

Report on a Scientific Event

Winter School in Abstract Analysis, section Set Theory & Set-Theoretic Topology

January 28th-February 4th 2012

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 28th and February 4th 2012. Out of the 60 registered participants 6 had to cancel their registration leading to a total of **54 participants** from diverse countries.

The conference consisted of four 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 two of the tutorials (each tutorial comprising of three 50 minute lectures) were devoted to advanced topics of Set-theoretic Topology, one focused on Descriptive Set Theory and the remaining tutorial concentrated on combinatorial Set Theory. As is the tradition, they were delivered by leading experts in the respective fields.

Professor **Todd Eisworth** (Ohio University, Athens OH) gave a series of talks about **reflection principles**, focusing principally on reflection and nonreflection of stationary sets at successors of singular cardinals. His talk nicely complemented his survey article for the Handbook of Set Theory.

Professor **Stefan Geschke** (Hausdorff Center for Mathematics, Bonn) gave a survey of descriptive methods in the context of combinatorics on infinite graphs. He focused on **definable colorings of graphs**, and the chromatic and cochromatic numbers.

Professor **Klaas Pieter Hart** (Delft University of Technology, Delft) prepared three lectures showing interesting applications of the **Löwenheim-Skolem theorem** in topology, in particular he applied it to the lattice of closed sets to prove two classical theorems and then he showed how applying the method in the case of Lelek's problem in continuum theory (which was recently solved by former K. P. Hart's student Logan Hoehn), one could get interesting new insights.

Professor **István Juhász** (Alfréd Rényi Institute of Mathematics, Budapest) talked about recent progresses in **resolvability** of topological spaces. Part of the new results he presented were the outcome of a collaboration started at the previous Winter School.

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 and the Theory of Ultrafilters.

Each day participants had time to discuss their work with colleagues.

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

winterschoo.eu/2012

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. This helps prevent the isolation which sometimes threatens people working on a very specialized topic.

Perhaps one of the most gratifying moments was to see presentations of results which were the

outcome of collaboration and work done during the last Winter School. This validates our hope that meetings such as these make very good sense.

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 talk where the person did not have it 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

ESF Funding	
Board	€ 882
Accommodation	€ 4158
Transportation	€ 360
Administrative costs	€ 600
Total	€ 6000
Co-Sponsors	
CTS ¹	€ 300
MŠMT ČR ²	€ 300
MU AV ČR ³	€ 900
Total	€ 1500

¹Center for Theoretical Study, Charles University and Academy of Sciences of the Czech Republic

²The Ministry of Education of the Czech Republic

³The Mathematical Institute of the Academy of Sciences of the Czech Republic

Final Scientific Programme

SUNDAY

Morning Session

Jana Flašková

10:30–11:20, **K. P. Hart** Applications of the Löwenheim-Skolem theorem to compact hausdorff spaces I.

11:40–12:10, **E. Thuemmel** The Horn-Tarski problem

Afternoon Session

Lajos Soukup

16:00–16:40, **T. Weinert** Transfinite ordinal partition relations and coloured finite digraphs

17:00–17:50, **T. Eisworth** Successors of Singular Cardinals I.

18:00–18:30, **G. Plebanek** Simple Boolean algebra with complicated space of measures

MONDAY

Morning Session

Taras Banakh

9:00–9:50, **K. P. Hart** Applications of the Löwenheim-Skolem theorem to compact hausdorff spaces II.

10:20–10:50, **A. Farhat** Local connectedness and images of βH^*

11:00–11:30, **M. Walczyńska** Kuratowski operations revisited

11:40–12:10, **T. Yorioka** Some results in the extension with a coherent Suslin tree

Afternoon Session

Fernando Hernandez-Hernandez

16:00–16:30, **R. Hernandez Gutierrez** Countable Dense Homogeneous Filters

16:50–17:40, **I. Juhász** Resolvability of topological spaces I.

17:50–18:30, **B. Farkas** Covering properties of ideals

TUESDAY

Morning Session

Artur Bartoszewicz

9:00–9:50, **K. P. Hart** Applications of the Löwenheim-Skolem theorem to compact hausdorff spaces III.

10:20–11:10, **S. Geschke** Definable graphs on Polish spaces I.

11:30–12:00, **T. Yorioka** Killing some S-spaces by a coherent Suslin tree

Afternoon Session

Grzegorz Plebanek

16:00–16:40, **W. Kubiś** Universal homogeneous structures in ZFC

17:00–17:50, **T. Eisworth** Successors of Singular Cardinals II.

18:00–18:20, **Z. Vidnyanszky** Coanalytic Transfinite Constructions

WEDNESDAY
Morning Session

Jan Stary

10:00–10:30, **R. Honzík** Supercompact cardinals and failures of GCH

11:00–11:50, **T. Eisworth** Successors of Singular Cardinals III.

12:05–12:25, **J. Šupina** Spaces not mappable onto $[0,1]$

THURSDAY
Morning Session

Wieslaw Kubiś

9:00–9:50, **I. Juhász** Resolvability of topological spaces II.

10:20–11:10, **S. Geschke** Definable graphs on Polish spaces II.

11:25–11:50, **R. Ralowski** Two-point sets

12:00–12:30, **M. Wyszkowski** The independence of the covering numbers of the ideals of splitting tree forcing and Sacks forcing

Afternoon Session

Egbert Thuemmel

16:00–16:30, **P. Eliaš** Permitted sets on Cantor group

16:35–17:05, **N. Dobrinen** Ramsey-classification theorems and applications in the Tukey theory of ultrafilters

17:25–17:55, **J. Flašková** The generic existence of certain I-ultrafilters

18:00–18:30, **J. Stary** Coherent ultrafilters on Boolean algebras

FRIDAY
Morning Session

Petr Simon

9:00–9:50, **I. Juhász** Resolvability of topological spaces III.

10:20–11:10, **S. Geschke** Definable graphs on Polish spaces III.

11:30–12:00, **S. Plewik** Katowice "pattern" for the questions inspired by Czech mathematicians

Afternoon Session

Tomáš Pazák

16:00–16:30, **M. Bienias** Independent Bernstein sets and algebraic constructions

16:40–17:00, **S. Glab** strong algebraicity of series and functions

17:20–17:50, **T. Banach** Algebraically determined topologies on permutation groups

18:00–18:30, **L. Soukup** Variations of Separability

List of participants



Name & Surname	Institution	Country
<i>Giorgio Audrito</i>	University of Torino	ITALY
<i>Boris Šobot</i>	Faculty of Science	SERBIA
<i>Jaroslav Šupina</i>	UPJŠ Košice	SLOVAKIA
<i>Bohuslav Balcar</i>	CTS	CZECH REPUBLIC
<i>Taras Banakh</i>	Lviv University and Jan Kochanowski University	UKRAINE
<i>Artur Bartoszewicz</i>	Technical University of Lodz	POLAND
<i>Wojciech Bielas</i>	Silesian University	POLAND
<i>Marek Bienias</i>	Institute of Mathematics, Technical University of Lodz, Poland	POLAND
<i>Piotr Borodulin-Nadzieja</i>	Wrocław University	POLAND
<i>Gemma Carotenuto</i>	Università di Salerno	ITALY
<i>David Chodounsky</i>	Institute of Mathematics AS CR	CZECH REPUBLIC
<i>Michal Dečo</i>	UPJŠ Košice	SLOVAKIA
<i>Natasha Dobrinen</i>	University of Denver	UNITED STATES
<i>Todd Eisworth</i>	Ohio University	UNITED STATES

Final Report

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Name & Surname	Institution	Country
<i>Peter Eliaš</i>	Mathematical Institute, Slovak Academy of Sciences	SLOVAKIA
<i>Ahmad Farhat</i>	Wroclaw University	POLAND
<i>Barnabás Farkas</i>	Budapest University of Technology	HUNGARY
<i>Jana Flašková</i>	Katedra matematiky, Západočeská univerzita	CZECH REPUBLIC
<i>Stefan Geschke</i>	Hausdorff Center for Mathematics	GERMANY
<i>Szymon Glab</i>	Technical University of Lodz	POLAND
<i>Klaas Pieter Hart</i>	TU Delft	NETHERLANDS
<i>Rodrigo Hernandez Gutierrez</i>	Universidad Nacional Autonoma de Mexico	MEXICO
<i>Fernando Hernandez-Hernandez</i>	Universidad Michoacana de San Nicolas de Hidalgo	MEXICO
<i>Radek Honzík</i>	Charles University	CZECH REPUBLIC
<i>István Juhász</i>	Alfréd Rényi Institute of Mathematics	HUNGARY
<i>Alicja Krzeszowiec</i>		POLAND
<i>Wieslaw Kubiś</i>	Czech Academy of Sciences	CZECH REPUBLIC
<i>Andrzej Kucharski</i>	University of Silesia in Katowice	POLAND
<i>Marta Nowakowska</i>	University of Silesia in Katowice	POLAND
<i>Aleksandar Pavlović</i>	University of Novi Sad	SERBIA
<i>Tomáš Pazák</i>	CTS	CZECH REPUBLIC
<i>Grzegorz Plebanek</i>	Instytut Matematyczny, Uniwersytet Wrocławski	POLAND
<i>Szymon Plewik</i>	Instytut Matematyki Uniwersytetu Śląskiego w Katowicach	POLAND
<i>Robert Ralowski</i>	Wroclaw University of Technology	POLAND

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Name & Surname	Institution	Country
<i>Edoardo Ravello</i>		ITALY
<i>Růžena Roháčková</i>	Matematický ústav AV ČR	CZECH REPUBLIC
<i>Jeff Serbus</i>	University of Freiburg	GERMANY
<i>Petr Simon</i>	Charles University	CZECH REPUBLIC
<i>Lajos Soukup</i>	Renyi Institute of Mathematics, Hungarian Academy of Sciences	HUNGARY
<i>Wojciech Stadnicki</i>	University of Wrocław	POLAND
<i>Jan Stary</i>	Czech Technical University	CZECH REPUBLIC
<i>Carsten Szardenings</i>	Universität Münster - Institut für Mathematische Logik und Grundlagenforschung	GERMANY
<i>Katie Thompson</i>	TU Wien	AUSTRIA
<i>Egbert Thuemmel</i>		CZECH REPUBLIC
<i>Fabio Tonti</i>	Universitaet Wien	AUSTRIA
<i>Jonathan Verner</i>	Department of Logic, Charles University	CZECH REPUBLIC
<i>Anna Vernerová</i>	ÚFAL, Charles University	CZECH REPUBLIC
<i>Zoltan Vidnyanszky</i>	Eotvos Lorand University, Budapest	HUNGARY
<i>Mate Vizer</i>	Central European University	HUNGARY
<i>Marta Walczyńska</i>	Uniwersytet Śląski w Katowicach	POLAND
<i>Thilo Weinert</i>	Hausdorff Research Center, University of Bonn	GERMANY
<i>Marek Wyszkowski</i>	Christian-Albrechts-Universität zu Kiel	GERMANY
<i>Teruyuki Yorioka</i>	Shizuoka University	JAPAN
<i>Szymon Zeberski</i>	Wrocław University of Technology	POLAND