



THE HEBREW UNIVERSITY OF JERUSALEM
ISRAEL INSTITUTE FOR ADVANCED STUDIES

In and around Combinatorics

The 18th Midrasha Mathematicae

January 18-30, 2015

All lectures will take place at the Israel Institute for Advanced Studies,
on the Edmond J. Safra, Givat Ram Campus

Organizers:

Noga Alon (Tel Aviv University)

Irit Dinur (Weizmann Institute of Science)

Gil Kalai (The Hebrew University of Jerusalem)

Nati Linial (The Hebrew University of Jerusalem)

Benny Sudakov (ETH Zurich)

Program

Sunday, 18 January

- 08:45 - 09:15 Registration
- 09:15 - 09:30 Greetings - Michal Linial (Director, IAS)
- 09:30 - 11:00 **Irit Dinur** (Weizmann Institute of Science)
Direct Products of Games and Graphs I
- 11:00 - 11:30 Coffee Break
- 11:30 - 13:00 **Peter Keevash** (University of Oxford)
The Existence of Designs I
- 13:00 - 13:15 Group Photograph
- 13:15 - 14:30 Lunch- Wise Cafeteria
- 14:30 - 16:00 **David Steurer** (Cornell University)
Sum of Squares Method I
- 16:00 - 16:30 Coffee Break
- 16:30 - 18:00 **Nati Linial** (The Hebrew University of Jerusalem)
High Dimensional Combinatorics: A
Combinatorial Perspective of Simplicial
Complexes
- 18:00 - 20:00 **Reception at the IAS**

Monday, 19 January

- 09:30 - 11:00 **David Steurer** (Cornell University)
Sum of Squares Method II
- 11:00 - 11:30 Coffee Break

- 11:30 - 13:00 **Peter Keevash** (University of Oxford)
The Existence of Designs II
- 13:00 - 14:30 Lunch- The French House on Givat Ram Campus
- 14:30 - 16:00 **Alexandru Nica** (University of Waterloo)
Combinatorial Aspects of Free Probability Theory
I
- 16:00 - 16:30 Coffee Break
- 16:30 - 18:30 Meet and Greet, getting to know each other and
poster session

Tuesday, 20 January

- 09:30 - 11:00 **Alexandru Nica** (University of Waterloo)
Combinatorial Aspects of Free Probability Theory
II
- 11:00 - 11:30 Coffee Break
- 11:30 - 12:30 **Ehud Friedgut** (Weizmann Institute of Science)
Analysis of Boolean Functions on Graph Products,
Dictatorships and Juntas I
- 12:30 - 13:45 Lunch-Belgium House
- 13:45 - 14:45 **Ehud Friedgut** (Weizmann Institute of Science)
Analysis of Boolean Functions on Graph Products,
Dictatorships and Juntas II
- 14:45 - 15:15 Coffee Break
- 15:15 - 16:45 **David Steurer** (Cornell University)
Sum of Squares Method III
- 16:45 - 18:45 Film Event: Film Collage on the subject of Melting
Pot vs Multiculture in Israeli Cinema by script
writer, Galit Roichman

18:45 - 19:45 Pizza and Beer

Wednesday, 21 January

09:30 - 11:00 **David Steurer** (Cornell University)
Sum of Squares Method IV

11:00 - 11:30 Coffee Break

11:30 - 13:00 **Peter Keevash** (University of Oxford)
The Existence of Designs III

13:00 - 14:00 Lunch-Wise Cafeteria

14:00 - 18:00 **Tour of the Old City of Jerusalem**

18:15 - 19:45 **School Dinner - for all participants**

Thursday, 22 January

09:30 - 11:00 **Alexandru Nica** (University of Waterloo)
Combinatorial Aspects of Free Probability Theory
III

11:00 - 11:30 Coffee Break

11:30 - 12:30 **Ron Peled** (Tel Aviv University)
Probabilistic Existence of Regular Combinatorial
Structures

12:30 - 14:30 Lunch-Belgium House

14:30 - 15:30 **Peter Keevash** (University of Oxford)
Math colloquium talk: Hypergraph Matchings

15:30 - 16:15 Coffee Break

16:15 - 17:45 **Alexander Postnikov** (MIT)
The Combinatorics of the Grassmanian I

Friday, 23 January

09:30 - 11:00 **Peter Keevash** (University of Oxford)
The Existence of Designs IV

11:00 - 11:30 Coffee Break

11:30 - 13:00 **Alexander Postnikov** (MIT)
Combinatorics of the Grassmannian II

13:00 - 13:30 Light Lunch- IAS

Saturday, 24 January

08:30 - 18:00 **Day-Long Excursion, optional**

Sunday, 25 January

09:30 - 11:00 **Alexandru Nica** (University of Waterloo)
Combinatorial Aspects of Free Probability Theory
IV

11:00 - 11:30 Coffee Break

11:30 - 13:00 **Irit Dinur** (Weizmann Institute of Science)
Direct Products of Games and Graphs II

13:00 - 14:30 Lunch-Wise Cafeteria

14:30 - 15:30 **Tali Kaufman** (Bar-Ilan University)
High Dimensional Expanders: What, Why and
How

15:30 - 16:00 Coffee Break

16:00 - 17:30 **Alexander Postnikov** (MIT)
The Combinatorics of the Grassmanian III

Monday, 26 January

- 09:30 - 11:00 **Wojciech Samotij** (Tel Aviv University)
The Kleitman - Winston Lemma: Counting
Independent Sets in Graphs
- 11:00 - 11:30 Coffee Break
- 11:30 - 13:00 **Joel Hass** (University of California, Davis)
Knots - Definitions and Descriptions
- 13:00 - 14:30 Lunch-Belgium House
- 14:30 - 15:30 **Tamar Ziegler** (The Hebrew University of
Jerusalem)
Narrow Progressions in Primes
- 15:30 - 16:00 Coffee Break
- 16:00 - 17:30
Open Problem Session

Tuesday, 27 January

- 09:30 - 11:00 **Joel Hass** (University of California, Davis)
Classical Knot Invariants
- 11:00 - 11:30 Coffee Break
- 11:30 - 12:45 **Irit Dinur** (Weizmann Institute of Science)
Direct products of Games and Graphs III
- 12:45 - 14:30 Lunch- The French House on Givat Ram Campus
- 14:30 - 16:00 **Alexander Postnikov** (MIT)
The Combinatorics of the Grassmanian IV
- 16:00 - 16:30 Coffee Break
- 16:30 - 18:30 **Free time; homework, discussion**

Wednesday, 28 January

- 09:30 - 11:00 **Wojciech Samotij** (Tel Aviv University)
The Hypergraph "Container" Theorems;
Szemerédi's Theorem in Random Sets of Integers
- 11:00 - 11:30 Coffee Break
- 11:30 - 12:30 **Chaim Even-Zohar** (The Hebrew University of
Jerusalem)
Invariants of Random Knots and Links
- 12:30 - 13:30 Lunch-Wise Cafeteria
- 13:30 - 15:00 **Ben-Zion Shilo** (Weizmann Institute of Science)
Life's Blueprint: The Science and Art of Embryo
Creation
- 15:00 - 17:00 Tour at the Israel Museum

Thursday, 29 January

- 09:30 - 11:00 **Wojciech Samotij** (Tel Aviv University)
Turan-Type Problems in $G(n,p)$ and the Structure
of a Typical H -free Graph II
- 11:00 - 11:30 Coffee Break
- 11:30 - 13:00 **Tahl Nowik** (Bar-Ilan University)
Finite type invariants of knots
- 13:00 - 14:30 Lunch-Belgium House
- 14:30 - 15:30 **Postnikov - Math colloquium**
- 17:15 - 20:15 **Farewell Dinner and Party**

Friday, 30 January

- 09:30 - 11:00 **Wojciech Samotij** (Tel Aviv University)
A Sketch of the Proof of the Hypergraph
“Container” Theorems
- 11:00 - 11:30 Coffee Break
- 11:30 - 13:00 **Joel Hass** (University of California, Davis)
Random Topics and Random Knots
- 13:00 - 13:30 Light Lunch- IAS