Report on a Scientific Event

Winter School in Abstract Analysis, Set Theory & Topology January 26th–February 2nd 2013 Hejnice, Czech Republic

Summary

The meeting jointly organized by the Czech Mathematical Society and the Mathematical Institute of the Czech Academy of Sciences took place at Hejnice, Czech Republic between January 26th and February 2nd 2013. Out of the 97 registered registered participants 17 had to cancel their registration leading to a total of **80 participants** from diverse countries.

The conference consisted of five series of **tutorial lectures** delivered by the invited speakers, **research presentations** of the participants and **discussion & networking time**. One afternoon was devoted to a trip to the mountains.

The conference took place at the International Center for Spiritual Rehabilitation, an old monastery which was recently renovated and now serves as a conference center with accommodation facilities. The location was ideal since it allowed the participants to stay in a single place and had excellent supporting facilities. We were also able to arrange favourable prices.

Based on the feedback of participants the conference was an **overall success** and the participants have been very enthusiastic about attending the school next year.

Scientific Content

This year of the tutorial lectures (each tutorial comprising of several 50 minute lectures) were devoted to advanced topics of Set Theory & Descriptive Set Theory, Forcing and Set-Theoretic topology. They were delivered by leading experts.

Professor **Michael Hrušák** (UNAM, Morelia) reviewed basic forcing and preservation properties of natural partial orders associated with filters and ideals on countable sets. He paid special attention to destructibility of ideals by forcing. As an application he sketched the proof of the solution to Malykhin's problem: Consistently every separable Frechet topological group is metrizable.

Professor **Jan van Mill** (Vrije Universiteit, Amsterdam) gave a tutorial on the topic of **uniquely homogeneous spaces**. A (nontrivial) space X is called *uniquely homogeneous* provided that for all $x,y \in X$ there is a unique homeomorphism of X that takes x onto y. This concept is due to Burgess who asked in 1955 whether there exists a uniquely homogeneous metrizable

continuum. Barit and Renaud showed in 1978 that there are no locally compact uniquely homogeneous metrizable spaces. There is a nontrivial uniquely homogeneous Baire space of countable weight and it is unknown whether there is a Polish uniquely homogeneous space. He discussed these results and others and presented many fundamental open problems which remain unsolved. For example, whether there exists a nonmetrizable uniquely homogeneous compact space. Such an example, if it exists, would definitely be completely different from all the known examples of homogeneous compacta.

Professor **Slawek Solecki** (University of Illinois at Urbana-Champaign, Urbana IL) had a series of lectures on the **Tukey reduction between directed orders**. The notion originated in the theory of convergence in topological spaces. More recently, it proved useful in classification problems and in the study of cardinal invariants of the continuum. He presented an outline of recent research in which Tukey reduction is applied to investigate the structure of the classes of analytic P-ideals of subsets of ω and of analytic σ-ideals of closed subsets of compact spaces.

Professor **Stevo Todorčević** (University of Toronto, Toronto) talked about how **forcing with a coherent Souslin tree** can be analyzed using a sufficient amount of PFA that allow the existence of such a tree. He also presented a list of few applications to set-theoretic topology.

Professor **Jindřich Zapletal** (University of Florida, Gainesville) gave an introduction to **Idealized forcing**. His tutorial was based on his book *Forcing idealized*. The topics he talked about included: The quotient poset P_I of Borel I-positive sets for a σ-ideal I on a Polish space; Translating forcing properties of P_I into analytic properties of I and back; Operations on σ-ideals vs. operations on forcings; The countable support iteration and product;

The research presentations were given mainly by younger participants who presented their newest results. The topics included General Topology, Set Theory, Boolean Algebras and Forcing, Descriptive Set Theory, Functional Analysis and the Theory of Filters.

Each day participants had time to discuss their work with colleagues. The topics of the discussions were diverse and included recent developments in set theory.

The final program of the conference, presentation slides from the talks and the list of participants can be found at the following address:

winterschool.eu/2013

Results assessment

There are two main purposes scientific meetings serve. First they are a means of disseminating knowledge and presenting current research. Secondly they have a networking effect in bringing together people and facilitating cooperation. In both of these aspects the present meeting had fulfilled its goals.

The tutorials were an invaluable opportunity for younger researchers to acquaint themselves with topics currently only accessible in research articles or not

accessible at all. Time was reserved for questions and the speakers made special effort to present the topics in very clear and intuitive terms.

The research presentations gave a nice overview of current set theoretic research trends ranging from combinatorial problems on the natural numbers, descriptive set theory of the reals to large cardinals. It helped prevent the isolation which sometimes threatens people working on a very specialized topic.

Each of the participants was invited to submit the slides of their talk to the organizers so that they could be made available on the conference website. We were happy that, except for one research talk and one tutorial, where the persons did not have them in electronic form, we were able to make them available to a broader audience on our website.

The conference itself is part of a recently emerging trend of strong set theoretic research in Europe as witnessed by the **INFTY** network or, e.g., the **Young Set Theory Workshops**.

Financial report summary

We were able to fully fund the participation of 15 participants and partially fund further 8 with a total amount of € 5700. The ESF funds were allocated as given in the following table.

ESF Funding	
Board	€ 2142
Accommodation	€ 2858
Administrative costs	€ 0
Total	€ 5000

Final Scientific Programme

Sunday

Morning Session

David Chodounsky

10:10--10:50, **T. Banakh** Solecki submeasures and densities on groups
11:05--11:55, **S. Solecki** Tukey reduction among analytic P-ideals and σ-ideals I.
12:00--12:30, **P. Borodulin-Nadzieja** Hausdorff towers and gaps

Afternoon Session

Grzegorz Plebanek

15:00--15:50, **S. Solecki** Tukey reduction among analytic P-ideals and σ-ideals II.
16:10--17:00, **M. Hrušák** Forcing with filters and ideals I.
17:10--17:40, **J. Starý** Compactness of the order-sequential topology
17:45--18:15, **O. Selim** Submeasures and signed measures

Monday

Morning session

Petr Simon

9:00--9:20, **M. Dečo** Strongly Dominating Sets of Reals
9:25--10:15, **S. Solecki** Tukey reduction among analytic P-ideals and σ-ideals III.
10:30--11:20, **M. Hrušák** Forcing with filters and ideals II.
11:25--11:55, **O. . Guzmán González** Namba forcing and set theory of the reals
12:00--12:30, **J. Serbus** Configurations of Cardinal Invariants Consistent with the P-ideal Dichotomy

Afternoon Session

Antonio Aviles

15:00--15:50, **S. Todorčević** Forcing With a Coherent Souslin Tree I.
16:10--16:35, **M. Krupski** Some new observations on the t-equivalence relation
16:40--17:10, **W. Kubis** Universal homomorphisms
17:20--17:50, **J. Garbulińska** Isometric uniqueness of a complementably universal Banach space for Schauder decompositions
17:55--18:25, **M. Nowak** Topological classification of countable IFS-attractors

Tuesday

Morning Session

Wieslaw Kubis

9:00--9:20, **E. Grzegorek** Outer measure and hull property
9:25--10:15, **J. Zapletal** Forcing Idealized I.
10:30--11:20, **M. Hrušák** Forcing with filters and ideals III.
11:25--11:55, **W. Wohofsky** Characterizing Strong Measure Zero Sets in Polish groups
12:00--12:30, **B. Farkas** Representations of ideals in Polish groups and in Banach spaces

Afternoon Session

Szymon Glab

15:00--15:50, **S. Todorčević** Forcing With a Coherent Souslin Tree II.
16:10--16:40, **W. Bielas** Generating Borel Measurable Functions with Continuous Functions
16:45--17:30, **K. Fournier** Wadge Hierarchy of Difference of Analytic sets
17:35--18:05, **Y. Pequignot** Between Bqo and Wqo: the space of ideals
18:10--18:30, **Z. Vidnyanszky** Borel hulls of shy sets

Wednesday

Morning Session

Taras Banakh

9:30--10:00, **O. Sidorov** The innovative structure of point sets in terms of the next point principle
10:15--11:05, **J. van Mill** Uniquely homogeneous spaces I.
11:15--11:45, **A. Kucharski** A normally supercompact Parovicenko space
11:50--12:05, **M. Martynenko** On skeletally factorizable spaces
12:10--12:30, **J. Jureczko** On existence of independent sets in partially ordered sets

Thursday

Morning Session

K. P. Hart

9:00--9:20, **J. Supina** Sequence selection principles for functions
9:25--10:15, **J. Zapletal** Forcing Idealized II.
10:30--11:20, **J. van Mill** Uniquely homogeneous spaces II.
11:25--11:55, **A. Farhat** Generating compact spaces from trees
12:00--12:30, **W. Stadnicki** Wallman representations of hyperspaces

Afternoon Session

Piotr Borodulin-Nadzieja

15:00--15:50, **S. Todorčević** Forcing With a Coherent Souslin Tree III.
16:10--16:40, **A. Aviles** A new C(K) space with few operators
16:50--17:20, **S. . Szczepaniak** Some remarks on splittings
17:30--18:00, **J. Flašková** Some remarks concerning the van der Waerden ideal
18:10--18:25, **R. A. Zachariah** Randomness and Universality in Topological Spaces.

Friday

Morning Session

Piotr Zakrzewski

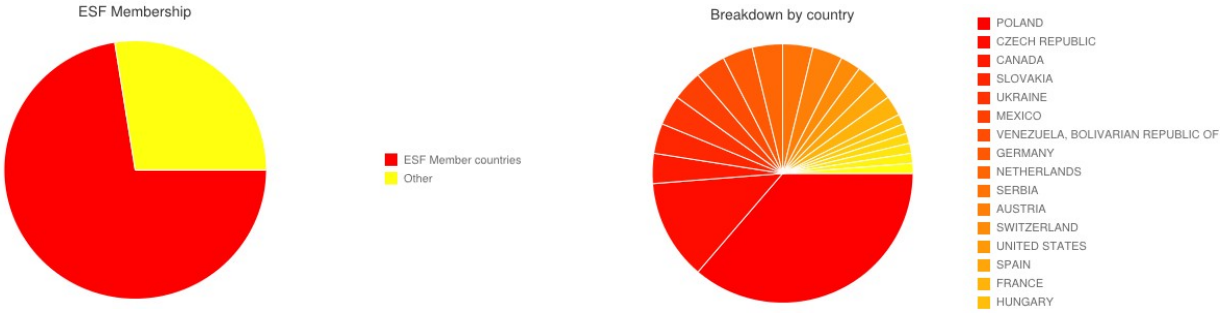
9:00--9:20, **A. A. Martínez Celis Rodríguez** Cardinal invariants of porous sets.
9:30--10:20, **J. Zapletal** Forcing Idealized III.
10:40--11:30, **J. van Mill** Uniquely homogeneous spaces III.
11:40--12:00, **A. Kwela** Ideals represented on Polish spaces
12:10--12:30, **M. Doucha** Universal structures on the Urysohn universal space

Afternoon Session

Jonathan Verner

15:00--15:15, **Z. Kosztołowicz** Generalizations of Strok-Szymański theorem
15:20--15:35, **S. Turek** Hereditarily supercompact spaces
15:55--16:25, **L. Zdomskyy** Covering properties and CDH filters
16:35--17:20, **G. . Plebanek** On isomorphisms and embeddings of C(K) spaces
17:30--18:10, **K. P. Hart** Dimension(s) of compact F-spaces

List of participants



Name & Surname	*Institution*	*Country*
Giorgio Audrito	University of Torino	ITALY
Antonio Aviles	University of Murcia	SPAIN
Bohuslav Balcar	Center for Theoretical Study	CZECH REPUBLIC
Taras Banakh	Ivan Franko National University of Lviv (Ukraine) and Jan Kochanowski University in Kielce (Poland)	UKRAINE
Maria Bas	Universidad Central de Venezuela	VENEZUELA, BOLIVARIAN REPUBLIC OF
Wojciech Bielas	University of Silesia, Institute of Mathematics	POLAND
Marek Bienias	Institute of Mathematics, Lodz University of Technology	POLAND
Piotr Borodulin-Nadzieja	University of Wroclaw	POLAND
David Chodounsky	The Fields Institute for Research in Mathematical Sciences	CANADA
Michal Dečo	Institute of Mathematics UPJŠ	SLOVAKIA
Michal Doucha	Faculty of Mathematics and Physics, Charles University	CZECH REPUBLIC
Piotr Drygier	University of Wroclaw	POLAND

Name & Surname	*Institution*	*Country*
Ahmad Farhat	University of Wroclaw	POLAND
Barnabás Farkas	University of Wroclaw	POLAND
Jana Flašková	University of West Bohemia in Pilsen	CZECH REPUBLIC
Kevin Fournier	UNIL - Paris VII	SWITZERLAND
Jocer Franquiz	Universidad Central de Venezuela	VENEZUELA, BOLIVARIAN REPUBLIC OF
Joanna Garbulińska	The Jan Kochanowski University/ Jagiellonian University	POLAND
Szymon Glab	Lodz University of Technology	POLAND
Magdalena Grzech	Cracow University of Technology	POLAND
Edward Grzegorek	Instytut Matematyki, Uniwersytet Gdański	POLAND
Osvaldo Guzmán González	Instituto de matemáticas, Unidad Morelia, Universidad Nacional Autónoma de Mexico	MEXICO
K. P. Hart	TU Delft	NETHERLANDS
Michael Hrušák	Instituto de matemáticas, Unidad Morelia, Universidad Nacional Autónoma de Mexico	MEXICO
Jakub Jasinski	University of Calgary	CANADA
Joanna Jureczko	Cardinal Stefan Wyszynski University in Warsaw	POLAND
Witold Kisielewski	University of Silesia	POLAND
Zdzisław Kosztołowicz	Jan Kochanowski University in Kielce	POLAND
Mikolaj Krupski	Polish Academy of Sciences	POLAND
Alicja Krzeszowiec	Łódź University of Technology	POLAND
Michał Krzeszowiec	Polish Academy of Sciences/ Łódź University of Technology	POLAND

Name & Surname	*Institution*	*Country*
Wieslaw Kubis	Czech Academy of Sciences / Jan Kochanowski University	CZECH REPUBLIC
Andrzej Kucharski	University of Silesia	POLAND
Adam Kwela	Polish Academy of Sciences	POLAND
Roman Lubczyk	Uniwersytet Opolski	POLAND
Leon Luo	TU Delft	NETHERLANDS
Arturo Antonio Martínez Celis Rodríguez	Centro de Ciencias Matemáticas	MEXICO
Marta Martynenko	Pidstryhach Institute for Applied Problems of Mechanics and Mathematics of Ukrainian Academy of Sciences; Ivan Franko National University of Lviv	UKRAINE
Nenad Moraca	Department of Mathematics and Informatics	SERBIA
Magdalena Nowak	Jagiellonian University in Kraków / Jan Kochanowski University in Kielce	POLAND
Aleksandar Pavlović	Department of Matematics and Informatics, Novi Sad, Serbia	SERBIA
Tomáš Pazák	Center for Theoretical Study	CZECH REPUBLIC
Yann Pequignot	Université de Lausanne/Université Paris VII	SWITZERLAND
Claribet Piña	Université Paris Diderot Paris 7	FRANCE
Grzegorz Plebanek	Instytut Matematyczny UWr	POLAND
Dušan Radičanin	Department of Matematics and Informatics, Novi Sad, Serbia	SERBIA
Robert Ralowski	Wroclaaw University of Technology	POLAND
Cristobal Rodriguez Porras	Université Paris 7 - Diderot	FRANCE
Růžena Roháčková	Matematický ústav AV ČR	CZECH REPUBLIC

Name & Surname	*Institution*	*Country*
Omar Selim	University of East Anglia	UNITED KINGDOM
Jeffrey Serbus	Uni Freiburg	GERMANY
Oleg Sidorov	Plekhanov Russian University of Economics	RUSSIAN FEDERATION
Petr Simon	Charles University	CZECH REPUBLIC
Sergii Slobodianiuk	Higher School of Economics in Moscow	UKRAINE
Damian Sobota	Wrocław University of Technology - Institute of Mathematics and Computer Science	POLAND
Slawomir Solecki	University of Illinois at Urbana-Champaign	UNITED STATES
Wojciech Stadnicki	University of Wroclaw	POLAND
Jan Starý	Czech Technical University	CZECH REPUBLIC
Michal Stas	Faculty of Electrical Engineering and Informatics, TUKE	SLOVAKIA
Šárka Stejskalová	Department of logic, Charles University	CZECH REPUBLIC
Campo Elías Suárez Villagrán	Universidad de los Andes	COLOMBIA
Jaroslav Supina	P.J. Safarik University in Kosice	SLOVAKIA
Jarosław Swaczyna	Institute of Mathematics, Lodz University of Technology	POLAND
Sławomir Szczepaniak	Polish Academy of Sciences	POLAND
Anda Ramona Tanasie	Kurt Goedel Research Center, University of Vienna	AUSTRIA
Stevo Todorčević	University of Toronto	CANADA
Daniela Torrealba	Universidad Central de Venezuela	VENEZUELA, BOLIVARIAN REPUBLIC OF

Name & Surname	***Institution***	***Country***
Sławomir Turek	Jan Kochanowski University in Kielce	POLAND
Jan van Mill	Vrije Universiteit	NETHERLANDS
Jonathan Verner	Department of Logic, Charles University	CZECH REPUBLIC
Zoltan Vidnyanszky	Eotvos Lorand University	HUNGARY
Dimitris Vlitas	Univercity of Barcelona	SPAIN
Luisa Vogel	Universität Bonn	GERMANY
Thilo Weinert	Hausdorff Centre for Mathematics	GERMANY
Wolfgang Wohofsky	TU Vienna, Institute for Discrete Mathematics and Geometry	AUSTRIA
Rachel Alisha Zachariah		INDIA
Piotr Zakrzewski	Institute of Mathematics, University of Warsaw	POLAND
Jindřich Zapletal	University of Florida	UNITED STATES
Lyubomyr Zdomskyy	Kurt Goedel Research Center for Mathematical Logic, University of Vienna	AUSTRIA
Szymon Zeberski	Wroclaw University of Technology	POLAND