Sixth Young Set Theory Workshop 2013, Oropa

Scientific Report

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Summary

The Young Set Theory Workshop 2013 took place between June 10th and June 14th in the Oropa sanctuary, in the northwestern part of Piemonte, Italy. This was the sixth such workshop after the series originated in Bonn in January 2008. Since then, the Young Set Theory Workshop has been established as an important annual event in set theory with many participants from Europe and overseas. This year, there were 90 participants (including the 4 tutorial speakers, the 5 postdoc speakers and 2 of the three members of the organizing committee).

Similarly to the previous editions, the goal of this workshop was to bring together postgraduates and postdocs in set theory in order to learn from senior researchers in the field, hear about the latest research, and discuss research issues in small focused groups. This was achieved through the format which was successful in the past, and which combines tutorials, postdoc talks, and discussion sessions. The participants had the opportunity to meet and exchange ideas in their area of research in a friendly cooperative environment.

Four senior set theorists (James Cummings, Sy David Friedman, Su Gao, and John Steel) gave four hours tutorials on new results in different areas of set theory (singular cardinal combinatorics - Cummings, descriptive set theory of uncountable cardinals - Friedman, Borel markers and their use in classification problems - Gao, an introduction to inner model theory - Steel). Each tutorial began with an introduction to the topic and then moved quickly towards recent results.

Five postdocs presented recent research in several different areas related to set theory, ranging from descriptive set theory and combinatorics (Motto Ros), combinatorial problems (Torres-Perez), the theory of large cardinals on the edge of the hierarchy (Cramer), generic absoluteness results for fragments of third order arithmetic (Wilson), and applications of set theory to operator algebra (Bice).

Description of the scientific content of and discussions at the event

Similar to the previous years, the format of the workshop consisted of tutorials, talks and discussions.

Tutorials

- James Cummings, PCF-theory and its interactions with large cardinals, forcing, and L-like combinatorial principles.

  The tutorial focused on applications of Shelah's PCF-theory outside cardinal arithmetic. After a general introduction, this consisted in constructions for Jonsson algebras, strong covering lemmas, and constructions for almost-free or non-free objects.

- Sy David Friedman, Descriptive Set Theory on κ^κ.

  Assuming GCH, most of the basic notions of classical descriptive set theory generalize easily from Baire space ω^ω to generalized Baire space κ^κ, for an uncountable regular cardinal κ, but many of the classical theorems do not. The tutorial focused on the regularity properties and the Borel reducibility of definable equivalence relations in this generalised setting.

- Su Gao, Borel markers in the study of countable Borel equivalence relations.

  The tutorial gave an introduction to the theory of Borel markers in the study of countable Borel equivalence relations. Borel markers are important tools used to attach structures to the classes of countable Borel equivalence relations. They play a prominent role in the study of hyper-finite and treeable equivalence relations, and have applications in other topics such as the computation of Borel chromatic numbers.

- John Steel, Iteration Trees.

  The tutorial covered the basic theory of iteration trees, and some of its applications. It started at a basic level, defining ultrapowers of

models of ZFC and their properties, and tried to keep the presentation accessible to anyone who has taken a graduate-level course in set theory; in particular no background in inner model theory was assumed.

Postdoc Talks

- Tristan Bice, Set Theory and Operator Algebras.
- Scott Cramer, Inverse limit reflection and the structure of $L(V_{\lambda+1})$.
- Luca Motto Ros, On the complexity of the embeddability relation between uncountable models.
- Victor Torres Perez, Rado's Conjecture and Ascent Paths of Square Sequences.
- Trevor Wilson, A dichotomy for $\Sigma^2_1(Hom^\infty)$-sets of reals, with applications to generic absoluteness.

Afternoon research discussions

This years we organized the discussion sessions as follows: They took place on monday, tuesday, and thursday afternoon and were shortly less than two hours long. The first 45 minutes of each discussion session was dedicated to the presentation of three posters (thursday two posters) that some of the participants had prepared (10 to 15 minutes allotted to each poster) for a total of eight posters. On monday, in the remaining hour of the discussion session, we organized different discussion groups on various topics ranging among all fields of set theory. These topics have been selected on the basis of the research statements that all participants had submitted: during the second hour on monday all particiapnts were invited to either present their research material in the following days or suggest a topic of discussion for the next discussion sessions. Out of this, eigth small groups were formed, and on tuesday and thursday we organized four distinct one hour long parallel sessions during which each of these small groups gathered and discussed their respective topic. The format of these specific parallel sessions was very different from one group to another. In some, two among the participants gave a presentation of their research in the form of a conference talk, in others the material was instead discussed in a seminal way. We cannot make a precise account on how the discussions went in each group since we were

able to attend only some of them. However we strongly believe that these structured discussion sessions encouraged many of the participants – and especially the young ones – to talk about their research interests and get to know those who share the same research interest. Apart from these organized discussion sessions, many other research discussions originated spontaneously among the participants all along the meeting.

Assessment of results and impact of the event on the future direction of the field

Considering the number of participants, the workshop was a success. The tendancy of increasing number of participants, observed throughout the previous workshops, was confirmed once more: there were 41 participants in Bonn in January 2008, 63 in Bellaterra (close to Barcelona) in April 2009, 70 in Raach (near Vienna) in February 2010, 76 in Königswinter (close to Bonn) in March 2011, 79 in Luminy (Marseille) in may 2012, 90 (including the 9 speakers and 2 of the organizers) this year.

Participants came from a wide variety of countries, including very distant ones. This confirms the interest in the workshop, which has now become a major event for young researchers in set theory worldwide. This year, we had people attending from Austria, Canada, Czech Republic, Finland, France, Germany, Hungary, Italy, Israel, Japan, Mexico, Netherlands, Poland, Portugal, Serbia, Spain, Switzerland, United Kingdom, United States, and many other countries.

The feedback we received was extremely positive, both from the regular participants and from the invited speakers. Participants have emphasized the importance of the workshop as a meeting place, where it is possible to discuss precise research questions with other students, but also with well-known specialists. Senior set theorists were also very enthusiastic about being offered the possibility of exposing the young generation to new lines of research.

As in the previous years, what seemed to work particularly well is the conference structure:

- Tutorials giving a general overview on and a quick introduction into certain subfields of contemporary set theory, providing a strong motivation to study the topics and emphasizing open questions in the area.
- Talks by postdocs highlighting some interesting recent developments in a more focused way.
- Discussion sessions which allowed students and researchers to interact in an less formal way.

The workshop has a beneficial impact on the set theory community as a forum for current research in set theory especially geared towards young researchers. If the activity during the workshop reflects the number of future interactions, then it is reasonable to expect a good number of future collaborations.

Annexes

Final program of the meeting

The detailed programme is available on the workshop website:
http://www2.dm.unito.it/paginepersonali/viale/YST2013/yst2013-program.html

	Monday	Tuesday	Wednesday	Thursday	Friday
09h30-10h20	Gao 1	Gao 3	Friedman 1	Steel 1	Steel 3
10h30-11h20	Gao 2	Gao 4	Friedman 2	Steel 2	Steel 4
11h20-11h40	Pause	Pause	Pause	Pause	Pause
11h40-12h30	Torrez-Perez	Bice	Wilson	Motto-Ros	Cramer
12h30-15h00	Lunch	Lunch	Lunch	Lunch	Lunch
15h00-16h45	Discussions	Discussions		Discussions	
17h00-17h50	Cummings 1	Cumming 3		Friedman 3	
18h00-18h50	Cummings 2	Cummings 4		Friedman 4	
19h30	Dinner	Dinner	Dinner	Dinner	Dinner

List of invited speakers

Tristan Bice, Scott Cramer, James Cummings, Sy David Friedman, Su Gao, Luca Motto Ros, John Steel, Victor Torres Perez, Trevor Wilson.

List of participants including speakers and convenors

Dominik Thomas Adolf, Alessandro Andretta, Giorgio Audrito, Amitayu Banerjee, Dana Bartosova, Omer Ben-Neria, Tristan Bice, Alexander Carstensen-Block, Hazel Brickhill, Andrew Brooke-Taylor, Raphael Carroy, Yong Cheng, David Chodounsky, Brent Martin Cody, Scott Cramer, James Cummings, Raffaella Cutolo, Jaime da Gama Gaspar, Raj Dahya, Vincenzo Dimonte, Stamatios Dimopoulos, Michal Doucha, Barnabas Farkas, Gabriel Zanetti Nunes Fernandes, Kevin Fournier, Sy David Friedman, Emanuele Frittaion,

Su Gao, Fiorella Guichardaz, Gabriele Gullà, Ajdin Halilovic, Daniel Hathaway, Matthew Hendtlass, Peter Holy, Daisuke Ikegami, Julia Ilin, Daniele Impieri, Tanmay Inamdar, Thomas Johnstone, Asaf Karagila, Burak Kaya, Michal Korch, Marios Koulakis, Angeliki Koutsoukou-Argyraki, Giorgio Laguzzi, Chris Lambie-Hanson, Lorenzo Lami, Chris Le Sueur, Alonso Lenin Celis Martínez, Paolo Lipparini, Philipp Moritz Luecke, Gregory McKay, Paul McKenney, Mayra Montalvo Ballesteros, Miguel Fernando Moreno Wandurraga, Luca Motto Ros, Hugo de Holanda Cunha Nobrega, Aleksandar Pavlović, Yann Pequignot, Claribet Pina, Edoardo Rivello, Cristobal Rodriguez Porras, Julian Johannes Schloeder, David Schrittesser, Assaf Shani, Xianghui Shi, Boris Sobot, Wojciech Stadnicki, Jan Stary, John Steel, Silvia Steila, Carsten Szardenings, Anda Ramona Tanasie, Sourav Tarafder, Fabio Tonti, Victor Torres Perez, Nam Trang, Konstantinos Tsaprounis, Lauri Tuomi, Apostolos Tzimoulis, Sandra Uhlenbrock, Giorgio Venturi, Matteo Viale, Zoltán Vidnyánszky, Alessandro Vignati, Trevor Wilson, Wolfgang Wohofsky, Liuzhen Wu, Rafael Zamora Calero, Yizheng Zhu.