

Ben Lund

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Education

Ph.D., Rutgers University, 2017. Adviser: Shubhangi Saraf.

M.S., University of Cincinnati, 2012. Adviser: George Purdy.

Experience

Senior researcher, IBS, DIMAG, Aug. 2020-present. PI: Sang-il Oum

NSF mathematical sciences postdoc, Princeton University, Sept. 2018-July 2020. Adviser: Zeev Dvir

RTG postdoc, University of Georgia, Sept. 2017- Sept. 2018. Adviser: Giorgis Petridis.

Renyi Institute, Sept.-Dec., 2015. Adviser: Imre Bárány.

IPAM, Algebraic Techniques for Computational and Combinatorial Geometry, Mar.-Jun., 2014.

Publications

Preprints

1. Paige Bright, Ben Lund, and Thang Pham. On a radial projection conjecture in F_q^d . *arXiv preprint arXiv:2311.05127*, 2023
2. Debsoumya Chakraborti, Kevin Hendrey, Ben Lund, and Casey Tompkins. Rainbow saturation for complete graphs. *arXiv preprint arXiv:2212.04640*, accepted to *SIAM Journal on Discrete Mathematics*, 2022
3. Krishnendu Bhowmick, Ben Lund, and Oliver Roche-Newton. Large convex sets in difference sets. *arXiv preprint arXiv:2309.07527*, 2023
4. Ben Lund, Thang Pham, and Le Anh Vinh. Orthogonal projections in the plane over prime order fields. *arXiv preprint arXiv:2311.05148*, 2023
5. Ben Lund, Thang Pham, and Vu Thi Huong Thu. Radial projection theorems in finite spaces. *arXiv preprint arXiv:2205.07431*, 2022

Journal articles

6. Debsoumya Chakraborti and Ben Lund. Almost spanning distance trees in subsets of finite vector spaces. *Bulletin of the London Mathematical Society*
7. Manik Dhar, Zeev Dvir, and Ben Lund. Furstenberg sets in finite fields: Explaining and improving the ellenberg–erman proof. *Discrete & Computational Geometry*, 71(2):327–357, 2024
8. József Balogh, Ce Chen, Kevin Hendrey, Ben Lund, Haoran Luo, Casey Tompkins, and Tuan Tran. Maximal 3-wise intersecting families. *Combinatorica*, 2023
9. Jeong Han Kim, Ben Lund, Thang Pham, and Semin Yoo. Threshold functions for incidence properties in finite vector spaces. *Finite Fields and Their Applications*, 87:1021–49, 2023
10. Manik Dhar, Zeev Dvir, and Ben Lund. Simple proofs for Furstenberg sets over finite fields. *Discrete Analysis*, (22), 2021
11. Matija Bucic, Pat Devlin, Mo Hendon, Dru Horne, and Ben Lund. Perfect matchings and derangements on graphs. *Journal of Graph Theory*, 97(2):340–354, 2021
12. Ben Lund. Two theorems on point-flat incidences. *Computational Geometry*, 92:101681, 2021
13. Ben Lund. A refined energy bound for distinct perpendicular bisectors. *Annals of Combinatorics*, pages 1–11, 2020
14. Ben Lund and Giorgis Petridis. Bisectors and pinned distances. *Discrete & Computational Geometry*, pages 1–18, 2019
15. Sara Fish, Ben Lund, and Adam Sheffer. A construction for difference sets with local properties. *European Journal of Combinatorics*, 79:237–243, 2019
16. Abdul Basit and Ben Lund. An improved sum-product bound for quaternions. *SIAM Journal on Discrete Mathematics*, 33(2):1044–1060, 2019
17. Imre Bárány, Julien Bureaux, and Ben Lund. Convex cones, integral zonotopes, limit shape. *Advances in Mathematics*, 331:143–169, 2018
18. Ben Lund, Thang Pham, and Le Anh Vinh. Distinct spreads in vector spaces over finite fields. *Discrete Applied Mathematics*, 239:154–158, 2018
19. Ben Lund, Shubhangi Saraf, and Charles Wolf. Finite field Kakeya and Nikodym sets in three dimensions. *SIAM Journal on Discrete Mathematics*, 32(4):2836–2849, 2018
20. Ben Lund. Essential dimension and the flats spanned by a point set. *Combinatorica*, 38(5):1149–1174, 2018
21. Ben Lund and Alexander Magazinov. The sign-sequence constant of the plane. *Acta Mathematica Hungarica*, 151(1):117–123, 2017
22. Javier Cilleruelo, Alex Iosevich, Ben Lund, Oliver Roche-Newton, and Misha Rudnev. Elementary methods for incidence problems in finite fields. *Acta Arithmetica*, 177:133–142, 2017
23. Ben Lund. An improved bound on $(A + A)/(A \cdot A)$. *Electronic Journal of Combinatorics*, 23(3), 2016
24. Brandon Hanson, Ben Lund, and Oliver Roche-Newton. On distinct perpendicular bisectors and pinned distances in finite fields. *Finite Fields and Their Applications*, 37:240–264, 2016

25. Ben Lund, Adam Sheffer, and Frank De Zeeuw. Bisector energy and few distinct distances. *Discrete & Computational Geometry*, 56(2):337–356, 2016
26. Ben Lund and Shubhangi Saraf. Incidence bounds for block designs. *SIAM Journal on Discrete Mathematics*, 30(4):1997–2010, 2016
27. Ben Lund, George B Purdy, and Justin W Smith. A pseudoline counterexample to the strong Dirac conjecture. *The Electronic Journal of Combinatorics*, 21(2), 2012
28. Ben Lund, George B Purdy, and Justin W Smith. A bichromatic incidence bound and an application. *Discrete & Computational Geometry*, 46(4):611, 2011

Conference abstracts

29. Ben Lund and Aditya Potukuchi. On the list recoverability of randomly punctured codes. In *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM 2020)*. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2020
30. Ben Lund, Adam Sheffer, and Frank de Zeeuw. Bisector Energy and Few Distinct Distances. In Lars Arge and János Pach, editors, *31st International Symposium on Computational Geometry (SoCG 2015)*, volume 34 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 537–552, Dagstuhl, Germany, 2015. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik
31. Ben Lund, George B Purdy, Justin W Smith, and Csaba D Tóth. Collinearities in kinetic point sets. *CCCG*, 2011

Teaching

- Instructor, Graph Theory, University of Georgia, Spring 2018.
- Instructor, Multivariable Calculus, University of Georgia, Fall 2017.
- Instructor, Discrete Structures 1, Rutgers, Summer 2016.
- TA for Bahman Kalantari, Rutgers, Spring 2015, 2016, 2017.

Awards and distinctions

- NSF Mathematical Sciences Postdoctoral Research Fellow, 2018-2020.
- Heidelberg Laureate Forum delegate, 2015.
- Rizvi family prize (awarded by computer science department of Rutgers), 2015.
- Top Coder Open 2nd place, Design track, 2007.

Talks and presentations

2023

- IBS discrete mathematics seminar, Dec, *Almost spanning distance trees in subsets of finite vector spaces*
- Chungbuk National University Mathematics Colloquium*, Sept, *Almost spanning distance trees in subsets of finite vector spaces*

The Korea-Taiwan-Vietnam Joint Meeting on Discrete Geometry and Geometric Measure Theory, Jul, Almost spanning distance trees in subsets of finite vector spaces

JMM Special session on distance problems in continuous, discrete, and finite field settings, Jan, Radial projections in finite vector spaces

2022

IBS discrete mathematics seminar, Mar, *Thresholds for incidence properties in finite vector spaces*

IBS discrete mathematics seminar, Jun, *Radial projections in finite vector spaces*

2021

IBS discrete mathematics seminar, Nov, *Maximal 3-wise intersecting families*

Young researchers in extremal and probabilistic combinatorics, *Maximal 3-wise intersecting families*

TCS Seminar, IIT Bombay, *Simple proofs for Furstenberg sets*

Moscow conference on combinatorics and applications, *Finite field Kakeya and Furstenberg sets*

IBS discrete mathematics seminar, May, *Limit shape of lattice zonotopes*

Build a network of young researchers in mathematics 1, *Kakeya and Furstenberg sets over finite fields*

IBS discrete mathematics seminar, Jan, *Perfect matchings and derangements on graphs*

2020

IBS discrete mathematics seminar, Jan

SUNY Korea CS Colloquium, Oct

IBS discrete mathematics seminar, Aug

2018

NYC Discrete geometry seminar, Fall

Princeton discrete math seminar, Fall

Courant institute geometry seminar, Spring

2017

Oberwolfach workshop on discrete geometry 1715

University of Georgia, Analysis and Combinatorics Seminar, Spring and Fall

University of Georgia, Number Theory Seminar, Spring and Fall

University of Georgia, Geometry Seminar, Fall

2016

University of Rochester combinatorics seminar

First Vietnam Workshop on Graph Theory and Discrete Geometry

California Institute of Technology combinatorics seminar

Kent State Informal Analysis Seminar (Poster presentation)

Courant Institute geometry seminar

2015

Renyi Institute extremal combinatorics seminar
Renyi Institute geometry seminar
31st International Symposium on Computational Geometry
Courant Institute geometry seminar

2014

Princeton discrete math seminar
IPAM Algebraic techniques for combinatorial and computational geometry culminating workshop
IPAM Algebraic techniques for combinatorial and computational geometry seminar series

Service

Organizer for 2024 IBS-DIMAG workshop on combinatorics and geometric measure theory
Organizer for DIMAG/ECOPRO lunchtime seminar series (Aug. 2023-present)
Referee for Advances in Combinatorics, Discrete & Computational Geometry, Combinatorica, Pacific Journal of Mathematics, The Electronic Journal of Combinatorics, Discrete Analysis, Discrete Mathematics, Foundations of Computer Science (FOCS), Symposium on Computational Geometry (SoCG), Finite fields and their applications, Computational geometry: Theory and applications, European Journal of Combinatorics

References

Shubhangi Saraf, Associate professor of mathematics and computer science, University of Toronto, shubhangi.saraf@utoronto.ca
Giorgis Petridis, Associate professor of mathematics, University of Georgia, petridis@uga.edu
Zeev Dvir, Associate professor of mathematics and computer science, zdvir@cs.princeton.edu