

IZHAR OPPENHEIM

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Department of Mathematics ◊ Ben Gurion University of the Negev

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EDUCATION

B.A. in Mathematics (*summa cum laude*) 1999-2002
Technion - Israel Institute of Technology, Israel.

M.A. in Mathematics (*summa cum laude*) 2004-2008
Tel-Aviv University, Israel.
Thesis Title: The Rohlin property for the pseudo-arc
Thesis Adviser: Prof. Eli Glasner

Ph.D. in Mathematics 2008-2012
Technion - Israel Institute of Technology, Israel.
Dissertation Title: Groups acting on simplicial complexes.
Dissertation Adviser: Prof. Uri Bader.

APPOINTMENTS

Senior Lecturer (equivalent to Assistant Professor) at Ben-Gurion University 12/2018-now, (*tenured since 2/2019*)

Lecturer (tenure track) at Ben-Gurion University 9/2015-12/2018

Zassenhaus Assistant Professor (Postdoctoral position) at Ohio State University 8/2012-8/2015

HONORS AND AWARDS

Undergraduate awards. Technion's president's list 1999-2002, *every semester*

M.A. Award. Tel-Aviv Faculty excellence award for M.A. research 2008

Haim Hanani prize, Technion 2010

Elisha Netanyahu prize, Technion. Highest prize of the Technion's math department for excellence in Ph.D. research (awarded once a year to only one Ph.D. graduate) 2012

RESEARCH GRANTS

Israel Science Foundation Individual Research Grant 293/18, Sole PI, Period of grant: 10/18-9/22, Annual amount: 245,000 NIS (67,250 \$), Total Amount: 980,000 NIS (269,000 \$)

GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

M.Sc. Students

Zohar Grinbaum-Reizis, expected graduation 6/2020

Postdoctoral Fellows

Bakul Sathaye, 10/2019-8/2020

TEACHING EXPERIENCE

Ohio State University

- First course in calculus at OSU (Math 1151) - 2 times
- Accelerated Calculus I for Honors Engineers at OSU (Math 1161.02) - 2 times
- Second course in calculus at OSU (Math 1172) - 3 times
- Introduction to analysis (Math 4547) - 2 times
- Pre-calculus course (Math 1150)

Ben-Gurion University - Service courses

- Calculus I for electrical engineers - 2 times
- calculus II for mechanical engineers
- Integral calculus and ordinary differential equations for electrical engineers
- Multivariable calculus for electrical engineers
- Fourier analysis for electrical engineers

Ben-Gurion University - Courses for math majors and/or graduate students

- Introduction to topology
- Basic concepts in modern analysis
- Fourier analysis
- Fundamentals of measure theory
- Kazhdan property (T) (reading course)
- Coarse geometry (reading course)
- Expansion in graphs and groups (new course - the teaching included development of all course materials)

SERVICE

Departmental Activities

Mathematics department graduate students adviser

11/2017-now

Public Activities

- Referee for: Journal of the European Mathematical Society, Annales de l'Institut Fourier, Journal of Combinatorial Theory A, RANDOM 2019 conference
- Thesis committee: Bharat Rangarajan (Tel-Aviv University, M.Sc. in Computer Science, 2018)

PUBLICATIONS

Journal Publications

1. *An intermediate quasi-isometric invariant between subexponential asymptotic dimension growth and Yu's Property A*. Internat. J. Algebra and Comput., (2014) 24 (6) : 909-922.
2. *Property A and the existence of a Markov process with a trivial Poisson boundary*. Bull. London Math. Soc. (2014) 46 (4): 836-846.
3. *Fixed point theorem for reflexive Banach spaces and uniformly convex non positively curved metric spaces*. Mathematische Zeitschrift 278 (2014), no. 3-4: 649-661.
4. *Vanishing of cohomology and property (T) for groups acting on weighted simplicial complexes*. Groups Geom. Dyn. 9 (2015), no. 1: 67-101.
5. *Property (T) for groups acting on simplicial complexes through taking an "average" of Laplacian eigenvalues*. Groups Geom. Dyn. 9 (2015), no. 4: 1131-1152.
6. *Averaged projections, angles between groups and strengthening of property (T)*. Mathematische Annalen, (2017) 367 (1-2) : 623-666.
7. *Vanishing of cohomology with coefficients in representations on Banach spaces of groups acting on Buildings*. Commentarii Mathematici Helvetici, (2017) 92 (2) : 389-428.
8. *Angle criteria for uniform convergence of averaged projections and cyclic or random products of projections*. Israel Journal of Mathematics, 223 (2018), no. 1, 343-362.
9. *Local spectral expansion approach to high dimensional expanders I: descent of spectral gaps*. Discrete and Computational Geometry, 59 (2018), no. 2, 293-330.
10. *Local spectral expansion approach to high dimensional expanders II: Mixing and Geometrical Overlapping*. Discrete and Computational Geometry, in press.
11. With Alexander Lubotzky. *Non p -norm approximated groups*. Journal d'Analyse Mathématique, in press.
12. With Tali Kaufman. *High Order Random Walks: Beyond Spectral Gap*. Combinatorica, in press.

Conference Publications

1. With Tali Kaufman. *Construction of new local spectral high dimensional expanders*. STOC 2018 : ACM Symposium on Theory of Computing.
2. With Tali Kaufman. *High Order Random Walk - Beyond Spectral Gap*. International Workshop on Randomization and Computation.

Submitted Papers

1. Bounding the high order edge expansion via high order radius, joint with Tali Kaufman.
2. High dimensional expanders and coset geometries, joint with Tali Kaufman.

Papers in preparation

1. Garland's p-adic curvature revisited - sharp cohomology vanishing results (working title), joint with Zohar Grinbaum-Reizis.
2. Vanishing of cohomology with L^p coefficients for random groups (working title), joint with Alexander Lubotzky and Ron Rosenthal.

INVITED TALKS

Conference and Workshop Talks

- "Spectral high dimensional expanders construction" (4 hours), Summer cluster on error-correcting codes and high dimensional expanders, Simons institute, Berkeley, July 2019.
- "Vanishing of cohomology for groups acting on buildings", Conference "Rigidity" part of the Simons Semester "Geometric and Analytic Group Theory" (held at the Banach center, Warsaw), June 2019.
- "Random walks on simplicial complexes", Beyond Randomized Rounding and the Probabilistic Method workshop, Simons institute, Berkeley, February 2019.
- "Construction of new high dimensional local spectral expanders", Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University, December 2017.
- "Garland method's" (2 talks), School on Geometric, Topological and Computational Aspects of High-Dimensional Combinatorics (held at Sde-Boker), October 2017.
- "Cohomologies with coefficients in Banach representations for groups acting on buildings", Workshop on High-dimensional Expanders at Les Diableretes, Switzerland (organized by the ETH), June 2016.
- "Between subexponential asymptotic dimension growth and Yu's Property A", 49th Spring Topology and Dynamics Conference (held at BGSU), May 2015.
- "High dimensional expanders from a 1-dimensional perspective", Borel Seminar on High dimensional expanders at Les Diableretes, Switzerland (organized by the ETH), March 2015.
- "Property (T) from a spectral gap of the 1-dimensional links", Topological Methods in Group Theory conference (held at OSU), June 2014.
- "Fixed point property for groups acting on simplicial complexes", Non positive curvature, isometric actions and dynamics of cocycles conference (held at Cajon del Maipo, Chile), May 2013.
- "Local criteria for Kazhdan property (T)", Israel Mathematical Union annual meeting, May 2012.
- "Criteria for Kazhdan property (T) - some variations on Zuk's criterion", Geometric group theory conference held by the center for Mathematical Sciences at the Technion, June 2011.
- "Triangle Buildings", CAT(0) spaces and Affine Buildings workshop (held by the Israel Science Foundation). February 2010.

Seminar Talks

- Department of Computer-Science Theory seminar. *June. 2018*
- Department of Computer-Science Theory seminar, Tel-Aviv University. *May. 2018*
- Mathematics and Computer-Science joint seminar, Bar-Ilan University. *July. 2017*
- IMPAN, Geometric Group Theory seminar. *April. 2016*
- Action Now wandering seminar at Tel-Aviv University. *Jan. 2016*

- Ben-Gurion University, Probability and Ergodic Theory Seminar. *Dec. 2015*
- Technion-ILL optimization and non linear analysis seminar. *Oct. 2015*
- Technion-ILL - Groups, Dynamics, and Related Topics Seminar. *Jun. 2014*
- OSU geometric group theory seminar. *Mar. 2013*
- Technion-ILL analysis seminar. *Dec. 2012*
- Université catholique de Louvain seminar. *Nov. 2011*
- Université de Genève seminar. *Nov. 2011*
- Brandeis Every-topic Seminar. *Oct. 2011*
- Brown Group Actions, Dynamics and Geometry Seminar. *Oct. 2011*
- Rutgers Topology/Geometry Seminar. *Oct. 2011*
- Yale Number Theory and Dynamics Seminar. *Oct. 2011*
- Indiana University Bloomington Topology-Geometry Seminar. *Sep. 2011*
- UIC Geometry, Topology and Dynamics Seminar. *Sep. 2011*
- Tel-Aviv Horowitz Seminar. *Oct. 2008*

Mini Courses

- “Special Day on Random Groups and Property (T)” (4 talks), Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University. February 2018.
- “Spectral high dimensional expanders: the Garland method” (3 talks), Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University. December 2017.

SHORT VISITS

Simons Institute, Berkeley, Summer cluster on error-correcting codes and high dimensional expanders *July-August 2019*

Hausdorff institute Bonn, Germany, special trimester devoted to the subject of Rigidity. *September 2009*