

CURRICULUM VITAE

• **Personal Details**

Name: Izhar Oppenheim

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• **Education**

B.A. - 1999-2002, Technion, Department of Mathematics

M.A. - 2004-2008, Tel-Aviv University, Department of Mathematics

Name of advisor: Prof. Eli Glasner

Title of thesis: The Rohlin property for the pseudo-arc

Ph.D. - 2008-2012, Technion, Department of Mathematics

Name of advisor: Prof. Uri Bader

Title of thesis: Groups acting on simplicial complexes

• **Employment History**

2015-now: Lecturer (tenure-track), Ben-Gurion University

2012-2015: Zassenhaus Assistant Professor (Post-Doc position), Ohio State University

• **Professional Activities**

(a) Positions in academic administration:

November 2017-now - Mathematics department Graduate students adviser

(b) Ad-hoc reviewer for journals:

Journal of the European Mathematical Society

• **Educational activities**

Courses taught:

Advanced math courses for math majors/math graduate students taught at Ben-Gurion University:

- Introduction to topology.
- Basic concepts in modern analysis.
- Fourier analysis.

Service courses at the undergraduate level taught at Ben-Gurion University:

- First course in calculus (Hedva 1) for electrical engineers - 2 times.
- Second course in calculus (Hedva 2) for mechanical engineers.
- Integral calculus and ordinary differential equations for electrical engineers.
- Multivariable calculus for electrical engineers.

Courses at the undergraduate level taught at 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).

- **Awards**

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

Haim Hanani prize, Technion, 2010

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

- **Scientific Publications**

1. I. Oppenheim^{PI}. 2014. 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. I. Oppenheim^{PI}. 2014. Property A and the existence of a Markov process with a trivial Poisson boundary. *Bull. London Math. Soc.* (2014) 46 (4): 836-846.
3. I. Oppenheim^{PI}. 2014. 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. I. Oppenheim^{PI}. 2015. Vanishing of cohomology and property (T) for groups acting on weighted simplicial complexes. *Groups Geom. Dyn.* 9 (2015), no. 1: 67-101.
5. I. Oppenheim^{PI}. 2015. 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. I. Oppenheim^{PI}. 2017. Averaged projections, angles between groups and strengthening of property (T). *Mathematische Annalen*, (2017) 367 (1-2) : 623-666.
7. I. Oppenheim^{PI}. 2017. Vanishing of cohomology with coefficients in representations on Banach spaces of groups acting on Buildings. *Commentarii Mathematici Helvetici*, (2017) 92 (2) : 389-428.

8. I. Oppenheim^{PI}. 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. I. Oppenheim^{PI}. Local spectral expansion approach to high dimensional expanders I: descent of spectral gaps. *Discrete and Computational Geometry*, 59 (2018), no. 2, 293–330.
10. T. Kaufman^{PI}, I. Oppenheim^{PI}. Construction of new local spectral high dimensional expanders. *STOC 2018 : ACM Symposium on Theory of Computing*.
11. T. Kaufman^{PI}, I. Oppenheim^{PI}. High Order Random Walk - Beyond Spectral Gap. *International Workshop on Randomization and Computation*. Accepted.

- **Short term visits**

- Institute of Mathematics of the Polish Academy of Sciences, Warsaw, Poland, April 2016.
- Hausdorff institute Bonn, Germany, special trimester devoted to the subject of Rigidity, September 2009.

- **Lectures and Presentations at Meetings and Invited Seminars**

- (a) Invited plenary lectures at conferences/meetings

- 2018, Title: “Construction of New Local Spectral High Dimensional Expanders”, The Annual ACM Symposium on Theory of Computing.
- 2017, Title: “Garland method’s” (2 Talk’s), School on Geometric, Topological and Computational Aspects of High-Dimensional Combinatorics (held at Sde-Boker).
- 2016, Title: “Cohomologies with coefficients in Banach representations for groups acting on buildings”, Workshop on High-dimensional Expanders, Switzerland (organized by ETH).
- 2013, Title: “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).

- (b) Presentations at informal international seminars and workshops

- 2018, Title: “Special Day on Random Groups and Property (T)” (4 Talk’s), Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University.
- 2017-2018, Title: “Spectral high dimensional expanders: the Garland method” (3 Talk’s), Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University.
- 2017, Title: “Construction of new high dimensional local spectral expanders”, Research Group on High Dimensional Combinatorics, Israel Institute for Advanced studies in the Hebrew University.

- 2015, Title: “Between subexponential asymptotic dimension growth and Yu’s Property A”, Spring Topology and Dynamics Conference (held at BGSU).
- 2014, Title: “Property (T) from a spectral gap of the 1-dimensional links”, Topological Methods in Group Theory conference (held at OSU).
- 2012, Title: “Local criteria for Kazhdan property (T)”, Israel Mathematical Union annual meeting.
- 2011, Title: “Criteria for Kazhdan property (T) - some variations on Zuk’s criterion”, Geometric group theory conference (held by Center for Mathematical Sciences at the Technion).
- 2010, Title: “Triangle Buildings”, CAT(0) spaces and Affine Buildings workshop (held by the Israel Science Foundation).

(c) Seminar presentations at universities and institutions

- 2018, Department of Computer-Science Theory seminar, Ben-Gurion University, Construction of High Dimensional Spectral Expanders.
- 2018, Department of Computer-Science Theory seminar, Tel-Aviv University, Construction of High Dimensional Spectral Expanders.
- 2018, Ben-Gurion Ashalim Program, Banach-Tarski Paradox - Popular Science Lecture.
- 2017, Department of Mathematics and Department of Computer-Science joint seminar, Bar-Ilan University, Spectral descent in simplicial complexes.
- 2016, Action now wandering seminar, held at Tel-Aviv university, A strengthened version of Banach property (T) and angles between projections.
- 2015, Department of Mathematics, Technion-ILL, A criterion for quick convergence of averaged projections in Banach spaces.
- 2015, Department of Mathematics, Ben-Gurion University, Strengthening of Banach property (T) and applications.
- 2015, Department of Mathematics, Ohio State University, High dimensional expanders from a 1-dimensional perspective.
- 2014, Department of Mathematics, Technion-ILL, Coarse embedding in a Hilbert space.
- 2013, Department of Mathematics, Ohio State University, Property A and the existence of a Markov process with a trivial Poisson boundary.
- 2012, Department of Mathematics, Technion-ILL, Fixed point property for groups acting on simplicial complexes.
- 2011, Department of Mathematics, Université catholique de Louvain, Criteria for Kazhdan property (T) – variations on Zuk’s criterion. Université catholique de Louvain.
- 2011, Department of Mathematics, Université de Genève, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.

- 2011, Department of Mathematics, Brandeis University, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2011, Department of Mathematics, Brown University, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2011, Department of Mathematics, Rutgers University, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2011, Department of Mathematics, Yale University, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2011, Department of Mathematics, Indiana University, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2011, Department of Mathematics, University of Illinois at Chicago, Criteria for Kazhdan property (T) – variations on Zuk’s criterion.
- 2008, Department of Mathematics, Tel-Aviv University, The Rohlin property of Fraïssé limits with application to the pseudo-arc.

• **Present Academic Activities**

Research in progress

- High dimensional expanders and applications to computer science, ongoing research partly joint with Prof. Tali Kaufman.
- Stability of groups with respect to p -norms, joint with Alex Lubotzky, expected completion date: 2018.
- Banach Kazhdan property (T) and spectral gaps in the Banach spaces, ongoing research.

Articles to be published

In preparation:

1. Construction of new local spectral high dimensional expanders (a version was already accepted to STOC 2018 : ACM Symposium on Theory of Computing - see above, but it will also be submitted to a mathematical journal).
2. Stability of groups with respect to p -norms.

Submitted:

- High Order Random Walks: Beyond Spectral Gap, joint with Tali Kaufman.
- Local spectral expansion approach to high dimensional expanders II: Mixing and Geometrical overlapping.

• **Research Grants**

- ISF 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 \$)

• **Additional Information**

I have an additional partial employment (i.e., I receive an additional salary) as a researcher under Tali Kaufman’s ERC grant titled: “CO-HOMCODES: Robust Codes from Higher Dimesional Expanders”.