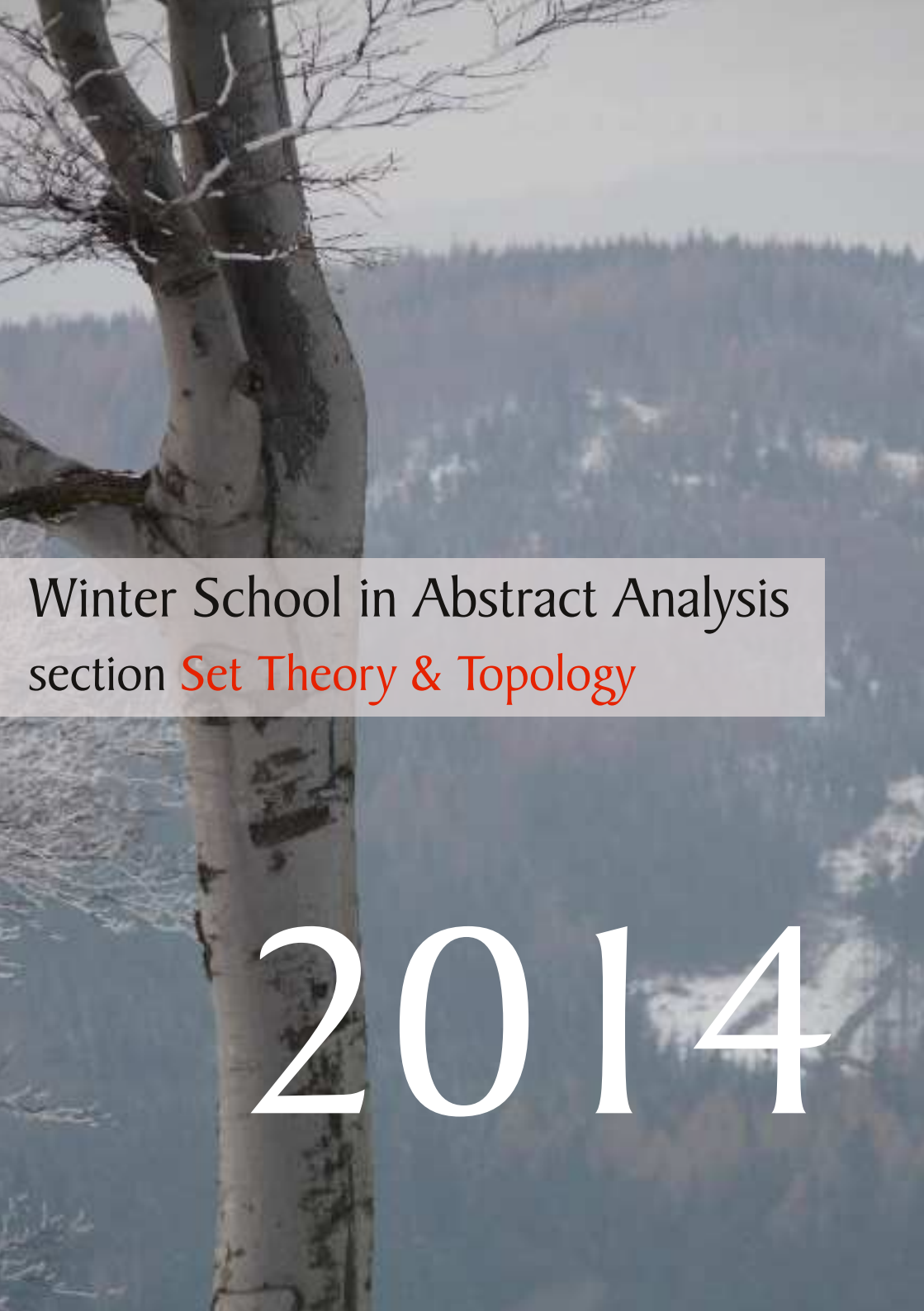
Winter School in Abstract Analysis
section Set Theory & Topology
2014

Winter School in Abstract Analysis

section Set Theory & Topology

25 Jan - 1 Feb, 2014

Hejnice, Czech Republic

jointly organized by

Faculty of Arts, Charles University

Czech Mathematical Society

Mathematical Institute, Czech Academy of Sciences

David Chodounský, Růžena Roháčková, Jan Starý, Jonathan Verner

FF UK

EUROPEAN SCIENCE FOUNDATION

INFTY

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Summary

The meeting, which was jointly organized by the *Faculty of Arts, Charles University*, the *Czech Mathematical Society* and the *Mathematical Institute of the Czech Academy of Sciences*, took place at Hejnice, Czech Republic between January 25th and February 1st 2014. Out of the 82 registered registered participants only 1 had to cancel his registration and one participant arrived later, leading to a total of *81 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 and each evening there was time for social bonding over a table of pool or a game of fussball.

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 thus increasing the "networking potential" and also had excellent supporting facilities. We were 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.

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Scientific Content

Tutorials

This year three of the tutorial lectures were devoted to Set Theoretical topics while the fourth was devoted to (mostly) Finite Combinatorics.

Professor *Antonio Avilés* (University of Murcía, Spain) presented some recent results which he obtained in collaboration with Stevo Todorcevic. The results are about understanding how a finite number of incompatible hereditary families of infinite subsets of the natural numbers interact. When these families are definable, for instance analytic, there are finite combinatorial structures that rule this interaction, imposing surprising constrains.

Professor *Jaroslav Nešetřil* (Charles University, Prague) surveyed recent development showing fine interplay between Homomorphisms, Structural Ramsey Theory and Limits. Some of the key words mentioned in his lectures were: density and universality of homomorphism order, forbidden homomorphisms and dualities, Ramsey classes and ultrahomogeneous structures, limits and FO limits, graphons, graphings and modelings. His lectures were partly based on the paper Nešetřil, J. and de Mendez, P. O.: *An unified approach to structural limits and limits of graphs of bounded tree depth*, and the monographs Nešetřil, de Mendez: *Sparsity*, Springer 2013 and Hell, Nešetřil: *Graphs and Homomorphisms*, OUP.

Professor *Dilip Raghavan* (National University of Singapore) presented techniques for constructing different types of MAD families (Laflamme families, tight families and completely separable families). These techniques were recently devised by Shelah and further developed by the speaker and his collaborators. An abstract for his tutorial with further citations may be found on the conference website.

Professor *Matteo Viale* (University of Torino, Italy) developed in his tutorial the theory of iterated forcing by means of commutative systems of complete homomorphisms of complete atomless Boolean algebras. This approach is equivalent to the standard development of iterated forcings but he aimed to show that it is much simpler to handle. It has already been pursued in the nineties by Donder and Fuchs, however few of their results have been published and their work remained largely unaccomplished. In the tutorial the direct and inverse limit of iterated systems of complete boolean algebras was defined. That was then followed by the definition of proper and semiproper iterations and sketch the proof of the preservation of properness under countable support iterations and of semiproperness under RCS iterations.

Research Track

The research presentations were given mainly by participants who presented their newest results. The topics ranged from Pure Topology (*Pytkeev spaces*, *Subcontinua of H**) to Set Theoretic Topology (*Porous sets and Martin numbers*), Descriptive Set Theory (*Hjorth Analysis of General Polish Group Actions*), pure Set Theory (*The Filter Dichotomy*, *Guessing principles in the Mathias model*), combinatorics (*Ramsey classes of trees*) and Set Theoretic Algebra (*Shelah's Easy Blackbox*). All in all most areas of current Set Theory were represented as well as some topics from Topology, Boolean Algebras, and Banach space theory.

A list of all of the lectures together with downloadable slides may be found on our website at www.winterschool.eu/2014

Mathematics was not, however, limited to tutorials or research presentations. There was plenty of time after the lectures for participants to discuss their work and, perhaps, start new productive collaborations. It was also common for small talk over dinner to suddenly turn towards mathematics; we took this to be a good sign of the fact, that mathematics was alive at the conference.

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 success of the INFTY network or, e.g., the Young Set Theory Workshops.

Financial Report

Support

Due to generous CEI and ESF support (under the INFTY project), we were able to fully fund 28 participants and partially fund 10 more participants. Most of the funded participants were young students who had not yet finished their PhDs and had no outside sources of funding. These people would have to pay for the participation out of their pocket and most of them would probably not be able to participate at all. In one case we also supported a more experienced researcher from Ukraine who's institution has no funding sources.

Budget

Compared to other comparable conferences, the total expenses may seem very low. Although we strive to keep the costs down to make the conference as accessible as possible, other contributing factors must be mentioned: we have been able to negotiate very favourable prices with the conference venue; part of the costs were born by the organizing institutions which kindly provided administrative and material support and, most importantly, the time of the organizers; and, of course, we were also helped very much by the favourable exchange rate.

Budget Summary

(not including in-kind contributions)

Income	
Registration fees	€ 10755
ESF (INFTY) support	€ 5000
CEI support (up to 15% of expenses)	€ 2715
Total	*€ 18470*
Expenses[†]	
Transport	€ 958
Board	€ 5428
Accommodation	€ 8928
Catering	€ 714
Invited speakers (accommodation & per diems)	€ 536
Bank & administrative fees	€ 714
Material	€ 179
Support staff	€ 845
Other	€ 80
Total	*€ 18182*
Total	**€ 88**

[†]Most of the costs were in CZK; for the purpose of this summary they were converted to EUR using the exchange rate current at the end of the conference. Some amounts are estimates as accounting was not yet closed when this report was prepared.

Final Scientific Programme

Sunday

Morning Session

David Chodounsky

10:35 **T. Weinert:** *Partition Relations for Linear Orders in a non-Choice-Context*

10:55 **A. Avilés:** *Basis problem for analytic multiple gaps I*

Coffee Break

12:30 **P. Holy:** *Simplest Possible Locally Definable Wellorders*

Afternoon Session

Jana Flašková

15:00 **W. Wohofsky:** *Strong measure zero and meager-shiftable in topological groups*

Coffee Break

15:50 **J. Nešetřil:** *Homomorphisms, Structural Ramsey Theory and Limits I*

16:50 **T. Banakh:** *Pytkeev $\aleph_0$-spaces*

17:25 **J. Starý:** *Ultraproduct of measures*

18:00 **J. Grebík:** *Asymptotic Density in Generic Extensions*

Morning Session

Wieslaw Kubis

9:00 **P. Klinga:** *Rearranging series of vectors on a small set*

9:35 **C. Brech:** *On PID and biorthogonal systems*

Coffee Break

10:25 **A. Avilés:** *Basis problem for analytic multiple gaps II*

11:25 **R. Carroy:** *Ordering functions*

12:00 **H. Pequignot:** *Wadge hierarchy on second countable spaces*

Afternoon Session

Kevin Fournier

15:10 **M. Bienias:** *Some properties of compact preserving functions*

Coffee Break

15:50 **J. Nešetřil:** *Homomorphisms, Structural Ramsey Theory and Limits II*

16:50 **M. Doucha:** *Universal groups and group structures on the Urysohn space*

17:35 **W. Bielas:** *An example of a rigid superuniversal metric space*

18:00 **F. Strobin:** *Large free subgroups of automorphisms groups of ultrahomogeneous spaces*

Tuesday

Morning Session

Grzegorz Plebanek

9:00 **A. Kwela:** *On a new F_σ ideal*

9:35 **W. Stadnicki:** *Guessing principles in the Mathias model*

Coffee Break

10:25 **A. Avilés:** *Basis problem for analytic multiple gaps III*

11:25 **B. Farkas:** *Almost disjoint refinements*

12:00 **R. Filipow:** *The reaping and splitting numbers of nice ideals*

Afternoon Session

Peter Eliaš

15:00 **W. Kubis:** *Ultrafilter selection properties*

Coffee Break

15:50 **J. Nešetřil:** *Homomorphisms, Structural Ramsey Theory and Limits III*

16:50 **M. Viale:** *Iterated forcing defined by means of Boolean algebras I*

17:50 **O. Drucker:** *Hjorth Analysis of General Polish Group Actions*

Morning Session

Taras Banakh

9:00 **M. Walczyńska:** *Embeddability properties of σ-discrete metrizable spaces*

9:20 **J. Šupina:** *Ideal versions of wQN-space and QN-space*

Coffee Break

9:45 **M. Staniszewski:** *On ideal equal convergence*

10:25 **D. Raghavan:** *Constructing special almost disjoint families I*

11:25 **R. Lupton:** *The Filter Dichotomy*

12:00 **O. Gutik:** *Pseudocompact inverse primitive (semi)topological semigroups*

Wednesday Winter School Walk

Start in front of the building

Thursday

Morning Session

KP Hart

9:00 **M. A. Gaspar Arreola:** *Minimally generated Boolean algebras and its Stone space*

9:35 **A. Medini:** *Seven characterizations of non-meager P-filters*

Coffee Break

10:25 **M. Viale:** *Iterated forcing defined by means of Boolean algebras II*

11:25 **M. Pitz:** *Compactifications of* $\omega^* \setminus \{x\}$

12:00 **R. Leek:** *Radiality and compactifications*

Afternoon Session

Barnabas Farkas

15:00 **J. Cancino-Manríquez:** *Another cardinal invariant for ideals on* ω

Coffee Break

15:50 **D. Raghavan:** *Constructing special almost disjoint families II*

16:50 **O. Guzman:** *MAD families and ideals*

17:25 **A. A. Martínez Celis Rodríguez:** *Porous sets and Martin numbers.*

18:00 **U. A. Ramos-García:** *Extremal disconnectedness and ultrafilters*

Morning Session

Christina Brech

9:00 **J. Jureczko:** *On some problems concerning strong sequences*

9:20 **M. Viale:** *Iterated forcing defined by means of Boolean algebras III*

Coffee Break

10:25 **D. Raghavan:** *Constructing special almost disjoint families III*

11:25 **G. McKay:** *Abstract well and better quasi-orders.*

12:00 **L. Scow:** *Ramsey classes of trees*

Afternoon Session

Jonathan Verner

15:00 **S. Cramer:** *Measures and combinatorics on* λ^+

Coffee Break

15:50 **H. G. Salazar Pedroza:** *Shelah's Easy Black Box*

16:25 **G. Plebanek:** *On small measures on Boolean algebras and compact spaces*

17:15 **D. Sobota:** *On tightness in the space of measures on Boolean algebras and compact spaces*

17:45 **K. Hart:** *Subcontinua of Hstar*

18:35 **J. Verner:** *The Last Talk*

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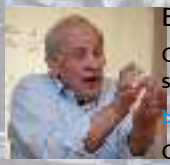

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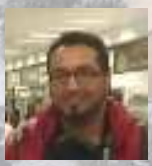

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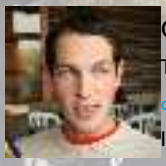

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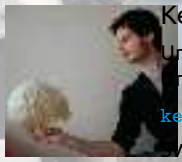

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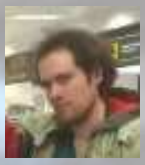

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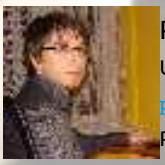

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Summary of Participants

The total number of participants (including 4 scientific organizers, 4 invited speakers and one person as administrative staff) was 81 which had exceeded our estimates. Also, the number of people who had to cancel their registration was a relatively low 7.

Countries

Most of the people were from Europe, however, we also had a strong group from Mexico and a few other non-European countries. In total, there were 17 different countries represented at the conference. The table on the right shows the breakdown by country as well as by ESF/CEI membership.

Europe	
Poland	23
Czech republic	11
Great Britain	6
Austria	5
Italy	5
Germany	4
Ukraine	4
Switzerland	2
Spain	2
France	2
Slovakia	2
Netherlands	1
Serbia	1
World	
Mexico	5
Brazil	3
United States of America	2
Canada	1
Israel	1
Singapore	1
Total	81
of that from	
ESF member countries	61
CEI member countries	51

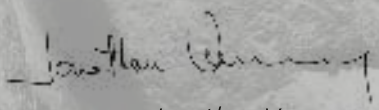
Future Outlook

Although the conference has barely ended and there is still some administrative work left to be done, preparations for next year are already under way. The organizing team met to discuss possible invited speakers for the Winter School in 2015 and we have already started contacting potential candidates. We have made preliminary accommodation reservation for 31.1. – 7.2.2015 in Hejnice as their schedule is already quite tight.

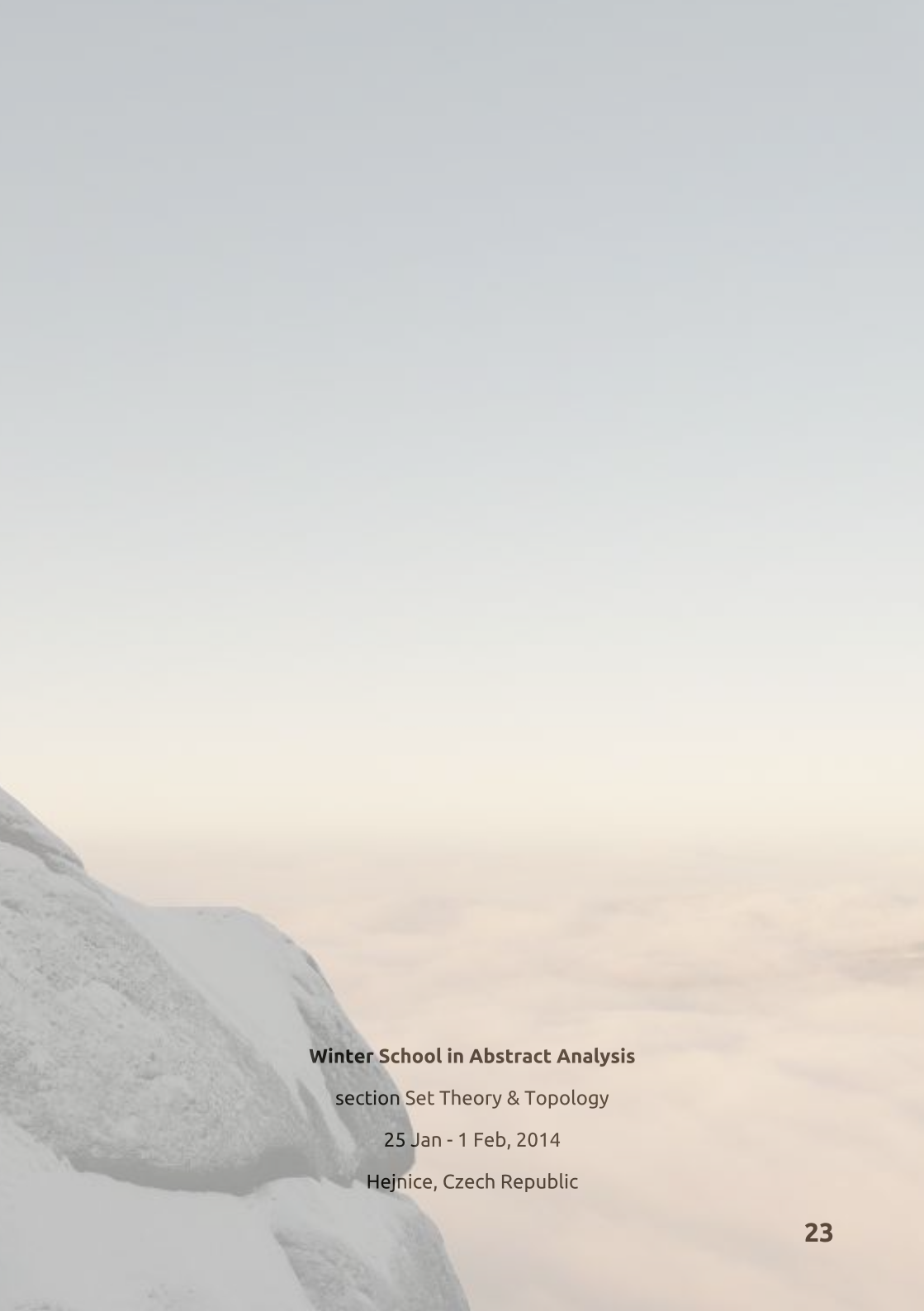
For the past several years, the conference received ESF support through the INFTY project, which will end in 2014. Although it would be viable to fund the conference entirely from registration fees, this would severely limit our ability to support participants who have no source of funding. This would be rather unfortunate as one of the strengths of the conference lies in bringing together younger researchers, who often lack sufficient funds to attend, with the more experienced ones. We thus need to look for other sources of funding.

Looking back at this years meeting, the thing that strikes me most was the proportion of young people — most of them did not yet finish their PhD — who presented very interesting research projects. It is a testament to the fact that Set Theory is 'alive and kicking' and it gives us motivation to continue organizing Winter Schools in the future.

I would like to end this report by a word of thanks to the people, withouth whom the Winter School would not have been possible: R. Roháčková, the invited speakers, the organizing team (J. Flašková, J. Grebík, D. Chodounský and J. Starý) and, of course, the people who we have learned from: B. Balcar, T. Pazák, and P. Simon.



Jonathan Verner



Winter School in Abstract Analysis

section Set Theory & Topology

25 Jan - 1 Feb, 2014

Hejnice, Czech Republic