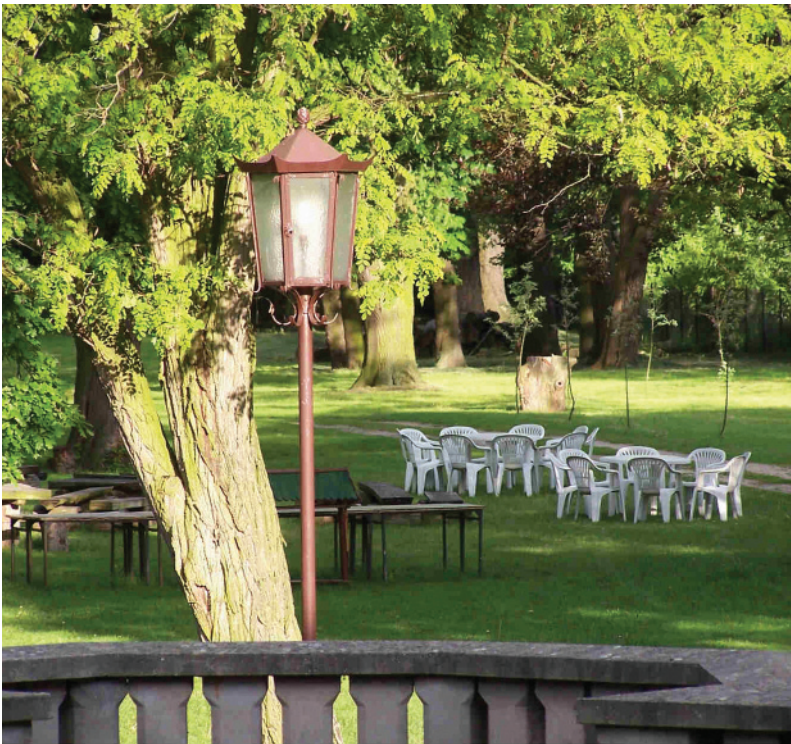
is to promote, determine, consider and approve the scientific activity of the Center. Every year the scientific program of the Banach Center is approved by its Scientific Council by means of evaluating applications for organization the conferences and workshops.

From 1972 till 1993 the Scientific Council was constituted by two representatives of each signatory academy of sciences and the director of the Center. Since 1993, the Council consists of no more than ten members, each serving for no more than two terms. These are three representatives from EMS, three representatives from the countries that are the founders of the Center (which are currently Czech Republic, Hungary and Russia); and four representatives from Poland. The members elect the Chairwomen/Chairmen from among themselves. Former chairmen of the Scientific Council were:

- Lubomir Iliev (Bulgaria) 1972–1976
- Ákos Császár (Hungary) 1977–1980
- Klaus Matthes (East Germany) 1981–1982
- Kazimierz Urbanik (Poland) 1983–1986
- Romulus Cristescu (Romania) 1987–1989
- Sergei M. Nikolskii (USSR) 1990–1992
- Friedrich Hirzebruch (Germany) 1993–2001
- Rolf Jeltsch (Switzerland) 2002–2005
- Ari Laptev (Sweden) 2006–2013.

A part of the research achievements of the Banach Center have been recorded in the Banach Center Publications series. It is a series of proceedings containing research, survey and expository articles. Already ninety eight volumes were published in the series [1].

Till 2001 the Banach Center was located in an old baroque building at Mokotowska street in Warsaw. In 2001 the building was returned to the previous owners and consequently the Banach Center moved to the premises of the Institute of Mathematics of the Polish Academy of Sciences situated at 8 Śniadeckich street.



↑ Surroundings of the Palace.

→ Interior of the Palace – dining room.



In 1997, the Institute of Mathematics acquired a neogothic palace together with a park in Będlewo near Poznań and built facilities for future mathematical conference center there. Since 2001 Będlewo Palace serves as a principal space of an activity for the Banach Center, where larger scientific events such as conferences and big workshops are organized. The premises

of the Conference venue can host up to 140 persons in 80 guest rooms: 24 single rooms, 44 double rooms and 12 apartments, all of which are equipped with bathrooms, radio as well as free Wireless Internet connection. There are four fully equipped conference rooms available: for 40, 60, 120 and 150 participants.

Smaller events, such as workshops, research groups, seminars and advanced lecture series are usually organized in Warsaw, on the fourth and third floors of the building at Śniadeckich Street, making use of two main auditorium halls, seminar rooms, small cafeteria and the Banach Center Office. Eighteen small studios situated on the fifth and sixth floor of the building serve as guest rooms for the participants of the Banach Center events.

The basic forms of activity of the Banach Center are semesters or so-called mini-semesters devoted to various subjects of mathematics and its applications; conferences, workshops, research groups, i.e. meetings of small groups of researchers working on a particular scientific problem, topical forums (regular conferences devoted to specialized subjects generally organized every two years), Banach Center Colloquia (lectures by leading specialists), special condensed courses for PhD students by renowned specialists.

Recently Banach Center is organizing approx. 25 conferences and workshops per year. The information on how to apply for the scientific meetings with the support of the Banach Center is available at <http://www.impan.pl/BC/apply.html>

The scientific director of the Institute in charge of the Banach Center is Stanisław Janeczko. He is in charge of the scientific events sponsored by the Banach Center which take place at Będlewo Conference Center. The person in charge of the Będlewo Conference Center is the scientific director of the Institute Łukasz Stettner.

For details concerning organization of mathematical scientific meetings, please contact Banach Center Office: tel: +48 22 5228 232, [Banach.Center@impan.pl](mailto:Banach.Center@impan.pl)

For details concerning organization of other meetings, please contact directly with Mr. Sławomir Malecha, administrative manager of the Conference Center: tel.: +48 61 813 5187, [bedlewo@impan.pl](mailto:bedlewo@impan.pl)

Twenty four European mathematical centers are organized into the consortium: European Research Centers on Mathematics (ERCOM). Banach Center, being one of the oldest mathematical centers in Europe, is an active member of ERCOM since the very beginning of its existence in 1997, and is one of ten members of the European Postdoctoral Institute in Mathematics.





# Scientific Events

## *Special scientific session commemorating 80th anniversary of prof. Andrzej Lasota*

On January 13th, 2012 Mathematical Center for Science and Technology of IMPAN, jointly with Faculty of Mathematics, Physics and Chemistry of Silesian University organized 5th jubilee lecture and a special session commemorating 80th anniversary of prof. Andrzej Lasota (1932–2006).

The jubilee lecture entitled *Functional Analysis and Nonlinear Boundary Value Problems: The Legacy of Andrzej Lasota* was delivered by prof. Jean Mawhin (Université Catholique de Louvain).

In the above session contributions of prof. A. Lasota were presented by professors: Józef Myjak,

Ryszard Rudnicki and Tomasz Szarek. The meeting gathered strong representation of the officials of the Silesian University, including deputy rector, dean of the Faculty and directors of the Institutes of Mathematics, Physics and Chemistry.



**Andrzej Lasota (1932–2006)** Professor, Ordinary Member of Polish Academy of Sciences, Full Member of Polish Academy of Arts and Sciences (PAU). He studied at the Jagiellonian University, made PhD under supervision of Tadeusz Ważewski in 1960 at IMPAN and habilitation in 1964 at the Jagiellonian University. He worked there in the years 1953–1976 and 1988–2005. He was the Dean of the Mathematics, Physics and Chemistry Department there in 1972–1975. Since 1976 till his death he worked (except in 1986–1988) at the Silesian University in Katowice, where he founded the Biomathematics Laboratory. For periods of time he worked also at Marie Skłodowska-Curie University in Lublin and at IMPAN. He promoted 21 PhD students. His most famous books and articles include:

→ "Probabilistic properties of deterministic systems" (joint with M. Mackey),

Cambridge University Press, Cambridge, 1985 and its revised and extended version: "Chaos, fractals, and noise. Stochastic aspects of dynamics", Springer-Verlag, New York, 1994.

→ "On the existence of invariant measures for piecewise monotonic transformations" (joint with J. Yorke), Trans. Amer. Math. Soc. 186 (1973), 481–488.

## Scientific Session in honour of Friedrich Hirzebruch on the occasion of his 85th birthday

On May, 18, 2012 at the Institute of Mathematics of the Polish Academy of Sciences in Warsaw there was organized a special scientific session in honour of Friedrich Hirzebruch [1] on the occasion of his 85th birthday.

Professor Friedrich Hirzebruch, director of the Max-Planck-Institute of Mathematics in Bonn, former President (first President) of European Mathematical Society, played an important role not only in the area of mathematics, but he also made a special contribution to the Banach Center while being the chair of its Scientific Council in the period of 1993–2001, when the political image of Europe was changing.

The Organisers of the session, Stanisław Janeczko and Tadeusz Januszkiewicz, scholars of the Max Planck Institute in Bonn and Professor Hirzebruch's students, wanted to take this occasion to recall and thank him for his personal involvement in securing the conditions and activity of the Banach Center.

Professor Hirzebruch could not unfortunately participate in the above session. However he sent to the organizers of the session video-lecture entitled *The shape of planar algebraic curves defined over the reals – application of the Atiyah-Bott-Singer fixed point theorem* he intended to give during the session. His son – Michael with wife came to the session

as Prof. Hirzebruch's ambassadors. They read a letter written by Prof. Hirzebruch with a message to the participants of the scientific session.

During the scientific session, in which also the members of the Scientific Council of the Banach Center participated, 4 lectures made by the scholars of the Max Planck Institute were given:

- Adrian Langer, *On the Grothendieck-Katz conjecture*
- Zbigniew Błocki, Hörmander's estimate, *Suita conjecture and the Ohsawa-Takegoshi extension theorem*
- Jarosław Wiśniowski, *Another view on Cox rings: Jaczewski's theorem revisited*
- Jarosław Kędra, *Gromov-Witten invariants of the Kodaira-Thurston manifold.*



May 16, 2012

Dear friends and colleagues,  
since quite some time my wife Inge and I looked forward to this conference were Friday, May 18, was planned to be a special day for me. Two unfortunate incidents with falling down leaving me with disturbances and pain prevented me to come. Inge and I are very sad. Our son Michael and his wife Anne had planned to accompany us. Now they are coming alone as our ambassadors to bring our good wishes for health and happiness and excellent results in the mathematical work to all participants. I remember with pleasure all the years I was working for the Banach center always enjoying the good cooperation with the directors and all the members of the new scientific committee, closely connected with

the European Mathematical Society founded in 1990 in Poland, marking the beginning of a new era for the Banach center. During all these years before and after the minutes Inge and I enjoyed cordial hospitality by our Polish friends. Some of them visited the Max Planck Institute for Mathematics in Bonn. One can apply any time for a research stay at the MPI, I look forward meeting many of you there, former visitors and new ones. Inge and I wish all of you a good day. We hope to be able to visit Poland and our friends there at some other time.

Regards and greetings from  
Fritz and Inge Hirzebruch



↑ The flowers for prof. Hirzebruch were handed to his son – Michael and his son's wife.

1. Professor F. Hirzebruch passed away a few days after the scientific session.

## *Trends in Set Theory*

### 08–11 July, 2012 | Warsaw

The conference took place in the days 8–11 of July, 2012 at the Institute of Mathematics of the Polish Academy of Sciences in Warsaw and focused on the interactions between set theory and other parts of mathematics, from Banach spaces and  $C^*$ -algebras to topological groups, sets of the reals, general topological spaces, and others. This included both the advances concerning appropriate set-theoretic tools from forcing theory, Ramsey theory, descriptive set theory and other branches of set theory, as well as concrete applications of these methods in the mathematical practice.

The scientific committee of the conference consisted of: Piotr Koszmider (chair), Grzegorz Plebanek, Janusz Pawlikowski, Marcin Sabok and Sławomir Solecki. The conference had the official status of the satellite event to the 6th European Congress of Mathematics held in Cracow, Poland in the days 1–7 of July 2012.

Three leading set-theorists: A. Kechris, S. Shelah and S. Todorcevic were among the main speakers of the Congress in Cracow and agreed to come to Warsaw's conference. This attracted many other mathematicians to participate both in our conference and the Congress.

#### INVITED SPEAKERS OF THE CONFERENCE WERE:

A. Aviles (Murcia), J. Brendle (Kobe), M. Džamonja (UEA Norwich), M. Elekes (Renyi Institute), S. Geschke (Hausdorff Center), M. Hrusak (UNAM

Morelia), A. Kechris (Caltech), W. Kubis (AVCR and UJK Kielce), J. Lopez-Abad (ICMAT Madrid), S. Shelah (Jerusalem and Rutgers), S. Solecki (Urbana-Champaign), L. Nguyen Van The; (Aix-Marseille), S. Thomas (Rutgers), S. Todorcevic (CNRS and Toronto), T. Tsankov; (Paris 7), B. Velckovic (Paris 7), P. Zakrzewski (Warszawa), J. Zapletal (AVCR and Gainesville).

The organizers of the conference received financial contribution from the European Science Foundation, Institute of Mathematics of the Polish Academy of Sciences and from University of Wrocław.

#### SCIENTIFIC CONTENT OF THE EVENT INCLUDED:

- Set Theory of the Real Line
- Descriptive Set Theory in Polish Groups
- Combinatorial Set Theory in Banach Spaces
- Set-theoretic Topology
- Algebra and Set Theory
- Developing Set-theoretic Tools
- Problem session

The idea of the conference as focused on applications of set theory in diverse mathematical disciplines was quite original and created a new environment for interactions and the exchange of ideas. There were two leading combinatorial set-theorists: Saharon Shelah and Stevo Todorcevic, and a leading Descriptive set-theorist- Alexander Kechris. Internationally leading mathematicians also included S. Solecki and S. Thomas. On the other hand, half of the participants were young mathematicians. This created quite dynamic interaction, which must have inspired many young participants. The organizers also hope that young mathematicians' lesson from this conference is that applying set theory in other fields of mathematics is at least as exciting as creating a new set theory. Of course many discussions from the conference will result in publications and new scientific results. Although this scientific gathering was diverse, participants spoke the same language of the set theory. Deep impact of the event is expected by its organizers.



← The lecture of Saharon Shelah, one of the main invited speakers of the conference.

## 41st Polish Conference on Applications of Mathematics

The 41st Polish Conference on Applications of Mathematics was held at Zakopane–Kościelisko at the foot of the Tatra Mountains on September 4–11th, 2012. The conference gathered over 120 specialists of various applications of mathematics. The Conference started with a special lecture devoted to the secrets of Enigma delivered by prof. A. Orłowski.

Among various longer lectures one should point out these concerning investments under uncertainty, measures of risk, control, geometry and space missions, metrics on the family of convex sets and collisionless kinetic equations. There was also a special session commemorating prof. Ryszard Zielinski organized, who passed away at the end of April this year. His former PhD students: prof. W. Niemirow, M. Męczarski, A. Boratyńska and T. Rychlik presented a wide spread of contributions and scientific interests of prof. Zieliński.

During the conference we had an open meeting of the Subcommittee on Applications of Mathematics of the Committee of Mathematics of the Polish Academy of Sciences devoted to various aspects of applications of mathematics in Poland. The presentations and letters concerning the discussion on this topic are available at the website: <http://www.impan.pl/CZM/komisja.html>

The participants of the conference had also an opportunity to listen to prof. Tadeusz Trzaskalik (piano) musical performance with accompaniment of violin, violoncello and a soprano singer.



↑ Tatra Mountains, Hala Gąsienicowa. August 2012 (photo by F. Przytycki).  
← Siwarna Hotel in Zakopane-Kościelisko.

## IMPAN PRIZES

Dr Mateusz Kwaśnicki is Kuratowski Award winner in 2012. He is awarded for outstanding results in potential theory of Lévy processes.

Mateusz Kwaśnicki works as an assistant professor (adiunkt) at the Wrocław University of Technology. In 2010–2012 he also held a temporary position at IMPAN. He made PhD entitled “Potential theory of fractional powers of Laplace operator” in 2008, under supervision of Tadeusz Kulczycki.

Kuratowski Award was established in 1981 by the daughter of professor Kazimierz Kuratowski, professor Zofia Kuratowska. It is awarded yearly for mathematicians under 30 years old, by the Institute of Mathematics of Polish Academy of Sciences and Polish Mathematical Society.

## Banach Center Upcoming Events 2013

For more information, please check out: <http://www.impan.pl/BC/Program/2013.html>

	TITLE	DATE	SCIENTIFIC ORGANIZERS	PLACE
1.	IV Hurwicz Workshop on Mechanism Design Theory	16–17.11.2012	R. Golański, H. Sosnowska, Ł. Stettner, J. Werner	Warsaw
2.	Workshop on Set Theoretic Methods in Compact Spaces and Banach Spaces	17–21.04.2013	A. Aviles, P. Koszmider, W. Marciszewski, G. Plebanek	Warsaw
3.	Stochastic Analysis and Control. 50 years of scientific activities of Professor Jerzy Zabczyk (conference)	05–10.05.2013	A. Chojnowska-Michalik, S. Peszat, Ł. Stettner	Będlewo
4.	International Conference Beyond Uniform Hyperbolicity	27.05–07.06.2013	K. Barański, Ch. Bonatti, K. Burns, S. Crovisier, M. J. Pacifico, F. Przytycki, M. Viana, L. Wen, A. Wilkinson	Będlewo
5.	Advances in Mathematics of Finance. 6th General AMaMeF and Banach Center Conference	10–15.06.2013	A. Palczewski, Ł. Stettner	Warsaw
6.	Nonlinear Methods in Non-Mathematical Applications (conference)	16–22.06.2013	G. Graff, A. Kaczkowska	Będlewo
7.	Chilean-French-Polish Conference on Nonlinear Evolutionary PDE's	30.06–05.07.2013	P. Biler, M. Kowalczyk, P. Rybka	Będlewo
8.	School of Gravitational Waves	30.06–06.07.2013	Ch. Belczynski, T. Bulik, P. Jaranowski, B. Krishnan, A. Królak, B. Owen, R. Prix, D. Rosińska, J. T. Whelan	Warsaw
9.	Applied Topology (conference)	07–13.07.2013	W. Marzantowicz, P. Dłotko, G. Graff	Będlewo
10.	Satellite Summer School to the 7th International Conference on Lévy Processes	07–13.07.2013	K. Bogdan, Z. Palmowski	Będlewo
11.	7th Conference on Lévy Processes	15–19.07.2013	K. Bogdan, T. Byczkowski, Z. Palmowski, T. Rolski, Ł. Stettner	Wrocław
12.	Arithmetic Geometry (conference)	14–20.07.2013	L. Berger, A. Langer, W. Niziot	Warsaw
13.	Classical Aspects of Ring Theory and Module Theory (conference)	14–20.07.2013	C. Bagiński, P. Grzeszczuk, J. Matczuk, R. Mazurek, J. Okniński	Będlewo
14.	Geometric Singularity Theory. Polish-Japanese Singularity Theory Working Days	24–31.08.2013	W. Domitrz, G. Ishikawa, S. Izumiya	Warsaw
15.	Formal and Analytic Solutions of Differential, Difference and Discrete Equations (conference)	25–31.08.2013	W. Balsler, G. Filipuk, G. Łysik, S. Malek, S. Michalik, M. Yoshino	Będlewo
16.	Mathematics, Mechanics and Modelling. A tribute to Zbyszek Peradzyński (conference)	22–27.09.2013	B. Kaźmierczak, T. Lipniacki, P. Mucha, T. Piasecki, P. Rybka, D. Wrzosek	Będlewo

# Advances in Mathematics of Finance 6th General AMaMeF and Banach Center Conference

## 10–15 June, 2013 | Warsaw

AMaMeF is a successful network called Advanced Mathematical Methods for Finance, which in 2005–2010 was financed by ESF. The Steering Committee of the network consists of the representatives of Belgium, England, Finland, France, Germany, Italy, Netherlands, Norway, Poland, Romania, Sweden, Switzerland and Turkey. The network organizes conferences, workshops and seminars.

The Second General AMaMeF Conference (jointly with Banach Center Conference) was organized in April 30th–May 5th, 2007 in Będlewo. The selected contributions of the conference were published in 83rd volume of the Banach Center Publications.

Upcoming sixth General Conference will be organized again in Poland for the period of June 10th–15th, 2013 in the building of the old library of the University of Warsaw.

The Conference will be organized by Banach Center together with the Faculty of Mathematics, Informatics and Mechanics of the University of Warsaw under honorary patronage of the Rector of the University of Warsaw.

The website of the conference is available at: <http://bcc.impan.pl/6AMaMeF/>

## THEY PASSED AWAY

**Ryszard Zieliński (01.07.1932–30.04.2012)** He was graduated from Warsaw University of Economics in 1955. In 1961 he made PhD under supervision of prof. Wiesław Sadowski. In 1963 he was graduated from Faculty of Mathematics at the Warsaw University. Since 1961 he has been working in IMPAN. In 1976 he defended habilitation at IMPAN entitled "Global stochastic approximation". In 1988 he received the title of professor of mathematics. Ryszard Zieliński worked at the area of mathematical statistics and he was leading Polish statistician. He was interested in particular in Monte Carlo methods, robustness, stochastic approximation and nonparametric inference. He is the author of about 80 research papers, 16 books, 7 translations and many other publications. He supervised 14 PhD theses. He served as Editor of *Applicationes Mathematicae* in 1992–1999, and as a member of the Editorial Committee of the journal afterwards.

**Danuta Przeworska-Rolewicz (31.05.1931–23.06.2012)** She worked at IMPAN since 1960 till 2011, at the Analysis Department and recently at the Mathematical Physics and Differential Geometry Department. She studied at the University of Warsaw and made there PhD in 1960 under supervision of Witold Pogorzelski, entitled "On systems of strongly singular integral equations". Since 60-ties her main area of research were algebraic methods in analysis. In 1964 she made habilitation entitled "Équations avec opérations algébriques". In 1974 she

received the title of professor mathematics. In 1969 she received Stefan Banach award of the Polish Mathematical Society for outstanding results in mathematics (joint with Stefan Rolewicz) and several other awards. She published more than 160 scientific papers, 50 other publications, 7 monographs (edited in Poland, the Netherlands and England) and 4 text-books. She promoted 9 PhD students.

**Jerzy Urbanowicz (25.05.1951–6.09.2012)** He studied at the University of Warsaw and made there PhD in 1982 under supervision of Jerzy Browkin, on "Values of Dedekind zeta-functions" and habilitation at IMPAN in 1992 on "Connections of Dedekind zeta-functions with K-theory". He worked at IMPAN since 1988 at the Number Theory Unit, headed by Andrzej Schinzel. For long periods of time J. Urbanowicz worked also in Warsaw University of Life Sciences – SGGW, The John Paul II Catholic University of Lublin – KUL, Cardinal Stefan Wyszyński University in Warsaw and the Institute of Computer Science of the Polish Academy of Sciences. He published 32 papers and a monograph, joint with Kenneth Williams, *Congruences for L-Functions*, 2000. In 1994–1997 Secretary of *Acta Arithmetica*. Co-editor (with H. Iwaniec and W. Narkiewicz) of "Andrzej Schinzel, *Selecta, Heritage of European Mathematics*", EMS Publishing House 2007. Polish Armed Forces adviser for cryptography and teleinformation. In 1999 he created the Section of Cryptography at IMPAN.

# THE INSTITUTE IS THE PUBLISHER OF THE FOLLOWING JOURNALS:

(Web: <http://journals.impan.gov.pl/>)

→ **Acta Arithmetica** (founded in 1936)

*Number theory*

→ **Annales Polonici Mathematici** (founded in 1954)

*Mathematical analysis, differential equations, geometry*

→ **Applicationes Mathematicae** (founded in 1953)

*Applications of mathematics, especially mathematical modeling, optimization, probability and statistics, mathematics of finance, numerical methods*

→ **Bulletin of Polish Academy of Sciences Math** (founded in 2004, continuation of the series published by PAN, founded in 1953)

*Short research papers in all areas of mathematics*

→ **Colloquium Mathematicum** (founded in 1948)

*Research and survey papers in all areas of mathematics*

→ **Dissertationes Mathematicae** (founded in 1952)

*Small monographs in all areas of mathematics*

→ **Fundamenta Mathematicae** (founded in 1920)

*Set theory, mathematical logic and foundations of mathematics, topology, algebra, dynamical systems*

→ **Studia Mathematicae** (founded in 1929)

*Functional analysis, abstract methods of mathematical analysis, probability theory*

→ **Banach Center Publications** (founded in 1976)

*Proceedings of selected conferences and semesters held at the International Stefan Banach Mathematical Center. Each volume has its particular editors, in general from among the organizers of the given conference or semester.*

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